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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).

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LIST OF ABBREVIATIONS

Countries

AT	Austria	JP	Japan
AU	Australia	KR	South Korea
BE	Belgium	LI	Liechtenstein
BG	Bulgaria	LT	Lithuania
CA	Canada	LU	Luxembourg
CH	Switzerland	LV	Latvia
CN	China	MT	Malta
CY	Cyprus	NL	Netherlands
CZ	Czechia	NO	Norway
DE	Germany	PL	Poland
DK	Denmark	PT	Portugal
EE	Estonia	RO	Romania
EL	Greece	RU	Russia
ES	Spain	SE	Sweden
FI	Finland	SG	Singapore
FR	France	SI	Slovenia
HR	Croatia	SK	Slovakia
HU	Hungary	TR	Turkey
IE	Ireland	TW	Taiwan
IL	Israel	UK	United Kingdom
IN	India	US	United States
IT	Italy		

Others

AI	Artificial intelligence	ESMA	European Securities and Markets Authority
AFME	Association for Financial Markets in Europe	ESRB	European Systemic Risk Board
AML	Anti-money laundering	FSB	Financial Stability Board
BITs	Bilateral investment treaties	GDP	Gross domestic product
BLS	Bank lending survey	HICP	Harmonised index of consumer prices
CCPs	Central counterparties	IFRS	International Financial Reporting Standards
CEE	Central and Eastern Europe	IPO	Initial public offering
CMU	Capital Markets Union	IT	Information technology
CRD	Capital Requirements Directive	ICT	Information and communication technology
CRR	Capital Requirements Regulation	LHS (lhs)	Left-hand side
EBA	European Banking Authority	MFIs	Monetary and financial institutions
ECB	European Central Bank	MiFID II	Markets in Financial Instruments Directive
EDIS	European deposit insurance scheme	ML	Machine learning
EFAMA	European Fund and Asset Management Association	NFC	Non-financial corporation
EIB	European Investment Bank	NLP	Natural language processing
EIOPA	European Insurance and Occupational Pensions Authority	NPLs	Non-performing loans
EMIR	European Market Infrastructure Regulation	PSD	Payment Service Directive
EP	European Parliament	RHS (rhs)	Right-hand side
ESAs	European Supervisory Authorities		
ESM	European Stability Mechanism		

EXECUTIVE SUMMARY

The annual European Financial Stability and Integration Review (EFSIR) provides an analysis of recent economic and financial developments and their impact on financial stability and integration in the EU. The report first describes general developments in financial markets and the financial sector (Chapter 1). It then reviews the main recent policy developments in EU financial services (Chapter 2). This is followed by a more in-depth review of two particular topics that affect financial stability and integration: the macro-prudential toolbox for the EU banking sector (Chapter 3); and the opportunities and challenges related to artificial intelligence (AI) applications in the EU financial sector (Chapter 4). The analysis in Chapter 4 is relevant for the FinTech action plan to sustain the transition towards a competitive and technology-enabled innovative European financial sector.

Chapter 1 reports that global economic activity remained robust in 2018, although less synchronised than in 2017. Real GDP in the EU expanded by 1.9% in 2018 as a whole, but the pace of economic growth slipped in the second half of the year and early 2019, largely because of international trade tensions and other policy uncertainties, including concerns about public finances in some EU Member States. The European Central Bank's monetary policy stance remained accommodative, despite some steps towards normalization.

The main concerns for the EU's financial stability remained: (i) the risks of a sustained and disruptive repricing of major financial market asset classes; (ii) public and private debt sustainability; and (iii) the resurgence of EU banking sector stress amid persisting challenges in some banks. Financial integration did not improve during 2018, highlighting the need to make further progress with the Capital Markets Union (CMU) and to complete the Banking Union.

EU banks became more resilient thanks to stronger capital positions, stable liquidity positions and improved asset quality. Profitability remained a challenge. The size of the EU non-bank financial sector continued to increase. Access to finance eased somewhat in 2018, especially for small and medium-sized enterprises. Overall, the financing structure of the non-financial corporate sector in the EU has remained rather stable, with the proportion of loans, trade credits and other liabilities increasing slightly.

Chapter 2 provides an overview of the main financial-sector policy developments in 2018 and early 2019. In particular, it highlights the progress made in completing the Banking Union and deepening the CMU. The Commission has put forward measures to reduce risks substantially so that EU banks are even more resilient. A comprehensive banking package was adopted in April 2019. However, a substantial amount of work still needs to be done on the European Deposit Insurance Scheme and the common backstop before the Banking Union is completed. Progress has been made on important CMU initiatives as referenced in the recent progress report.¹ In order to support the transition towards a sustainable economy, the Commission adopted an action plan on financing sustainable growth in March 2018 and reached political agreement on the proposals related to sustainability-related disclosures and benchmarks in April 2019.

¹ Capital Markets Union: progress on building a single market for capital for a strong Economic and Monetary Union, COM (2019)136 of 15 March 2019.

Chapter 3 focuses on the cross-border dimension of macro-prudential policy in the EU banking sector. The EU macro-prudential framework is to a significant extent decentralised. Authorities in the Member States identify risks and may implement macro-prudential measures within the remit of their jurisdiction. Such a decentralised set-up is justified on the basis that systemic risks are often local or national in scope and interrelate with specific national situations. Yet, as financial markets become more integrated, implementing macro-prudential measures increasingly has to take into account the fact that the sources of a risk may lie abroad, and the cost of a measure may be partially borne abroad.

The EU macro-prudential framework comprises mechanisms to address the challenges arising from its decentralised implementation. In particular, the framework provides for a reciprocity framework and safeguards and coordination mechanisms. The European Systemic Risk Board (ESRB) plays an important role in both respects. It ensures that the objectives of financial integration at EU level and financial stability at the Member State level can be jointly pursued. Political agreement has recently been achieved on a revision of the governing rules of the ESRB.

Chapter 4 analyses the growing use of artificial intelligence (AI) applications in financial services. The latest wave of AI applications focuses on prediction as one of the critical components of decision-making. Better AI-based predictions could result in immediate cost savings, better risk management and improved productivity and profitability over the medium to long term. The use of AI in financial services may improve market efficiency, and regulatory and systemic risk surveillance. Its impacts on consumers of financial services, however, needs to be analysed further.

The free movement of data across the EU single market is indispensable for further development of AI applications, provided that it is in full compliance with the applicable data protection and security regulations. EU data regulation policy will promote effective competition and further financial integration, transforming the structure of the EU financial sector. Other policy implications relate to the interpretability, auditability and trustworthiness of AI-based outcomes and machine-learning methods, to non-discriminatory access to financial services, and to financial stability considerations. As for the latter, AI technologies and models may prove vulnerable to new forms of cybercrime and misconduct.

Chapter 1 MACROECONOMIC AND FINANCIAL SECTOR DEVELOPMENTS

1.1 Economic and financial market developments

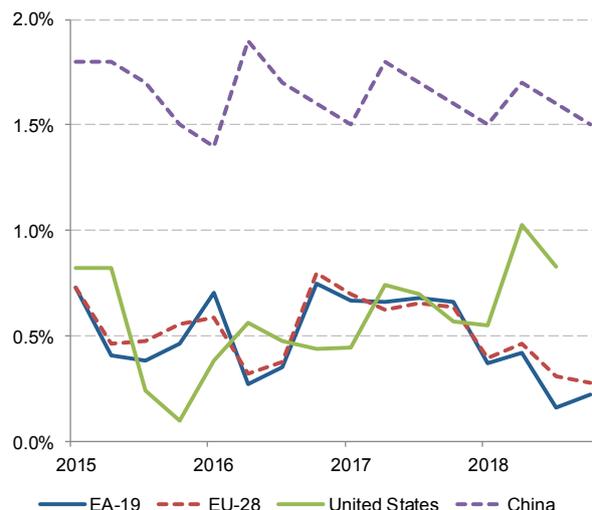
1.1.1 *Macroeconomic developments*

Global economic activity remained robust in 2018 but became more uneven compared to the strong and highly synchronised growth in 2017. Towards the end of the year, growth started to moderate. Waning policy support across advanced economies and tensions in international trade relations weighed on sentiment. While financial conditions remained accommodative in advanced economies, they tightened in some emerging economies.

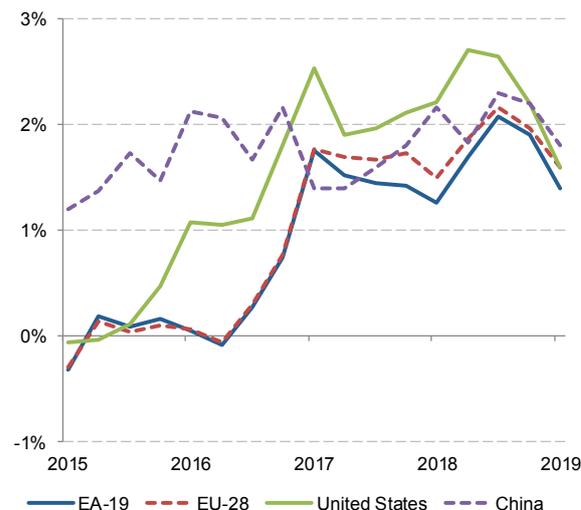
Real GDP in the EU expanded by 1.9% in 2018, albeit decelerating to a quarter-on-quarter pace of 0.3% in the second half of the year, largely because of uncertainty surrounding international trade policy and some other external factors (see Chart 1.1). This was further compounded by uncertainties surrounding fiscal policy in some Member States. Despite this softening in the second half of 2018, the fundamentals of the EU economy remained sound. Private consumption was supported by solid fundamentals, including higher levels of employment, rising wages, increased household disposable income and low interest rates. Residential investment was supported by favourable income prospects. Business investment continued to grow in the first half of the year, amid a positive earnings outlook, favourable financing conditions, and high rates of capacity utilisation in manufacturing. However, in the latter half of the year, continued trade tensions and policy uncertainty began to dent business sentiment and led to a moderation in investment. Inflation moved higher over the year, but slowed towards the end of 2018 (see Chart 1.2). The euro-area (EA) annual inflation rate (measured by the harmonised index of consumer prices (HICP)) was 1.3% in December 2017, moved up to 2.3% in October 2018, and was at 1.5% at the end of 2018. The EU annual inflation rate was around 1.6% in the beginning and end of 2018, after peaking at 2.3% in October, following a rally over late summer.

The aggregated general government budget balance of the EU declined to -0.6% in Q3-2018, mainly as the result of favourable cyclical conditions and lower interest payments. The aggregate fiscal stance for the EU, however, masks significant differences across countries. The aggregate public debt-to-GDP ratio inched down to 80.5% in Q3-2018, from 82.3% at the end of 2017.

Outside the EU, growth in the US economy was supported by a sizeable pro-cyclical fiscal stimulus, comprising lower taxes and increased expenditure, and a buoyant labour market. Growth was more divergent in emerging market economies (EMEs), with financial vulnerabilities materialising in countries such as Argentina and Turkey. Economic activity in China remained robust, supported by solid consumption and government policy support. Growth in China weakened towards the end of 2018 amid concerns about the adverse economic impact of US trade tariffs.

Chart 1.1: Real GDP growth

Source: Eurostat, OECD.
Note: Quarter-on-quarter growth data.

Chart 1.2: Consumer prices

Source: Eurostat, OECD.
Note: Year-on-year data.

Looking forward, economic growth is expected to soften to 1.3% (EA) and 1.5% (EU-27) in 2019, before rebounding to 1.6% (EA) and 1.8% (EU-27) in 2020.² Inflation is likely to drop to 1.4% (EA) and 1.6% (EU-27) in 2019, and pick up again to 1.5% (EA) and 1.7% (EU-27) in 2020. The EU's economic growth outlook is predicated on receding uncertainties, a gradual unwinding of temporary domestic factors currently holding back domestic growth and still favourable labour market conditions. However, risks remain substantial and mainly stem from potential adverse global policy decisions. Although trade tensions eased somewhat, they still contribute to uncertainty and pose a high risk for the global economy. In the US, the risk of an abrupt fiscal tightening appears to have increased, especially for 2020. The Chinese economy might slow down more sharply than anticipated, while many emerging markets are still vulnerable to sudden changes in global risk sentiment.

1.1.2 Monetary policy developments

The monetary policy stance in the euro area overall remained accommodative in 2018. The main refinancing rate remained at 0% throughout the year (see Chart 1.3), while the pace of monthly net asset purchases was reduced (from EUR 60 billion to 30 billion in January, and then to 15 billion from October), before being phased out by the end of 2018. Although net purchases have been stopped since the end of 2018, the ECB stated that the Eurosystem would continue to reinvest the principal payments from maturing securities purchased under the asset purchase programme for an extended period of time. The ECB has clearly stated that it expects the policy rates to remain at their current levels at least through the summer of 2019 to ensure the continued sustained convergence of inflation to levels that are below, but close to, 2% over the medium term.

Outside the euro area, some central banks in the EU have also maintained an accommodative monetary policy stance but opened the door to some degree of monetary policy normalisation

² See European Commission, *European Economic Forecast: Winter 2019 (Interim)*, Institutional Paper 096.

(e.g. Sweden and Hungary). Other central banks have continued to further normalise their monetary policies (e.g. in the UK, Czech Republic and Romania).

The US Federal Reserve continued to increase its target range for the federal funds rate in steps of 25 basis points, reaching 2.25-2.5% at the end of 2018. The normalisation of US monetary policy led to a further divergence between the policy stance in the EA and the US, magnified by the introduction of the enhanced ECB forward guidance on policy rates. While a tighter US monetary policy was also considered more appropriate for 2019 to offset the expected significant boost to output from the federal tax cuts and government spending increases, at the turn of 2019 markets started to price in a pause of rate hikes. In January, the Federal Reserve took a more dovish stance on the path of interest rates and showed further willingness to stop the unwinding of its balance sheet towards the end of the year.

Policy changes by the Peoples Bank of China (PBoC) — China's central bank — went against the global trend, with the central bank easing its monetary policy stance in mid-April to cushion the slowdown in domestic growth and the possible negative impacts of US tariffs. The PBoC lowered the rate on reserves that commercial banks were required to keep in order to maintain reasonable and sufficient liquidity to help supply credit to smaller businesses and optimise their liquidity structure.

1.1.3 *Financial market developments*

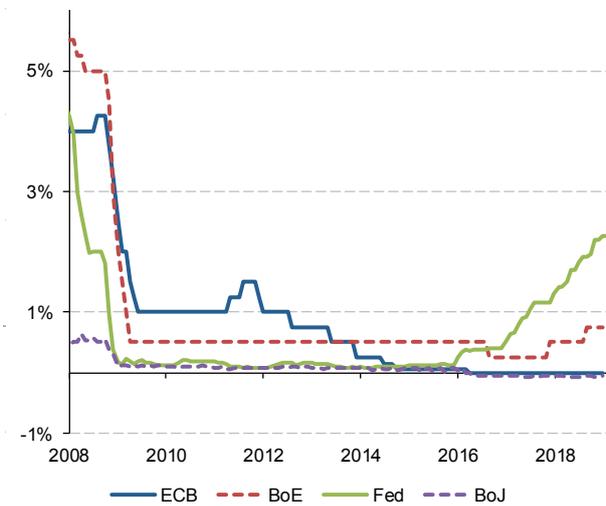
The macro-financial environment was increasingly subject to pressures in 2018. The investor-friendly climate of 2017 was first put to the test early in the year by concerns that US monetary policy could tighten faster than expected. This led to some market stress in February 2018, resulting in a downward adjustment of asset prices from high levels on both equity and credit markets. A gradual recovery of asset prices followed in the subsequent months, supported by robust global macroeconomic data and strong corporate earnings. Global investors nevertheless became more cautious in view of mounting concerns about the adverse effects of trade policy tensions, increased geopolitical frictions, upside pressure on oil prices and the expected further rise in US interest rates. Furthermore, concerns about debt sustainability increased, especially for emerging markets with significant domestic and external vulnerabilities.³ Chinese equity markets have been under continued downward pressure, both as a result of concerns over tightening credit conditions and the impact of higher US tariffs on imports from China. Meanwhile in Europe, the political developments in Italy and its expansionary fiscal stance led to a sharp widening of Italian sovereign bond spreads. Finally, in the last quarter of the year, an abrupt sell-off occurred on global equity and debt markets, with a broad reversal in risk appetite, as markets again became nervous when it appeared that US monetary policy might be tightened at a faster pace and that the first signs of a slowdown in US/global growth were emerging. The year ended with rather subdued financial-market sentiment.

The euro dropped out of its trading range of USD 1.21-1.25 in spring 2018 and oscillated at around USD 1.15 for the remainder of the year (see Chart 1.4). The euro weakened against the

³ In particular, Turkey and Argentina, with current account imbalances and US dollar debt liabilities, were subject to concerns about debt sustainability.

background of fiscal stimulus and an improved economic outlook in the US, and slower economic growth prospects in the EU. Expectations about the monetary policy stances in the US and the euro area also contributed, as did weakening economic momentum and rising political uncertainty in some Member States.

Chart 1.3: Central bank policy rates



Source: Bloomberg.

Chart 1.4: Foreign exchange rates



Source: Bloomberg.

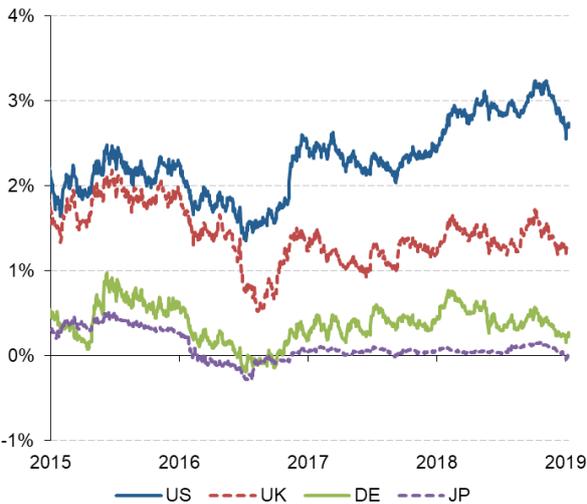
At the beginning of 2018, euro-area benchmark sovereign bond yields rose amid strong momentum in global and domestic economic growth and confidence that inflation was gradually converging towards the ECB’s target (see Chart 1.5). However, the 10-year German Bund yield declined over the remainder of the year from about 0.6% at the beginning to below 0.3% at the end of 2018, driven by the factors mentioned above and particularly weaker-than-expected EA economic data, renewed risk aversion, and still accommodative monetary policy. In the US, a 36-year downward trend in 10-year Treasury yields was reversed in mid-January, breaching the 3% threshold as investors started to price in rising inflation amid wage pressures and a more aggressive monetary policy stance. In Q4-2018, however, US 10-year benchmark yields dropped back below 3% on risk aversion and a softening macroeconomic outlook.

EA sovereign bond spreads narrowed until May, amid improvements in macroeconomic fundamentals and a broad-based expansion across Member States (see Chart 1.6). Italian bond spreads widened sharply in May on political and policy uncertainties and fluctuated between 210-320 basis points over the remainder of the year. Concerns about fiscal sustainability induced by the incoming government’s fiscal reform proposals and signs of a deteriorating growth outlook weighed on the already loosened budget balance. The initial contagion from Italian bonds to other EA sovereign bonds proved short-lived, and EA sovereign bond spreads fell back soon after.⁴ However, EA sovereign bond spreads widened over the second half of

⁴ The sovereign bonds of other Member States have become more resilient to increased fiscal risks in Italy as a result of significantly improved macroeconomic and fiscal resilience and the effect of the new euro-area policy architecture, which the ECB uses to give support through the implementation of sovereign bond quantitative easing (QE), long-term refinancing operations (LTRO — liquidity provision), and the potential use of outright monetary transactions (OMT).

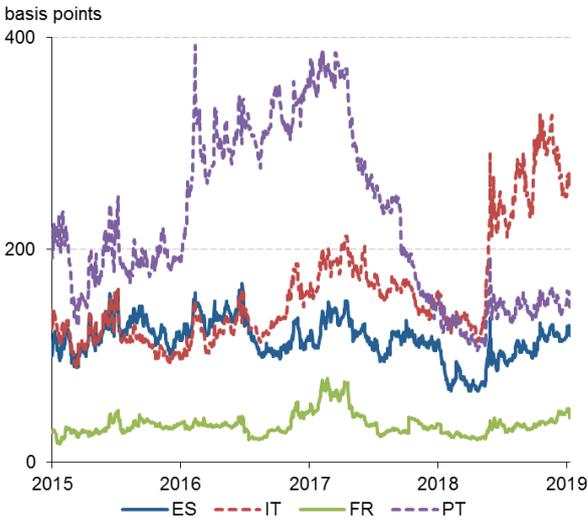
the year amid heightened EA-wide growth risks and rising fiscal and political uncertainties in some other Member States.

Chart 1.5: Benchmark 10-year government bonds



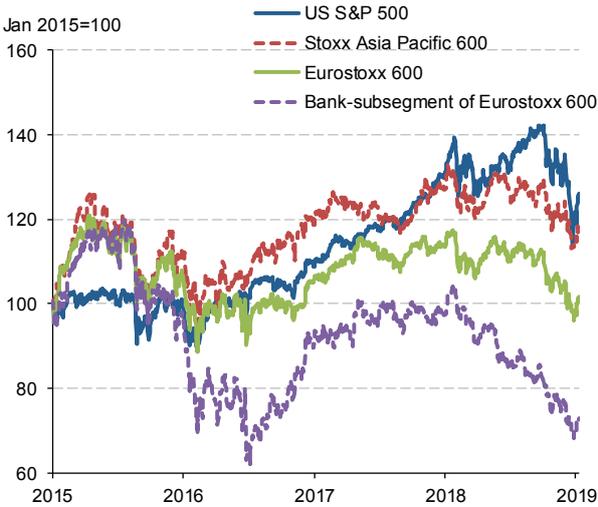
Source: Bloomberg.

Chart 1.6: Sovereign bond spreads to 10-year German bund



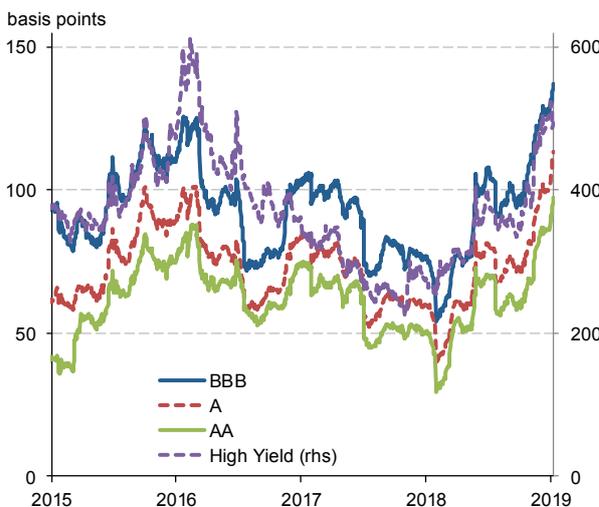
Source: Bloomberg. DG FISMA calculations.

Chart 1.7: Stock market performance



Source: Bloomberg.

Chart 1.8: Euro-area corporate bond spreads



Source: Bloomberg.
Note: Five-year maturity bond data.

Global stock markets had a strong start in January but experienced a sudden correction in early February 2018, after the release of data on higher-than-expected wage increases in the US (see Chart 1.7). The correction was partly technical in nature⁵ but was also due to elevated valuation in several market segments. After the February correction, global stock markets recovered, hesitantly, weighed down by concerns over the impact on corporate profits of heightened political and economic risks, particularly in relation to US trade policy. While US markets recovered further, supported by strong corporate earnings releases and record equity buybacks, European stock indices fell under the spell of trade-related concerns, and oscillated

⁵ Specifically, due to volatility, targeting strategies, de-risking, and market makers' hedging option positions.

without clear direction. While the depreciation of the euro against the US dollar (see Chart 1.4) could have supported EU stock markets, a number of economic factors, like weaker economic indicators, trade tensions, oil price increases, and turmoil in some EMEs weighed on their performance. In Q4-2018, global stock markets dropped steeply amid increasing geopolitical uncertainty and a deteriorating macroeconomic outlook. Over the year, EU bank asset valuations were significantly and adversely impacted, first amid concerns about banks' exposure to emerging economies, and to Turkey in particular, and subsequently by concerns about the direct and indirect impact of widening Italian sovereign bond yields on EA banks. As a result, European bank indices significantly underperformed both major global peers and other EU sectoral indices.

As for the market for private debt securities, bond spreads of euro-area non-financial corporations (NFCs) widened over the whole year, despite continued support from the Eurosystem's corporate sector purchase programme (see Chart 1.8). The spread on investment-grade NFC bonds almost doubled over the year, although from very depressed levels. Spreads of high-yield corporate bonds moved up in tandem. Corporate bond spreads ended 2018 at levels slightly above the ones observed in early 2016, prior to the start of the corporate sector purchase programme.

1.1.4 *Financial stability risks*

Three main sources of risk to EU financial stability were evident in 2018: (i) a possibly sustained and disruptive repricing of major financial market asset classes; (ii) renewed concerns about public and private debt sustainability, and (iii) the possible resurgence of EU banking sector stress amid persisting challenges in banks.

The risk of a sustained and significant repricing of major financial market asset classes continues to weigh on the financial system.⁶ Despite some correction in asset prices in the course of 2018, valuations remained generally stretched, in particular in the US. In the bond markets, investors' expectations appear to reflect the idea that the orderly unwinding and end of unconventional monetary policy measures in major regions of the world will lift risk-free interest rates in a gradual way. This view seems to be based on the presumption that growth prospects will hold firm. Several factors like negative inflation or adverse political/policy developments could lead to sudden and sharp increases in term premiums and significantly higher yields. Against the background of high global debt and the unwinding of monetary stimulus measures, interest rate increases would raise the debt service costs for governments and could set in motion adverse self-reinforcing dynamics. While the average fiscal deficit in the EU and in most Member States continue to decline, this reduction is increasingly on account of cyclical conditions and lower interest rates, and the contribution of structural consolidation measures is, on average, waning. This makes the fiscal outlook and thus the market sentiment towards many EU sovereign issuers more sensitive to growth and interest rate development. Positively, the maturity structure of sovereign debt has improved recently. The higher duration of sovereign debt implies a slower pass-through of interest rate changes on government interest costs and thus increases the resilience of public budgets.

⁶ For a discussion, see European Financial Stability and Integration Report (EFSIR), SWD(2018) 165 final of 3 May 2018.

Debt sustainability concerns in the non-financial corporate sector, albeit still low, rose during 2018 and reflect the vulnerabilities that have been building up over the past years, in particular in the higher risk segment. The aggregate level of non-financial corporate debt stood at 82% of GDP at the end of 2018, i.e. high by historical standards. Moreover, average creditworthiness declined in 2018: the total amount of BBB-rated corporate debt and non-investment grade debt has risen steadily. At the same time, investors' safeguards have deteriorated, for instance because of the increasing use of 'covenant-lite' loan conditions.⁷ This may imply that, in an economic downturn, recovery rates on loans (and associated collateralised loan obligations) could be unexpectedly low. On a more positive note, firms have been able to borrow at longer maturities, which reduces the risk of refinancing, and firms' debt servicing capabilities are underpinned by rising corporate profitability and record-low corporate interest payment burdens.

Box 1: Leveraged loans

A number of market observers have recently focused on the increasing risks and rapid growth of the leveraged loan market. Depending on the definition of leveraged loans, estimates of the global market size vary within the range of EUR 1.3 to 2.2 trillion. Leveraged loans are granted to non-financial companies that have high levels of debt, or whose credit ratings are below investment-grade. Currently, the market is concentrated in the US and fuelled by securitisations. In the current low-interest-rate environment, the growth in the leveraged loan market has been driven by investors searching for yield and increasingly willing to forgo legal covenants that oblige borrowers to report and maintain certain financial ratios like loan-to-earnings ratios. 'Covenant-lite' leveraged loans with much less stringent requirements have increasingly become the industry norm globally. As a result, lenders miss early warning signs when a borrower faces financial troubles and are thus likely to face higher losses if the borrower defaults. In addition, recent leveraged loan underwriting seems to be riskier, as evidenced by higher leverage ratios and lower credit ratings. The dynamics and riskiness of the global leveraged loan market lead some observers to draw certain comparisons with the development of the 2007 US subprime mortgage crisis. For instance, the market size of US subprime mortgages in 2007 was USD 1.1 trillion (13% of US mortgages), while the size of the global leveraged loan market in 2018 is estimated at USD 2.2 trillion (9% of corporate credit in advanced economies). As regards securitisation, the US subprime mortgage market reached USD 1 trillion in 2007, while securities related to leveraged lending account for USD 0.8 trillion in 2018.

While current estimates suggest that direct exposures of EU banks may be limited, true exposures remain uncertain. In addition, non-bank financial institutions seem to hold most of the leveraged loans in Europe. It remains unclear how this sector might be affected by potential widespread defaults in the leveraged loan market, and how distress might feed back into the EU banking sector. More data and analysis are required for assessing, in full, potential risks to financial stability. Regulators and supervisors in the EU and internationally have taken steps to address this gap in information.

On the other hand, concerns are growing about the impact of the turn of the credit cycle. If such a turn is associated with higher debt financing costs, which should be expected, the servicing and roll-over of debt will be complicated and might result in a rise in the number of

⁷ 'Covenant-lite' loans are loans issued with fewer restrictions on the borrower and fewer protections for the lender compared to traditional loans. They are more flexible with regard, for instance, to the borrower's collateral, level of income and the loan's payment terms. See Box 1 for more on this.

global corporate defaults. Moreover, despite lengthened maturities, a record amount of corporate bonds will mature over the next few years. This might raise the refinancing risk, in particular for lower-rated credits, and will make refinancing more expensive in case of a sudden increase in yields. Again on a more positive note, aggregate cash balances are strong and NFCs may rely on these buffers to substitute for loans and debt securities. However, highly levered firms tend to have lower cash holdings, making them more exposed to a tightening in financing conditions. Of particular concern are the vulnerabilities building up in the leveraged loan market, especially in the US where the market has expanded very strongly over the last few years (see Box 1).

Domestic banking sectors in highly indebted Member States may face further challenges as doubts about the quality and sustainability of public finances spill over to the banking sector. While the banking sector's resilience to very adverse shocks, as reflected in the recent stress test of the European Banking Authority (EBA), has strengthened further, structural challenges stemming from elevated non-performing loans (NPLs) concentrated in some banks and Member States, high cost-to-income ratios, and excess capacity, among other factors, remain substantial.

Besides these three major risks to financial stability, some other risks merit careful monitoring.

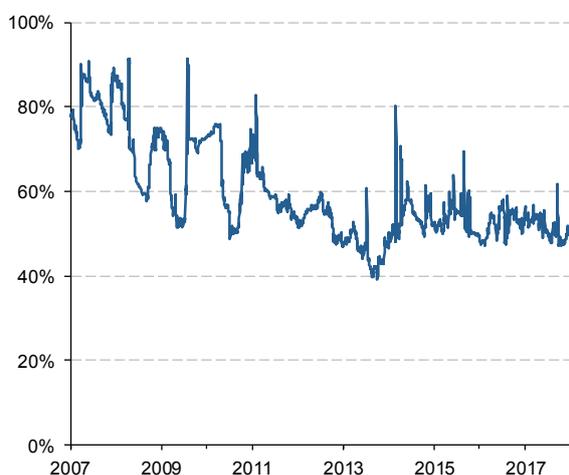
- Risks stemming from non-bank credit intermediation are rising. In a search for yield, investment funds have been gradually increasing the duration and credit risk of their exposures, making them more exposed to interest and credit risk. Their interconnectedness with the banking industry and sharp growth in size has made them an important potential channel for propagating systemic stress.
- Prices in residential real estate market prices have further increased, fuelled by low interest rates and the economic expansion. Risks of a price correction are building up in some Member States, due to high household debt, overvalued markets and loosening mortgage-lending conditions. In the commercial real estate (CRE) market of some Member States, prices are increasingly misaligned with historical prices, making these markets vulnerable to adverse economic shocks such as a rise in interest rates. Moreover, CRE funding sources have evolved over the past few years (including investment funds), opening up new forms of interconnectedness with, and transmission channels to, financial markets.
- Cyber-attacks remain a major risk factor. Despite massive investments in cyber-security, the financial industry remains particularly exposed to cyber risks. Cyber-attacks have increased and become more sophisticated. They are often compromising networks of trust, and have in some cases even the potential to threaten global financial stability.
- Financial conditions in a broad group of EMEs are tightening. Some countries with significant trade and financial linkages to the EU, like Turkey and Argentina, have faced severe market stress over 2018. In case of a snap-back in yields or further tightening of financial conditions, EMEs — even those with more stable fundamentals — may face headwinds, in particular against the background of increased corporate and sovereign debt levels. The European bank sector's exposure to these EMEs is

sizeable, but not to the extent of threatening the integrity of the system at large. Several individual European banks, however, are significantly exposed to EMEs.

Box 2: Banking-sector interconnectedness in the euro area

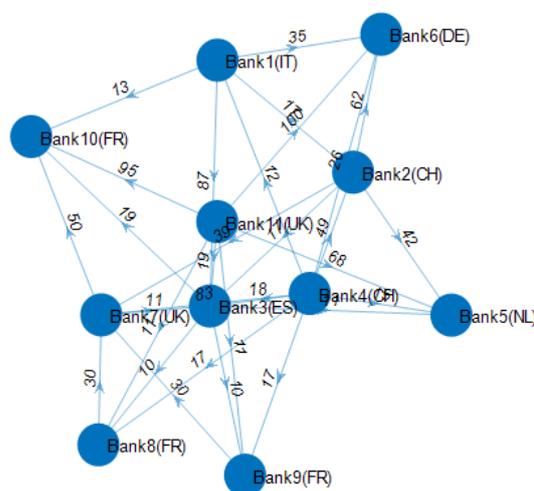
This box examines the interconnectedness within the euro-area banking sector, based on an analysis of how the volatility of banks’ equity valuations is reciprocally connected and how it spreads and concentrates. Greater interconnection implies that shocks that affect the banking system are able to spread more rapidly and extensively through the system. The analysis presents a way of measuring the contagious effect of investor fear, considering that consecutive price falls increase risk aversion and consecutive run-ups bolster exuberance somewhat. It captures thus the consequences of direct financial interconnections between entities and the effects of similar exposures to risk, as perceived by the market. Volatility interconnection is also interesting from the point of view of real time systemic risk monitoring since return dispersions tend to sway and move together in times of crisis, while returns co-move more frequently both in times of crisis and booms.

