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Review 2018

Banking and
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European Financial Stability and Integration Review 2018

European Commission

Directorate-General for Financial Stability, Financial Services and Capital Markets Union

European Commission

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European financial stability and integration review (EFSIR)

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LIST OF ABBREVIATIONS

Countries

AT	Austria	IT	Italy
BE	Belgium	LT	Lithuania
BG	Bulgaria	LU	Luxembourg
CY	Cyprus	LV	Latvia
CZ	Czech Republic	MT	Malta
DE	Germany	NL	Netherlands
DK	Denmark	NO	Norway
EE	Estonia	PL	Poland
EL	Greece	PT	Portugal
ES	Spain	RO	Romania
FI	Finland	SE	Sweden
FR	France	SI	Slovenia
HR	Croatia	SK	Slovakia
HU	Hungary	UK	United Kingdom
IE	Ireland	US	United States

Others

AIF	Alternative investment fund	ICOs	initial coin offering
APP	asset purchase programme	IMF	International Monetary Fund
BoP	balance of payments	IPO	initial public offering
CESEE	central, eastern and south-eastern Europe	Lhs	left hand side
CMU	capital market union	MFI	monetary and financial institutions
CSD	central securities depository	MiFID II	Markets in Financial Instruments Directive
EBA	European Banking Authority	NFC	non-financial corporation
EBAN	European business angel network	NPL	non-performing loan
ECB	European Central Bank	NTW	negotiated trade waiver
EDIS	European deposit insurance scheme	OECD	Organisation for Economic Co-operation and Development
EFAMA	European fund and asset management association	PPS	purchasing power standards
EIB	European Investment Bank	Rhs	right hand side
EIOPA	European Insurance and Occupational Pensions Authority	RPW	reference price waiver
ESRB	European Systemic Risk Board	SAFE	Survey on the access to finance of enterprises
ETF	exchange traded fund	SBSS	sovereign bond-backed securities
EUR	Euro	SCR	solvency capital requirement
FDI	foreign direct investment	SMEs	small and medium enterprises
G20	International forum of the world's 20 leading industrialised and emerging economies	T-LTRO	targeted long-term refinancing operation
GDP	gross domestic product	UCITS	Undertakings for collective investment in transferable securities
GFDD	global financial development database	VC	venture capital

EXECUTIVE SUMMARY

Economic activity in the European Union (EU) continued to strengthen throughout 2017 and in early of 2018. In the EU as a whole, the economy has now seen one of the longest periods of recovery and all Member States are currently experiencing economic growth. The EU has taken the opportunity of this benign climate to advance an ambitious reform agenda to strengthen the financial services sector and the EU at large, in order to make them more resilient and ready to face future challenges and support further integration.

The annual European financial stability and integration review (EFSIR) provides an analysis of recent economic and financial developments in the EU and their impact on financial stability and integration. The report first describes recent general developments in financial markets and the financial sector (Chapters 1-3). This is followed by more in-depth analysis of two particular topics that impact financial stability and integration. In this edition, the first focus chapter (Chapter 4) discusses (the merits of) EU capital market development, with a focus on Member States in central, eastern and south-eastern Europe. The second (Chapter 5) looks at initial coin offerings (ICOs) as a new form of start-up funding, a phenomenon linked to the latest developments of crypto-currencies. The topics discussed in the EFSIR also relate to a number of key initiatives that span the broader policy areas covered by the capital market union (CMU) and the banking union.

Chapter 1 shows that economic activity in the EU has gained momentum and surpassed expectations, in line with the global trend. Growth was spurred by supportive macroeconomic policies and the protracted low-interest-rate environment, accompanied by continued unconventional monetary policy measures. Portfolio rebalancing and cross-border portfolio investment flows were important conduits for the European Central Bank's quantitative easing and asset purchase programme. Nevertheless, inflation remained subdued despite narrowing output gaps and improving labour market conditions. Entering 2018, markets saw a spell of very high, but short-lived volatility. The main stability risks stem from a re-assessment of risk premia and concerns about residential real-estate markets in some EU Member States.

Chapter 2 discusses the funding of the economy and shows that market funding has become more prominent in the EU, in line with the goals of CMU. In particular, non-financial corporations have increased their market funding relative to bank loans. They represent the main issuers of equity and a fast-rising segment in bond markets.

Chapter 3 argues that the restructuring of banks' balance sheets has brought them closer to a more traditional business model of deposit-taking and lending. While bank balance sheets have shrunk overall, both loans and deposits have increased. EU banks' resilience has improved: banks have limited their exposures to market risk by reducing their bond and derivative portfolios. Overall bank performance improved thanks to cost reductions and increased revenues. Despite these positive developments, profitability remains an important challenge in view of the low-interest environment, tight interest margins and high provisions for non-performing loans. Also, the insurance sector is stronger, despite the challenges of low interest rates. EU insurance companies have steadily improved their solvency position as they have adjusted to the new Solvency II regime.

Chapter 4 provides an overview of the merits of capital market development in the EU. The chapter first reviews the link between capital markets and economic progress in general, and presents a set of determinants of capital market development. The results show that Member States in central, eastern and south-eastern Europe are lagging behind other parts of the EU in terms of depth and access to capital markets. This implies that these Member States are those with the most potential to reap the benefits of CMU.

The remainder of the chapter zooms in on the specific characteristics of those Member States and examines how local capital markets could play a role in fostering their further integration into the CMU. The expansion of local markets may help these economies to catch up faster by providing more diversified sources of funding to finance growth and economic development.

Chapter 5 sheds light on initial coin offerings (ICOs), a relatively new funding model for start-up companies. ICOs have become topical because they developed quickly and are linked to crypto-currencies such as bitcoin. As of mid-2017, the pace of fundraising using ICOs had surpassed that of business angels and venture capital. The chapter provides an overview of market developments, shows how ICOs relate to more traditional funding models and compares them with other forms of risk capital, such as business angels, venture capital and crowdfunding.

The ICO market is still an immature market, characterised by information asymmetries, skewed incentives and a lack of a proper disclosure framework. To reap the full potential of ICOs, the market would benefit from more transparency. This would give all parties a better understanding of the proper functioning of the market and the prevailing level of investor protection, which in turn would empower potential investors to finance their eligible projects efficiently.

Chapter 1 ECONOMIC AND FINANCIAL DEVELOPMENTS

In 2017, EU economic activity gained momentum in an environment that was characterised by low interest rates. Spurred by supportive macroeconomic policies and unconventional monetary policy measures, economic growth in the EU and elsewhere surpassed expectations. Inflation remained subdued, despite narrowing output gaps and improving labour market conditions.

Investors continued to be driven by a ‘search for yield’ for most of the year. Central banks in the EU and the United States (US) announced that any adjustment of monetary policy would be very prudent. This reassured investors that bond yields would increase gradually and without sudden shocks. Entering 2018, markets became more volatile, with a volatility spike at the beginning. Volatility nevertheless is likely to remain at elevated levels throughout the year.

The EU continued to be a net exporter of