Chart B2.1: Total system interconnectedness



Source: Bloomberg. DG FISMA calculations.

Chart B2.1: Net total directional connectedness



Source: Bloomberg. DG FISMA calculations.

The calculations capture potential indirect channels of contagion through market prices by using the methodology developed by Diebold and Yilmaz (2014) with daily volatility measures obtained from bank stock indices.⁸ It relates the volatility of one bank’s return to impacts from another expressed as a percentage, with 100% indicating the maximum transmission. The analysis focuses on banks and thus interconnectedness does not take into account non-bank intermediaries.

The first graph illustrates the obtained measure of total interconnectedness based on equity volatility between institutions on the 2018 Financial Stability Board (FSB) list of European global systemically important banks (G-SIBs). The highest levels of interconnection were attained just before the global financial crisis and then mitigated due to banking reforms. Recent spikes were visible for 2014 and 2016, and their timing corresponds largely to monetary policy measures that reduced interconnectedness.

The network graph provides a measure of the role of the various nodes in the network. The sense of the arrow reflects the direction of the impact from one bank to the other, and their measure gives an indication of the net total directional connectedness. That is, the graph gives insight into

⁸ Volatility is calculated using the GJR procedure of Glosten, Jagannathan, and Runkle (1993).

the impact that each bank has on the others in relative terms. Hence, Bank 6 has the highest level of interconnectedness (100%) with Bank 11, followed by Bank 11 with Bank 10. In other words, if Bank 6 experiences a shock, Bank 11 would be subject to the largest volatility impact.

The analysis shows the importance of cross-border linkages which result in connections between banks' equity valuations. The analysis illustrates, for instance, that UK institutions are interconnected to all other Member States. It also appears that Spanish banks are more interconnected to UK, French and Italian banks, which can be explained by their mutual credit exposures, although non-EU country diversification is relatively high for the first; German banks seem to be more tightly related to UK, Swiss and French ones, with the highest transmission of volatility in this case; French banks have closer co-movements with UK, Spanish and Swiss financial entities. Italian banks are more closely interlinked to German, French and UK banks and Dutch to Swiss, UK and Spanish financial institutions.

Several of the risks mentioned above are intertwined and would mutually reinforce each other if they were to materialise simultaneously, therefore increasing the cumulative impact on financial stability (see Box 2). For instance, a sustained and significant repricing of major financial market asset classes would directly affect financial institutions (net trading income; rise in funding cost), investment funds, and retail investors. Sudden and large-scale redemptions by investors of money market funds and other investment funds may in turn lead to the sale of bank debt securities and an increase in the cost of short and longer-term debt funding of the banking sector. A sharp increase in debt-servicing costs would undermine corporate creditworthiness, which consequently would affect the quality of bank assets and may call for higher provisioning and capital when external sources of capital become scarcer. A correction in house prices would negatively affect economic growth, stress real estate investors like certain investment funds, and possibly force banks to increase their provisions for NPLs.

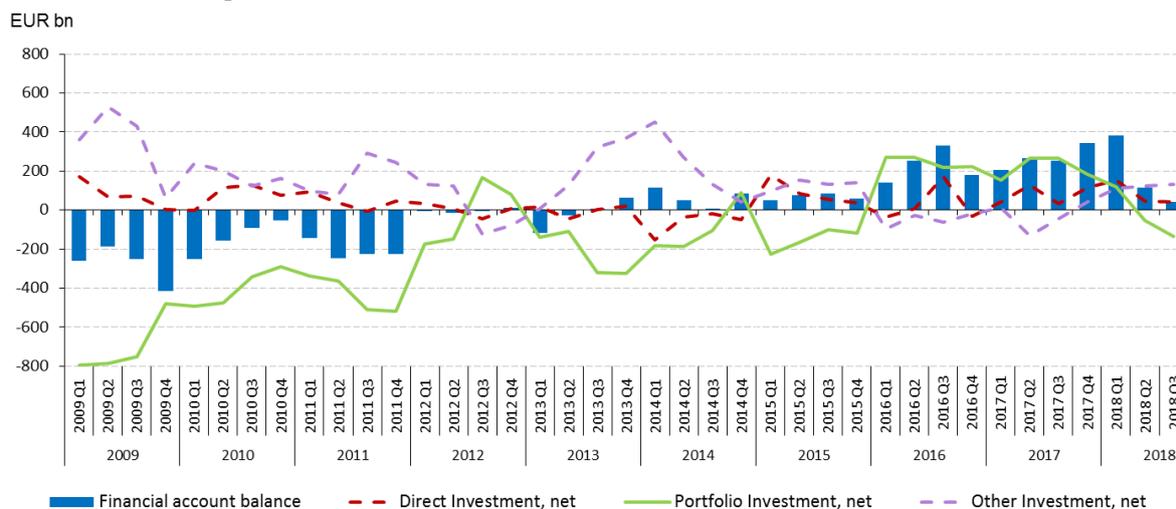
1.1.5 *International capital flow developments*

This section provides a short overview of developments in EU and international capital flows. Free movement of capital is essential to the functioning of the single market and the further development of well-integrated capital markets. A more detailed discussion of capital flows is available in the separate Commission staff working document on 'The Movement of Capital and Freedom of Payments'.⁹

The EU financial account balance (measuring net capital flows) for the year ending in Q3-2018 decreased compared to the same period in 2017, but remained positive (see Chart 1.9). The increase in net foreign assets was almost entirely due to higher foreign direct investment (FDI) of EU investors in non-EU countries, while the net outflows in other investments (mostly bank loans and deposits) almost entirely offset the net inflows in portfolio investments. Regarding gross flows, both inflows and outflows were lower, indicating a more subdued cross-border activity with the portfolio investments of EU investors in financial instruments of non-EU countries recording the highest decline.

⁹ SWD(2019) 94 final of 27 February 2019 on the movement of capital and the freedom of payments.

Chart 1.9: EU net capital flows with non-EU countries

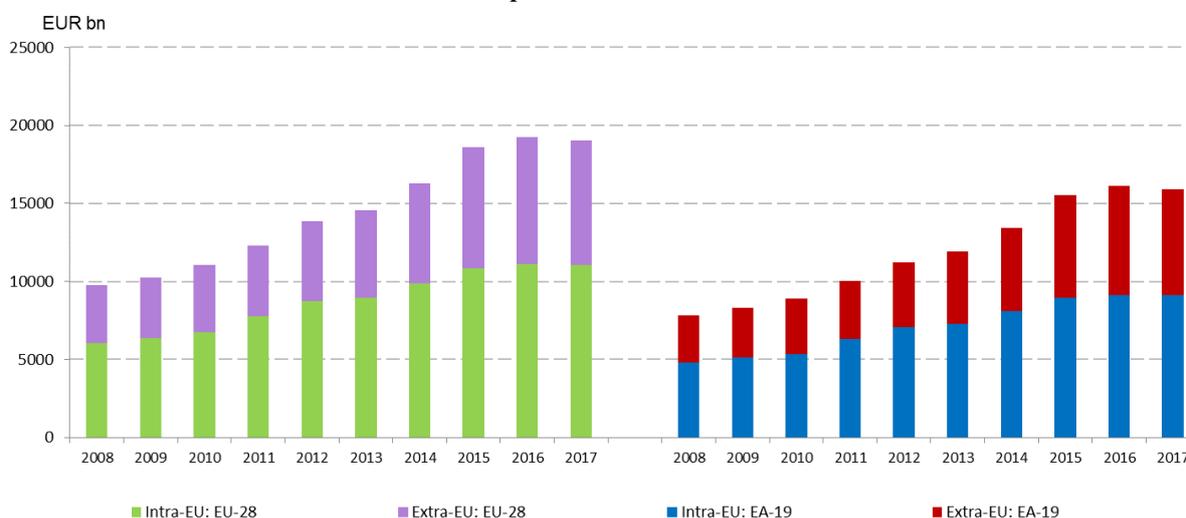


Source: Eurostat BoP statistics.

Note: Excluding bilateral intra-EU flows. Positive figures indicate outflows (an increase in net foreign assets), negative figures indicate inflows (an increase in the net incurrence of liabilities). Cumulated four-quarters data.

Chart 1.10 shows the dynamics of the total FDI positions for the EU (and the EA). Against the background of a global slowdown of cross-border investment in 2017-2018, the stocks of EU and euro-area FDI plateaued in the reporting period after almost a decade of sustained increases in the post-crisis period. The share of intra-EU FDI in the total stock of cross-border investment remained above 50% for both the EU as well as the EA, with higher levels (more than 85%) for instance in the central and eastern European countries.¹⁰

Chart 1.10: Intra- and extra-EU and EA FDI positions



Source: Eurostat BoP statistics. DG FISMA calculations.

1.1.6 Financial integration developments

¹⁰ For a detailed assessment, see SWD(2019) 108 final of 13 March 2019 on foreign direct investment in the EU.

This section reviews recent developments in financial integration, drawing in particular from the ECB’s financial integration indicators for the euro area. The aggregate post-crisis reintegration trend in the euro area did not continue during 2018. The price-based composite integration indicator (see Chart 1.11), which is constructed from selected indicators of price dispersion in different financial market segments, showed a marked decline in the second quarter of 2018, coinciding with the sharp widening of Italian bond spreads in May and the related financial market movements discussed in Section 1.1.2. The latest data available for September 2018 shows renewed reintegration later in the year. The quantity-based indicator also showed a decline in integration based on the volume of cross-border holdings.

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



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

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



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

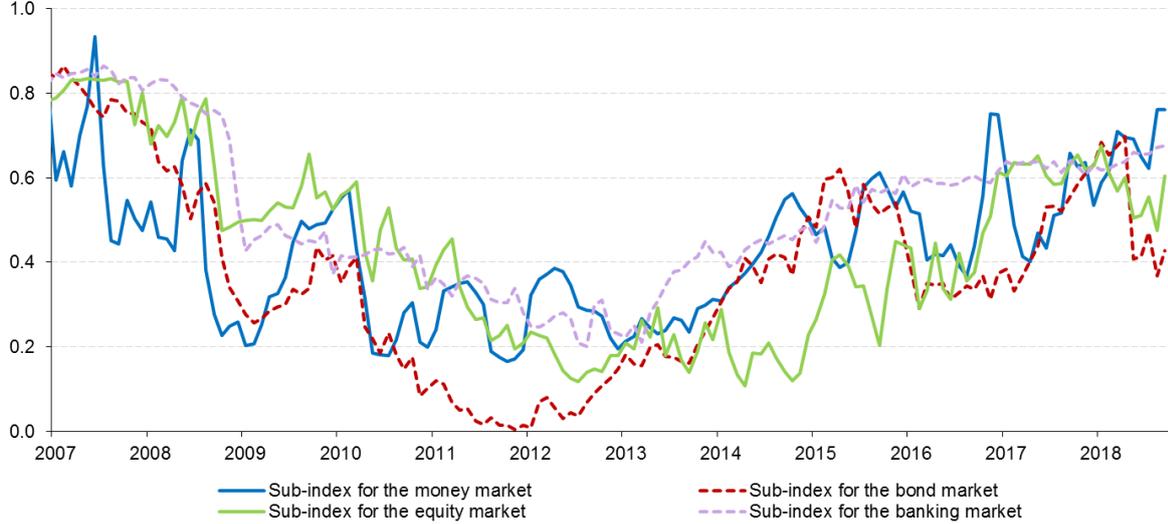
Recent macroeconomic and financial market trends affected integration, but to different degrees in the different financial market segments. When looking at the price-based indicators for the four market segments captured by the ECB data, it appears that the euro-area money market remained the most integrated, based on the latest available data for 2018 (see Chart 1.13). By contrast, as reflected in the sharp decline in the integration indicator for bond markets, the second half of 2018 was characterised by a continuous worsening in terms of yield dispersion, reflecting the widening of bond spreads and a negative market response to the political and fiscal uncertainties, as already discussed.

Chart 1.14 shows the dispersion of the 10-year euro-area sovereign bond yields. After an episode of relative convergence in the second half of 2017, dispersion started to increase again, in particular after Q2-2018. As discussed in Section 1.1 already, this divergence mostly reflects increased fiscal and political uncertainties in some euro-area Member States.

Recent developments in equity markets reveal a mixed picture. While there has been a decline in the price dispersion among euro-area stock market indices (see Chart 1.16), suggesting increasing integration, by end 2018, investment funds as one of the principal institutional investors in equity markets somewhat reduced their holdings of equity instruments issued by residents of other euro-area Member States (see Chart 1.17). Box 3 presents a separate

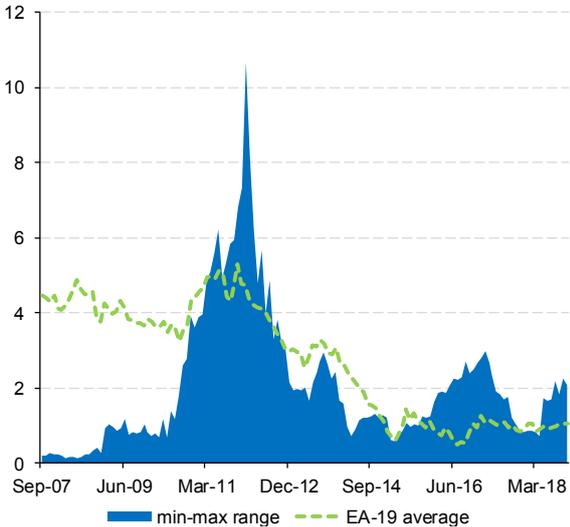
analysis on the geographic breakdown of portfolio investment holdings in the EU.

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



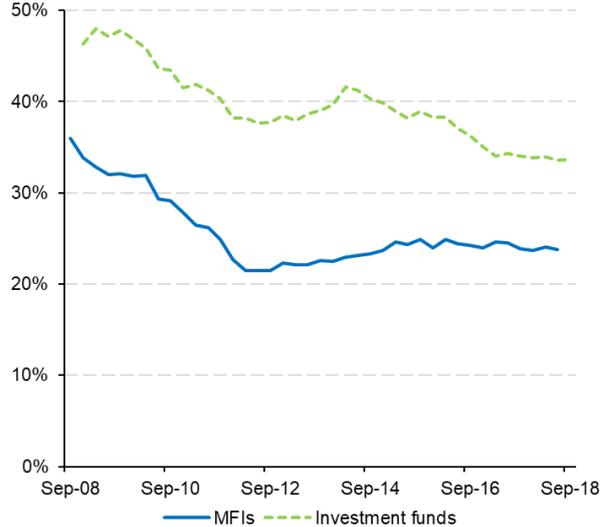
Source: ECB financial integration indicators.
 Note: A value of one corresponds to the highest degree of integration. Monthly data.

Chart 1.14: Dispersion of euro-area 10-year sovereign bond yields (price-based indicator)



Source: ECB financial integration indicators.
 Note: Higher levels of dispersion indicate a lower degree of integration and vice versa. Monthly data. Percentages.

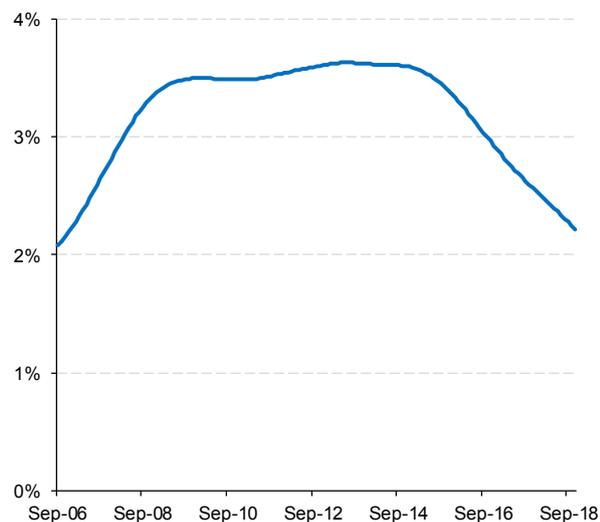
Chart 1.15: Share of intra-euro area holdings of debt securities issued by corporates and sovereigns, by type of institutional investor (quantity-based indicator)



Source: ECB financial integration indicators.
 Note: Higher shares of cross-border holdings indicate a higher degree of integration and vice versa. Quarterly data.

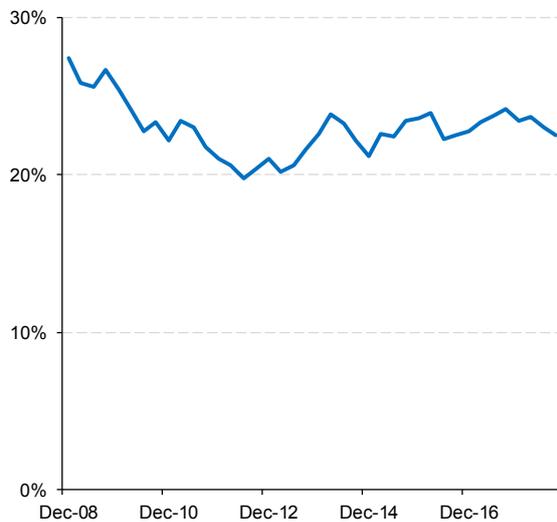
Overall, the economic and financial developments described above were not favourable to European financial integration. The data shows a halt and even some decline in integration in 2018, suggesting that not all the economic benefits that might be expected from more integrated financial markets are yet fully materialising. Hence, it remains important to make further progress with the Capital Markets Union and to complete the Banking Union.

Chart 1.16: Dispersion of euro-area stock market indices (price-based indicator)



Source: ECB financial integration indicators.
Note: Higher levels of dispersion indicate a lower degree of integration and vice versa. Monthly data.

Chart 1.17: Share of intra-euro area holdings of equity securities by investment funds in the euro area (quantity-based indicator)



Source: ECB financial integration indicators.
Note: Higher shares of cross-border holdings indicate a higher degree of integration and vice versa. Quarterly data.

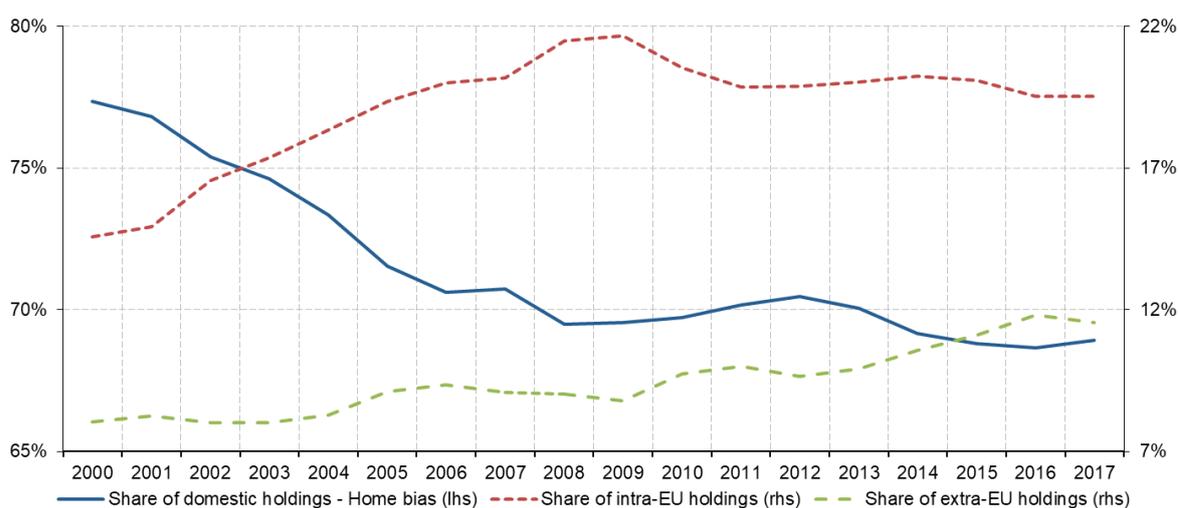
Box 3: Home bias in portfolio investment

Although there is no uniform definition of the concept of ‘home bias’, usually it refers to a preference to invest in assets of the home country rather than in foreign assets. This box estimates the home bias based on the share of investments in domestic equities and bonds in total EU portfolio investment holdings.

By construction, a reduction in the home bias indicates a rise in financial integration, as domestic investors tend to hold a higher proportion of foreign assets from other EU countries or from non-EU countries. The home bias indicators also estimate the degree of geographical diversification in portfolio investment holdings of equities and bonds, and thus their contribution to risk sharing.

Chart B3.1 reports yearly data for the home bias in total EU (equity and debt) portfolio holdings from 2000 to 2017. In 2017, the share of domestic holdings (i.e. the home bias) was about 68% of total holdings, which is lower than in the post-crisis years, but stabilising (and indeed slightly higher than in 2016) rather than further continuing the downward trend in the pre-crisis period. While the decline in the home bias before the crisis can be attributed to an increasing share of intra-EU portfolio investment, in recent years there has been mostly an increase in the share of portfolio investment in extra-EU countries.

Chart B3.1: Home bias in equity and debt portfolios



Source: JRC-ECFIN FinFlows database, BIS debt securities, EUROSTAT national accounts. JRC computations following Schoenmaker and Bosch (2008).

1.2 Developments in the banking and non-bank financial sectors

Since January 2018, financial institutions have been exposed to several macroeconomic trends, political events and policy changes (see Section 1.1). The performance of EU financial institutions was supported by the growing European economy and the limited contagion across the EU from policy uncertainty in Italy. The low interest rate environment eased access to funding but weighed on profitability. More globally, geopolitical risks and trade protectionism intensified, adding to the operational risks of EU financial institutions. The rising political and policy uncertainty, together with the stress in selected emerging market economies, negatively impacted performance.

Against the mix of these developments, the performance of EU bank and non-bank institutions was overall positive, as demonstrated by strong bank lending and systematic

improvements in asset quality and capital ratios. EU banks' profitability stabilised but continued to lag behind their global peers. The budget controversy in Italy affected Italian banks and the domestic financial market, but spillovers to other Member States have so far remained limited.

Outside the banking sector, the size of the EU non-bank financial sector continued to increase both in absolute terms and relative to the size of the total financial sector. In the insurance sector, the low-yield period continued to weigh on profitability, and the development of the sector continued to differ across European countries. In the fund sector, assets of investment funds expanded against the background of rising asset valuations, continuing their long-term growth. By contrast, the total assets of money market funds and pension funds decreased slightly. The assets of EU investment funds remained concentrated in a few EU countries. In view also of the increasing size of the sector and risk-taking by non-banks, continued efforts are needed to review and where necessary strengthen the regulatory and supervisory framework for the non-bank financial sector.

1.2.1 Banks

EU banks have become more resilient since 2018, as illustrated by stronger capital positions and stable liquidity positions. The quality of bank assets has improved further but profitability challenges remain.

Solvency and liquidity

Supported by economic growth, EU banks maintained strong capital positions in 2018. The common equity tier 1 or CET1 ratio on a transitional¹¹ basis was at 14.7% at the end of 2018, as compared to 14.9% at the end of 2017 (see Chart 1.18).¹²

Over the last year, CET1 has decreased by 0.2 percentage points while the fully loaded CET1 ratio decreased to 14.4% at the end of 2018 from 14.6% at the end of 2017. Capital positions remained diversified across the EU, with Estonian, Luxembourgish, Latvian, Croatian and Irish banks registering the highest (averaged) capital ratios by country, whereas Spanish, Italian, Portuguese, Hungarian and Austrian banks lagged slightly below the EU average (see Chart 1.19).

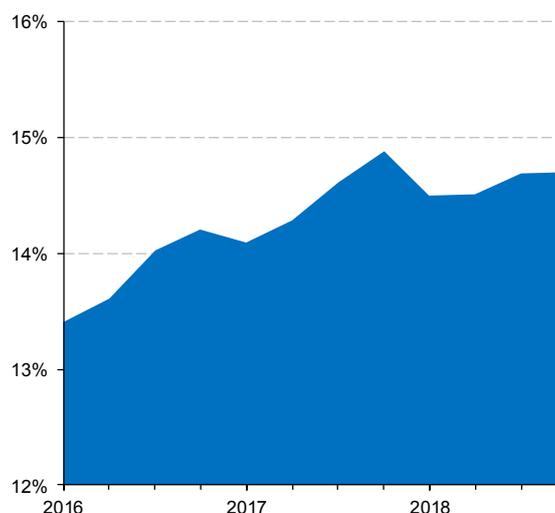
The multi-year trend of improving capital ratios came to a halt, in particular in Member States more affected by the euro-area sovereign debt crisis where capital ratios had already been lower.

¹¹ Basel III introduced a number of more stringent bank prudential measures with mandatory effect from 2019. Basel III ratios calculated on a transitional basis account for the expected phase-in of provisions whereas 'fully loaded' ratios assume a full implementation of regulatory requirements that are currently subject to transitional arrangements, meaning that they are more stringent.

¹² Prudential figures used for this section derives from the 2018 Q4 EBA *Risk Dashboard* and represent European and national weighted averages of indicators measured for 190 European banks (including 36 subsidiaries).

In some cases, the drop in capital levels reflected the impact of IFRS 9 first-time adoption with the negative impact mainly stemming from increased NPL provisions and from changes to rules about the reclassification of assets. In addition, several banks, notably in Italy, experienced declines due to valuation losses on their sovereign bond holdings. Looking ahead, banks' capital positions remain sensitive to worsening sovereign risk perceptions due to concerns of a possible aggravation of debt sustainability.

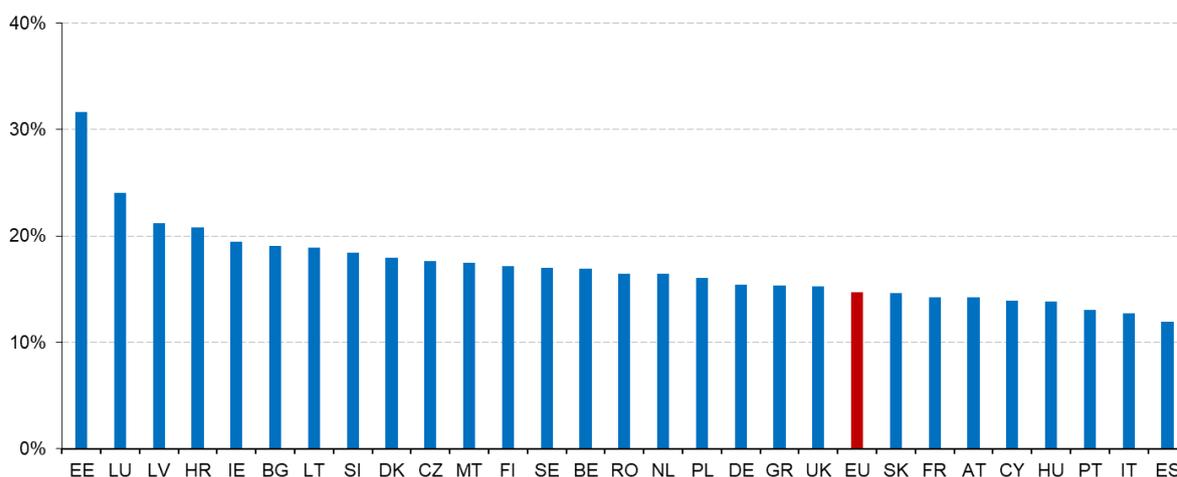
Chart 1.18: EU aggregate CET1 ratio



Source: EBA.

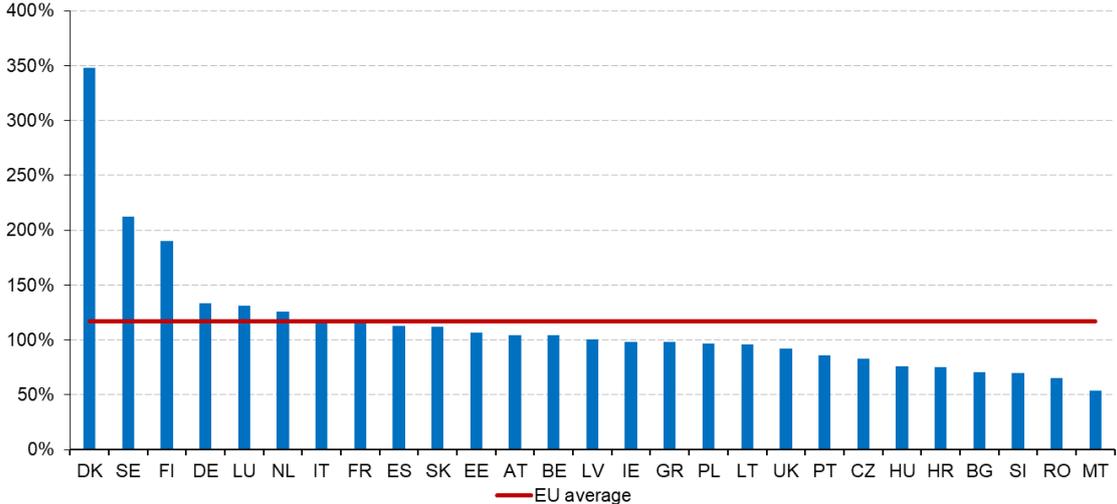
Regarding EU banks' liquidity positions (see also the separate discussion below on funding structure), the loan-to-deposit ratio remained broadly stable at the end of 2018 at 117.08% due to equal growth rates of loans and deposits. The dispersion across EU Member States persisted, with the banking sectors of Denmark, Finland and Sweden reporting loan-to-deposit ratios well above the EU average, while Malta, Romania and Bulgaria posted substantially lower ratios. The low levels of loans in relation to deposits in eastern European banking sectors provide good prospects for bank expansion going forward

Chart 1.19: CET1 ratio in EU Member States



Source: EBA.
Note: Q4-2018 data.

Chart 1.20: Loan-to-deposit ratios in EU Member States



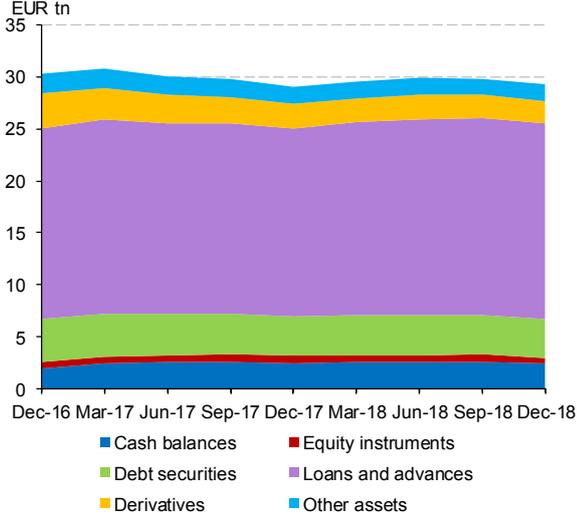
Source: EBA.
 Note: Q4-2018 data. Data for CY are not available.

Asset composition and asset quality

In line with balance sheet developments for EU banks, bank-lending flows to households and non-financial corporations remained robust.

Loan growth continued to be supported by low or declining bank lending rates across the euro area and most EU Member States and by strong demand for bank loans. In the euro area, bank lending to non-financial corporations (NFCs) grew by 3.7% in February 2019 and mortgage loans to households grew by 3.5%. However, credit growth remained unequal across Member States, as strong credit expansion in Germany, France and Portugal contrasted with weaker developments in Italy and Spain.

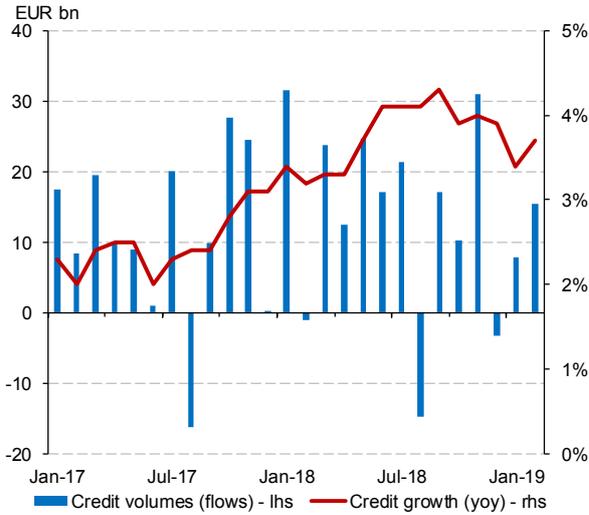
Chart 1.21: Asset composition of EU banks



Source: EBA. DG FISMA calculations.
 Note: Q4-2018 data.

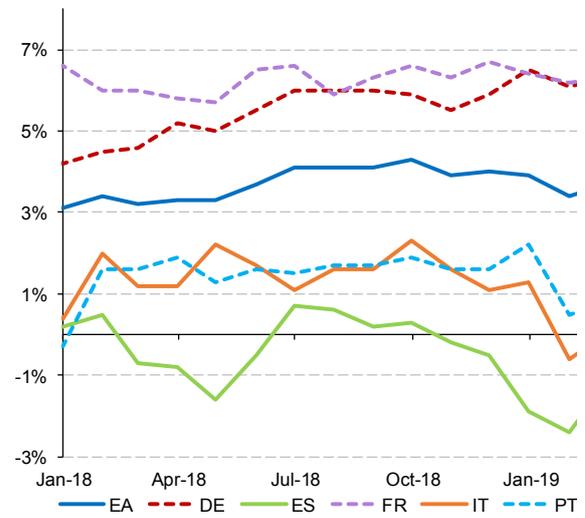
The results of the ECB’s latest bank lending survey are consistent with a steady recovery of bank lending volumes in the euro area. Banks reported a further easing of credit standards for all loan categories, in parallel with a rising demand for loans, and expected these trends to continue. The increasing competitive pressure and lower risk perception are the main drivers of the credit standards easing. Terms and conditions on new loans continued to ease across all loan categories. Outside the euro area, equivalent national bank lending surveys demonstrated that credit standards remained on easing trends while the demand for credit continued to grow.

Chart 1.22: Bank credit to NFCs (adjusted) in the euro area



Source: ECB.

Chart 1.23: Growth of credit to NFCs (adjusted)



Source: ECB.

Meanwhile, EU banks are vulnerable due to their exposures to EMEs, which amounted in Q2-2018 to EUR 1.5 trillion or 7% of total assets of euro-area significant institutions.¹³ Although small at aggregate level, euro-area banks' EME exposures are concentrated in a few countries and banking institutions. By country, more than 95% of the exposure is concentrated in the five largest euro-area economies (i.e. Spain, France, the Netherlands, Germany and Italy). At bank level, more than 90% of the exposure is concentrated in the 10 euro-area systemically important institutions. The risks faced by euro-area banks in relation to EME vulnerabilities stem mainly from USD-denominated loans. In particular, loans granted by euro-area banks to EME households and firms in non-domestic currencies might become non-performing as borrowers might not be hedged against the strengthening of the currency in which their credit contract is denominated. More difficult to quantify are the effects through indirect channels, such as higher volatility in financial markets and adverse global confidence effects which could arise from more widespread risk aversion vis-à-vis emerging markets. While the effect of distress in EMEs so far has been limited for EU banks, the impact could become broader should the distress spread to other EMEs. The fact that some of the banks perform their activity via subsidiaries in local currencies mitigates some of the risks related to direct EME exposures.

Adding to these risks, the heightened volatility in government bond markets (notably in Italy) further weighed on bank asset prices and recalled the vulnerabilities linked to the sovereign-bank nexus.¹⁴ Bank exposures to the domestic sovereign remain elevated in the euro area. Illustrating this trend, the correlation between financial and sovereign credit default swap (CDS) spreads strengthened in Q2-2018, driven, among others, by Italian sovereign bond

¹³ For more details, see ECB (2018), *Financial Stability Review*, November 2018.

¹⁴ Banks with sizeable holdings of sovereign bonds face the risk of capital erosion via valuation effects in the event of sudden increases in sovereign risk premiums.

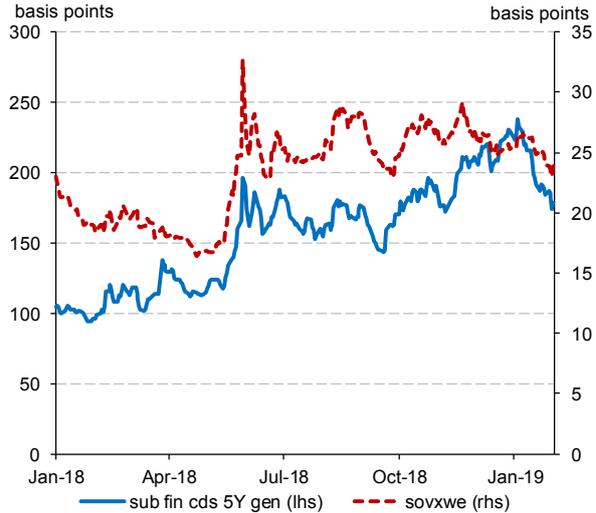
market developments. More recently, the pressures have eased, as reflected by decreasing measures of risk in both the sovereign and financial sectors.

The relatively benign cyclical conditions supported banks’ credit quality, and banks continued to reduce their credit risk. In Q3-2018 (latest available data), the ratio of non-performing loans (NPLs) to total loans remained on a downward trend and amounted to 3.95% for the euro area as a whole, its lowest level since the NPL definition was harmonised across European countries. The equivalent figure for the EU was 3.3% as of Q3-2018, down from 4.4% in Q3-2017. Since Q4-2014, the total NPL stock of significant institutions has declined by around one third and the NPL ratio has nearly halved.

The provisioning coverage of NPLs also improved. Coverage increased across most NPL categories, including both shorter and longer-dated NPLs, and for most EU Member States. The NPL reduction process accelerated or continued apace in the majority of high-NPL countries. The NPL disposal activity reported by banking sectors with weaker asset quality (as measured by the NPL ratio) was larger than in other banking sectors, suggesting convergence across EU banks.

The declining trend of the NPL ratio across the EU was due to the growth of total loans and the continuous reduction of NPL volumes via cures, liquidations, or write-offs. A more active secondary market for impaired assets contributed significantly to NPL disposals. Despite the increased transactions, liquidity in the secondary markets for NPLs continues to be dampened by several types of market failures. NPL transaction platforms could help in overcoming market failures by offering the prospect of greater transparency in NPL markets, fostering wider investor participation and addressing coordination issues. Going forward, the new set of prudential measures, as agreed by the European Parliament (EP) and the Council, should help to prevent the accumulation of non-performing loans.¹⁵ These prudential measures were part of a broader package of measures to address non-performing loans in the EU banking sector, which followed up on the 2017 action plan for reducing non-performing loans.¹⁶ In addition to prudential rules, the package contained proposals to further develop secondary markets for NPLs and to enable an accelerated out-of-

Chart 1.24: Co-movement of financial and sovereign credit default swap



Source: Bloomberg.
 Note: ‘sub fin cds 5Y gen’ refers to the Markit iTraxx Europe Subordinated Financial index, which comprises 30 equally weighted credit default swaps on investment-grade European entities; ‘sovxwe’ refers to Markit iTraxx SovX western Europe index, which comprises 14 names from the EA plus DK, NO, SE, and the UK, which trade on western European documentation.

¹⁵ http://europa.eu/rapid/press-release_IP-18-6786_en.htm

¹⁶ <https://www.consilium.europa.eu/en/press/press-releases/2017/07/11/banking-action-plan-non-performing-loans/>

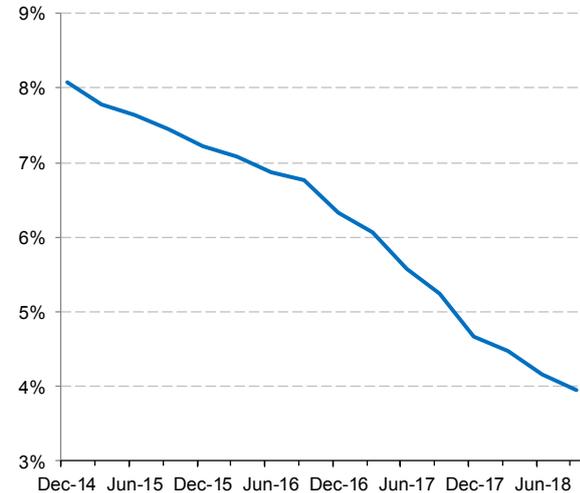
court enforcement of loans secured by collateral, as well as a technical blueprint for how to set up national asset management companies.

Liabilities

While remaining broadly favourable for most banks, the costs of bank debt market funding increased in the second half of 2018 amid renewed sovereign debt concerns, most notably in Italy. The average spreads on Italian bank debt increased across all instruments, but its magnitude differed across seniorities and maturities, with high-yielding debt registering the most pronounced increases. Spillovers to other instruments and to bank funding costs in other Member States were limited.

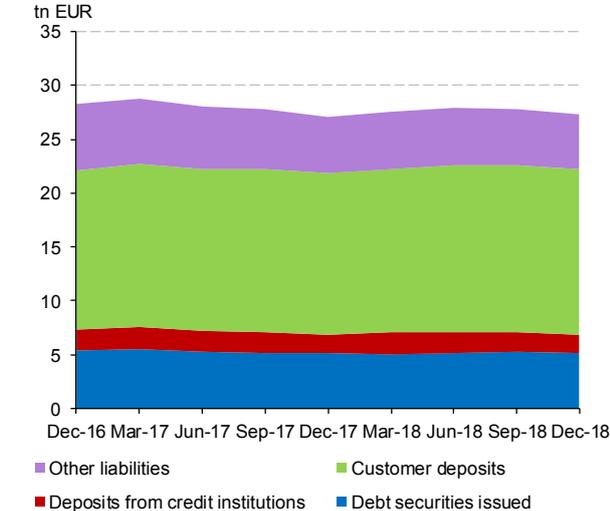
The latest EU bank regulatory reforms¹⁷ should further consolidate banks’ funding and protect banks from excessive leverage. The banking package, on which a political agreement was reached in December 2018, implements international standards (‘Basel III’) and aims to complete the post-crisis regulatory agenda. It introduces various measures, including a binding leverage ratio, a binding net stable funding ratio (NSFR) to address the excessive reliance on short-term wholesale funding and a specific requirement for global systemically important institutions (G-SIIs) to hold minimum levels of capital and other instruments which bear losses in resolution (known as total loss-absorbing capacity or TLAC). Looking ahead, banks’ future funding activity in debt markets could be negatively affected by the winding-down of central bank funding support in 2020-2021. High reliance on foreign currency funding, having a short-term, wholesale nature, may add to vulnerabilities for some EU banks in case of sudden fluctuations in foreign exchange markets. Although euro-area banks’ reliance on USD funding is limited in aggregate (at 11%), there are substantial differences at bank level, with some significant euro-

Chart 1.25: Euro-area NPL ratio



Source: ECB.
 Note: EA total gross non-performing loans and advances, in % of total gross loans and advances, end-of-quarter values.

Chart 1.26: Euro-area MFIs’ liabilities structure



Source: ECB. DG FISMA calculations.

¹⁷ See Chapter 2 for details.

area institutions exhibiting a USD funding share of up to 29%, generally reflecting their involvement in the US and international markets.

Profitability

Despite the ongoing economic recovery and positive developments on the asset side, EU banks' operating performance remains subdued. EU banks' average return on equity¹⁸ stood at 6.5% at the end of 2018, comparable to 6% at the end of 2017. Banks' price-to-book ratios also trended downwards, partly due to a slight downward shift of future earnings expectations, but also due to country-specific factors (in particular, heightened policy uncertainty in Italy) and concerns about some emerging exposures. Worsening market perceptions particularly affected banks with high NPL ratios, suggesting persisting concerns about these banks' profitability prospects.

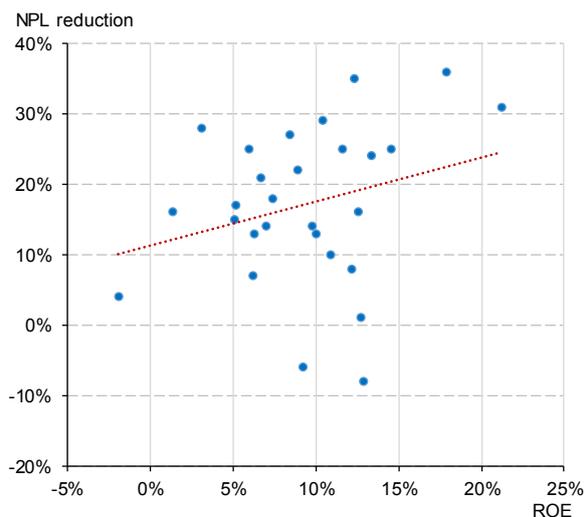
Continuing the trend of the last few years, a fall in impairment costs significantly contributed to banks' profitability in 2018, helped by a favourable macroeconomic environment and banks' continued efforts to reduce their NPLs. However, this positive impact was more than offset by a decline in operating profits (mainly driven by lower trading revenues) and in non-recurring revenues. On average, euro-area banks continue to be less profitable than their US peers, reflecting, among other things, incomplete business model adjustments, remaining cost inefficiencies and overcapacity in some euro-area banking sectors. Despite a fall to 63% from 65% at the beginning of 2018, the cost-to-income ratio for EU banks remained relatively high compared to global peers.

Significant differences in profitability across banks remained largely attributable to differences in net interest income. More profitable banks registered stronger net interest income while less profitable banks experienced declining net interest income, driven by a shrinkage of interest-earning assets. The latter was often associated with continued deleveraging, de-risking and NPL reductions. In contrast, the revenue growth of more profitable banks was aided by a healthy increase in net fee and commission income, supported by a pick-up in fee income from asset management activities. Chart 1.27 shows a positive relationship between bank profitability (measured by return on equity or ROE), the level of NPLs and the pace of NPL reduction. More specifically, the median ROE of banks with faster NPL reduction gradually improved in the last few years, contrasting with a persistent low (or negative) profitability of banks with slower NPL reduction. Looking ahead, higher net interest income and increases in interest-earning assets in light of the economic outlook could support bank profitability. Continued cost-cutting actions by banks should further improve banks' operational performance and profitability.

Underscoring the continued profitability challenges, EU bank stock prices have declined since the beginning of 2018, significantly underperforming broader stock markets as well as other financial stocks (see Chart 1.28). Earnings expectation downgrades across the continent, renewed market turmoil in EMEs and higher political uncertainty in countries such as Italy drove up the risk premiums required on bank stocks. Bank stocks have been recovering since the beginning of 2019, but prices are still below the levels reached in January 2018.

¹⁸ Measured by the last four quarters' net profits divided by average equity over this period.

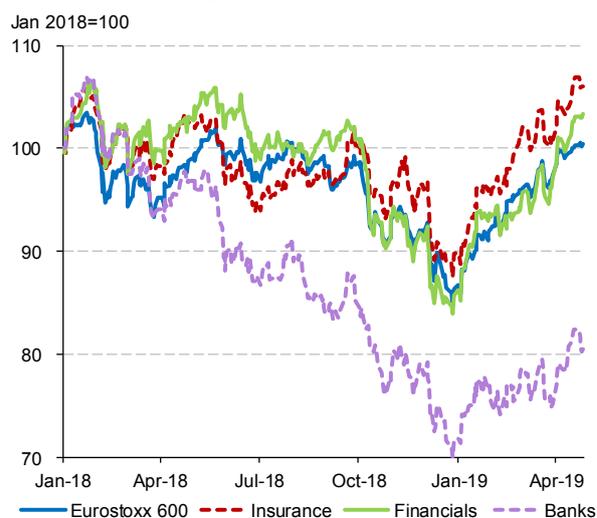
Chart 1.27: ROE versus NPL reduction



Source: EBA and ECB. DG FISMA calculations.

Notes: Q2-2018 data. Dots refer to EU countries. The red line is the linear regression trend line. The pace of NPL reduction is measured using proportionate changes in the NPL ratio.

Chart 1.28: European financial stocks by sector



Source: Bloomberg.

Note: 'Insurance', 'Financials', and 'Banks' are subindices of the Eurostoxx 600 index covering the relevant sector.

1.2.2 Non-bank financial institutions

The size of the EU non-bank financial sector continued to increase both in absolute terms and relative to the size of the total financial sector. Against the background of rising asset valuations, assets of investment funds continued to grow. By contrast, the total assets of money market funds and pension funds slightly decreased. In terms of portfolio composition, investment funds increased their holdings of long-term, less liquid assets and lower-rated assets. Consequently, their exposure to interest rate risk increased alongside the longer aggregate maturity of portfolios. A search for yield in the low interest rate environment was the main driver behind the rebalancing of portfolios towards riskier assets. Meanwhile, insurance corporations and pension funds slightly reduced the riskiness of their portfolios.¹⁹

Geographically, the holdings of EU insurance corporations and pension funds remained highly concentrated in securities issued in the euro area, but investment fund portfolios were mainly invested in non-euro area markets. In particular and in line with monetary policy normalisation in the United States, US securities holdings increased in June 2018 to account for nearly a quarter of the aggregate investment fund portfolio.²⁰ This significant shift towards US dollar-denominated securities was likely driven by higher valuations in the US equity and corporate debt markets compared to European assets.

Selected developments in the insurance sector

The solvency capital requirement ratio (SCR) remains high for the majority of EU insurance companies. The average SCR ratio was above 200% in Q3-2018.²¹ Despite persistent differences among EU Member States, average SCR ratios were well above the prudential

¹⁹ For more details, see ECB (2018), *Financial Stability Review*, November 2018, Section 3.2.

²⁰ See footnote 19, page 29.

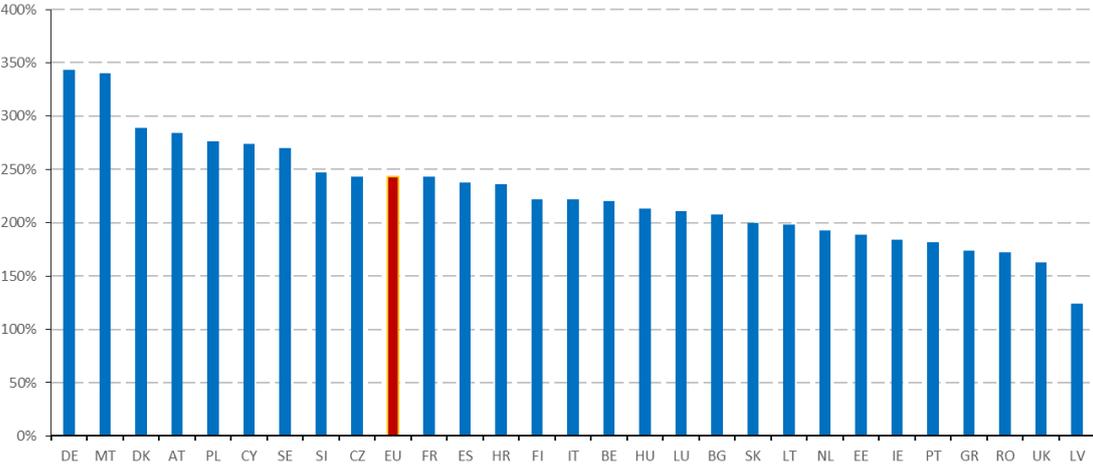
²¹ As calculated by EIOPA for its Q4-2018 *Risk Dashboard*, median value for 97 insurance groups in Europe.

requirement of 100% in all Member States, ranging from 124% in Latvia to 343% in Germany.

The low interest rate environment continued to weigh on the sector’s profitability, which remained substantially lower compared to the pre-crisis period. Based on the latest available annual data (for 2017), the average return on assets (ROA) for insurance companies was about 3.4%. Life-insurers who promise long-term interest guarantees to their policyholders are particularly sensitive to low interest rates and to interest rate changes. The results of the EIOPA stress tests²² show that a prolonged low interest rate environment will make it increasingly difficult for insurance companies to meet their long-term commitments.

Another consequence of the prevailing low-interest environment has been a steady rise in the unit-linked business²³ as a percentage of gross written premiums (GWP). Although this trend helps insurance companies decrease their interest rate risk exposure and the required capital requirements, this happens at the cost of shifting risk to policyholders.

Chart 1.29: SCR ratios in EU Member States



Source: EIOPA insurance statistics database.
 Note: Q3-2018 data.

The structure and the degree of development of the insurance sector continues to differ substantially among European countries. In the first half of 2018, Luxembourg remains to have the largest insurance sector in the EU relative to the size of the Member State’s economy. Looking at absolute figures, the UK constituted the biggest insurance market with total GWP of EUR 181 billion in the first half of 2018, followed by France (EUR 154 billion), Germany (EUR 137 billion), Italy (EUR 71 billion) and Spain (EUR 38 billion).²⁴

²² https://eiopa.europa.eu/Publications/Surveys/EIOPA_2018_Insurance_Stress_Test_Report.pdf
²³ Contrary to traditional or life insurance products with interest rate guarantees (where insurance companies bear profits or losses from investment income above the guaranteed minimum), unit-linked (or variable) insurance plans allow for the coverage of an insurance policy with premium payments allocated to funds that are priced over time according to their market value.
²⁴ EIOPA (2018), *Financial Stability Report*, December 2018.

Selected developments in the investment fund sector

The European asset management industry faced a more challenging investment climate in 2018. The combined net assets of undertakings for collective investments in transferable securities (UCITS) and alternative investment funds (AIFs) decreased by nearly 3% to EUR 15 157 billion from EUR 15 625 billion as a result of the sharp decline in world stock markets.²⁵ All major UCITS fund categories, except money market funds, recorded a decrease in net assets, with guaranteed/protected funds, equity and bond funds experiencing the largest decreases. All AIF categories (i.e. equity, multi-asset, bond, money-market and guaranteed/protected funds) registered net asset decreases in 2018, except real-estate funds and other funds. Net sales also decreased in 2018, with net sales of UCITS amounting to EUR 117 billion from EUR 740 billion in the previous year, and EUR 128 billion of net sales for AIFs compared with EUR 208 billion in 2017 (see Chart 1.30).

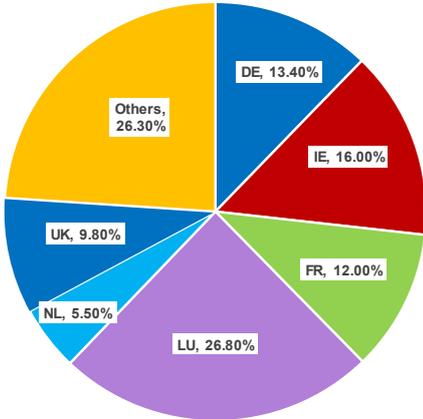
In terms of market structure, assets remained concentrated in Luxembourg (26.7%) and Ireland (15.8%), reflecting their dominant role as fund domiciles in the EU, followed by Germany (13.1%) and France (11.9%).²⁶ Overall, UCITS accounted for almost two thirds (61.2% - EUR 9 284 billion) of total European investment fund assets at the end of 2018, and AIFs accounted for the remaining 38.8% (EUR 5 873 billion).

Chart 1.30: Net sales of UCITS and AIFs in Europe



Source: EFAMA.
 Note: Data for the EU plus LI, NO, CH and TR.

Chart 1.31: Net assets of the European investment fund industry, share per selected Member State



Source: EFAMA.
 Note: Q4-2018 data.

1.3 Corporate funding and access to finance

Corporations need access to finance to be able to carry out their investment projects and fund their inventories. Where internal finance is insufficient, they will seek external financing, typically in the form of debt or equity. This section analyses the main developments in, and

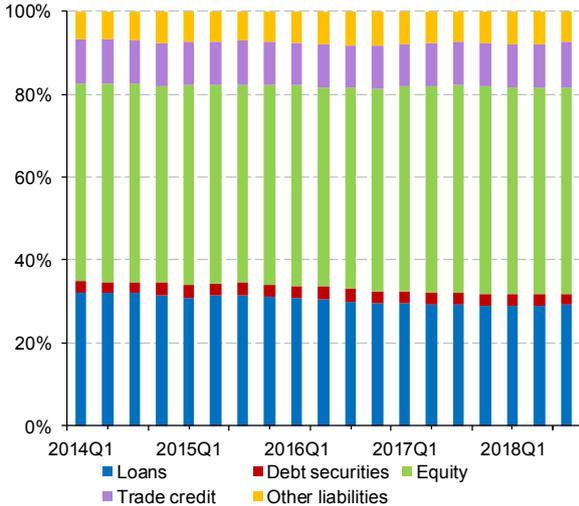
²⁵ EFAMA (2018), *Quarterly Statistical Release Q4*, March 2019.
²⁶ See footnote 25, page 31.

the composition of, the external financing of non-financial corporations (NFCs)²⁷ in the EU, mainly on the basis of the ECB’s published statistical information on the quarterly accounts of the non-financial corporate sector. External financing includes all liabilities of NFCs.

1.3.1 General trends in corporate funding structures

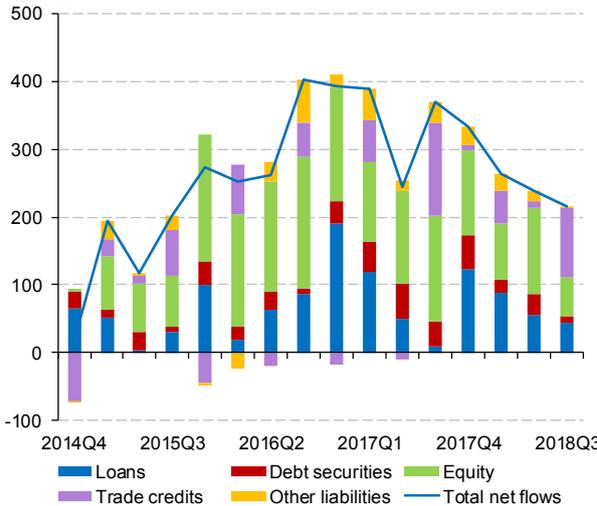
The financing structure of the non-financial corporate sector in the EU has remained rather stable over the past year. The proportion of loans, trade credits and other liabilities²⁸ has increased slightly, while that of debt securities and equity instruments somewhat decreased in Q3-2018 over the same period in Q3-2017 (see Chart 1.32). Equity constituted the biggest external financing instrument for NFCs in the EU (49.8% in Q3-2018), but mainly in the form of unlisted shares, followed by loans (29.2%) and trade credits (10.9%). Debt securities are of a more limited volume, with a share of 2.8% in Q3-2018. Chart 1.33 breaks down the total net external financing flows from Q4-2014 to Q3-2018 and shows an increase in financing through loans in Q3-2018 compared to Q3-2017, while net flows in debt securities, equity instruments and trade credits have decelerated over the same period.

Chart 1.32: Financing structure of EU NFCs



Source: ECB sector accounts. DG FISMA calculations.
 Note: Data are amounts outstanding. The item ‘Equity’ comprises the unlisted shares, listed shares and other equity. The item ‘other liabilities’ designates other accounts payable, excluding trade credits and advances; closing balance sheet positions.

Chart 1.33: Net flows of funding to EU NFCs



Source: ECB sector accounts. DG FISMA calculations.
 Note: The item ‘Equity’ comprises the unlisted shares, listed shares and other equity. The item ‘other liabilities’ designates other accounts payable, excluding trade credits and advances.

According to the half-yearly survey on the access to finance of enterprises (SAFE) conducted by the European Central Bank (ECB), many euro-area NFCs see access to financial resources as a constraint for their growth, although for the average company, this is not seen as a

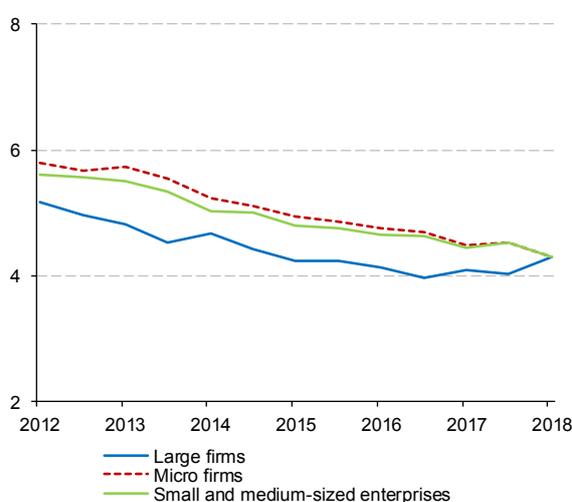
²⁷ The non-financial corporations sector comprises all private and public corporate firms that manufacture goods or provide non-financial services to the market. ‘Quasi-corporations’, which can be defined as non-financial unincorporated businesses that act like NFCs, are also included.

²⁸ The category of ‘other liabilities’ includes the following items: (1) Insurance, pension and standardised guarantee schemes; (2) Financial derivatives and employee stock options; and (3) Other accounts receivable/payable, excluding trade credits and advances.

‘strong’ constraint.²⁹ The most recent available survey data showed that access to finance continued to improve in the first 6 months of 2018, especially for micro firms and SMEs, while large firms reported slightly growing constraints (see Chart 1.34). Looking at the various types of financing instruments (see Chart 1.35), all types of firms continued to be positive in their assessment of the availability of bank loans and other loans in the first half of 2018, albeit to a lesser extent when compared with the second half of 2017. On the other hand, a considerably lower net percentage of firms indicated better availability of financing through debt securities, across all firm sizes. When it comes to the availability of equity finance, micro firms and small and medium-sized enterprises reported somewhat better access in the first half of 2018.

Chart 1.34: Perception of EA NFCs of the degree of constraint in their access to finance

Weighted average from 0 to 10 (0-3: weak; 4-6: medium; 7-10: strong)

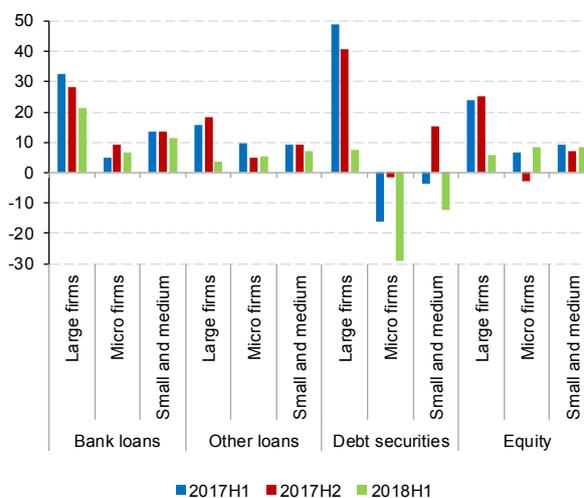


Source: ECB survey on the access to finance of enterprises (SAFE) — Q0b. Pressingness of problems that the firm is facing.

Note: The figures reflect the weighted average answer across all sectors of activity and firm ages; all financing sources are included. Micro firm: 1 to 9 employees; Small and medium-sized enterprises: between 10 and 249 employees; Large firms: 250 or more employees.

Chart 1.35: Change in the availability of external financing for euro-area NFCs

Net % (frequency of increase minus that of decrease)



Source: ECB survey on the access to finance of enterprises (SAFE) — Q9. For each of the following types of financing, would you say that their availability has improved, remained the same or deteriorated for your enterprise over the past six months?

Note: The data reflect the weighted average answer across all sectors of activity and firm ages.

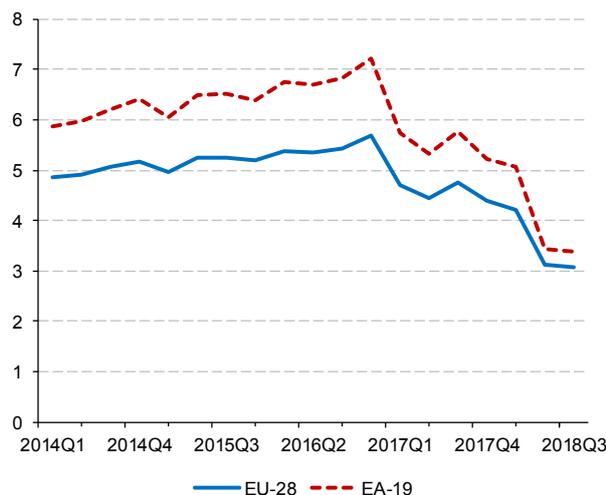
1.3.2 Loans

The maturity structure of loans to NFCs could shed light on the different financing demands of corporations. While loans with a longer maturity tend to be used to finance long-term investment, loans with shorter maturities mostly serve to finance the working capital needs. Long-term loans account for a larger share of total financial liabilities compared to short-term loans, but long-term loans have become relatively less important (see Chart 1.36). Chart 1.37 below shows how net loan flows evolved, broken down by original maturity. In the first three quarters of 2018, NFCs in the EU borrowed EUR 110.6 billion long-term and an even larger amount to cover short-term financing needs (EUR 121.5 billion).

²⁹ The current situation is still less favourable than it was in the pre-crisis period, when more than 75% of small and medium-sized enterprises (SMEs) in the euro area had sufficient financing for their activities, according to the European Commission’s Flash Eurobarometer on SMEs’ access to finance in the EU-15, published on 10 October 2005.

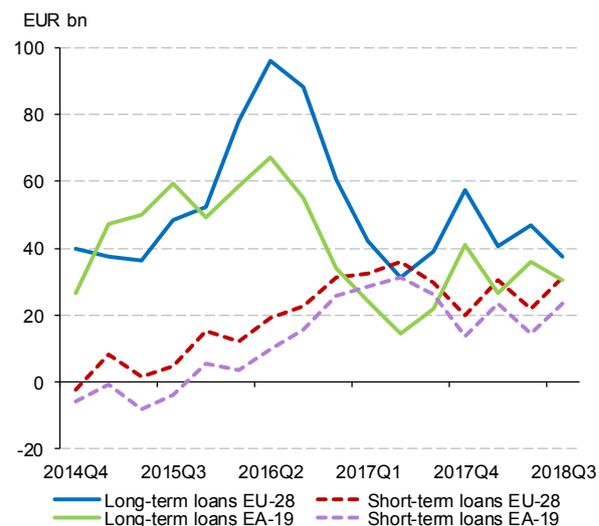
Despite the growing size of the non-bank sector, monetary and financial institutions (MFIs) continued to represent the largest source of loans to non-financial corporations, with a share of 45.6% of total outstanding NFC loans in Q3-2018.³⁰ Total net lending by MFIs to NFCs in the EU amounted to EUR 102.3 billion in the first three quarters of 2018 (see Chart 1.38). At the same time, corporate investment also picked up, with the annual growth rate of gross fixed capital formation in the euro area reaching 7.3% in Q3-2018, which is the highest growth rate observed since Q3-2016.³¹

Chart 1.36: Ratio of long-term outstanding loans to short-term outstanding loans



Source: ECB sector accounts. DG FISMA calculations.
 Note: 'Long-term loans' are defined as loans with an original maturity of more than 1 year, while 'short-term loans' are loans with an original maturity of 1 year or less.

Chart 1.37: Net loan flows by original maturity



Source: ECB sector accounts. DG FISMA calculations.
 Note: Four-quarter rolling average data.

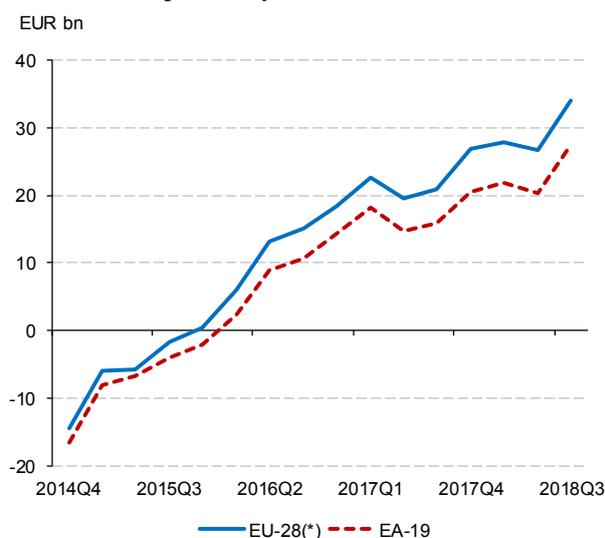
MFI lending rates on loans to NFCs continued to differ significantly between Member States, reflecting differences in their economies and in the structure of their financial sectors. For example, rates were significantly higher in the CEE (see Chart 1.39).

Loans to NFCs are determined by a combination of loan supply and loan demand factors. On the supply side, banks' terms and conditions for loans are driving factors behind the availability of credit as a financing source for corporations. In Q2-2018, credit standards for loans to NFCs and the terms and conditions applied to such loans tightened in the euro area, while showing some signs of easing in Q3 (see Chart 1.40). On the demand side, borrowing by NFCs is driven by financial needs in excess of firms' available internal financing sources. As Chart 1.41 illustrates, while demand for loans by NFCs in the euro area remained positive in Q3-2018, it was weaker compared to the second quarter and further decreased in the final quarter. It appears that banks, while experiencing weaker demand for such loans on balance, have eased their standards and the terms on loans to NFCs.

³⁰ Based on the [ECB Quarterly Sector Accounts](#).

³¹ Based on the [Eurostat Quarterly Institutional Sector Accounts](#).

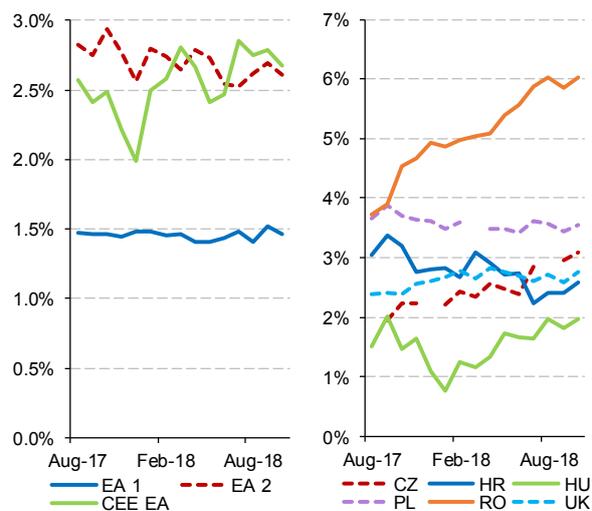
Chart 1.38: Net loan flows to domestic NFCs reported by MFIs



Source: ECB money, credit and banking statistics. DG FISMA calculations.

Note: Four-quarter rolling average data. EU-28(*) figures represent data for the EU-28, excluding Denmark for which data are not available. MFI loans excluding the Eurosystem.

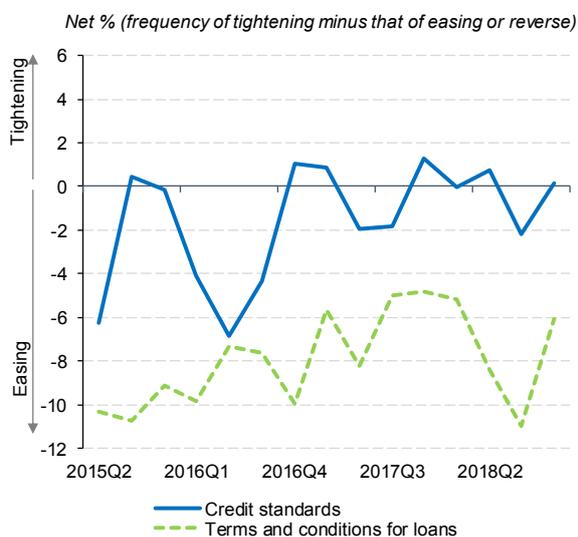
Chart 1.39: Annualised agreed rates on pure new NFC loans in domestic currency



Source: ECB MFI interest rate statistics. DG FISMA calculations.

Note: Data for BG and SE are not available. EA 1: AT, BE, FI, FR, DE, LU and NL; EA 2: CY, EL, IE, IT, MT, PT and ES; CEE EA: EE, LV, LT, SK and SI; unweighted averages for EA 1, EA 2 and CEE EA; loans other than revolving loans and overdrafts, convenience and extended credit card debt. All maturities.

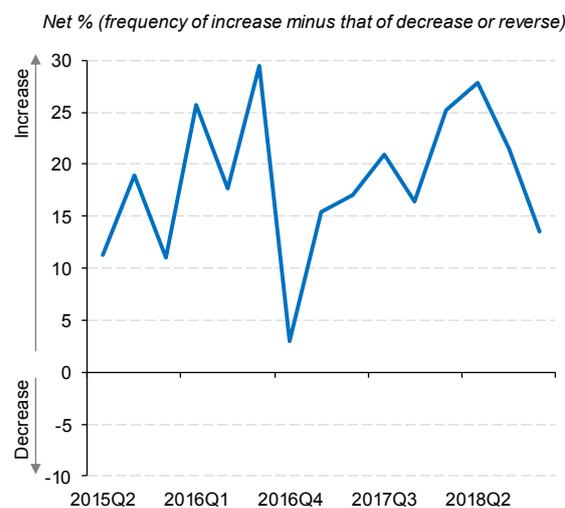
Chart 1.40: Change in credit standards and terms and conditions for loans to euro-area NFCs



Source: ECB bank lending survey (BLS).

Note: Figures available for AT, BE, CY, DE, EE, EL, IE, IT, LV, LT, LU, PT, SI and ES; backward-looking 3 months; unweighted averages.

Chart 1.41: Change in loan demand by euro-area NFCs



Source: ECB bank lending survey (BLS).

Note: Figures available for AT, BE, CY, DE, EE, EL, IE, IT, LV, LT, LU, PT, SI and ES; backward-looking 3 months; unweighted averages.

1.3.3 Debt securities

Most NFCs use both long-term and short-term debt but prefer to use more of the former in order to finance their long-term assets. This is reflected in the debt issuance and debt private placement of NFCs. In Q3-2018, the amount of long-term debt securities outstanding on the

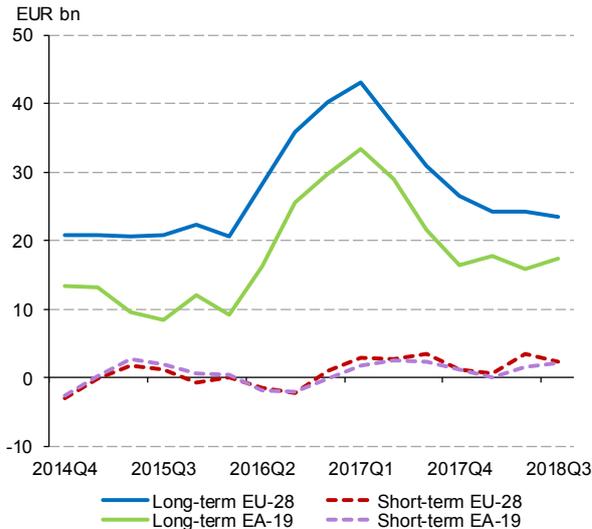
balance sheets of NFCs in the EU was approximately 152 times larger than that of outstanding short-term debt securities (see Chart 1.42). Looking at flows, the total net issuance of debt securities by NFCs in the EU was estimated at EUR 96.5 billion in the first three quarters of 2018, with the bulk of the net issuance concentrated in the euro area (EUR 75.4 billion). Net issuance of long-term debt instruments decelerated somewhat in 2018; in contrast, short-term debt picked up in the first quarter (see Chart 1.43). The second quarter of 2018 was particularly challenging for long-term corporate debt, with net issuance weighed down by a combination of factors such as rising interest rates, the gradual withdrawal of central bank stimulus in the euro area and growing concern about the level of corporate indebtedness.

Chart 1.42: Ratio of long-term to short-term outstanding debt securities



Source: ECB sector accounts. DG FISMA calculations.
 Note: Long-term debt securities are defined as instruments with an original maturity of more than 1 year, while short-term debt securities are those with an original maturity of 1 year or less.

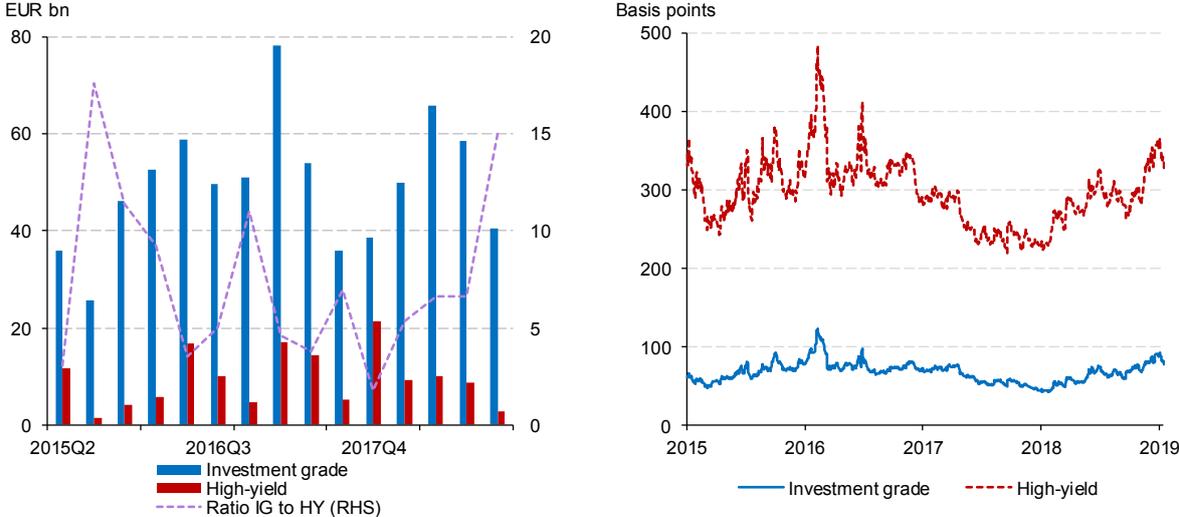
Chart 1.43: Net issuance of debt securities



Source: ECB sector accounts. DG FISMA calculations.
 Note: Four-quarter rolling average data.

Issues of high-yield corporate debt in Q4-2018 stood at EUR 2.7 billion, a sharp decline from the same quarter in 2017 (EUR 21.4 billion in Q4-2017) (see Chart 1.44, LHS), against a background of slower economic growth in the EU, among other factors. The investment grade gross issuance volume for Q2-2018 (EUR 65.7 billion) was the largest quarterly total since Q1-2017, while the final quarter of the year showed a relatively marked slowdown (to EUR 40.6 billion). High-yield bond issuance has decreased relative to the issuance of investment grade bonds. At the same time, investors continued to perceive the credit default risk on the European high-yield market to be relatively high throughout 2018 (see Chart 1.44, RHS).

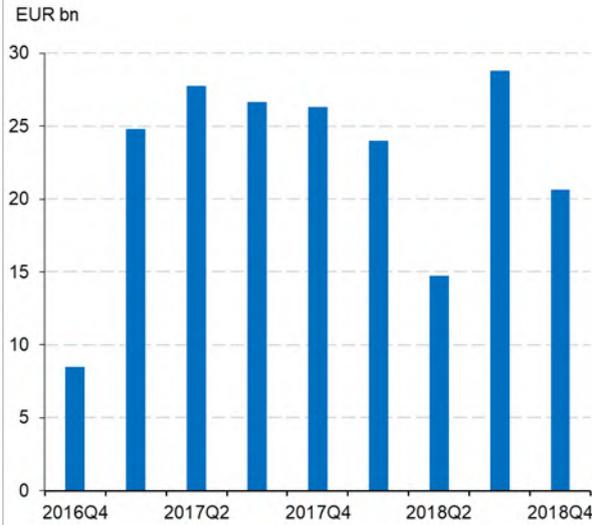
Chart 1.44: Corporate bond gross issuance in the EU by credit quality (lhs chart) and EU default perceptions (rhs chart)



Source: Dealogic (corporate bond issuance) and Bloomberg (EU default perceptions, Markit iTraxx). DG FISMA calculations.
Note: Lhs chart: Euro-denominated issuances with a credit rating assigned by credit rating agency Standard & Poor’s. Investment grade issuances have a credit rating of ‘BBB-’ or higher by Standard & Poor’s, while high-yield bonds carry a rating below ‘BBB’ by the same credit rating agency. ‘IG’: Investment grade; ‘HY’: high-yield. Rhs chart: Default perceptions are measured by spreads. One basis point equals annual cost in EUR 1 000 for insuring against the default of EUR 10 million of debt for 5 years.

As an alternative to the issuance of public securities, NFCs also raised significant amounts of capital through private placements, particularly because these operations are much less restrictive than a public offering of financial securities that are subject to regulatory scrutiny. Total gross issuance of private debt in 2018 was EUR 88.19 billion compared to EUR 199.41 billion for corporate bonds. Issuance of private debt securities in the EU amounted to about EUR 21 billion in Q4-2018, after a peak of EUR 29 billion in the previous quarter (see Chart 1.45).

Chart 1.45: Private placements in the EU

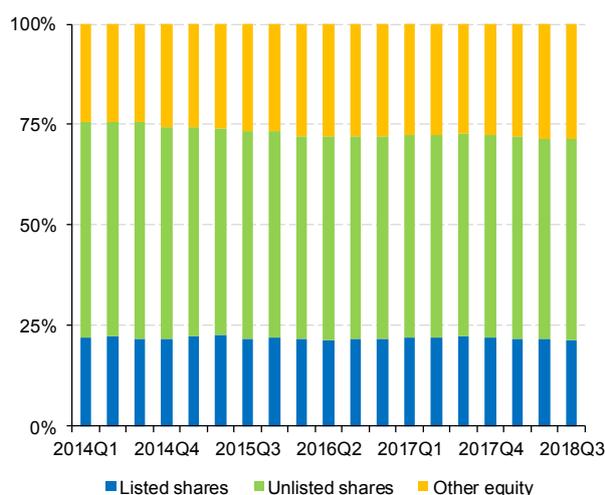


Source: Bloomberg. DG FISMA calculations.
Note: Euro-denominated issuances. Gross quarterly flows data.

1.3.4 Equity instruments

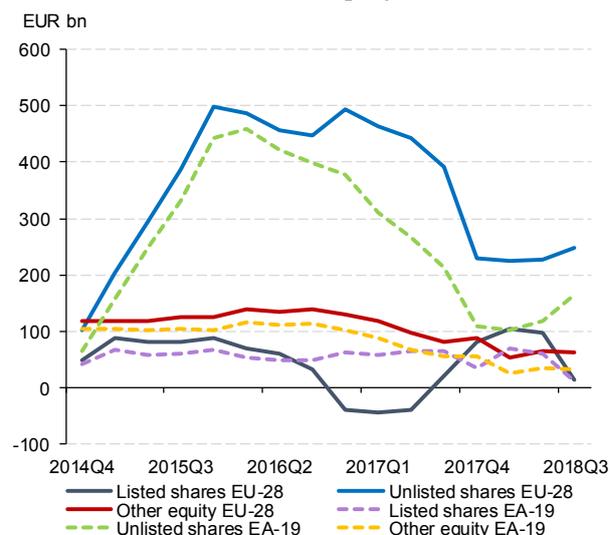
The share of listed equity in the total equity of EU NFCs stood at around 22% over the past quarters. Unlisted shares remain the most significant funding source in the category of equity instruments (49.9% of total equity in Q3-2018; see Chart 1.46). In terms of flows, EU NFCs issued a combined total of EUR 268 billion of equity instruments in the first three quarters of 2018, a fall of 34% compared to the same period in 2017. The net issuance of listed shares and other equity declined in 2018, while net funding from unlisted shares edged higher (see Chart 1.47).

Chart 1.46: Equity outstanding in the EU



Source: ECB sector accounts. DG FISMA calculations.
 Note: Breakdown by type of equity instrument. ‘Listed shares’ are equity securities listed on an exchange; ‘unlisted shares’ are equity securities not listed on an exchange; ‘other equity’ comprises all forms of equity other than those classified in the first two sub-categories.

Chart 1.47: Net issuance of equity



Source: ECB sector accounts. DG FISMA calculations.
 Note: Four-quarter rolling average data.

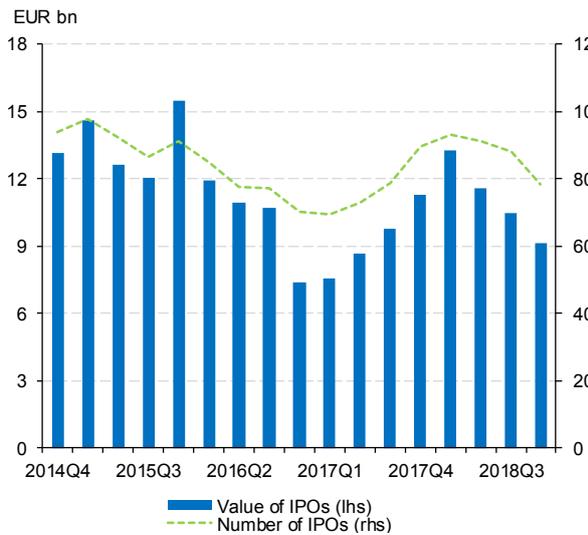
Although issuance by established corporations accounts for the majority of new issuance, initial public offerings (IPOs) play an increasingly important role in the expansion of equity markets. The percentage of IPOs in total new issuance reached 44% in 2018, up from around 27% in 2017 and 31% in 2016.³² However, as Chart 1.48 shows, the value of European IPO proceeds decreased throughout 2018 (down by 32.3% year-on-year in Q4-2018 from Q4-2017), with the value of deals reaching a two-year low of EUR 3.9 billion in the third quarter. A total of 81 deals were concluded in Q4-2018, 32.5% fewer than in the same period in 2017 (see Chart 1.48 RHS). This decline in European IPO activity mirrored global markets. Global IPO activity in Q4-2018 decreased by 34% in deal volume, while the proceeds were 10% lower compared with Q4-2017, against a background of market volatility and increased geopolitical uncertainties.³³

Private investors seem to have partially filled the gap left by the decline in IPOs. After a slower pace of activity in the second half of 2017, European private equity fundraising picked up in the first half of 2018, with deals worth a total of EUR 46 billion, while investments retreated and stood at EUR 31 billion and divestments dropped to EUR 12 billion (see Chart 1.49). Buyout activity saw the most change, while the other types of investments were relatively stable.

³² Association for Financial Markets in Europe (AFME) (2018), *Equity Primary Markets and Trading Report Q4 2018*.

³³ Ernst & Young (2018), *Big vs agile? Global IPO trends: Q4 2018*.

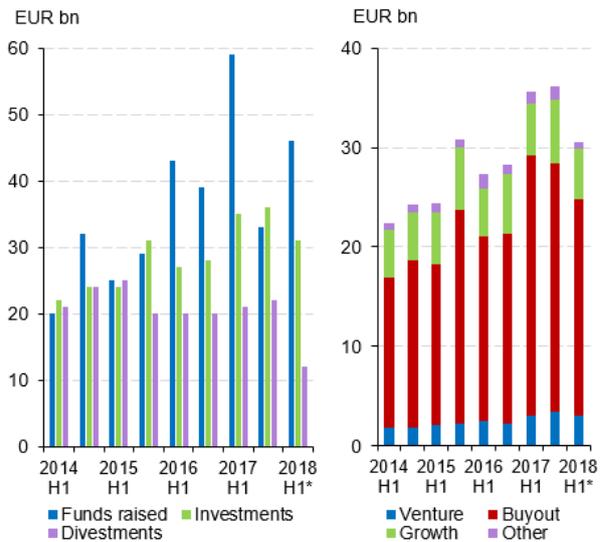
Chart 1.48: IPO proceeds originated by NFCs on European exchanges



Source: PwC (2018), *IPO Watch Europe Q3-2018*. DG FISMA calculations.

Note: Four-quarter rolling average data.

Chart 1.49: Private equity fundraising, investments

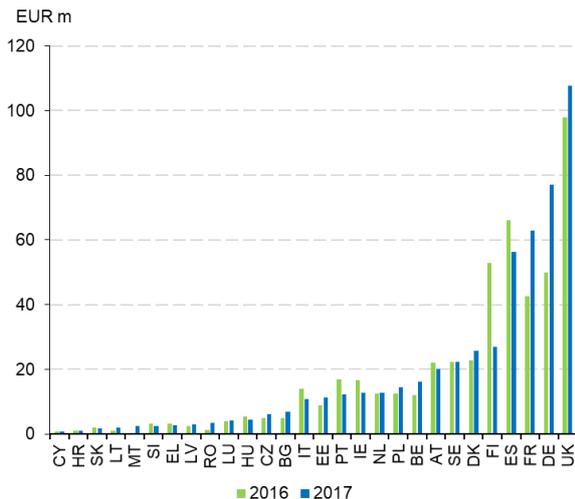


Source: Invest Europe (2018), *H1 2018 European Private Equity Activity Report*.

Note: Investments and divestments in Europe (LHS). Investments by stage (RHS). 2018 H1 data are preliminary and may be subject to change. The funds included in the statistics are: private equity funds making direct private equity investments, mezzanine private equity funds, co-investment funds, and rescue/turnaround funds. 'Other' includes rescue/turnaround and replacement capital.

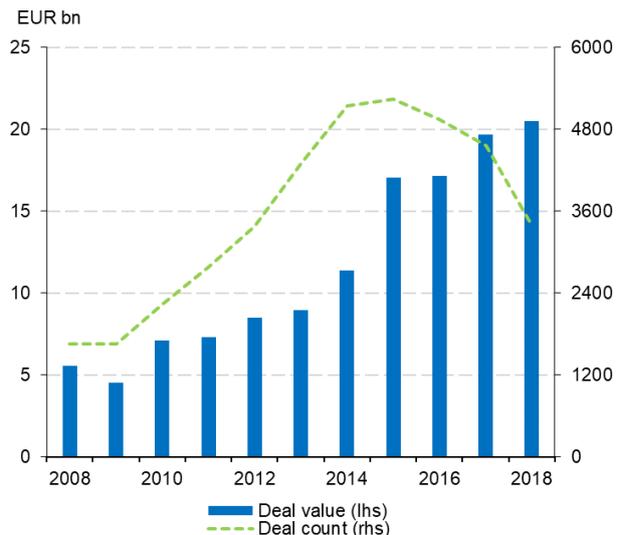
Alternative finance has begun to establish itself as a significant form of corporate funding, especially in the largest economies of the EU. The European alternative finance market encompasses the activity of a diverse range of participants, ranging from angel investors and venture capital funds to online crowdfunding platforms.

Chart 1.50: Angel investment by EU Member State



Source: EBAN (2018), *Statistics Compendium 2017*.

Chart 1.51: Venture capital deal activity and number of deals in Europe



Source: PitchBook (2019), *2018 Annual European Venture Report*, 16 January 2019.

Angel investors have become an important source of equity capital at the seed and early stages. Angel investors tend to support a wider range of innovation than venture capital (VC)

firms do, as they mainly invest locally and in a broader range of sectors. Angel investment in the EU totalled EUR 531 million in 2017, which represents an increase of 5.2% compared to 2016. The UK was the largest player on the EU angel market, with EUR 107.7 million of investment in 2017 (see Chart 1.50), followed by Germany (EUR 77 million), France (EUR 63 million), Spain (EUR 56.4 million) and Finland (EUR 27 million).

Venture capital is particularly relevant for young and innovative companies with growth potential but untested business models. Venture capital investments in Europe are much greater than overall angel investment, amounting to EUR 20.5 billion in 2018, an increase of 4.2% from 2017 (see Chart 1.51, LHS). The number of venture capital deals continued to drop in 2018, by 25.9% from 2017 (see Chart 1.51, RHS). The average venture capital deal size increased from EUR 4.3 million in 2017 to EUR 6.1 million in 2018.

Even though crowdfunding markets are still relatively small in Europe, they have been growing at a rapid pace in recent years and are mainly located in larger European economies. Crowdfunding still accounts for a relatively minor share of corporate financing, but has already outgrown angel investors in several Member States such as the UK, Italy or the Netherlands. In 2017, the UK ranked first for crowdfunding volumes (EUR 1.9 billion), followed by Italy (EUR 156.7 million), Germany (EUR 64.9 million) and the Netherlands (EUR 53.2 million).

Chapter 2 POLICY DEVELOPMENTS

This chapter reviews the main developments in EU financial services policies in 2018 and the first quarter of 2019.³⁴ The EU has left behind the crisis mode of the past decade, and the EU financial system has become more resilient compared to 10 years ago (see Chapter 1). However, the implementation of further measures to safeguard financial stability and support financial integration remains a priority.

The financial crisis and recent international developments have highlighted the need to deepen the Economic and Monetary Union and build liquid capital markets.³⁵ Clear progress has been made in completing the Banking Union. In addition, as set out in the 2015 action plan on building a Capital Markets Union and the 2017 mid-term review of CMU³⁶, the key steps have been achieved to put in place the building blocks of the Capital Markets Union.

The Commission took several policy initiatives in financial services related to sustainable finance to support the transition to a more sustainable economy. At the same time, the Commission also adopted the FinTech action plan³⁷ that promotes the adoption of new technologies by the financial sector, while seeking to make financial markets safer and easier to access for new players.

2.1 Banking Union

2.1.1 *The three pillars of the Banking Union*

In the wake of the banking and sovereign debt crisis, EU Member States agreed to address structural weaknesses arising from the interaction between banks and their respective sovereigns and to deepen the integration of the EU banking system via the creation of a Banking Union based on three pillars. The overall aim was to reinforce financial stability by restoring confidence in the banking sector through a combination of measures designed to both reduce and share banking sector risks. A stable and more integrated banking sector supports growth and welfare in the wider EU economy.

The Banking Union is based on three pillars: (i) a single supervisory mechanism (SSM), (ii) a single resolution mechanism (SRM) with a related single resolution fund, and (iii) a European deposit insurance scheme (EDIS). The Banking Union applies to Member States in the euro area but other non-euro Member States can also join.

First, the SSM ensures that banks are supervised according to the same high standards across the euro area. Most importantly, the SSM has harmonised the main tool for banking supervisors, the supervisory review and evaluation process (SREP). Given that all supervisors in the euro area now apply the same tool in the same manner, Member States have much less

³⁴ Table 2.1 provides an overview of the main legislative initiatives.

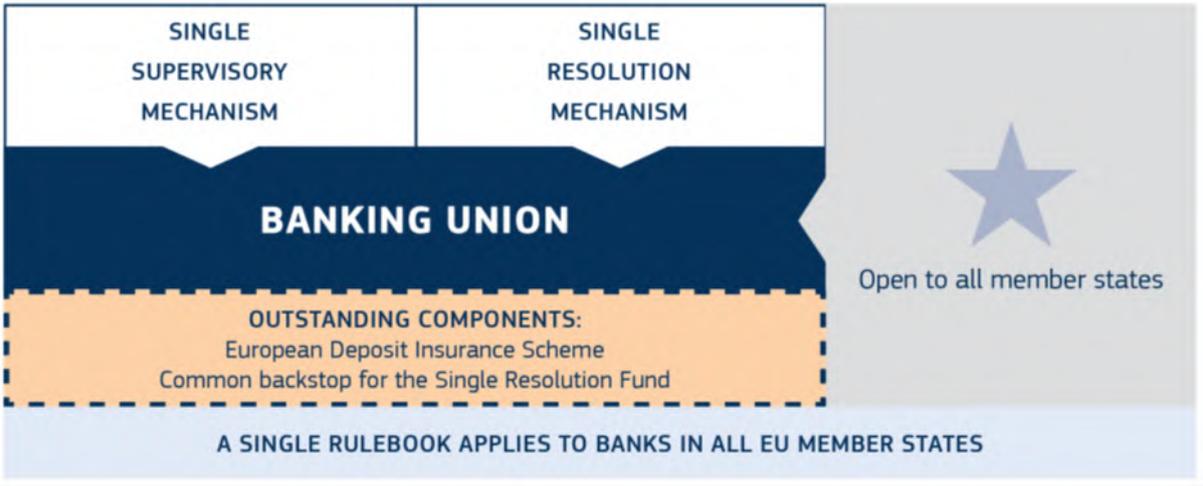
³⁵ Juncker, J-C. (2018), *State of the Union 2018: The Hour of European Sovereignty*, Strasbourg, 2 September 2018, https://ec.europa.eu/commission/sites/beta-political/files/sotou2018-speech_en.pdf.

³⁶ Action Plan on Building a Capital Markets Union COM(2015) 0468 final of 30 September 2015; Mid-Term Review of the Capital Markets Union Action Plan, COM(2017) 292 final of 8 June 2017.

³⁷ FinTech action plan: For a more competitive and innovative European financial sector, COM(2018) 109 final of 8 March 2018.

scope to ring-fence. European banking supervision helps to level the playing field for banks. At the same time, banks can more easily operate across borders as they no longer have to deal with different supervisory regimes.

Chart 2.1: Banking Union



Source: European Commission.

Second, for the operational aspects of bank resolution, the SRM created a Single Resolution Board (SRB). When a bank is failing or likely to fail, the SRB can decide whether there is a public interest in putting a bank into resolution. The SRB will then adopt a scheme for organising the resolution of the bank. For possible required funding in resolution, the SRM established a dedicated Single Resolution Fund (SRF) that will be fully funded by the banking sector.

In addition, in case resolution needs would go beyond the SRF capabilities, EU leaders designated the European Stability Mechanism (ESM) as the provider of a common backstop to the SRF. EU leaders have endorsed the terms of reference for the common backstop, which sets out the main features of how — at the latest by the end of 2023 — the backstop will be operationalised through amendments to the ESM Treaty. This is part of a comprehensive package agreed by the Eurogroup in December 2018 to further strengthen EMU. This package also includes the further development of the instruments and the role of the ESM, and possible instruments for competitiveness, convergence and stabilisation in EMU that will further strengthen the resilience of the euro area.

Moreover, the December 2018 Eurogroup report to Leaders on EMU deepening³⁸ also acknowledged the limitations in the current framework for liquidity provision in resolution which may hamper its effectiveness. In the first half of 2019, further work with the input of relevant institutions will therefore be conducted to look at possible solutions, with a possible reporting to the EU Leaders by June 2019.

Third, while the SSM and the SRM are now in place and largely operational, EDIS is still subject to legislative negotiations in the European Parliament and in the Ad Hoc Working Party of the Council. In its 2016 roadmap on Banking Union, the Council asked for further

³⁸ <https://www.consilium.europa.eu/en/press/press-releases/2018/12/04/eurogroup-report-to-leaders-on-emu-deepening/>

measures to reduce banking risks before starting the political negotiations on EDIS. As a response, the Commission adopted its Communication on the completion of the Banking Union in October 2017, followed by its banking package on risk reduction measures. The banking package has been finally adopted in April 2019. Moreover, at the Euro summit of 14 December 2018, Member States endorsed all the elements of the Eurogroup report on EMU deepening, including the establishment of a high-level working group on EDIS under the auspices of the Eurogroup Working Group which is expected to report by summer 2019 and will examine how EDIS would interplay with various other elements of the Banking Union.

2.1.2 Additional risk reduction measures

In 2018, further progress on reducing risks in the banking sector was made.³⁹ In December 2018, the European Parliament (EP) and the Council reached a political agreement on the banking package, a significant legislative package adopted by the Commission in November 2016 containing amendments to four pieces of EU legislation: the Bank Recovery and Resolution Directive (BRRD), the Single Resolution Mechanism Regulation (SRMR), the Capital Requirements Directive IV (CRD IV) and the Capital Requirements Regulation (CRR).⁴⁰

The package contains a comprehensive set of risk-reducing measures to strengthen further the resilience of EU banks both with respect to prudential and resolution aspects.⁴¹ In terms of prudential aspects, it implements into EU law a set of comprehensive measures agreed in Basel (e.g. net stable funding ratio; leverage ratio). In terms of resolution policy, it implements the internationally agreed total loss absorbing capacity standard and revises fundamentally the existing resolution framework to ensure an integrated, robust set of rules for all banks operating in the EU.⁴² The adoption of the banking package will lead to a further consolidation of the EU prudential and regulatory frameworks for banks.

³⁹ Communication on third progress report on the reduction of non-performing loans and further risk reduction in the Banking Union, COM(2018) 766 final of 28 November 2018.

⁴⁰ Banking risk reduction package of 23 November 2016, for more information see http://europa.eu/rapid/press-release_IP-16-3731_en.htm.

⁴¹ As regards the main agreed amendments to the CRR, they include measures implementing internationally agreed standards: a leverage ratio requirement for all institutions as well as a leverage ratio buffer for all global systemically important institutions (G-SIIs); a net stable funding requirement, a new total loss absorbing capacity requirement for G-SIIs, a new market risk framework (at this stage for reporting purposes only); revised rules on capital requirements for counterparty credit risk, for exposures to central counterparties and for equity exposures to funds; revised large exposure rules; and revised disclosure (Pillar 3) rules.

As regards the main agreed amendments to the CRD IV, they include: a revised Pillar 2 framework; a new approval regime and enhanced supervisory powers towards parent (mixed) financial holding companies; enhanced prudential rules in relation to anti-money laundering; and a requirement for third-country institutions having significant activities in the EU to have an EU intermediate parent undertaking.

⁴² In particular, in order to achieve a credible bail-in tool, the co-legislators agreed to tighten the rules on the subordination of MREL instruments. Beyond, the existing GSII category, they decided to create a new category of 'top-tier banks', which are large banks with a balance sheet size greater than EUR 100 billion in relation to which more prudent subordination requirements are formulated. National resolution authorities may also select other banks (non-GSIIs, non-top-tier banks) and subject them to the top-tier bank treatment. The co-legislators agreed a MREL minimum pillar 1 subordination policy for each of these different categories. Moreover, for a sub-set of G-SIIs and top-tier banks and under certain conditions, the resolution authority may also impose an additional Pillar 2 subordination requirement. For all other banks, the subordination requirement remains a bank-specific assessment based on the principle of 'no creditor worse off'.

Following the financial and sovereign debt crisis, a growing share of non-performing loans (NPLs) has accumulated on bank balance sheets. While NPLs in the EU banking sector are now receding (see Section 1.2), the high NPL stocks weaken the EU banking sector and restrict its ability to support the economy. In March 2018, the Commission proposed a set of measures, following up on the ECOFIN action plan of July 2017.⁴³ This package included:

- a proposal for a regulation on prudential backstops for the provisioning of NPLs;
- a proposal for a directive to enable banks to deal in a more efficient way with loans once these become non-performing by improving conditions to either (1) enforce the collateral used to secure the credit; or (2) sell the credit to third parties (i.e. the development of a secondary market for NPLs);
- a staff working document on a blueprint for the set-up of national asset management companies; and
- preparatory work on a data and transaction platform for NPLs (together with the ECB and EBA).

The Regulation on prudential backstops to prevent the accumulation of NPLs was finally adopted in April 2019.⁴⁴ The Regulation will ensure that banks set aside funds to better cover the risks associated with loans that may become non-performing in the future. A political agreement was reached by the Council on the secondary market part of the Directive.

As regards macro-prudential policy, targeted improvements were made to the macro-prudential tools available in the CRD IV/CRR, as examined in more detail in Chapter 3. Minor adjustments to the institutional framework for EU macro-prudential policies via a reform of the ESRB were also agreed as part of the review of the European System of Financial Supervision.

2.2 Capital Markets Union

The Capital Markets Union (CMU) is essential to further strengthening private risk sharing, enhancing the international role of the euro, facilitating access to finance for firms, and opening up investment opportunities for retail investors. Removing obstacles to cross-border capital flows will support economic growth and make the financial system more resilient through increased shock absorption. CMU thus contributes to the Commission's investment plan for Europe and strengthens the Economic and Monetary Union.

The Commission has delivered most of the measures announced in the 2015 Capital Markets Union action plan and in the 2017 mid-term review. The Commission presented an overview

⁴³ ECOFIN refers to the Economic and Financial Affairs Council. The ECOFIN action plan to address the problem of non-performing loans in the banking sector, <https://www.consilium.europa.eu/en/press/press-releases/2017/07/11/banking-action-plan-non-performing-loans/>.

⁴⁴ Regulation (2019) 630 of 17 April 2019 amending Regulation No 575/2013 as regards minimum loss coverage for non-performing exposures (published in the official journal on 25 April 2019). See also, https://ec.europa.eu/info/publications/180314-proposal-non-performing-loans_en, on the package of measures to address the risks related to high levels of NPLs in Europe.

and state-of-play on the CMU in its Communication of 15 March 2019.⁴⁵ As explained in the Communication, the Commission has tabled all legislative proposals set out in the Capital Markets Union action plan and mid-term review to put in place the key building blocks of the Capital Markets Union.⁴⁶

In addition to the legislative proposals put forward by the Commission since the beginning of its mandate, the Commission presented further legislative proposals in key areas of capital markets in March 2018. These include proposals on the harmonised framework for covered bonds, rules for crowdfunding, the cross-border distribution of collective investment funds and conflict-of-law rules for third-party effects of assignment of claims. In May 2018, the Commission adopted a proposal introducing targeted changes to the Market Abuse Regulation and the Prospectus Regulation with a view to supporting the SME growth markets.

Over the last few months, progress has been made on the negotiation of most of the outstanding proposals.

On the pan-European personal pension product (PEPP) proposal, the European Parliament voted the legislative text in first reading in April 2019. In addition, the proposal for the directive on preventive restructuring frameworks, second chance and measures to increase the efficiency of restructuring, insolvency and discharge procedures was approved by the European Parliament at the end of March 2019.

In February 2019, the co-legislators also reached a political agreement on the covered bonds legislative package. The agreed legislative text was voted in first reading by the European Parliament in April 2019. The harmonised rules, based on national high standards and best practice, will help to develop covered bonds as a stable and cost-effective source of funding for EU banks. By doing so, they will expand the capacity of banks to provide financing to the real economy. They will also give investors a wider range of safer investment opportunities.

On the package on facilitating the cross-border distribution of collective investment funds, co-legislators found an agreement in February 2019. The agreed legislative text was voted in first reading in the European Parliament in April 2019. The new rules will make the cross-border distribution of funds simpler, quicker and cheaper. They will do so by improving the transparency of national requirements, cutting red tape and harmonising diverging national rules. This will provide investors with more choice, and reduce their costs, while safeguarding investor protection.

In March 2019, the co-legislators also agreed on the new rules that will facilitate financing through capital markets for small businesses. The agreed legislative text was voted in first reading in the European Parliament in April 2019. SME growth markets are a new form of multilateral trading facility introduced in January 2018 by the new Markets in Financial Instruments Directive (MiFID II), which caters more specifically to the needs of smaller issuers, while maintaining a high degree of investor protection.

⁴⁵ Capital Markets Union: progress on building a single market for capital for a strong Economic and Monetary Union, COM(2019)136 final of 15 March 2019.

⁴⁶ See footnote 36, page 41.

Throughout 2018, the Commission worked with both co-legislators on the legislative proposal for a more proportionate prudential framework for investment firms.⁴⁷ A political agreement was reached on 26 February 2019, the agreed legislative text was voted by the EP in first reading in April 2019. The revised legislation will ensure more proportionate rules and better supervision for all investment firms on capital, liquidity and other risk management requirements. It will also ensure a level-playing field between large and systemic financial institutions: investment firms, which carry out bank-like activities and pose similar risks as banks will be subject to the same rules and supervision as banks. On the other hand, simpler and less risky firms will benefit from a fully revised rulebook more tailored to their business models. As part of the new framework, equivalence rules for the provision of investment services by non-EU country firms will also be more stringent and clearer.

The Commission has been working in close cooperation with the ESAs to develop and adopt technical standards specifying key aspects of the Securitisation Regulation, which came into force on 1 January 2019. Reviving the securitisation market on a sound and sustainable footing is an important building block of the CMU, providing additional funding sources for companies, strengthening banks' ability to support the economy and enhancing private risk sharing by diversifying risk exposure across the EU. The Commission also introduced targeted amendments to capital charges for simple, transparent and standardised (STS) securitisations under the 'Solvency II' legal framework for insurance in the EU. This has the aim of making it easier for insurers to invest in high-quality securitisations.

The Commission also delivered and set in motion the vast majority of the non-legislative actions announced in the CMU action plan and mid-term review, notably in the areas of retail investment and corporate finance.

As for improving access to finance for business, the Commission assessed the possibility of developing European secured notes for SME loans and infrastructure loans. The Commission also reviewed the functioning of corporate bond markets in the Union and the different national regimes for private placements of corporate debt. Markets for the private placement of debt can broaden the availability of finance for unlisted medium-sized companies. The Commission also launched an external study on supply chain finance.

The Commission has taken further action to make it easier for high-growth SMEs to access public securities markets. In 2018, the Commission published a draft delegated regulation amending MiFID II. The delegated regulation aims to alleviate the administrative burden placed on small issuers and increase the liquidity and attractiveness of SME growth markets. In addition, the Commission launched an external study to assess the situation of SME research coverage and the impact of the new MiFID II rules on payment unbundling.

In the area of investor protection, the Commission adopted a Communication on the protection of intra-EU investments that clarifies investors' rights in order to increase investors' confidence and boost investments in the EU.⁴⁸ The Communication lists the key

⁴⁷ Proposal for a Regulation of the European Parliament and of the Council on the prudential requirements of investment firms and amending Regulations (EU) No 575/2013, (EU) No 600/2014 and (EU) No 1093/2010, COM(2017) 0790 final of 20 December 2017; and a proposal for a Directive of the European Parliament and of the Council on the prudential supervision of investment firms and amending Directives 2013/36/EU and 2014/65/EU, COM(2017) 791 final.

⁴⁸ Communication on Protection of Intra-EU investment, COM(2018) 547 final of 19 September 2018.

rights of investors when making cross-border investments and their ability to enforce those rights before national administrations and courts. The Communication also explains the implications of the judgment of the Court of Justice of the European Union in the Achmea case of 6 March 2018 [case C-284/16].⁴⁹

In 2018, the Commission also undertook action on financial markets infrastructures. More specifically, it aimed to facilitate the adoption by the co-legislators of two legislative proposals to improve the efficiency and stability of EU derivatives markets, building on earlier work on the European Market Infrastructure Regulation (EMIR):

- The EMIR REFIT proposal aims to simplify rules and reduce regulatory burdens for market participants (notably for non-financial counterparties, pension funds and small financial counterparties) without compromising financial stability. The co-legislators reached a political agreement in February 2019. The EP plenary voted the agreed legislative text in April 2019.
- The EMIR proposal on the supervision of central counterparties (CCPs) aims to strengthen the EU's CCP supervisory framework to better anticipate and mitigate risk coming from EU CCPs or from systemic non-EU country CCPs servicing EU clients. The co-legislators reached a political agreement in March 2019. The EP plenary voted the agreed legislative text in April 2019.

Furthermore, the Commission adopted a delegated regulation under EMIR prolonging until 21 December 2020 the deferred application of the clearing obligation for transactions between non-EU country counterparties and counterparties established in the Union belonging to the same group. This deferred application aims at providing more time to the European Commission to adopt the relevant equivalence decision necessary for non-EU group entities that wish to benefit from this exemption.

The Commission also finalised a number of implementing and delegated acts related to other financial markets infrastructure legislation. A delegated regulation was adopted in May 2018 to further specify measures on securities settlement discipline under the Central Securities Depositories Regulation (CSDR). The Delegation Regulation specifies details for reporting settlement fails as well as details for cash penalties and mandatory buy-in procedures for failed settlements and aims to improve the efficiency of security settlement throughout the EU. In December 2018, the Commission adopted a package of eight delegated and implementing regulations under the Securities Financing Transactions Regulation (SFTR) in order to increase the transparency of shadow-banking transactions in the large securities-financing market. This package also implied the adoption of amendments to three delegated regulations under EMIR for the reporting of derivative transactions to trade repositories.

The Commission took several measures in the field of asset management, in addition to the legislative initiative to reduce barriers to the cross-border distribution of investment funds. Delegated acts on the Money Market Funds Regulation were adopted in April 2018. A delegated regulation as regards safe-keeping duties of depositaries was adopted in July 2018,

⁴⁹ In this judgment, the Court of Justice confirmed the Commission's view that investor-State arbitration contained in bilateral investment treaties (BITs) between Member States is not compatible with EU law. The Commission has worked intensively with Member States to ensure that the judgment is fully implemented. In particular, the Commission has been coordinating Member States' action to end the bilateral investment treaties (BITs).

following input from ESMA. Finally, the Commission asked the ESAs to work on a targeted review of measures relating to the Packaged Retail Investment and Insurance Products Regulation (PRIIPs). The ESAs started a consultation in 2018, and final adoption by the Commission is expected towards the end of 2019.

Finally, the Commission adopted a number of measures in December 2018 as part of a contingency package addressing a no-deal Brexit scenario (see Box 4 for a more general discussion on implications for financial stability).

Box 4: UK withdrawal from the EU and implications for financial stability

The UK decision to withdraw from the EU means for UK-based financial firms no more automatic access to EU-27 markets and clients (no more passporting into the EU-27), with various implications. First, due to the loss of the EU passport, UK-based entities will have to adapt their business models to continue serving EU-27 clients. As repeatedly urged by the Commission, many firms have implemented preparedness measures including relocation to the EU-27. This has led so far to the relocation of assets to the EU-27 of about EUR 1 trillion, with about 250 firms planning or setting up new hubs in various EU-27 Member States.⁵⁰ Second, as the UK becomes a third country, regulatory divergence with the EU-27 becomes possible, e.g. requiring groups to hold more of their capital at local level, which also heightens the risk of market fragmentation in case the relocation of groups to the EU-27 is not advanced.

The Commission analysed with the European Central Bank, the European Supervisory Authorities and the Single Resolution Board the risks of a no-deal Brexit and concluded that only a limited number of measures are necessary to preserve EU financial stability, in particular time-limited equivalence decisions for certain UK market infrastructure (central counter parties and central securities depositories). The Commission adopted these preparedness measures as part of its contingency actions on 19 December 2018. At national level, Member States have adopted contingency measures to address residual risks, mainly related to cross-border insurance contracts and the performance of life-cycle events for non-cleared derivatives. Overall, the Commission is monitoring the situation together with the ECB and the ESAs and is working with Member States to ensure a consistent approach across national measures.

2.3 The international role of the euro

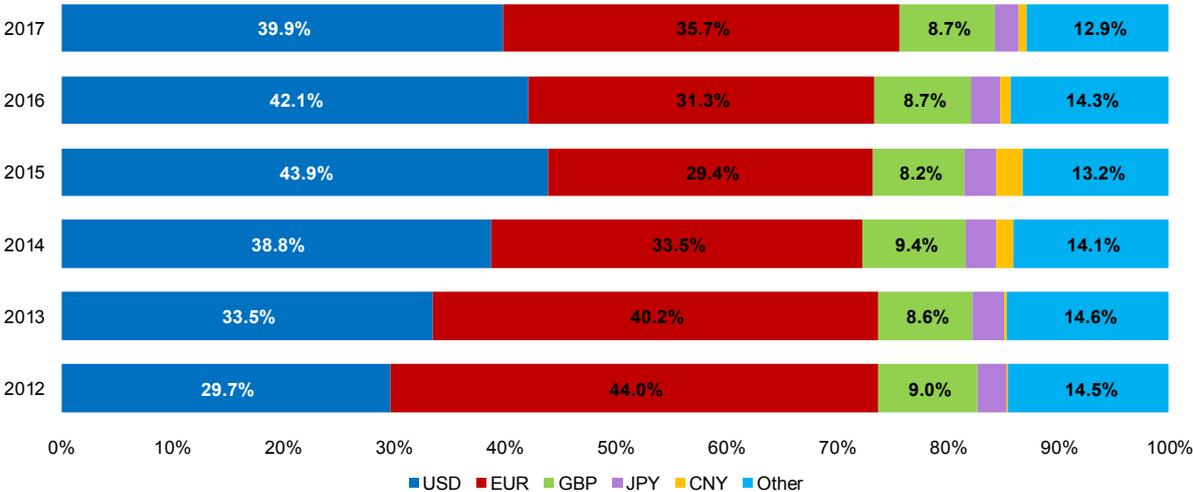
In his State of the Union Address of September 2018, President Juncker highlighted the strategic importance of the euro and called for action to make it play its full role on the global scene: ‘[The euro] is now the second most used currency in the world with 60 countries linking their currencies to the euro in one way or another. But we must do more to allow our single currency to play its full role on the international scene.’

Indeed, the euro has become the second most important international currency. It is a widely accepted currency for international payments: about 36% of the value of international transactions was invoiced or settled in euro in 2017, compared to about 40% for the US dollar. The euro accounts for around 20% of the foreign exchange reserves of central banks worldwide. Businesses and foreign governments use the euro for issuing debt: more than 20%

⁵⁰ New Financial (2019), *Brexit & the City — the impact so far*, March 2019.

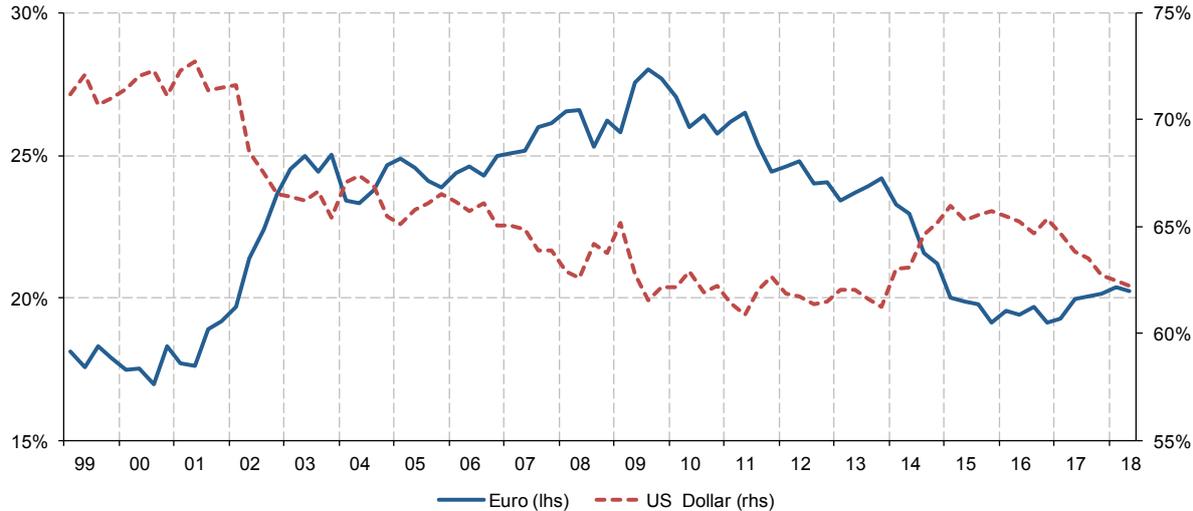
of debt issuance on international markets in 2017 was denominated in euro. In addition, around 60 countries are either using, will use, or link their currency to, the euro.

Chart 2.2: Currency composition of global payments



Source: SWIFT.

Chart 2.3: Currency composition of global foreign exchange reserves



Source: IMF. European Commission calculations.

However, further work is necessary. After the global financial crisis, the international use of the euro did not return to pre-crisis levels. For instance, the global share of foreign debt issuance denominated in euro reached a peak of 40% in 2007. It now stands slightly above 20%, close to its share in 1999.

The European Commission adopted its Communication ‘Towards a stronger international role of the euro’⁵¹ in December 2018 to secure the integrity and stability of the euro system and provide further opportunities for the euro’s international use. A wider international use of the euro can bring a number of benefits to the EU economy, including:

⁵¹ Towards a stronger international role of the euro, COM(2018) 796/4 of 5 December 2018.

- Lower costs and lower risks for European businesses, in particular for SMEs. Trading with foreign partners in euro rather than in other currencies will remove exchange rate risks and other currency-related costs.
- Better access to finance for European businesses and governments, even in periods of external financial instability, as European financial markets would become deeper, more liquid and integrated.
- Lower interest rates paid by European households, businesses and Member States, as a more attractive euro would reduce the interest rate demanded by investors.
- Stronger autonomy of European consumers and businesses, allowing them to make or receive cross-border payments, and finance themselves, with reduced exposure to legal actions taken by non-EU country jurisdictions, like extraterritorial sanctions.
- More choice for international market operators, and improved resilience of the international financial system and economy.

The Communication also proposes measures for a stronger single market such as the Banking Union and the CMU, thus consolidating the euro's international role and increasing the financial autonomy of the euro area. These measures aim to:

- make further use of European market infrastructure to widen the use of the euro in derivatives contracts;
- increase confidence in the euro-area financial markets by ensuring the availability of reliable interest-rate benchmarks, which play a key role as reference rates for many financial contracts;
- support a fully integrated instant payment system in the EU, in order to reduce risks and vulnerabilities for retail users of payment systems.

In addition, the Communication looks into policies with the potential to increase the use of the euro in foreign exchange markets, energy contracting and transactions in certain commodities and sectors, for example: oil and gas, raw materials, food commodities, and transport manufacturing — aircraft, maritime and railways.

Giving the euro a stronger international role will also require engaging more with international players, which includes encouraging closer collaboration among central banks to safeguard financial stability; increasing the share of euro-denominated debt held by European entities; fostering economic diplomacy to promote the euro; and providing technical assistance to improve the access of foreign entities to the euro payment system.

Market participants take their own decisions about what currency they use. The objective is not to interfere with this freedom, but rather to enhance their choice by making sure that the euro stands out as a strong and reliable alternative in all relevant aspects. The benefits of a greater international use of the euro, as reviewed above, come with increased global responsibilities. Although advantages clearly outweigh possible challenges, the consequences of an increased international use of the euro should be carefully calibrated.

2.4 Anti-money laundering

Money laundering and terrorist financing pose a risk to the stability and integrity of financial markets. Recent scandals have exposed certain vulnerabilities in the EU anti-money laundering (AML) framework. In particular, inadequate interaction between prudential and AML supervision, especially for the exchange of information and the coordination of actions between various authorities in a cross-border context, required immediate action at EU level.

On 19 June 2018, the 5th Anti Money Laundering Directive entered into force.⁵² Further, in September 2018, the Commission adopted a Communication, as well as a legislative proposal seeking to strengthen and centralise AML powers when dealing with the financial sector.⁵³ The proposal amends the September 2017 proposal to strengthen the European Supervisory Authorities (ESAs). It proposes to concentrate AML powers, which were previously spread across the three ESAs, in the hands of the European Banking Authority (EBA).⁵⁴ It also proposes to strengthen the EBA's existing mandate to ensure that all relevant authorities cooperate effectively, share information and consistently supervise the risks of money laundering. These measures thus aim to foster supervisory convergence and cooperation in this area. The co-legislators have politically agreed on the final legal text as an integral part of the European system of financial supervision (ESFS) review package. The agreed legislative text was voted by the European Parliament in April 2019.

The Communication sets out a wider agenda for preventing money laundering throughout the financial system. It envisages, in particular, specific short-term deliverables for national and European authorities and announces longer-term legislative considerations. In line with this Communication, the Economic and Financial Affairs Council (ECOFIN) adopted in December 2018 conclusions on an action plan to better tackle money laundering and terrorist financing, in which it invites the Commission and other relevant stakeholders to conduct more in-depth assessments of the recent money-laundering scandals, paving the way to further steps and required actions that would address remaining vulnerabilities in the system.

In parallel, in the context of negotiations of the banking package, a number of AML-related amendments to the CRD have been agreed by the co-legislators. The amendments have two main objectives: 1) enhance the cooperation and exchange of information between prudential supervisors, financial intelligence units and competent authorities for AML supervision; and 2) strengthen the AML dimension and ensure that it is properly factored in the core prudential tools: authorisation, fit and proper checks and supervisory review and evaluation process.

2.5 Retail financial services and payments

In 2018, the Commission adopted a legislative proposal extending the benefit of the Regulation on cross-border payments to all Member States. As a result, cross-border

⁵² 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.

⁵³ Communication on Strengthening the Union framework for prudential and anti-money laundering supervision for financial institutions, COM(2018) 645 final of 12 September 2018.

⁵⁴ Reinforcing integrated supervision to strengthen Capital Markets Union and financial integration in a changing environment, COM(2017) 542 final of 20 September 2017.

payments in euro will cost the same as domestic payments in the local currency of the Member State from which the cross-border payment originates. The Commission's proposal also seeks to increase the transparency of currency conversion charges, ensuring that consumers receive sufficient information about conversion rates and related costs. Following negotiations between the co-legislators, a political agreement was reached in December 2018. The legislative text was adopted in March 2019.

Throughout 2018, the Commission, together with the EBA and ECB, prepared and monitored the implementation of delegated acts under the Payment Services Directive (PSD2), which became applicable in January 2018, and will continue to do so also in 2019. One of the main delegated acts under PSD2 is the Commission Delegated Regulation⁵⁵ that sets regulatory technical standards for strong customer authentication and common and secure open standards of communication. This Delegated Regulation requires that payment service providers put in place the necessary measures to apply strong customer authentication to electronic payments at the point of sale or online.

2.6 FinTech

On 8 March 2018, the Commission adopted its FinTech action plan for a more competitive and innovative European financial sector, which sets out a number of legislative and non-legislative initiatives to ensure that the European financial sector remains innovative and competitive in the future.⁵⁶ The planned actions aim to contribute to three key policy goals: (i) enable innovative business models to reach EU scale; (ii) support the uptake of technological innovation in the financial sector; and (iii) enhance the security and integrity of the financial sector.

The FinTech action plan includes a proposal for a regulation for crowdfunding service providers, which was adopted by the Commission in March 2018 and is currently under negotiation. The European Parliament has adopted its first reading position in March 2019. In 2018, the Commission also undertook several non-legislative actions, such as creating the EU FinTech lab. It also set up an expert group to assess regulatory obstacles to financial innovation in EU legislation on financial services.⁵⁷ Based on the group's findings, the Commission will determine whether amendments to the current legislative framework are necessary.

Building on the European Supervisory Authorities (ESAs) joint report⁵⁸ with best practices for innovation facilitators issued in January 2019, the Commission decided to help the ESAs develop closer cooperation and coordination between the existing innovation hubs and regulatory sandboxes, in particular, in the context of the future European network of innovation facilitators. In the FinTech action plan, the ESAs were invited to assess the

⁵⁵ Delegated Regulation (EU) 2018/389 of 27 November 2017 supplementing Directive (EU) 2015/2366 of the European Parliament and of the Council.

⁵⁶ FinTech action plan: For a more competitive and innovative European financial sector, COM(2018) 109/2 of 8 March 2018.

⁵⁷ See https://ec.europa.eu/info/law/law-topic/eu-banking-and-financial-services-law_en#financial-supervision-and-risk-management. This does not include Directive (EU) 2015/849 as amended by Directive (EU) 2018/843.

⁵⁸ <https://www.esma.europa.eu/press-news/esma-news/esas-publish-joint-report-regulatory-sandboxes-and-innovation-hubs>

suitability and applicability of existing legislation for crypto-assets and initial coin offerings (ICOs). Based on their recently published advice⁵⁹, and its own monitoring and work with other standard setters, this could lead to considering an EU experimentation framework for adopting and adapting to new technologies. Finally, the Commission invited the ESAs to map the existing supervisory practices across sectors around ICT security and governance requirements and provide their advice on the need for legislative amendments.

2.7 Sustainable finance

The Commission has set out an ambitious programme to act promptly⁶⁰ on climate change and on advancing the UN Sustainable Development Goals (SDGs). The action plan on financing sustainable growth (see Box 5) is an important part of this comprehensive Commission strategy.⁶¹ Overall, policy actions are required to mitigate possible radical consequences to the EU ecosystem and economy. Private capital need to be oriented to sustainable investments in order to help bridging the prevailing investment gap associated with reaching a climate-neutral Europe by 2050.⁶² Climate change also poses risks to the financial system's stability (see Box 6).

In May 2018, the Commission made three legislative proposals:

- (1) A regulation on the establishment of a framework to facilitate sustainable investment.⁶³ On that basis, the Commission will be able to develop labels for 'green financial products' and set differentiated disclosure and reporting obligations for financial institutions and companies;
- (2) A regulation on disclosures relating to sustainable investments and sustainability risks, amending Directive (EU) 2016/2341⁶⁴;
- (3) A regulation amending Regulation (EU) 2016/1011 and establishing two new categories of low carbon benchmarks and increasing transparency and prevention of 'greenwashing'.⁶⁵

The European Parliament and the Council reached a political agreement on the creation of the 'EU climate transition benchmark' and the 'EU Paris-aligned benchmark' in February 2019.

⁵⁹ <https://www.esma.europa.eu/press-news/esma-news/crypto-assets-need-common-eu-wide-approach-ensure-investor-protection>; and <https://eba.europa.eu/documents/10180/2545547/EBA+Report+on+crypto+assets.pdf>.

⁶⁰ The need for prompt action follows from the fact that the current economic trajectory would lead to a global temperature increase between 3 °C to 3.5 °C while the recent report of the Intergovernmental Panel on Climate Change calls for capping global warming at 1.5 °C. The IPCC also indicates that carbon emissions need to drop to net zero by 2050. For further details, see IPCC (2018), *Global Warming of 1.5 °C*, 8 October 2018.

⁶¹ The EU has put in place its climate, energy and broader sustainability policy, with, for example, the 2030 climate and energy framework, the 2016 clean energy package and the 2018 circular economy package, and a long-term vision on a climate-neutral Europe by 2050.

⁶² In order to reach a climate-neutral Europe by 2050, the investment gaps may even be as high as EUR 175-290 billion per annum. This estimate is based on PRIMES model projections that are, for instance, used in *A Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy*, COM(2018) 773 final of 28 November 2018.

⁶³ COM(2018) 353 final of 24 May 2018.

⁶⁴ COM(2018) 354 final of 24 May 2018.

⁶⁵ COM(2018) 355 final of 24 May 2018.

The European Parliament voted the agreed legislative text in first reading in March 2019.⁶⁶ The two new benchmark categories are voluntary labels aimed at helping investors who prefer to follow a climate-conscious investment strategy.

Box 5: Action plan on financing sustainable growth

In March 2018, the Commission adopted its action plan on financing sustainable growth that sets out a comprehensive EU strategy on how the financial sector could support the transition towards a climate-neutral, circular and inclusive economy.⁶⁷

The action plan is built around three policy goals: (i) manage financial risks stemming from climate change, resource depletion, environmental degradation and social issues; (ii) reorient capital flows towards sustainable investments in order to achieve sustainable and inclusive growth; and (iii) foster transparency and long-termism in financial and economic activity. To achieve these goals, the action plan sets out 10 actions:

1. Establish a common language: a unified EU classification system ('taxonomy') to define which economic activities are sustainable and help investors identify areas where their sustainable investment can make the biggest impact;
2. Create standards and labels for green financial products, allowing investors to easily identify investments that comply with green or low-carbon criteria and thus reducing greenwashing risks;
3. Improve the efficiency and impact of public instruments mobilising sustainable investment;
4. Incorporate sustainability in investment advice, requiring insurance and investment firms to advise clients on the basis of their preferences on sustainability;
5. Develop sustainability benchmarks and enhance their transparency;
6. Better integrate sustainability in ratings and market research;
7. Clarify institutional investors' and asset managers' duties: ensure they take sustainability into account in their investment decisions process and enhance their disclosure requirements;
8. Incorporate sustainability in prudential requirements, including a green supporting factor when it is justified from a risk perspective to safeguard financial stability;
9. Enhance transparency in corporate reporting, revising the guidelines on disclosure of non-financial information with regard to climate-related information;
10. Foster sustainable corporate governance and attenuate undue short-termism in capital markets.

The political agreement on sustainable investment disclosure rules was reached in March 2019. The agreed legislative text was voted in first reading by the European Parliament in April 2019. The new Regulation will strengthen the disclosure of information towards end-investors by requiring disclosures on the integration of sustainability risks by manufacturers

⁶⁶ In the agreement, the co-legislators also granted providers of 'critical benchmarks' (i.e. interest rates such as Euribor or EONIA) two extra years (until 31 December 2021) to comply with the new Benchmark Regulation requirements. They also agreed on extending the period for mandatory contributions/administration to five years. Given the crucial importance of third-country benchmarks for EU market participants, the agreement also covers a two-year extension of the transitional period for third-country benchmarks. Hence, these benchmarks may continue to be used in the Union without the need for an equivalence decision by the Commission, an endorsement or recognition decision until end-2021.

⁶⁷ Following this action plan, 'sustainable finance' is defined as the process of taking due account of environmental and social considerations in investment decision-making, leading to increased investments in longer-term and sustainable activities. More specifically, environmental considerations refer to climate change mitigation and adaptation, as well as the environment more broadly and related risks (e.g. natural disasters). Social considerations refer to issues of inequality, inclusiveness, labour relations, investment in human capital and communities. Governance refer to the governance of public and private institutions, including management structures, employee relations and executive remuneration.

of financial products and financial advisers in their investment processes and disclosures of financial products with a sustainable investment objective (or products with similar characteristics). The co-legislators also added obligations on the disclosure of adverse sustainability impacts at entity and product level.

Box 6: Sustainable finance and financial stability

Climate change poses risks to the financial system's stability.⁶⁸ Policy action to address the effects of climate change is essential given the high cost of inaction.⁶⁹ At the same time, concerns have been raised over possible macro-financial risks during the transition towards a more sustainable economy. The main concern is that certain assets in the energy and fossil-fuel sector, as well as in related sectors such as airlines, manufacturing, the automotive industry or real estate and ultimately banking and insurance stocks, could be subject to a sudden repricing given that potential climate-related restrictions are not yet fully priced in. Individual and institutional investors are particularly vulnerable through their equity and bond portfolios or commodity positions. The banking sector is exposed to carbon risks through its loan portfolio, energy companies are directly exposed, while the insurance sector is exposed on both the liabilities and assets side.⁷⁰

The magnitude of the risks depends largely on: (i) the speed and the abruptness of environment-related asset re-pricing, (ii) the exact magnitude of the financial sector's exposure to these assets and (iii) the extent to which these changes are anticipated. Among attempts to analyse the resilience of the EU financial system to such risks, Weyzig *et al.* (2014) quantify the exposure in high-carbon assets of 43 of the EU's largest banks, insurance companies and pension funds and calculate their potential losses under various scenarios. The results suggest that exposures for EU pension funds were approximately 5% of their total assets, for banks 1.3% of their total assets and for insurance companies 4.4% of their total assets. Battiston *et al.* (2017) find that the direct equity portfolio exposures of financial players to the fossil-fuel sector are limited but that the exposures to all climate-policy-relevant sectors are large (that is, ranging from 45.2% for insurance and pension funds to 47.7% for governments). They highlight the importance of indirect exposures (for example, pension funds hold significant exposures in equity shares of investment funds and in bonds and loans to banks). Studies have also been conducted at national level to measure the possible impact of climate-related risks on the financial system.⁷¹

Regulators and policy makers are paying greater attention to environmental issues in line with the growing awareness of climate risk. Financial markets, however, do not seem to have yet fully priced in climate risk. One reason could be the still high degree of uncertainty over the implementation of more constraining climate policies across the globe. The European

⁶⁸ Two types of climate-related risks to the financial system are usually listed. Physical risks denote the direct climate-related risks for the financial system and real economy, e.g. the implications of rising sea levels or more extreme weather conditions. Transition risks denote the risks associated with the transition from a carbon-centred to low-carbon economy, e.g. the loss in value of carbon-intensive assets that become stranded because of the transition.

⁶⁹ Weyzig, *et al.* (2014).

⁷⁰ The actions of the Commission's action plan on financing sustainable growth (see Box 5) that aim at incorporating sustainability considerations into the investment and underwriting practices of insurance and reinsurance companies will further consolidate the prudential framework for the insurance sector. Note that a broader review of the Solvency II Directive is due in 2020.

⁷¹ See e.g. Bank of England (2015), *The impact of climate change on the UK insurance sector — A climate change adaptation report by the Prudential Regulation Authority*, September 2015; Bank of England (2016), *Transition in thinking: the impact of climate change on the UK banking sector*, September 2018; Banque de France and ACPR (2015), *Evaluating climate change risks in the banking sector*; De Nederlandsche Bank (DNB) (2016), *Time for transition — an exploratory study of the transition to a carbon-neutral economy*. DNB Occasional Studies, 14-2; DNB (2017), *Waterproof? An exploration of climate-related risks for the Dutch financial sector*, November 2017.

Commission's sustainable finance action plan⁷² is meant to eliminate some of this uncertainty. European institutions such as the ECB support these efforts.⁷³

In order to raise greater awareness and improve climate-related risk assessments (including possible financial stability implications), work is ongoing at European⁷⁴ and international⁷⁵ level to develop suitable methodologies and improve data availability. Reliable financial data, both at asset-level, company-level and aggregate level is essential to perform sound analyses. In terms of methodologies, work usually distinguishes between physical and transition risks from climate change. Unlike transition risks (described in the first paragraph of this box), physical risks result directly from the impact of climate and weather events and from subsequent events, such as supply chain disruption, resource scarcity, financial market disruptions. Generally speaking, a company with a higher negative impact on the climate will be more exposed to transition risks, whereas the exposure of a company to physical risks does not directly depend on whether or not that company has a negative impact on the climate. Among several techniques proposed, a climate scenario analysis could help in understanding the economic and financial implications of various climate transition trajectories. Climate stress tests assess the resilience of the economy and the financial system under extreme assumptions.

On the taxonomy proposal, discussions are still on-going. The European Parliament adopted its first reading position in March 2019. The Commission continues to work closely with the co-legislators to make tangible progress on the proposal in the upcoming months.

In June 2018, the Commission set up the Technical Expert Group on Sustainable Finance (TEG) to assist it in developing: a taxonomy to identify economic activities that are environmentally sustainable; an EU Green Bond Standard; benchmarks for low-carbon investment strategies; and guidance to improve corporate disclosure of climate-related information. Building on the TEG work on climate-related disclosure, the Commission published a consultation document on the revision of the guidelines on non-financial reporting, specifically with regard to climate-related information. In practice, the update is expected to consist of a new supplement to the existing guidelines to be published by the Commission in June 2019. Incorporating the recommendations of the international Task Force on Climate-related Financial Disclosures (TCFD), the update could contain disclosures on a company's impact on climate change and on how climate change might influence a company's performance. This supplement will provide further guidance to companies on how to comply with the disclosure requirements for climate-related information under the Non-Financial Reporting Directive.

⁷² See Box 5 for a discussion on the Commission's action plan for financing sustainable growth, adopted in March 2018.

⁷³ See e.g. Cœuré, B. [Member of the Executive Board of the European Central Bank] (2018), *Monetary policy and climate change*. Speech at a conference on 'Scaling up Green Finance: The Role of Central Banks', Berlin, 8 November 2018.

⁷⁴ See e.g. the work coordinated by the ESRB. Also see ESRB (2016), *Too late, too sudden: Transition to a low-carbon economy and systemic risk*, Reports of the Advisory Scientific Committee, No 6, February 2016.

⁷⁵ E.g. work by the *Supervisors' Network for Greening the Financial System* to improve knowledge on the transmission channels between climate-related risks, the financial system and the macro-economy and to develop transition scenarios; work by *FSB's Task Force on Climate-related Financial Disclosures*.

The Commission is actively working with the European Supervisory Authorities (ESAs) to assess the sustainability risks to insurance and investment sectors and consider potential changes to the relevant sectoral legislation. In this respect, in July 2018, the Commission sent a request for technical advices to EIOPA and ESMA. During 2018, the Commission also initiated preparatory studies on the use of the Eco-label in the financial services sector.

On 1 February 2019, the Commission called on the ESAs to assess whether there is undue short-term pressure from the financial sector on corporations. Based on the reports prepared by the ESAs, the Commission will consider whether further steps are needed to ensure that investors and issuers take into account long-term risks. In complementarity, the Commission is also undertaking consultative and analytical work to foster less abusive, more long-term and sustainable corporate behavior. Through two independent studies, in the course of 2019, the Commission will assess the possible need to require corporate boards to develop and disclose a sustainability strategy, appropriate due diligence throughout the supply chain, as well as measurable sustainability targets. It will also look into the need to redefine or clarify the term of the company's interest in which corporate board members are expected to act.

Table 2.1: Legislative proposals adopted in 2018

General objective	Legislative proposals adopted in 2018	Serial number	Adoption date
Capital Markets Union	Proposal for a Regulation of the European Parliament and of the Council on amending Regulation (EU) No 575/2013 as regards exposures in the form of covered bonds	COM(2018) 92	12/03/2018
Capital Markets Union	Proposal for a Regulation of the European Parliament and of the Council on amending Regulation (EU) No 575/2013 as regards exposures in the form of covered bonds	COM(2018) 93	12/03/2018
Capital Markets Union	Proposal for a Directive of the European Parliament and of the Council on the issue of covered bonds and covered bond public supervision and amending Directive 2009/65/EC and Directive 2014/59/EU	COM(2018) 94	12/03/2018
Capital Markets Union	Proposal for a Directive of the European Parliament and of the Council amending Directive 2014/65/EU on markets in financial instruments	COM(2018) 99	08/03/2018
Capital Markets Union	Proposal for a Regulation of the European parliament and of the Council on the law applicable to the third-party effects of assignments of claims	COM(2018) 96	12/03/2018
Capital Markets Union	Proposal for a Regulation of the European Parliament and of the Council on facilitating cross-border distribution of collective investment funds and amending Regulations (EU) No 345/2013 and (EU) No 346/2013	COM(2018) 110	12/03/2018
Capital Markets Union	Proposal for a Regulation of the European Parliament and of the Council on European Crowdfunding Service Providers (ECSP) for Business	COM(2018) 113	08/03/2018
Banking Union	Proposal for a Regulation of the European Parliament and of the Council on amending Regulation (EU) No 575/2013 as regards minimum loss coverage for non-performing exposures	COM(2018) 134	14/03/2018
Banking Union	Proposal for a Directive of the European Parliament and of the Council on credit servicers, credit purchasers and the recovery of collateral	COM(2018) 135	14/03/2018
Capital Markets Union	Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EC) No 924/2009 as regards certain charges on cross-border payments in the Union and currency conversion charges	COM(2018) 163	28/03/2018
Capital Markets Union	Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) No 596/2014 and (EU) 2017/1129 as regards the promotion of the use of SME growth markets	COM(2018) 331	24/05/2018

Capital Markets Union	Proposal for a Directive of the European Parliament and of the Council amending Directive 2009/103/EC of the European Parliament and the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to ensure against such liability	COM(2018) 336	24/05/2018
Banking Union	Proposal for a Regulation of the European Parliament and of the Council on sovereign bond-backed securities	COM(2018) 339	24/05/2018
Sustainable finance	Proposal for a Regulation of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investment	COM(2018) 353	24/05/2018
Sustainable finance	Proposal for a Regulation of the European Parliament and of the Council on disclosures relating to sustainable investments and sustainability risks and amending Directive (EU) 2016/2341	COM(2018) 354	24/05/2018
Sustainable finance	Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2016/1011 on low carbon benchmarks and positive carbon impact benchmarks	COM(2018) 55	24/05/2018
Capital Markets Union	Amended proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority); Regulation (EU) No 1094/2010 establishing a European Supervisory Authority (European Insurance and Occupational Pensions Authority); Regulation (EU) No 1095/2010 establishing a European Supervisory Authority (European Securities and Markets Authority); Regulation (EU) No 345/2013 on European venture capital funds; Regulation (EU) No 346/2013 on European social entrepreneurship funds; Regulation (EU) No 600/2014 on markets in financial instruments; Regulation (EU) 2015/760 on European long-term investment funds; Regulation (EU) 2016/1011 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds; Regulation (EU) 2017/1129 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market; and Directive 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing.	COM(2018) 646	12/09/2018

Source: European Commission.

Note: Data from 1 January 2018 to 30 April 2019.

Table 2.2: Legislation agreed with co-legislators in 2018/2019

General objective	Political agreement reached in 2018/2019	Serial number	Date of political agreement
Banking Union	Capital Requirements amending Regulation (CRR)	COD/2016/360	04/12/2018
Banking Union	Single Resolution Mechanism amending Regulation (SRMR) Resolution	COD/2016/361	04/12/2018
Banking Union	Bank Recovery and Resolution amending Directive (BRRD)	COD/2016/362	04/12/2018
Banking Union	Capital Requirements amending Directive (CRD)	COD/2016/364	04/12/2018
Banking Union	Regulation amending CRR on minimum loss coverage for non-performing exposures	COD/2018/60	18/12/2018
Capital Markets Union	EMIR: Refit amendment — Regulation	COD/2017/90	05/02/2019
Capital Markets Union	Pan-European Personal Pension Product Regulation	COD/2017/143	13/12/2018
Banking Union	Location of the seat of EBA	COD/2017/326	25/11/2018
Capital Markets Union	Prudential requirement of investment firms amending Regulation	COD/2017/359	26/02/2019
Capital Markets Union	Prudential supervision of investment firms amending Directive	COD/2017/358	26/02/2019
Capital Markets Union	CMU — Exposures in the form of covered bonds Regulation	COD/2018/42	26/02/2019
Capital Markets Union	CMU — covered bonds and covered bond public supervision Directive	COD/2018/43	26/02/2019
Capital Markets Union	CMU — facilitating cross-border distribution of collective investment funds	COD/2018/45	05/02/2019
Capital Markets Union	CMU — Amendment to UCITS and AIFM Directives with regard to cross-border distribution of collective investment funds	COD/2018/41	05/02/2019
Banking Union	SEPA — Amendment to cross-border payments Regulation	COD/2018/76	19/02/2019
Sustainable finance	Low carbon benchmarks and positive carbon impact benchmarks amending Regulation (EU) 2016/1011	COD/2018/180	25/02/2019
Sustainable finance	Regulation on sustainability-related disclosures in the financial services sector	COD/2018/179	07/03/2019
Capital Markets Union	Promotion of the use of SME growth markets amending Regulations (EU) No 596/2014 and (EU)2017/1129	COD/2018/165	06/03/2019

Source: European Commission.

Note: Data from 1 January 2018 to 30 April 2019.

Chapter 3 ENSURING THE SMOOTH FUNCTIONING OF DECENTRALISED MACRO-PRUDENTIAL POLICY IN A SINGLE MARKET

This chapter describes the decentralised set-up of the EU macro-prudential policy framework. It analyses the rationale behind and functioning of this framework and describes how macro-prudential tools have until now been implemented in the EU.

Macro-prudential policy is the use of primarily prudential tools to limit systemic risk and safeguard financial stability. Systemic risk refers to the risk of a widespread disruption to the provision of financial services caused by an impairment of the financial system or parts of it, and which can have serious negative consequences for the real economy and for the functioning of the internal market. Macro-prudential policies may either focus on mitigating the impact of a risk materialising by making the financial system more resilient or on reducing the risk identified.

The macro-prudential framework complements the micro-prudential framework, which focuses on the soundness of individual financial institutions or markets. By providing a systemic perspective, it aims to correct externalities that are not tackled by micro-prudential supervisors. It has clearly defined financial stability objectives, specific instruments and dedicated institutions.

Macro-prudential policy is a relatively new addition to the EU regulatory framework. The EU macro-prudential framework has been established in the wake of the global financial crisis.⁷⁶ The EU macro-prudential policy framework consists of three ‘building blocks’: (i) the European Systemic Risk Board (ESRB), set up in December 2010⁷⁷; (ii) macro-prudential instruments enshrined in EU legislation and common to all Member States⁷⁸, which have been recently improved (see Box 7); and (iii) national authorities and the European Central Bank/Single Supervisory Mechanism (ECB/SSM), which are responsible for the implementation of macro-prudential instruments.⁷⁹

The macro-prudential framework in the EU is to a significant extent decentralised. National authorities identify risks at the level of the Member State (either on the basis of exposures, or institutions under their jurisdiction) and may implement macro-prudential measures within the remit of their jurisdiction. Unlike micro-prudential regulation, which is to a great extent based

⁷⁶ For an analysis of the causes of the crisis, see the Economic Review of the Financial Regulation Agenda (EFRA), COM SWD(2014) 158 final of 15 May 2014.

⁷⁷ ESRB governance and institutional arrangements are introduced by means of two Regulations: (i) Regulation (EU) No 1092/2010 of the European Parliament and of the Council of 24 November 2010 on European Union macro-prudential oversight of the financial system and establishing a European Systemic Risk Board; and (ii) Council Regulation (EU) 1096/2010 of 17 November 2010 conferring specific tasks upon the European Central bank concerning the functioning of the European Systemic Risk Board.

⁷⁸ Given the bank-centric nature of the EU’s financial system and the role of the banks in the EU financial system crisis, the macro-prudential toolbox has been developed primarily to address risks in the banking sector. Macro-prudential instruments to address risks in banking have been available since January 2014 and were introduced through the Capital Requirements Regulation and Capital Requirements Directive IV (CRD IV/CRR): (i) Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012; and (ii) Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC.

⁷⁹ ECB/SSM macro-prudential competences in the Banking Union implemented through Article 5 of the SSM Regulation: Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions.

on a single rule book of regulatory requirements, not all instruments in the EU macro-prudential policy framework need to be transposed at national level. Furthermore, those that are mandatory can be applied with some discretion in accordance with specific national situations and circumstances. Separately, several Member States have introduced additional macro-prudential instruments under national law, which are not in the EU macro-prudential policy framework.

Such a decentralised set-up is justified on the basis that systemic risks are often local or national in scope and interrelate with specific national situations. This implies that national authorities are well placed to identify financial stability risks and to effectively address them. Also, the costs of systemic risks materialising at national level will be largely national.

As financial markets become more integrated, the decentralised nature of the framework may, however, be called into question and give rise to two considerations:

- *The sources of risk may lie outside of the Member State concerned:* national authorities have limited jurisdiction and may be unable to address all sources of the risk in an effective manner.
- *The cost of a measure is partially borne outside of the Member State concerned:* by definition, a macro-prudential measure implies a cost, which is justified by the benefits generated in terms of financial stability. Where financial institutions are active on a cross-border basis, however, these costs are not necessarily borne domestically, and may potentially cause unintended spillovers in other countries.

The EU macro-prudential framework comprises mechanisms to address the challenges posed by its decentralised nature. It has: (i) a reciprocation framework, in which the ESRB plays an important role, which allows domestic risks to be addressed by contributing to the effectiveness of a measure; and (ii) safeguards and coordination mechanisms enshrined in the governance of each instrument, which ensure that undue adverse cross-border effects are avoided or minimised.

An additional level of coordination also exists for Member States who are part of the Banking Union. Most of this coordination is done within the institutional framework of the ECB/SSM and its relations with national authorities.⁸⁰

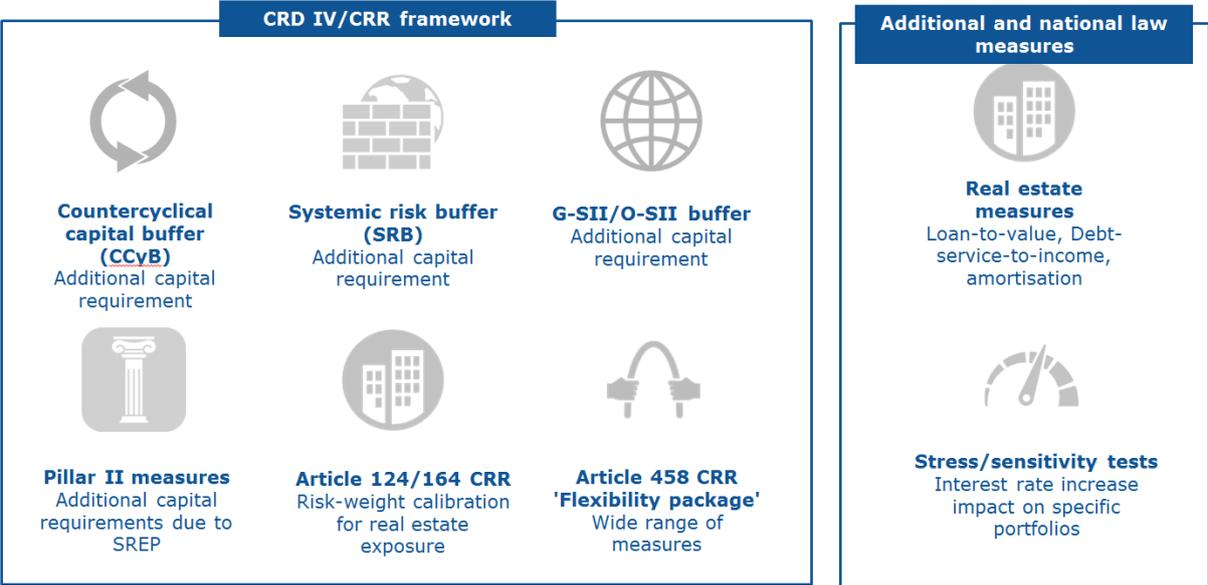
3.1 The macro-prudential toolbox for the EU banking sector

The macro-prudential instruments provided for in the CRD IV/CRR apply to banks and mainly consist in requirements to increase capital buffers to strengthen banks' resilience vis-à-vis a given cyclical or structural systemic risk. The effect of measures on the risk itself is typically of secondary order. Some of the instruments included in the EU framework are

⁸⁰ Within the Banking Union, the ECB/SSM has become the European competent authority for the banks it directly supervises and it has only become a designated authority at the national level for the same banks on macro-prudential matters. This change of responsibilities has implications for the activation of some instruments that provide for a priority of measures that are no longer under the responsibility of the same (national) authority. Moreover, there are still also competent and designated authorities at the national level, which further increases the need for proper coordination and information sharing, in particular for the macro-prudential instruments of the CRD V/CRR II that are in the hands of competent authorities.

based on international standards set by the Basel Committee of Bank Supervision (the Basel III framework), while others are EU-specific.

Figure 3.1: Macro-prudential policy toolbox available to Member States



Source: European Commission.
 Note: Following changes to the macro-prudential provisions in CRDV/CRRII, made in the context of the banking package adopted in April 2019, pillar II will no longer be part of the macro-prudential toolbox (see Box 7).

3.1.1 The macro-prudential instruments

The countercyclical capital buffer (CCyB) is a time-varying capital buffer, allowing resilience in the banking system to be strengthened during periods of strong credit growth and to release buffer requirements in a downturn in support of the economy. The setting of the CCyB rate each quarter follows the principle of ‘guided discretion’: on the basis of the deviation of the ratio of credit-to-GDP ratio from its long-term trend (‘credit-to-GDP gap’), national authorities calculate a reference rate, which serves as a guide (‘buffer guide’) in setting the CCyB rate. The CCyB rate is institution-specific in the sense that individual banks calculate it as an average of CCyB rates, weighted by the respective exposure shares to their risks in different countries.

The global systemically important institutions (G-SII) buffer and the other systemically important institutions (O-SII) buffer, respectively, are used to address risks posed by banks of systemic importance (‘too big to fail’). Both instruments are included in the Basel III framework. G-SIIs are determined on the basis of a set of harmonised criteria (size, interconnectedness with the financial system, ease of substitutability of services, complexity, and cross-jurisdictional activities). The O-SII buffer can be imposed on domestically important institutions which may pose a risk for the economy of the relevant Member State or the EU. The criteria to determine O-SIIs differ slightly from the G-SII-criteria. They provide for more flexibility and allow Member States to better capture specific features of national banking systems.

Table 3.1: Key features of macro-prudential instruments

Instrument	Type	Focus	Activation/Identification	Authority	Reciprocity
Articles 124/164 CRR	Exposure-based Cyclical	<ul style="list-style-type: none"> ▪ Higher risk weights (124 CRR) for standardised approach or higher LGD (164 CRR) for the internal ratings-based (IRB) approach; ▪ Reference should be ‘financial stability considerations’ (in line with regulatory technical standards (RTS)) 	Setting by national authorities in line with notification and consultation requirements with EBA	Competent authority	Mandatory
Countercyclical capital buffer (Articles 130, 135-140 CRD IV)	Exposure-based (system-wide) Cyclical	<ul style="list-style-type: none"> ▪ Additional capital buffer that is frequently adjusted over time (quarterly); ▪ Buffer is applicable to all domestic exposures 	<ul style="list-style-type: none"> ▪ Activation in line with the principle of ‘guided discretion’: common starting reference guide, principles and disclosure requirements as guidance for national authorities on buffer rates 	Designated authority	Mandatory up to 2.5%; voluntary > 2.5%
G-SII buffer (Article 131 CRD IV)	Institution-specific Structural	<ul style="list-style-type: none"> ▪ Additional capital add-on (between 1-3.5% RWA) for global systemically important institutions (at consolidated level); ▪ Ceiling to combination with SyRB 	<ul style="list-style-type: none"> ▪ Common methodology (RTS) for identifying G-SIIs reflecting size, interconnectedness, complexity, and cross-border linkages; allocation in 5 different sub-categories; ▪ Revision of identification annually 	Competent or designated authority	Not applicable
O-SII buffer (Article 131 CRD IV)	Institution-specific Structural	<ul style="list-style-type: none"> ▪ Additional capital add-on up to 2% RWA for other systemically important institutions (sub-consolidated or consolidated level); ▪ Limitation for add-on of subsidiaries of G-SIIs; ▪ Ceiling to combination with SyRB 	<ul style="list-style-type: none"> ▪ Common methodology (EBA guidelines) for identifying O-SIIs reflecting size, importance to the economy, cross-border linkages, and interconnectedness; ▪ Revision of identification at least annually 	Competent or designated authority	Not applicable
Pillar 2 measures (Articles 103 and 105 CRD IV)	Institution-specific/exposure-based Cyclical/structural	<ul style="list-style-type: none"> ▪ Considering ‘systemic risks’ in the SREP 	<ul style="list-style-type: none"> ▪ No specific activation procedures; measures are not public 	Competent authority	Not applicable/ voluntary

Systemic risk buffer (Articles 133 and 134 CRD IV)	Institution-specific/(exposure-based) Structural	<ul style="list-style-type: none"> ▪ Additional capital buffer to cover long-term non-cyclical risks (at solo, sub-consolidated or consolidated level) with a minimum level of 1% RWA; ▪ Applicable to (all) domestic and/or foreign exposures (not clear whether also applicable to a subset of exposures); ▪ Ceiling for combination with G-SII/O-SII buffer(s) 	<ul style="list-style-type: none"> ▪ Setting of SyRB in line with notification requirements and only after other measures (except 458 CRR) have been employed; ▪ SyRB between 3-5% RWA requires previous Commission approval, a SyRB of greater than 5% RWA only applicable to domestic exposures; <p>Revision at least every second year.</p>	Competent or designated authority	Voluntary; reciprocity might be difficult as introduction of SyRB in national legal framework is not mandatory
Article 458 CRR	Institution-specific/exposure-based Cyclical/structural	<ul style="list-style-type: none"> ▪ National measures to address risks not covered by other EU instruments in the following areas: <ul style="list-style-type: none"> i. Additional (institution-specific) capital requirements; ii. Tighter requirements for large exposure limitations; iii. Further disclosure requirements; iv. Adjusting the level of the capital conservation buffer; v. Tighter liquidity requirements; vi. Adjustment in risk weights for residential and/or commercial real estate; vii. Intra financial exposures. 	<ul style="list-style-type: none"> ▪ Complex approval process including mandatory opinions from ESRB and EBA and non-objection from Commission and Council; ▪ Only notification requirements for an increase in risk weights for real estate and intra financial sector exposures up to 25% and a tightening of large exposure limits by up to 15% for a period of up to 2 years (shorter if systemic risks cease earlier); ▪ Measures only allowed up to 2 years (shorter if systemic risks cease earlier); extension possible. 	Competent or designated authority	Voluntary

Source: European Commission.

Note: Following changes to the macro-prudential provisions in CRDV/CRR II, made in the context of the banking package adopted in April 2019, pillar 2 will no longer be part of the macro-prudential toolbox (see Box 7).

Under CRD IV, the systemic risk buffer (SyRB) allows the authorities to address long-term non-cyclical systemic or macro-prudential risks that cannot adequately be addressed by other macro-prudential instruments. This latter condition makes the SyRB a residual instrument. This broad scope of application of the SyRB and the absence of a precise definition for ‘structural systemic risk’ has provided some discretion to national authorities. National authorities can apply the SyRB to one or more subsets of the financial sector at consolidated, sub-consolidated or individual level. Furthermore, they can apply it to different sets of exposures, based on their geographical location. Under CRD V, the scope of the SyRB has been more clearly defined (see Box 7), removing its residual character.

The CRR provides for instruments to address real estate-related risks.⁸¹ In particular, national authorities may set higher risk weights (up to 150%) for the calculation of solvency ratios or impose stricter loss given default (LGD) parameters for exposures secured by mortgages on immovable property.

National flexibility measures are a special set of measures allowing national authorities to impose stricter prudential requirements to address systemic risks.⁸² They include the level of own funds, large exposure limits, public disclosure requirements, the level of the capital conservation buffer, liquidity requirements, risk weights for the residential and commercial real estate sectors, and measures for intra-financial sector exposures. These flexibility measures may only be used if national authorities can establish that a measure is necessary, effective and proportionate. Such measures may only be implemented where national authorities consider that no other measure specified in the common macro-prudential framework can adequately address the systemic risk, and thus have a residual character.

Finally, under existing EU banking legislation (CRD IV), the macro-prudential framework allows the use of pillar 2 measures for macro-prudential purposes. Under the forthcoming CRD V, the use of pillar 2 will exclusively be based on institution-specific considerations (see Box 7).

Box 7: Upcoming changes to the macro-prudential instruments in EU banking legislation⁸³

In December 2018, the Council and the European Parliament agreed to amend the Capital Requirements Regulation and Directive (CRR/CRD IV), as part of a broader overhaul of the EU’s prudential and resolution rules for banks. This ‘banking package’ (see Chapter 2 for details) also includes the targeted improvements to the macro-prudential instruments in CRR/CRD IV⁸⁴ described below.

Clarification of the scope in the use of the systemic risk buffer and the O-SII buffer

The scope of the SyRB is clarified, making it possible to apply it to sectoral exposures in a flexible manner. While the SyRB will remain applicable on all (domestic or foreign) exposures, it will now also be possible for authorities to apply it to individual sectors, allowing for a more

⁸¹ On the basis of Articles 124 and 164 CRR.

⁸² National flexibility measures can be activated on the basis of Article 458 CRR.

⁸³ See also ‘Upcoming changes to the macroprudential provisions in CRR/CRD4’ in ESRB (2019), *A Review of Macroprudential Policy in the EU in 2018*, April 2019.

⁸⁴ The new macro-prudential provisions will enter into force 20 days after their publication in the Official Journal and will start to apply only 18 months after their entry into force.

targeted use of the instrument.⁸⁵ The flexible application of the SyRB to sectoral exposures is further facilitated by the removal of the reference to ‘long-term non-cyclical’ systemic risks.

The caps on the O-SII buffer rate for both parent institutions and subsidiaries are raised. For the parent institution the cap is raised from 2% to 3%, and may be exceeded under certain conditions if duly justified. A higher cap has also been introduced for O-SII subsidiaries. These higher caps will grant authorities more flexibility in calibrating the O-SII buffer rates to the intensity of the risk posed by the systemic importance of individual O-SIIs. It should also end the observed practice of using the SyRB to overcome the caps on the O-SII buffer, thus ensuring that national authorities will use the most appropriate instrument to target risks stemming from systemic importance of banks. To complement this, the possibility to address risks stemming from systemically important institutions is explicitly excluded from the scope of the SyRB. This will improve the clarity and consistency of the overall macro-prudential framework.

The clearer scope of the different instruments strengthens the complementary nature of the macro-prudential toolkit. The clarifications of the scope of the respective instruments implies that the SyRB and G-SII/O-SII buffers will necessarily be used to target separate risks and are consequently made additive, removing the ‘higher-of-rule’ where only the higher buffer rate was binding. An overall cap of 5% for the cumulative SyRB and O-SII/G-SII buffer rates will, however, act as a safeguard to avoid excessive overall buffer requirements. This overall cap may only be exceeded in specific and duly justified circumstances.

Clarification of the roles and responsibilities of authorities in tackling real estate risks

The respective roles of competent and designated authorities are clarified for measures addressing real estate risks. Member States will be able to entrust the activation of measures on the basis of Articles 124 and 164 of the CRR to either the competent or the designated authority, while a sound framework for coordination and exchange of information between both authorities is now planned. Furthermore, the use of the two articles is made more flexible, and it will be possible for national authorities to apply them to one or more property segments either at national or local level. To ensure consistent use of the tools throughout the EU, the EBA and the ESRB will provide guidance and opinions.

Streamlined governance and reciprocation procedures for macro-prudential instruments

The macro-prudential coordination and cooperation framework in the EU has been strengthened. This will lighten the administrative burden of national authorities without diminishing transparency or hampering the effectiveness of the cross-border coordination and cooperation framework in the EU. In particular, the role of the ESRB in the transmission of information on planned macro-prudential measures has been strengthened.

The activation procedures of individual macro-prudential instruments have been facilitated. The notification procedures have been simplified for the CCyB (an official notification is only required when the buffer rate is effectively changed) and the SyRB. The ‘pecking order’ of the SyRB has been simplified. Furthermore, EU coordination requirements for the SyRB and the reciprocation mechanism by other Member States have been clarified. Finally, the prolongation of temporary measures under Article 458 CRR has been facilitated, while the scope for reciprocation has been broadened.

⁸⁵ Four separate sectors are specified: residential real estate, commercial real estate, exposures to non-financial corporations excluding real estate and exposures to households excluding real estate. Eventually, it will also be possible to apply the SyRB to specific subsets of these sectors.

Revised G-SII buffer requirements and G-SII score methodology

The revised toolkit will be better equipped to address risks posed by systemically important banks at global level. To that end, a leverage ratio buffer for G-SIIs has been introduced (equivalent to 50% of the risk-based G-SII buffer level) as part of the Basel 3 framework. It will apply on top of the binding 3% leverage ratio requirement. The leverage ratio buffer will strengthen the existing leverage ratio backstop to the risk-based capital requirements for G-SIIs.

Specific to banks within the Banking Union, an additional overall G-SII score has been introduced to reflect the advances in the cross-border bank resolution framework. The additional G-SII score excludes a group's activities across Banking Union Member States in the cross-jurisdictional activity indicator that is part of the G-SII score methodology. In case of a cross-border banking failure, the existence of a common bank resolution framework would limit the adverse spillovers and shorten the resolution relative to a situation where the bank failure would be dealt with by multiple resolution frameworks. Based on this additional overall G-SII score, the relevant supervisory authority may allocate a G-SII to a lower bucket in the exercise of its supervisory judgment. However, the additional methodology can never result in a bank being removed from the G-SII list. Therefore, the designation as a G-SII and the corresponding tighter requirements remain unaffected.

Streamlining of the pillar 2 framework

Finally, the targeted changes made to the different macro-prudential instruments and to their governance make the toolset more effective and versatile in addressing different types of financial stability risks. As such, these changes compensate for the decision to streamline the pillar 2 framework by making it exclusively micro-prudential with an institution-specific focus. While CRD IV allowed the macro-prudential use of pillar 2, it was in the remit of micro-prudential supervisors. However, no clear coordination framework had been planned between micro- and macro-prudential authorities for the use of pillar 2 to address risks going beyond a single institution. The clarification will mean greater accountability in the use of pillar 2 and better delineate the respective roles of the micro-prudential and macro-prudential authorities. Clearly separating macro-prudential and micro-prudential tools in terms of their objectives and procedures is also a safeguard against a double counting of risks.

Several Member States have complemented their macro-prudential toolbox with macro-prudential instruments based on national law, to address vulnerabilities stemming from the real estate sector. The instruments national authorities most frequently use are borrower-based measures, such as limits on the loan-to-value (LTV), loan-to-income (LTI) and debt-service-to-income (DSTI) ratios and on loan maturity. Unlike the instruments under CRR/CRD IV, which are mainly capital-based and affect the price of the loans, these instruments directly target credit supply standards. Harmonised definitions of LTV, LTI and DSTI ratios across Member States do not exist, and the use of these instruments is very diverse across Member States.

3.1.2 Use of the instruments to date

Macro-prudential instruments under EU law have been available since 2014. The application of these instruments, in terms of the types of instruments used, their frequency and the intensity of measures, has varied significantly across Member States. The patterns observed also directly reflect the features of the individual instruments (as defined in CRR/CRD IV), which may influence the national authorities' choice of particular instruments. The recent

adoption of the banking package will alter certain features (scope, governance, etc.) of some of the instruments (see Box 7). As a result, the use of the macro-prudential toolbox by national authorities is likely to change in future.

Since 2014, the nordic and eastern European Member States have been considerably more active than those in central and southern Europe, both in terms of the number and variety of measures taken (see Table 3.3). These differences are partially explained by a number of idiosyncratic factors, including the different phases of business and financial cycles or country size. An important caveat here is that the intensity of individual measures may not be comparable.

The number of Member States imposing the countercyclical capital buffer (CCyB) has increased over time, in line with the economic recovery and the upward phase of the credit cycle. During 2017 and 2018, several Member States either activated the CCyB or increased its rate.⁸⁶ At the end of 2018, 5 Member States had a non-zero CCyB rate (Czechia (1%), Slovakia (1.25%), Sweden (2%) and the United Kingdom and Lithuania (both 0.5%), while 4 more Member States (Bulgaria, Denmark, France and Ireland) activated the CCyB, which will apply in the course of 2019.

In 2018, national authorities designated 12 EU banks as G-SIIs⁸⁷ and subjected them to the corresponding buffer.⁸⁸ The list of EU G-SIIs and their buffer rates have been quite stable over time, reflecting the fact that the identification methodology captures structural characteristics that evolve only gradually over time.

In 2018, 207 banks in the EU were identified as O-SIIs. This high number, relative to the number of G-SIIs, reflects the O-SII buffer's objective of capturing the systemic importance of banks in a domestic context. O-SIIs typically account for a significant share of national banking systems. However, there are significant differences across Member States, in terms of size, number of identified O-SIIs and their share of the domestic banking sector. The list of O-SIIs has not changed significantly over time.

The SyRB is currently applied by 13 Member States, albeit with different objectives, reflecting the flexibility inherent in its current residual nature. Under CRD IV, the 'too-big-to-fail' risk is not explicitly excluded from the risks that the SyRB can address. In most cases, the SyRB has been used to address risks posed by the systemic importance of financial institutions and thus overlaps with the G-SII and O-SII buffers. This possibility will end once CRD IV enters into force. Some Member States have activated the SyRB to tackle vulnerabilities stemming from commercial real estate exposures (HU) or non-performing loans (RO). Estonia activated an SyRB on domestic exposures, applicable to the whole

⁸⁶ The setting of a CCyB rate is mandatory. The majority of Member States still have a CCyB rate of 0%.

⁸⁷ G-SIIs are banks that are deemed systemically important from a global perspective, that is their failure or malfunction can create widespread distress to the global financial system. The identification of these banks is performed each year globally, with an exercise coordinated by the Basel Committee on Banking Supervision (BCBS). The EU framework for G-SIIs is fully compliant with the Basel standard. G-SIIs are subject to higher buffer requirements to reduce their probability of failure and their moral hazard.

⁸⁸ The banking groups designated as G-SIIs in the Banking Union are BNP Paribas, Crédit Agricole, Société Générale, BPCE (FR), Deutsche Bank (DE), Banco Santander (ES), Unicredit (IT), and ING Bank (NL). The UK G-SIIs are HSBC, Barclays, Royal Bank of Scotland and Standard Chartered.

domestic banking system, to address the vulnerabilities to external shocks that its small open economy is exposed to.

Table 3.2: Macro-prudential measures notified, per Member State and per instrument

Member State	CCyB	G-SII buffer	O-SII buffer	SyRB	Other measures (EU law)	Total measures (EU law)	Measures (national law)	Total (all measures)
Austria			4	3		7	1	8
Belgium			4		4	8	1	9
Bulgaria	1		3	2		6	6	12
Croatia			4	1	2	7		7
Cyprus			6		2	8	5	13
Czechia	5		4	3		12	7	19
Denmark	2		5	4		11	5	16
Estonia			5	3		8	3	11
Finland		1	4	1	1	7	2	9
France	1	4	4		1	10		10
Germany		5	4			9		9
Greece			4			4		4
Hungary			4	4		8	13	21
Ireland	1		4		2	7	7	14
Italy		4	4			8		8
Latvia			4			4	1	5
Lithuania	2		4			6	6	12
Luxembourg	1		4			5	3	8
Malta			3		2	5	2	7
Netherlands		3	5	2		10	2	12
Poland			3	1		4	9	13
Portugal			5			5	3	8
Romania			4	4	1	9	6	15
Slovakia	3		4	4		11	15	26
Slovenia			4		2	6	6	12
Spain		4	4			8		8
Sweden	4	2	3	1	4	14	10	24
United Kingdom	4	5	4		2	15	5	20

Source: ESRB and European Commission.

Note: The table contains all measures notified since 2014. For the CCyB, only the actual changes to the CCyB rate are counted. Measures based on national law can pre-date the EU macro-prudential framework and have been notified since 2011.

So far, few Member States have used the dedicated instruments to address vulnerabilities linked to real estate markets on the basis of Articles 124 and 164 of the CRR. Seven Member States have activated measures to increase the risk weights for banks applying the standardised approach, but these banks have a very limited market share. On the other hand, instruments to set stricter loss, given default parameters — which apply to banks using the internal ratings-based credit risk models — have not been activated so far.

National flexibility measures (Article 458 CRR) have been increasingly activated in recent years. Measures have been implemented by Belgium (2014 and 2018), Finland (2017), Cyprus (2017), France (2018) and Sweden (2018). Authorities have used measures under Article 458 CRR as a basis to address different types of risk. In the majority of cases so far (Belgium, Finland, Sweden), the authorities have tackled a systemic risk originating in the residential real estate sector, consistent with that sector's central role in financial stability. Cyprus has implemented a measure to address systemic liquidity risk. France has implemented a measure to limit bank exposure to highly-indebted non-financial companies.

3.2 Effectiveness of national measures through a reciprocation framework

3.2.1 *Incomplete coverage*

National authorities do not necessarily have jurisdiction over all credit institutions that are active on their territory. In particular, internationally active banks providing cross-border lending, as well as most branches of foreign banks, fall outside their jurisdiction. However, both cross-border capital flows and foreign branches can directly contribute to risks at the domestic level, a likelihood that increases with financial integration. Analogously, international banks providing cross-border and foreign branches can be exposed to a domestic risk. This incomplete coverage by national authorities reduces the effectiveness of national macro-prudential measures. Furthermore, different banks active in the same jurisdiction could be subject to different macro-prudential measures, thus distorting the single market and preventing banks from competing on a level playing field.

Activating a national macro-prudential measure may intensify cross-border and foreign branch lending and their relative contribution to the financial stability risk. A national macro-prudential measure will raise the costs of those credit institutions subject to it and therefore give a comparative advantage to institutions that are not. This may act as an incentive to both credit institutions and borrowers — to the extent that the costs of the measure are eventually passed on to them — to circumvent a measure.⁸⁹ Such a rerouting of credit flows (sometimes referred to as a 'cross-border leakage') will increase the market share of non-domestic banks. A consequence of this is that, even if the intensity of the identified financial stability risk remains unchanged, its sources effectively migrate.

While a national measure can make domestic banks more resilient to a particular risk, it could actually lead to non-domestic banks being exposed to a higher risk, as non-domestic credit institutions normally will not be required to hold similar safety cushions to face that higher risk, unless required by their own national authorities. Such adverse externalities can be avoided if the relevant authorities of other countries are informed of national systemic risks and if they reciprocate the measure.

⁸⁹ While this goes beyond the scope of this chapter, bank-based measures may also give rise to circumvention through cross-sectoral shifts in activity, as well as risks.

3.2.2 *Reciprocation framework*

To ensure that a national macro-prudential measure is effective, and to avert its circumvention, the EU macro-prudential framework provides for instrument-specific reciprocation mechanisms. Reciprocation essentially entails other Member States' authorities replicating a national macro-prudential measure, which is applicable to all exposures that are targeted by the activating Member State. Reciprocation ensures a consistent treatment of a given risk across borders. In that way, all credit institutions, whether contributing or exposed to a systemic risk, can be covered by the measure via reciprocation.

Imposing a macro-prudential measure effectively subjects banks to a restriction and corresponding costs. A national macro-prudential measure will thus affect the relative costs of allocating capital in different countries. Like any macro-prudential measure, a decision to reciprocate needs to be well justified. Consequently, the reciprocation mechanism varies by instrument and by the intensity of a measure: reciprocation can be mandatory, i.e. automatic, for some tools, and voluntary for others. Broadly speaking, the more standardised or framed an instrument is, and the clearer its focus on exposures, the more automatic the reciprocation of a measure. Conversely, the reciprocation of residual tools, or measures activated at a high intensity, follows a more discretionary procedure. The reciprocation framework does not apply to instruments that target risks posed by individual institutions, such as buffers for systemically important institutions that are comprehensively addressed by national authorities.

In the EU, reciprocation is facilitated and coordinated by the ESRB, which assesses reciprocation requests when reciprocation is voluntary, and may recommend the reciprocation of measures. For voluntary reciprocation, an individual deliberation by all Member State authorities would be, in principle, required. To avoid multiple assessments by different Member State authorities, the ESRB coordinates the assessment of that measure and may eventually recommend the reciprocation of a measure to other relevant authorities. As for all ESRB recommendations, their addressees are subject to a 'comply or explain' mechanism.

Reciprocation ('recognition') is mandatory for the CCyB for buffer rates up to 2.5%. Given the CCyB's objective to counter the pro-cyclicality in the domestic financial system, all exposures contributing to the domestic credit cycle must be equally covered and treated, irrespective of the location of the lender. The mandatory reciprocation of the CCyB is justified by its detailed framing ('buffer guide'), which also ensures consistency in its application. In the case of the CCyB, the mandatory reciprocation framework is actually wider than the EU and also applies to all member jurisdictions of the Basel Committee.⁹⁰ Voluntary reciprocation is encouraged for non-member jurisdictions. CCyB rates exceeding the 2.5% cap for mandatory reciprocation can be reciprocated on a voluntary basis.

Reciprocation is also mandatory for the instruments to address real estate-related risks.⁹¹ Mandatory reciprocation ensures that risk parameters, such as risk weights and loss given default (LGD), are consistently applied, regardless of the location of the lender. This mandatory reciprocation also guards against the creation of an uneven playing field that could

⁹⁰ <https://www.bis.org/bcbs/membership.htm>

⁹¹ These instruments are based on Articles 124 and 164 CRR.

result in regulatory arbitrage. Reciprocation also ensures that foreign banks build up their resilience to a domestic real estate risk.

The reciprocation of the SyRB is not mandatory. This is justified both by the residual character of the SyRB under CRD IV, which implies that its activation is normally not specific to a particular contingency, and by the fact that it is not necessarily exposure-specific. Moreover, there has been no harmonisation or guidance on what level the SyRB should be set at in order to address a structural systemic risk, which has given Member States a substantial degree of discretion. However, the SyRB can be reciprocated on a voluntary basis if it is applied to certain exposures. Finally, it should also be noted that the SyRB is an optional tool and is consequently not necessarily available in all Member States, thus preventing reciprocation.

A similar rationale holds for national flexibility measures, which are activated to tackle risks that cannot be adequately addressed with any of the other tools. To the extent that it is impossible to determine in advance how Member States will use this flexibility, an automatic reciprocation mechanism cannot be set up from the start. Measures taken under Article 458 CRR can, however, be reciprocated on a voluntary basis, following a reciprocation request by the activating Member State. No reciprocation mechanism had been in place for pillar 2 measures.

As mandatory reciprocation does not require any particular deliberation, it is largely implemented through a system of notifications, where activating authorities inform their counterparts of any measures taken that need to be reciprocated.

3.3 Minimising adverse effects on the internal market through safeguards and coordination mechanisms

3.3.1 *Cross-border spillovers of national macro-prudential measures*

Macro-prudential measures are primarily implemented with a domestic focus and may not necessarily internalise the impact on the financial institutions in other Member States or on the single market. The EU macro-prudential framework aims to internalise the cross-border effects of macro-prudential measures and concerns about the fragmentation of financial markets along national lines, as observed in the wake of the financial crisis. Financial stability objectives and internal market objectives may, under certain circumstances, be in conflict. National macroprudential measures can bring financial stability benefits at national level that need to be weighed against potential negative effects on the internal market.

In an integrated financial market, the costs of a national macro-prudential measure may not necessarily be borne at the national level only. Some macro-prudential measures, even if aiming to limit systemic risk, may result in curtailing the activity of foreign banking.⁹² For instance, an internationally active bank may comply with the higher capital requirement in one Member State by scaling back lending in another Member State, which may not be

⁹² See e.g. Cetorelli and Goldberg (2016), Reinhardt and Riddiough (2014), or Kerl and Niepmann (2016).

affected by the systemic risk which the activating authority is addressing. The activating authority might not necessarily take this channel into account, given its national focus.

The negligence of such spillover effects on other Member States may result in the fragmentation of financial markets. Such fragmentation may adversely affect: (i) the resilience of banks and financial systems, (ii) the availability of capital and funding while raising the cost of investment, and (iii) the ability of banks to manage liquidity and funding risks. A fragmented European financial system would forego the benefits from increased financial integration⁹³ and curtail private risk sharing by European banks, which in turn heightens the adverse effects of fragmentation.

The scope of macro-prudential measures is a relevant dimension to consider in the case of cross-border spillovers, as macro-prudential instruments can be applied at the solo, sub-consolidated or consolidated balance sheet level, as well as on the set of exposures they cover. If an exposure-based measure is applied, for example, at the solo level, it is typically applicable in a geographically confined area to which the affected individual institutions are exposed. The main aim of such a measure may therefore not only be to improve the banking sector's resilience, but also to counter excessive risk-taking or lending by financial institutions in a geographically confined area. Conversely, if capital buffers are applied at the consolidated level, the measures also affect the activities of groups' branches and subsidiaries located abroad, which, in turn, influences the credit supply in those countries. Measures applied at consolidated level may lead to outward spillovers, and their specific effects in different countries will depend on the internal decision of the banking groups on how to allocate capital and liquidity buffers across their substructures.

3.3.2 *The EU safeguards in the macro-prudential framework*

The EU macro-prudential framework contains safeguards to ensure the consistency of policies tackling systemic risk at the level of the Union and aimed at preserving the integrity of the single market. These safeguards (caps, pecking order⁹⁴, coordination procedures for the activation of instruments, including opinions and approval procedures at European level) ensure that a macro-prudential measure will not give rise to disproportionate adverse effects. As such, the framework does not prevent instruments from being applied at a high intensity if required. For such purposes where instruments exceed certain thresholds, there are coordination mechanisms to ensure that this occurs without undue adverse effects on the internal market.

The G-SII buffer applies at the consolidated level, with buffer rates calibrated on the basis of a methodology agreed at international level. As G-SII buffers are always applied at

⁹³ 'Recent experience demonstrates that when mutual confidence is lost, the retreat from an open and integrated system can occur rapidly. A return to a nationally segmented global financial system would reduce both financial capacity and systemic resilience, with major consequences for jobs and growth across our economies. We must work to avoid this.' Mark Carney, Head of FSB, prepared FSB G20 communique, June 2012.

⁹⁴ The CRR/CRD IV establishes a hierarchy of instruments in terms of a mandatory sequencing of their activation ('pecking order'). Some instruments may be used only if other available instruments cannot adequately address the identified systemic risk.

consolidated level, the relative costs of allocating capital across borders remains unaffected. The potential negative impact on the internal market is hence limited.

The O-SII buffer aims to address the externalities stemming from domestic systemically important institutions. Considering the possibility that these externalities may arise at various levels of consolidation, including if an institution is a subsidiary of a foreign bank, the O-SII buffer can be applied at the consolidated, sub-consolidated and individual level. The CRD IV provides for a 2% cap on the O-SII buffer rate. Furthermore, if an O-SII is a subsidiary of either a G-SII or an O-SII that is already subject to a buffer on a consolidated basis, the buffer rate applicable at individual or sub-consolidated level may not exceed the higher of 1% and the buffer rate applicable at consolidated level.

The aim of these caps is to limit excessive divergence in the setting of buffer rates across the EU and to preserve the level playing field. Without the cap on subsidiaries, the efficient allocation of capital in the EU could be negatively affected, as parent institutions would not be in a position to optimally allocate capital and liquidity. The cap limits the risk of ring-fencing of capital, which may lead to an uneven playing field for credit institutions and may harm the integrity of the single market.

Under CRD IV, the systemic risk buffer (SyRB) is a residual instrument, allowing authorities to address risks that are not adequately covered by the other available instruments. The scope of the SyRB will be clarified, following the entry into application of CRD V. The current flexibility of the SyRB has given rise to a number of potential concerns from a single market perspective and led to an inconsistent use of the toolbox.

The CRD IV provides for a number of coordination and authorisation procedures to mitigate these risks. It requires the competent or designated authority to justify why none of the more targeted macro-prudential instruments can sufficiently address the identified risk (the ‘pecking order’). This framing of the flexibility of the instrument should lead to a more consistent application of the instruments across the internal market. Furthermore, when the SyRB is set with respect to exposures in other Member States, the SyRB rate will be set equally on all exposures, therefore ensuring the level playing field in the single market.

No prior authorisation is required when the SyRB rate does not exceed 3%. When the SyRB rate is set above 3%, different rules apply. Safeguards differ depending on the intended level of the rate and the geographic location of the exposures to be covered, with gradually tighter conditions applying when the instrument is used at higher intensities.⁹⁵ The application of the SyRB at consolidated level and on all geographical exposures, which is possible under CRD IV, would have an equivalent effect as a G-SII/O-SII buffer, essentially creating an overlap between those instruments. Therefore, what is known as a ‘higher of’ rule applies, i.e. the SyRB and G-SII/O-SII buffer rates cannot be added together. With the clarification of the scope of SyRB and the increase in the cap on the O-SII buffer rate under CRD V, the ‘higher of’ rule will no longer apply.

⁹⁵ When the SyRB rate is set above 3% for exposures located in other Member States, or above 5% for domestic and non-EU country exposures, it may only be adopted if authorised by the Commission, following an opinion from the ESRB (and optionally from the EBA) on the appropriateness of the measure. The procedural requirements for SyRBs with rates between 3% and 5% for domestic and non-EU country exposures vary depending on whether the buffer would apply to a subsidiary of a parent established in another Member State, with more safeguards if this is the case.

Finally, national flexibility measures may only be used if other instruments available in EU law cannot adequately address the identified systemic risk. To avoid an inappropriate use of the flexibility provided to national authorities, the CRR contains a number of safeguards. First, similar to the activation of the SyRB, Member States are required to demonstrate the residual nature of a proposed measure and justify why none of the existing macro-prudential instruments would sufficiently address an identified risk (the ‘pecking order’). Secondly, these measures are subject to a non-objection procedure at EU level. The ESRB and the EBA have to submit opinions on the proposed measures. Taking into account these opinions, the Commission may then propose to the Council that the draft measure be rejected if there is robust, strong and detailed evidence that the measure will have a negative impact on the internal market that outweighs the financial stability benefits of reducing the macro-prudential or systemic risk identified.

Several EU institutions and bodies are involved (the Commission, the ESRB and the EBA) in assessing the effects of macro-prudential measures on the single market and potential cross-border spillovers. In accordance with the ESRB Regulation, the ESRB contributes to ensuring financial stability and mitigating systemic risk that may negatively affect the internal market and, in turn, the real economy. By identifying risks to financial stability, the ESRB directly promotes timely and consistent policy responses among the Member States, thus preventing unjustified diverging approaches and improving the functioning of the internal market.

3.3.3 *The evidence*

To date, there have been no objections recorded in respect of any measure on the grounds that the measure has a potentially significant negative impact on the functioning of the single market. In particular, the existing safeguards appear to have contributed to this outcome, as they effectively contributed to an appropriate use of the instruments across the EU.

Authorities in Member States with largely foreign-owned banking systems have on average been considerably more active than those with largely domestic-owned banking systems.⁹⁶ Similarly, countries that are net international borrowers of credit have been more active than those who are net lenders. Foreign bank ownership and net capital inflows often run in parallel and are therefore linked with the structure of cross-border banking.

The application of the instruments and the extent to which safeguards have been binding also reveal some tensions in the framework. In particular, national authorities may have sometimes exploited the flexibility of some instruments to reach outcomes beyond what was originally intended in the legislation. The reliance on institution-specific measures (e.g. O-SII buffer) appears comparatively higher in Member States where the share of foreign-ownership of the banking system is high. Likewise, the rules applicable to subsidiaries also have relatively more relevance for these Member States. About a third of O-SIIs identified at domestic level belong to an O-SII or G-SII banking group located, in most cases, in another Member State.

The fact that the systemic nature of a bank largely depends on its role in the national context justifies the national application of the O-SII identification methodology. However, divergent

⁹⁶ In the EU, banking activity by foreign banks is predominantly conducted through foreign subsidiaries.

practices may lead to inconsistent treatment across Member States. This may in turn distort the level playing field in the single market and hamper the expected convergence.⁹⁷ A diverging application of the methodology can discourage the integration of the banking sector, encourage the transformation of subsidiaries into branches (branchification) or more volatile cross-border flows and may lead to an unlevel playing field in the single market. Academic research makes the case for a unified identification and calibration process across all countries to ensure a level playing in the EU.⁹⁸

The SyRB has in most cases been applied to address risks posed by the systemic importance of financial institutions, thus substituting for the G-SII and O-SII buffers. As no coordination or approval requirements apply for the SyRB rate that does not exceed 3%, it can be used in the manner of an O-SII buffer, albeit with a higher buffer rate. This issue can be more pervasive for subsidiaries, where the relevant O-SII cap is lower, and thus particularly affects countries with a large number of subsidiaries of foreign banks. Out of the 57 institutions on the 2017 list of O-SII subsidiaries, the buffer rate was set at the level of the cap in 33 cases (about 60%). However, 48 of those 57 institutions (85%) were also subject to an SyRB at a rate either set at the level of the cap or higher. This evidence suggests that the SyRB has often been used to require O-SII subsidiaries to hold higher capital buffers than would be possible with the O-SII buffer. This could be harmful for the appropriate functioning of the internal market and the optimal allocation of capital by banking groups.

So far, no Member State has set SyRB rates at levels that have triggered an additional EU coordination procedure. While the presence of these additional safeguards may have acted as a disincentive to set SyRB rates higher than 3%, this effect should not be overestimated. Indeed, Member States have increasingly relied on national flexibility measures, which are also subject to a comparable authorisation procedure. This evidence therefore suggests that exceptional measures can be activated reasonably and that the safeguards do not entail an excessive burden for Member States. The ESRB and EBA opinions provided so far in the authorisation process of these measures did not highlight disproportionate adverse effects to the internal market caused by the intended measures.

3.4 Conclusion

The EU macro-prudential framework is largely decentralised, reflecting diverging conditions at national level with respect to systemic risk and also specific national situations. However, systemic risks and macro-prudential measures both have a cross-border dimension, which the EU framework addresses by framing the use of instruments and promoting the reciprocation

⁹⁷ The O-SII identification methodology is framed by non-binding EBA guidelines. In late 2017, the EBA published a report summarising the outcome of a peer review of the application of the guidelines on the criteria to determine the conditions of application of Article 131(3) of CRD IV in relation to the assessment of O-SIIs. According to the report, even if the majority of Member States is compliant with the guidelines, several of them depart from the basic methodology suggested by the guidelines. Two Member States do not follow the EBA identification guidelines at all. Furthermore, the flexibility applied by some Member States in choosing the level of the cut-off score, which determines whether a bank is identified as an O-SII, can further hinder the level playing field. While changes in the cut-off score are envisaged in the guidelines, they may reflect a reverse engineering process adopted by some authorities to capture the intended list of institutions as O-SIIs. Further differences come from the choice of additional indicators. While it is difficult to assess the impact of the use of an indicator rather than another, differences across Member States diminish the coherence of the identification exercise.

⁹⁸ See e.g. Schaller and Sigmund (2018).

and coordination of individual measures. This ensures that the objectives of financial integration and financial stability at EU level can be jointly pursued. The co-legislators recently agreed upon a number of targeted changes to the macro-prudential toolkit, which are expected to foster further consistency in the cross-border application of macro-prudential policy.

Chapter 4 ARTIFICIAL INTELLIGENCE IN THE FINANCIAL SECTOR

The use of artificial intelligence (AI) applications in the EU financial sector continues to grow. Among all financial technology (FinTech) innovations, AI is expected to have particularly important and potentially disruptive impacts on financial services in the coming years.⁹⁹ The EU has not only recognised the productivity potential offered by AI solutions, but is also working towards accompanying the socio-economic changes induced by their increasing use and ensuring that it is set in an appropriate ethical and legal framework.¹⁰⁰

This chapter reviews the core potential of AI and explains why its use is becoming increasingly widespread. It identifies the potential advantages and disadvantages of using AI applications in the financial sector and highlights some policy implications.

4.1 What is artificial intelligence and why use it?

In contrast to the natural intelligence displayed by humans, AI is intelligence demonstrated by machines. Colloquially, ‘AI’ is used to describe a machine mimicking cognitive human functions such as learning and problem solving. Possible applications of AI include reasoning, knowledge representation, planning, learning, natural language processing (NLP), perception, and the ability to move and manipulate objects (i.e. robotics).¹⁰¹ Machine learning (ML) refers to the use of self-learning computer algorithms¹⁰² and has been a fundamental concept of AI since its inception.

The remarkable progress in the successful application of AI tools in recent years, which has been made possible by advances in computing power, the availability of data, and the complexity of the algorithms, has been largely driven by ML methods such as neural networks.¹⁰³

The latest wave of AI applications focuses on prediction, one of the three critical components of decision-making besides judgment and action. Making a decision under uncertainty requires applying judgment to a prediction and then acting.¹⁰⁴ Prediction requires data, which

⁹⁹ The European Commission is active in both the area of FinTech and AI, in general. The FinTech policy is set out in the FinTech action plan, see footnote 56, p. 52. The policy framework in the AI field is laid out in: European Commission (April 2019), *Building Trust in Human-Centric Artificial Intelligence*, COM(2019) 168 final of 8 April 2019; European Commission (December 2018), *Coordinated Plan on Artificial Intelligence*, COM(2018) 795 final of 7 December 2018; and European Commission (April 2019), *Building Trust in Human-Centric Artificial Intelligence*, COM(2019) 168 final of 8 April 2019.

¹⁰⁰ See European Commission (2019) and European Commission (April 2018), *Artificial Intelligence for Europe*, COM(2018) 237 final of 25 April 2018.

¹⁰¹ Machine intelligence that can successfully perform any intellectual task of a human — referred to as general intelligence — is among the long-term goals of AI research. The AI field draws on computer science, information engineering, mathematics, psychology, linguistics, philosophy, and many other fields.

¹⁰² In mathematics and computer science, an algorithm is an unambiguous specification of how to solve a class of problems. Algorithms can perform calculation, data processing, and automated reasoning tasks. Self-learning algorithms can be classified into supervised and unsupervised learning, as well as reinforcement and deep learning. For further explanation, see e.g. FSB (2017), *Artificial intelligence and machine learning in financial services: Market developments and financial stability implications*, 1 November 2017.

¹⁰³ See also Section 4.2.

¹⁰⁴ Training with input data enables a prediction, which is combined with judgment to choose the appropriate action, leading to an outcome. The outcome is then fed back in the form of input data to improve the next prediction. For more details, see Agrawal, Gans, and Goldfarb (2018).

can be costly to acquire, resulting in a trade-off between the cost of data and the predictive accuracy.

Data in AI applications come in three distinct forms:

- training data used to *generate* the algorithm;
- *input* data used to feed the algorithm, so it can *produce* a prediction (output);
- *feedback* or output data used to *improve* the algorithm's performance with experience.

A drop in the cost of prediction has a positive impact on the value of data and, by extension, data collection devices that are necessary for the prediction technology to deliver.¹⁰⁵ Data have three main advantages derived from economies of scale, economies of scope, and their non-rivalry nature.¹⁰⁶ *Economies of scale* stem from the fact that more data improves prediction. However, there is a natural limit to this, beyond which acquiring more data would exhibit diminishing returns to scale in terms of the marginal improvement in prediction accuracy. Typically, ML algorithms need much more data than humans do in order to train for comparable skills.¹⁰⁷ *Economies of scope* arise when the benefits of analysing a merged dataset are higher than those of analysing each dataset separately. Finally, *non-rivalry* means that the economic benefits derived from data are higher than those derived from goods or traditional services, since data and its processing technology can be easily copied and thus be used by many people simultaneously.

The essential promise of the latest AI developments to the business world is that AI lowers the cost of making predictions, so it can be used more widely. As an immediate effect, AI will allow firms to save on costs, but as prediction technology becomes more accurate and reliable over time, it may lead to more productive business models and new ways to compete.

Prediction plays a key role in the financial sector, given that many decisions are made based on forward-looking analyses. For instance, banks extend loans and price them in accordance with clients' expected future creditworthiness. Insurance premiums are set in accordance with the likelihood of a specific future event materialising. AI applications that lead to better predictions in these domains can thus result in immediate cost savings induced by improved risk analysis or better client segmentation and product price differentiation. Provided it can be achieved, this could in the medium term lead to better risk management and improved profitability.

4.2 Historical development of artificial intelligence

The development of AI dates back more than 50 years, but the recent breakthrough has come from advances in computing power, the availability of data, and the complexity of the algorithms. The history of AI started with logic-based approaches. In the 1950s and 1960s, computers started to solve algebraic problems, prove geometric theorems and use English

¹⁰⁵ For a wider debate on the data acquisition trade-off, see Agrawal, Gans and Goldfarb (2018).

¹⁰⁶ See also footnote 111, p. 81.

¹⁰⁷ With a high variety of observations and many explanatory variables in the dataset, achieving robust predictions may require very large datasets.

syntax and grammar. However, all this was merely a proof of concept. By the mid-1970s, the general perception was that researchers had over-promised and under-delivered.¹⁰⁸

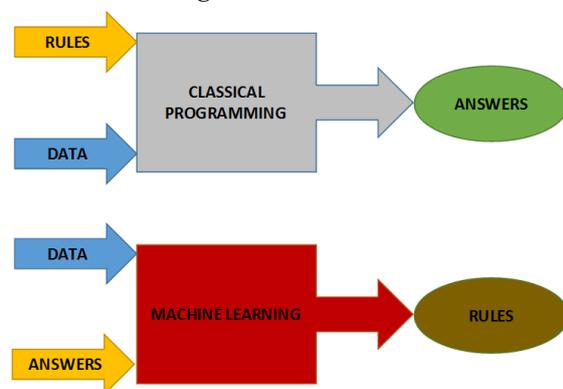
In the 1980s, the AI focus shifted to expert systems that mimicked the decision-making process of a human expert. For the first time, AI was capable of solving real-world problems by automating highly specific decisions based on logical rules derived from expert knowledge. Initially, these systems were widely used in industries in view of perceived cost savings, but expert systems soon turned out to be too expensive to maintain, as they had to be manually updated and could not handle non-standard inputs, let alone learn.

From 2000 onwards, data-driven approaches became ever more prevalent, with better data, models and computers at the core of progress in AI development. There is now a new phase of high expectations, fuelled by vastly increased computing processing capabilities and data. This combination supports new applications, such as ML that has emerged as a promising subfield of AI to better predict behaviour.

ML represents an important shift in computing. Traditionally, a programmer would write computer code setting the rules needed to process data inputs to get an answer as output. In ML, the computer receives input data as well as the answers expected from the data, and the ML tool needs to produce the rules, which can then be applied to new data to produce future answers (see Figure 4.1). In other words, unlike in traditional explanatory modelling, ML leaves the choice of combinations and interactions among the different variables to the machine and not the programmer. Hence, an ML system is trained rather than explicitly programmed.

For instance, neural networks are a ML method designed to resemble brain networks¹⁰⁹, although they cannot understand in the true sense of the word. They possess no internal model or theory to reflect on what is being analysed but instead function as mere engines of statistical association and classification that cannot deal with causal inference.¹¹⁰ Unlike traditional models, ML methods do not require humans to formulate rules for the model, instead leaving this task to the machine. Thus, ML can better accommodate complex models with many interconnected variables, enabling them to make predictions based on entirely unanticipated correlations.

Figure 4.1: From classical programming to machine learning



Source: European Commission (2018).

¹⁰⁸ For example, an AI system that analysed the English language could only handle a 20-word vocabulary, because that was the maximum data the computer memory could store.

¹⁰⁹ ‘The human brain, it is often stated, is the most complex structure in the known universe. It consists of some 85 billion nerve cells, each of which is connected to many thousands of other nerve cells, with some 150 trillion connections’, Marsh (2019), *Can we ever build a mind?* Financial Times, 12/13 January 2019.

¹¹⁰ To illustrate this point, while ML tools can predict future creditworthiness of corporate debt with rather high accuracy, they are unlikely to determine the underlying reasons.

The recent progress in AI and ML methods (such as the advances in prediction discussed above) results, in particular, from three parallel developments:

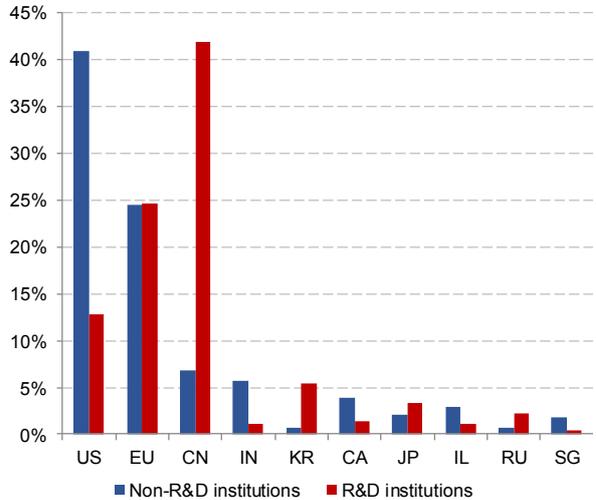
- First, computer-processing capabilities have substantially improved, enabling fast parallel computing at low cost as a result of multi-core central processing units and graphics processing units.
- Second, large amounts of data have become available as computers and their users are linked up, supported by better storage data capabilities. These large datasets improve the training of AI models, allowing them to better address some hard problems such as object recognition and machine translation.
- Third, new ML algorithms with more flexible learning capabilities have been developed. In addition, the creation and testing of ML algorithms have become easier thanks to specialised open source ML software libraries.

4.3 Artificial intelligence in the EU economy

Intense competition has been taking place around the world. The report on Artificial Intelligence¹¹¹ over the period 2009-2018 shows that the EU has one of the highest shares of institutions actively developing AI solutions (25%), just behind the US (28%) and just ahead of China (23%).

Relative to GDP, the EU is ahead with 0.59 AI institutions per billion euro compared with 0.57 in the US and 0.43 in China. The distribution of research and corporate AI institutions is, however, different in the three geographical areas. Europe is balanced, accounting for approximately 25% of the global share of both research and corporate institutions. The US has approximately three times as many corporate institutions as research ones (41% and 13% respectively), whereas China has about six times as many research institutions as corporate ones (7% and 42% respectively). The high proportion of corporate players in the US reflects its vibrant industrial ecosystem, while the balanced picture in the EU attests to a very strong research and academic environment with potential to help developing a flourishing AI industry. Chart 4.1 provides an overview. As shown in Chart 4.2, the highly-developed industrial ecosystem in the US puts it at the forefront of AI-related activities, with 37% of all

Chart 4.1: Research and corporate AI institutions in the top-10 countries



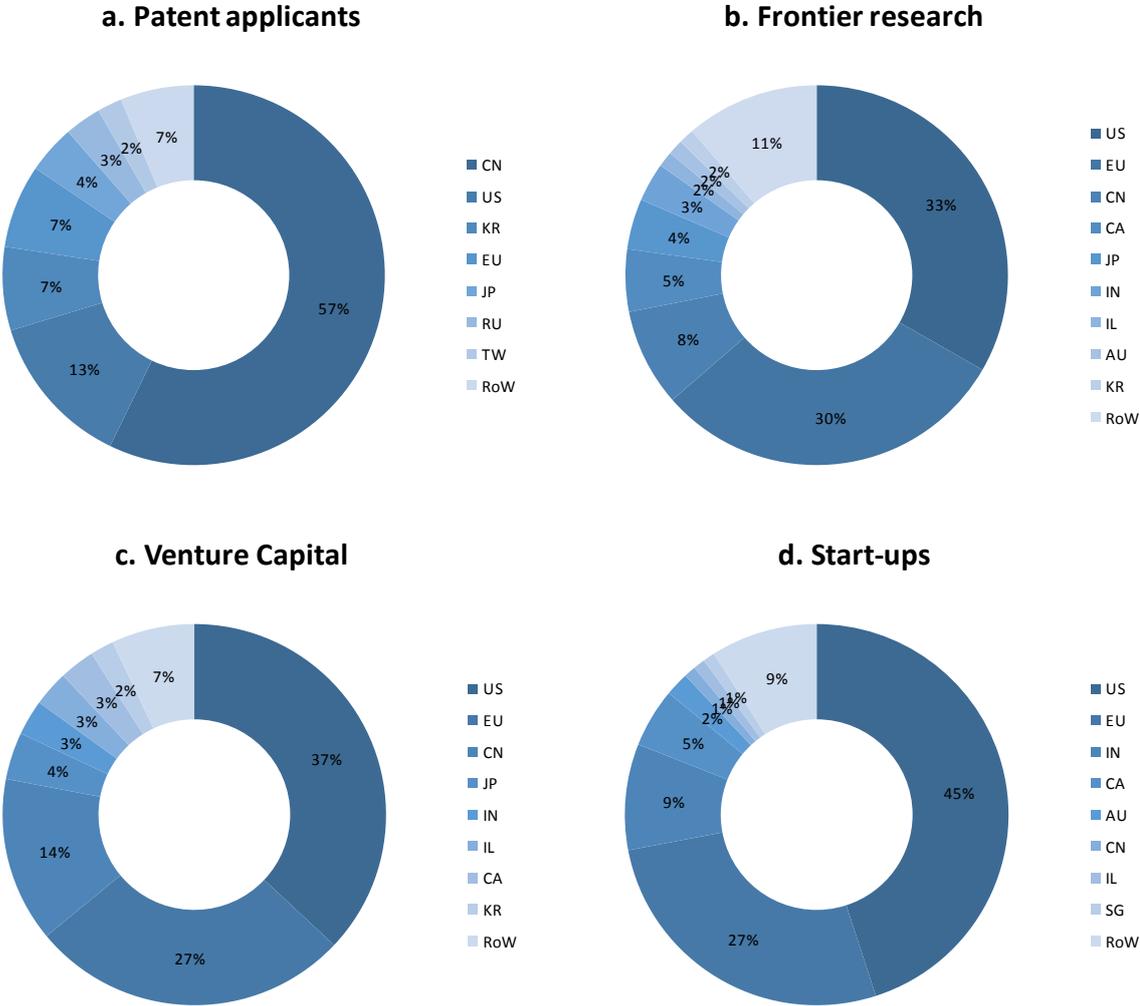
Source: European Commission (2018).
 Note: Data are the number of AI institutions for the period 2009-2018.

¹¹¹ For more details, see the analysis in European Commission (2018), *Artificial intelligence: A European perspective*, Science for Policy report by the Joint Research Centre (JRC), Luxembourg. The analysis covers 2009-2018 and looks at some 35 000 players worldwide, of which 16 000 were involved in at least one research or innovation activity, while 19 000 players were engaged solely in industrial activities.

firms funded by venture capital applying AI tools, and 45% of start-ups being active in the field. The EU also scores well with 27% on both metrics, which is a result of the research funding and the intense inter-country collaboration provided by the EU framework programmes. Key areas of strength in Europe are automated/connected vehicles and robotics. China, on the other hand, is making a strong effort to turn research into patents, accounting for almost 60% of the world total. It also applies a coordinated approach to AI, including government policy, industrial applications and research with the objective of becoming the world leader in AI by 2030.

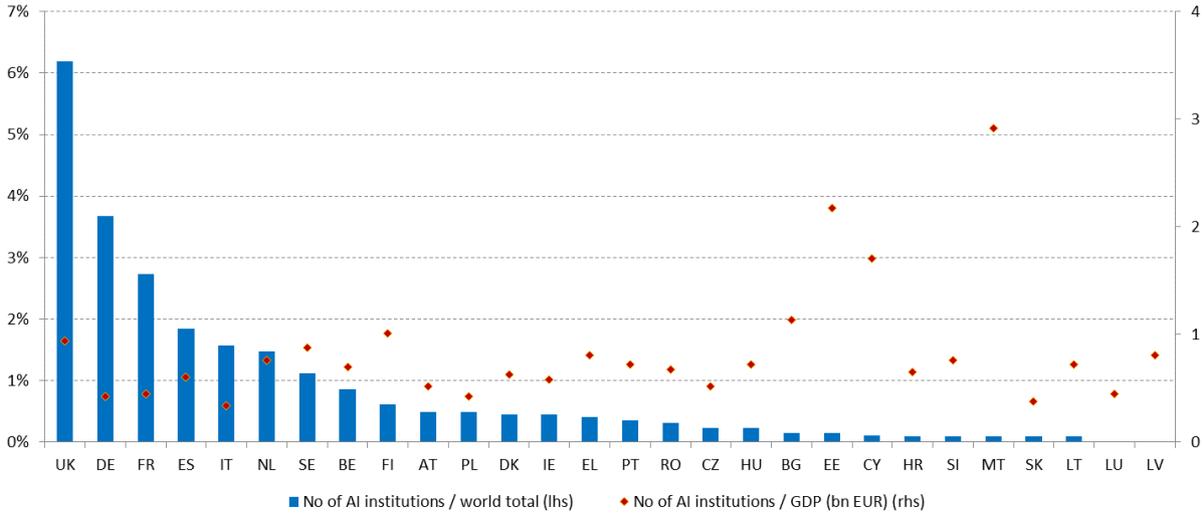
Chart 4.3 shows that within the EU, the largest economies have the highest number of AI institutions, with the UK representing 25% of the EU total, Germany about 15% and France about 11%, followed by Spain, Italy and the Netherlands.

Chart 4.2: Number of AI institutions by activity



Source: European Commission (2018).
 Note: Data are expressed as % of world total for the period 2009-2018.

Chart 4.3: AI institutions in the EU

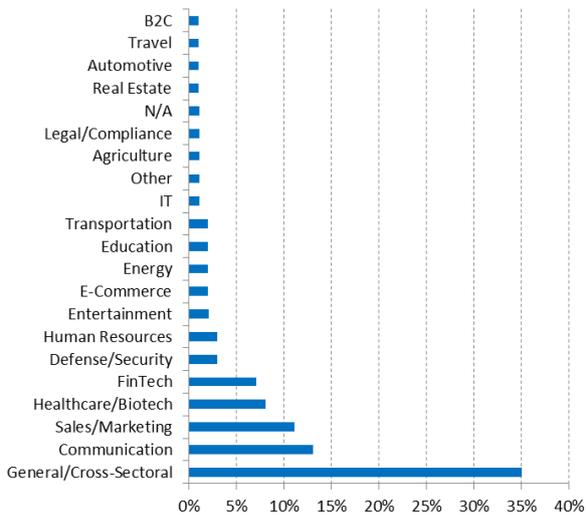


Source: European Commission (2018).
 Note: Data are expressed as % of world total and to GDP for the period 2009-2018.

In 2018, the United States led the AI development, with 40% of the total number of AI start-ups worldwide and China accounted for 11%.¹¹² The EU as a whole recorded 18% of the total, with the UK as fourth in the country rankings (with 245 start-ups), France as seventh (with 109 start-ups) and Germany as eighth (with 106 start-ups).

At both global and EU levels, business-to-business services were the most important sector for AI start-ups, followed by healthcare and FinTech, the latter accounting for 7% of the AI start-ups in Europe (see Chart 4.4). Out of 39 EU FinTech start-ups developing AI applications, the report identifies 24 as based in the UK, 6 in Sweden, 5 in France, and 2 each in Germany and Spain. Overall, the EU accounts for 20% of FinTech AI start-ups globally, while the US accounts for 36% and China for 9%. AI development in the EU could be constrained by start-up funding, as the average fundraising deal in 2017 was for instance only EUR 2.6 million in France and EUR 1.7 million in Germany, compared to approximately USD 10 million in the US and USD 36 million in China.

Chart 4.4: European artificial intelligence industries in 2018



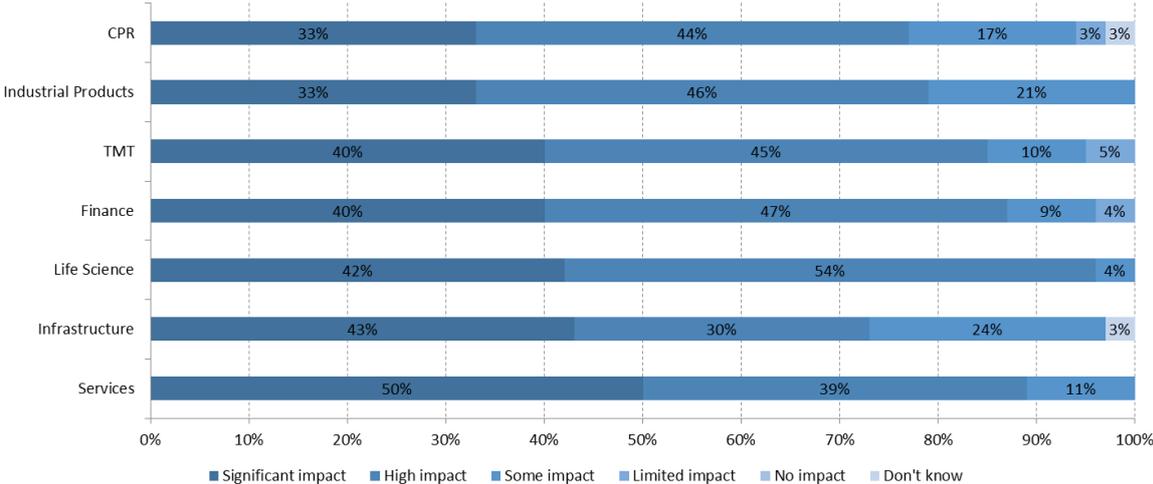
Source: Roland Berger and Asgard (2018), *Artificial Intelligence — A strategy for European startups: Recommendations for policymakers*.
 Note: Data are expressed as % of AI start-ups.

¹¹² The data in the remainder of Section 4.3 are taken from Roland Berger and Asgard (2018), who looked at 3 465 start-ups with an AI profile across the world economies. For further details, see Roland Berger and Asgard (2018), *Artificial Intelligence — A strategy for European startups: Recommendations for policymakers*.

4.4 Opportunities for AI use in financial services

Financial services are currently a frontrunner in the use of AI technologies among main branches of business-to-customer industries in Europe.¹¹³ A recent study showed that nearly 90% of industry executives expect AI to have a high or even disruptive impact on financial services within the next 5 years — one of the highest among the industries included in the study (see Chart 4.5). The use of AI is expected to have the highest impact in the next 3 to 5 years from among various FinTech innovations (see Chart 4.6).

Chart 4.5: Expected impact of AI on industries in the next 5 years



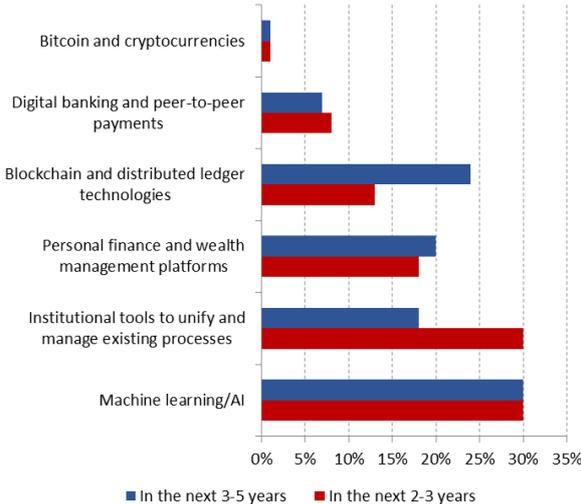
Source: Ernst & Young (2018), *Artificial Intelligence in Europe, Outlook for 2019 and Beyond*.
 Note: CPR stands for ‘Consumer Products & Retail’ and TMT for ‘Technology, Media/Entertainment & Telecoms’.

The World Economic Forum forecasts that by 2021 investment in AI technologies will reach USD 58 billion. It expects investments by financial institutions to reach USD 10 billion per year in 2020.¹¹⁴

The recent EU coordinated plan on AI aims to scale up public and private investments in AI technologies to EUR 20 billion per year by 2028, with financial services among the priority areas.¹¹⁵

The combination of expertise in advanced modelling, analytics and data availability required to apply AI technologies will have

Chart 4.6: Expected impact of FinTech innovations (% of respondents to the survey)



Source: Mediant (2017), *Trends in FinTech and Investor Communications: 2017 and Beyond*.

¹¹³ Ernst & Young (2018). The main branches covered by the report are industrial products, consumer products and retail (CPR), technology/media/telecoms (TMT), life science, financial services, infrastructure and services. For further details, see Ernst & Young (2018), *Artificial Intelligence in Europe, Outlook for 2019 and Beyond*.

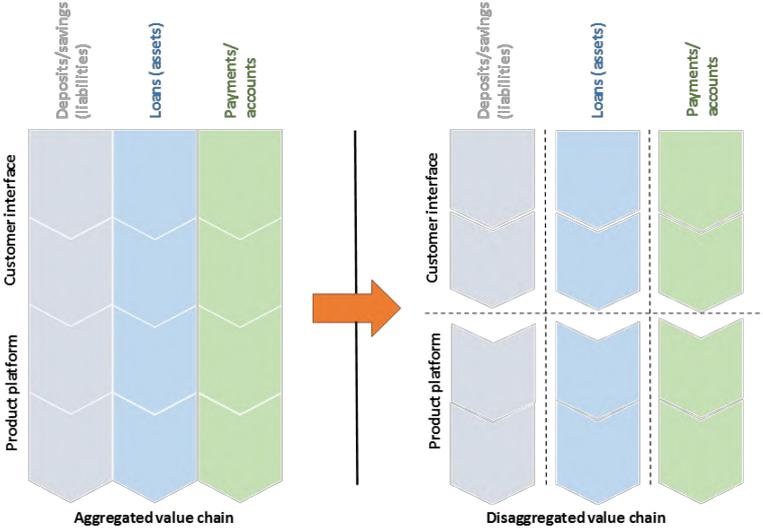
¹¹⁴ World Economic Forum (WEF) (2018), *The New Physics of Financial Services — How artificial intelligence is transforming the financial ecosystem*, 15 August 2018.

¹¹⁵ See European Commission (December 2018).

an impact on the structure of financial institutions and their workforce composition across the whole value chain of financial services provision.

The current integrated model of manufacturing and distribution of financial products can be expected to be disaggregated into its component parts (see Figure 4.2) and the creation and issuance of financial products likely to be separated from distribution and financial advice. Incumbent companies may then have to position themselves strategically where they have competitive advantages. AI expertise may help companies from outside the financial sector enter parts of the value chain. The distribution of financial products and financial advice are likely to provide most of the new opportunities.

Figure 4.2: AI-driven transformation of the structure of financial industry



Source: BaFi (Die Bundesanstalt für Finanzdienstleistungsaufsicht) (2018), *Big data meets artificial intelligence*.

AI technologies are expected to drive the financial industry’s transformation. The crucial prerequisite for the successful application of AI technologies is access to financial and non-financial data and their efficient management in full compliance with the applicable data protection and security regulations. This enables both the Bigtech and FinTech companies¹¹⁶ to compete successfully with traditional financial institutions. The former already own large and varied data sets, while the latter are increasingly gaining access to incumbent financial companies’ data thanks to recent regulatory changes, such as the latest amendments to the EU Payment Services Directive.¹¹⁷ These new market players may combine the financial and non-financial customer data to incorporate targeted financial product offerings as a seamless addition to their core product range.

¹¹⁶ BigTech firms are large technology companies that expand into the direct provision of financial services or of products very similar to financial products. FinTech refers to technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services. FinTech firms are firms whose business model focuses on these innovations. See, Financial Stability Board, 2019, *FinTech and market structure in financial services: Market developments and potential financial stability implications*, 14 February 2019.

¹¹⁷ 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.

According to a survey¹¹⁸ of business leaders responsible for the AI agenda in nearly 300 European companies, a positive impact of AI is expected in several business areas such as optimisation of operations, customer engagement, transformation of products and services, and increasing employee productivity. The main uses of AI across business areas are expected to be:

- predictions based on data from multiple sources;
- automation of tasks avoiding the need for human intervention;¹¹⁹
- insights from patterns and trends in data;
- personalisation of content and user experience; and
- suggestions of solutions to predefined problems.

The order in which AI benefits are expected to materialise in financial services is similar to other industries. The most immediate areas of improvement are the optimisation of back-office operations followed by customer interaction. Transformation of products and services, as well as employee productivity increases are expected to take longer, because they will require changes to companies’ business culture and to the workforce skillset.

Figure 4.3: AI application potential in bank business areas

STRATEGY	CORPORATE-CORE	CHANNELS
CORPORATE STRATEGY	ASSET LIABILITY MANAGEMENT	EMAIL
BUSINESS UNIT STRATEGY	REGULATORY	RELATIONSHIP MANAGER
OPERATING STRATEGY	TECHNOLOGY	WEALTH MIDDLE OFFICE
CUSTOMER	RESOURCE MANAGEMENT	MOBILE
SEGMENTATION	FINANCE	INTERNET / WEBCHAT
INSIGHTS	RISK MANAGEMENT	BRANCH
CORE-FUNCTION	HUMAN RESOURCES	CONTACT CENTRE
CROSS PRODUCTION SUPPORT	SALES	
PAYMENTS	PRICING	
ACCOUNT MANAGEMENT	ORIGINATE PRODUCTS & SERVICES	
DEFAULT MANAGEMENT	SELL PRODUCTS & SERVICES	
DISPUTE & FRAUD MANAGEMENT		
ENQUIRY RESOLUTION		
		LOW AI POTENTIAL
		MEDIUM AI POTENTIAL
		HIGH AI POTENTIAL
		VERY HIGH AI POTENTIAL

Source: Accenture (2018), *Redefine Banking with Artificial Intelligence*.

¹¹⁸ Ernst & Young (2018), *Artificial Intelligence in Europe, Outlook for 2019 and Beyond*.

¹¹⁹ It should be noted, however, that Article 22 of the GDPR gives the data subject the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her.

The areas of application mentioned above span all subsectors of the financial industry, including banking, insurance, wealth/asset management, capital markets and financial market infrastructure. The extent to which the different applications are relevant varies among subsectors. Specifically for banking, the business areas expected to be impacted most are depicted in Figure 4.3.

Back-office and middle-office functions are expected to benefit from efficiency gains in areas with a sufficiently high number of repetitive tasks. This is the case in retail customer and small and medium-sized (SME) corporate customer segments. Further candidates for efficiency gains through AI-based automation are post-trade settlement and invoicing processes. NLP and/or image recognition techniques can be deployed for automated document analysis (e.g. insurance claims or customer complaints). Other areas where AI-driven optimisation and automation can increase efficiency and effectiveness are fraud prevention, anti-money laundering and compliance monitoring. The resulting benefits are likely to contribute to both cost reduction and revenue growth. For example, a typical bank can expect potential savings of between 20 and 25% across IT operations.¹²⁰

In the area of customer interface, the use of AI is likely to relax the trade-off between scale and customisation by supporting human employee interaction with customers through AI or delegating it entirely to AI-driven systems. A combination of both scale and customisation is already present in the lending and insurance underwriting business for retail customers through automated application scoring and/or approval. The future application of AI could extend such automation to more complex products, such as lending to SME corporate customers as well as to retail investment and savings products. The most relevant AI tools in this area are ML prediction technologies based on customer transactions and payment data. One of the perceived strengths of AI is that, if adequately designed, it should not suffer from behavioural biases affecting human decision makers. However, this is true only if the AI algorithms are trained on a data sample that is not itself already biased. Otherwise, AI applications would merely amplify biases present in the data.¹²¹

Further customisation of the user experience could be achieved by deploying virtual agents and chatbots, as well as using speech recognition and NLP techniques. Virtual agents and chatbots can provide 24/7 availability of financial services, e.g. to give immediate replies to contractual questions, such as means of payment, statements of expenditure or account movements and transfers, or even instant insurance claims handling. Since financial products are often related to a purchase of non-financial goods (as a means to an end), the financial offering could be embedded directly into the purchase transaction, using AI prediction and pattern recognition techniques.

However, the transformative potential of AI goes far beyond the improvement of processes and customer service. It could allow institutions to redefine completely their core offerings, unlocking untapped market segments and revenue opportunities through new products and services. For fraud detection and anti-money laundering, applying AI pattern detection on data pooled across institutions can be particularly effective, as it would allow reconstruction

¹²⁰ Accenture (2018), *Redefine Banking with Artificial Intelligence*.

¹²¹ For a discussion, see Villasenor, J. (2019), *Artificial intelligence and bias: Four key challenges*.

of the complete picture of financial transaction flows. This would significantly increase detection accuracy.

The employees of financial services institutions could benefit from AI in a working environment that combines the strengths of AI with human qualities. To achieve this may require substantial changes to the organisational structure, its culture and the skillset of the workforce. By relieving humans of routine tasks, such an organisational changeover is expected to result in substantially higher employee productivity and work satisfaction. For example, human traders could focus on the underlying economics of the transactions, while leaving sheer execution to AI tools. AI could also automate generation of detailed and specific reports (e.g. personal wealth) to support wealth management advisors in their interaction with clients. It could also be used to support insurance sales teams by enhancing their capabilities to make complex decisions (e.g. through quotes for commercial clients). Box 8 provides current real-life examples of AI applications in the financial industry.

Box 8: Examples of AI applications in the financial sector

AI is applied in different areas in the financial sector.¹²² In commercial lending, the HSBC partnership with Tradeshift uses ML to analyse supply chains in optimising working capital financing decisions. OakNorth built a platform that leverages ML, NLP techniques and internal and external data sets to conduct fundamental credit analysis, with speed and deep insights. It also provides proactive portfolio monitoring focused on early warning signals to be able to intervene before covenant breaches and defaults.

In insurance claims processing, a Belgium-based insurance company, Ageas, uses AI to analyse customer-sent photos to estimate the damage to cars, freeing it from having to send investigators to assess the damage. Furthermore, NLP is used in its call centres and will soon play a pivotal role in transforming customer service. Ageas is implementing AI in client-facing areas to respond quickly and effectively, while freeing up employees to focus on the most critical aspects of the business.

Deutsche Bank partnered with IBM Watson to develop a system based on analysis of structured and unstructured data to be used in the bank’s Artificial Intelligence Client Communication Centre (AI-C³). It is expected to enable customer advisors to prepare personalised discussions with customers in a much shorter period of time and at the same time provide a more suitable solution tailored to the customer’s needs.

For payments, MasterCard SpendingPulse provides market intelligence based on national retail sales across all payment types. SpendingPulse findings are based on aggregated sales activity in the Mastercard payments network, coupled with survey-based estimates for certain other forms of payment, such as cash and check. It includes expert analysis of the current market conditions and applies ML to forecast macroeconomic trends.

Furthermore, Standard Chartered is developing portfolio compression and risk optimisation solutions by applying ML algorithms to minimise margin costs over the lifetime of a portfolio, while keeping the market risk exposure constant.

¹²² For these and other examples, see Ernst & Young (2018), *Artificial Intelligence in Europe, Outlook for 2019 and Beyond* and World Economic Forum (WEF) (2018), *The New Physics of Financial Services — How artificial intelligence is transforming the financial ecosystem*, 15 August 2018.

4.5 Challenges of using AI in financial services

Challenges exist both when it comes to successful implementation of AI technologies in the market for financial services as well as to maintaining effective competition, safeguarding customer benefits and protecting consumers against the associated risks. The latter are mainly related to such issues as transparency of AI systems, explainability of algorithms, and accountability for AI-based outcomes, including adequate redress procedures. For example, AI systems should be clearly flagged as such to users, including a designation of a contact person for related queries. More broadly, it is important to prepare for the impending socio-economic changes and to put in place an appropriate ethical and legal framework for the use of AI.¹²³

Accelerating digitisation and the more frequent use of AI tools is expected to affect the rate of employment, the required labour skills, and working conditions in the financial sector. Overall, three major job market impacts can be expected: job cuts, increased efficiency and job creation. There will be increased demand for talents skilled in AI technologies, both on a technical and application level. AI is also expected to amplify soft skills, increasing demand for creativity, emotional communication and complex problem-solving.¹²⁴

The first prerequisite for successful implementation of AI technologies relates to the data. The common belief that a firm can overcome data quality problems by making use of massive amounts of unstructured, disaggregated, imprecise data has proven to be flawed.¹²⁵ Effective data management is a prerequisite for AI implementation, and financial institutions may be required to upgrade and potentially completely redesign their existing data infrastructure. The second prerequisite for the implementation of AI technologies is to have an adequately skilled workforce. Financial institutions globally and in the EU in particular do not currently have the necessary workforce composition. They are likely to face strong competition for the relevant talent and skills, not only within their own industry, but also from other industries.¹²⁶ The third prerequisite is a culture of experimentation, which collides with hierarchical structures of traditional financial institutions.¹²⁷

Data is likely to pose another challenge to the competition within the industry. It provides a competitive advantage to firms that own large amounts of data by enhancing their ability to develop, train and apply ML models. Moreover, the use of ML models in day-to-day business would enable them to increase their advantage further through the collection of additional (output) data that can be used to improve the algorithm, potentially tilting the level playing field and creating monopolies. The first step in safeguarding competition in the sector would be to ascertain that firms are not using personal data for illegitimate purposes.

¹²³ See European Commission (April 2018) and European Commission (April 2019).

¹²⁴ See European Commission (July 2018), *Employment and Social Developments in Europe 2018*, Luxembourg and World Economic Forum (2018), *4 ways AI will impact the financial job market*, 14 September 2018 for a wider discussion.

¹²⁵ See e.g. Selz and Saunders Calvert (2018), *The benefits of AI in investment banking*.

¹²⁶ World Economic Forum (WEF) (2018), *The New Physics of Financial Services — How artificial intelligence is transforming the financial ecosystem*, 15 August 2018.

¹²⁷ Ernst & Young (2018), *Artificial Intelligence in Europe, Outlook for 2019 and Beyond*.

According to recent literature, discriminatory access to data or the varying ability of firms to use it for customer profiling increases corporate profits at the expense of consumer value.¹²⁸ Personalised pricing is profitable only if competitors do not have access to the data and/or technology that enables the underlying customer profiling. Without any information about customers, firms choose to set uniform prices, leading to a higher price level and constrained product access. In financial markets, above all, the latter is a result of a signalling effect. By not disclosing their individual data, customers actually signal to the firm their expectation that they would be charged a personalised price that is above the uniform price. This signalling effect makes firms react by adjusting the uniform price upwards and/or restricting access to the specific product or service.

Once data on customer types is freely available to all firms and they have the same ability to profile them, firms would drive down the prices by competing for every single customer, leading to effective competition at the individual customer level. There is even empirical evidence that consumer surplus improves further when data can be traded downstream.¹²⁹

In conjunction with the above, there is an extensive discussion on the implications of AI usage for non-discriminatory access to financial services and possible social consequences.¹³⁰ Two separate issues can be distinguished here: that of discrimination based on individual risk profiles discussed above and that of biased algorithms. The latter implies that an AI tool would systematically discriminate against a specific group of customers based on a common feature (e.g. age, ethnic origin or social status). As mentioned in Section 4.1, the most advanced ML algorithms are not programmed explicitly, but follow a self-learning path based on training data. Thus, potential biases that such an algorithm may end up with are likely to come from its training data. As such, these biases could be expected to wither away as the feedback data is used to fine-tune the algorithm over time. In any case, the industry has to comply with the applicable EU non-discrimination laws and principles as of day one. Whilst many financial services could potentially be replaced by AI in the future, the human contact may remain necessary when dealing with some consumers, especially the most vulnerable.

Another important factor affecting the future use of AI is the demand that the models and algorithms used be explained, so that the reasoning behind decisions reached by or with the help of AI can be better understood (see Section 4.6). Finally, proliferation of AI technologies and models in combination with their complexity may prove vulnerable to new forms of cybercrime and misconduct. In this context, effective attribution of legal liability in case things go wrong is of paramount importance. An efficient redress mechanism is also a must to build user trust and social acceptance of AI applications.¹³¹ It is also indispensable to establish cybersecurity requirements for the use of AI tools with the objective to protect them from attacks and to address their potential abuse for malicious purposes.¹³²

¹²⁸ See e.g. Burke, Taylor and Wagman, (2012), Taylor and Wagman (2013), Belflamme and Vergote (2016), or Belflamme, Lam and Vergote (2017).

¹²⁹ See Kim and Wagman (2015).

¹³⁰ From the economic point of view, this debate is especially acute for the insurance sector due to the strong risk-pooling nature of this industry branch. See e.g. Gapper (2018), *Life insurance should not get too personal*. Financial Times, 6 December 2018.

¹³¹ See European Commission (April 2018).

¹³² See e.g. European Commission (December 2018).

Overall, AI applications should respect seven key requirements to be considered trustworthy:¹³³ human agency and oversight; technical robustness and safety; privacy and data governance; transparency; diversity, non-discrimination and fairness; societal and environmental well-being; and accountability.

4.6 Policy implications

In summary, it should be emphasised that any AI applications in the EU financial sector are subject to the broader Commission's agenda on the use of AI across the economy. As such, all the various general AI policy work streams referred to throughout this chapter¹³⁴ are bound to shape the way AI is used, also in the EU financial sector.

The first and foremost regulatory policy implication is the centrality of access to data, since they represent a necessary input to AI applications in the financial sector and the economy at large. As no AI is possible without data,¹³⁵ they have become a production factor for firms and it is as important to ensure that data enjoy free movement across the EU single market as is the case for capital and labour.¹³⁶ Of course, it needs to be ensured that this is done in full compliance with the applicable regulations on data protection and security.

EU regulatory policy on data has thus become a matter of financial integration. Without integrated data flows across the EU, firms will not be able to benefit fully from the potential that AI applications offer in terms of innovative business models and productivity gains. This is largely determined by the data characteristics described in Section 4.1, notably their economies of scale. Restricting data flows within EU Member States would constrain the training data sets of firms, resulting in a suboptimal performance of algorithms.

The EU has laid the policy foundations in this area with the General Data Protection Regulation (GDPR) for personal data of natural persons¹³⁷ and the Regulation on the free flow of non-personal data.¹³⁸ The GDPR applies whenever personal data is processed, irrespective of the technology used. The GDPR and the Regulation on the free flow of non-personal data together constitute key building blocks of the digital single market, which is designed to boost the data economy and the development of emerging technologies, including AI. The two Regulations are meant to enable the free flow of data (both personal and non-personal),

¹³³ For a wider discussion, see European Commission (April 2019).

¹³⁴ E.g. as regards the ethical and legal framework, data access, adjustment to the socio-economic changes, cybersecurity aspects etc.

¹³⁵ The data do not always have to be 'real' for all purposes across the economic sectors though, as virtual data can also be used to train algorithms in specific circumstances. E.g. algorithms of self-driving cars are trained in virtual environments.

¹³⁶ In addition to the original four freedoms of the EU single market, it is sometimes referred to as the fifth freedom. The four freedoms are: free movement of goods, services, capital and labour (i.e. free movement of workers along with the right of establishment).

¹³⁷ 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.

¹³⁸ Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union.

creating a single European space for data. In addition, there is also the EU Data Base Directive (DBD)¹³⁹, which applies to any data collected by firms.¹⁴⁰

Data regulation is likely to have a transformative impact on the future structure of financial markets. For example, data protection and security requirements will determine the extent of usage of cloud infrastructure services, data portability and digital identity solutions. Due to the characteristics of digital data described in Section 4.1, concentration of data or restricted access to data may pose a competition problem, because its strategic use can lead to foreclosure effects, e.g. by leveraging a firm's position in another market. Since AI technology may soon enable fully personalised prices¹⁴¹, the overall effects on consumer welfare will depend on the competitive landscape and customer behaviour.

Furthermore, it is worth inquiring about any possible financial stability implications of growing AI usage in the financial sector. As pointed out by the FSB, the use of AI in financial services may bring some key financial stability benefits in the form of market efficiency, and regulatory and systemic risk surveillance.¹⁴² Information is at the core of risk management in financial markets. Therefore, more efficient processing of information should contribute to a more efficient financial system. The use of AI applications, and ML tools in particular, can be expected to improve risk management, fraud detection, and regulatory compliance practices, as well as lower the cost of these activities, boosting the resilience of financial markets. On the regulatory and supervisory side, there is also potential to increase supervisory effectiveness and perform better systemic risk analysis in financial markets.

At the same time, the network effects and scalability inherent in ML technologies may in the future give rise to additional third-party dependencies, leading to the emergence of new systemically important players. Like in other platform-based markets, there is potential for natural monopolies or oligopolies in the third-party provider markets. In addition to being relevant from an economic efficiency perspective, such competition issues can also translate into financial stability risks, possibly having systemic effects.

According to the FSB, the lack of interpretability or 'auditability' of ML methods also has the potential to contribute to macro-level risk if not appropriately supervised. As mentioned in Section 4.1, many of the algorithmic models that result from the use of ML techniques are

¹³⁹ Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases.

¹⁴⁰ DBD contains two provisions: copyright and a *sui generis* right. Copyright protects the structure of databases, which, if original, constitutes the author's own intellectual creation. By contrast, the more controversial *sui generis* right protects databases regardless of their originality, as long as there has been 'substantial investment in obtaining, verifying or presenting the contents'.

¹⁴¹ Economic theory distinguishes among three degrees of price discrimination. First degree (also called perfect price discrimination) involves effectively charging each individual a different price in line with that person's willingness to pay (also known as reservation value). The economic effect of this is that the firm maximises its profit by extracting the full value from that transaction. Had it charged less, the consumer would have been better off. Second-degree price discrimination envisages price changes in line with the quantity bought, while the third-degree discrimination classifies consumers into groups to which different prices apply. In general, perfect price discrimination is likely to benefit consumers that have a below-average willingness to pay for a specific good or service at the expense of those that have an above-average willingness to pay. For the specific purposes of financial services though, such as loans or insurance, it is also likely to benefit customers that exhibit a lower than average risk profile at the expense of those with a higher than average risk profile. For an overview of recent market practices, see European Commission (June 2018), *Consumer market study on online market segmentation through personalised pricing/offers in the European Union*, Request for Specific Services 2016 85 02 for the implementation of Framework Contract EAHC/2013/CP/04, Final report, June 2018.

¹⁴² For further details, see FSB (2017), *Artificial intelligence and machine learning in financial services: Market developments and financial stability implications*, 1 November 2017.

difficult or impossible to interpret due to the very nature of ML methods, such as deep learning. Regulators often subject the use of algorithmic models by financial institutions to prior supervisory approval or endorsement. This requires the precise operation of the model to be explained. As AI and ML-based models cannot be explained or interpreted in the same way as human programmed models, since AI/ML models also evolve and self-learn, requiring such prior approval or endorsement may effectively place limits on the use of fully automated decision-making in financial services that AI and ML would, in principle, support.

All these aspects will need to be carefully monitored to ensure that the use of AI does not lead to new systemic risks in the EU financial sector. As with the use of any new product or service, there are important issues around the appropriate risk management and oversight of AI and ML that should be taken seriously. Regulatory and supervisory review of what the AI or ML models are optimised for, rather than exactly how they operate, may also be a way forward for financial regulators and supervisors.¹⁴³

To conclude, it should be noted that the policy implications described in this section are by no means exhaustive and provide merely a snapshot of some areas where potential issues have been identified.

¹⁴³ Hofheinz, P. (2018), *The Ethics of Artificial Intelligence: Machine Learning for Social Good*, Lisbon Council Interactive Policy Brief, 23/2018.

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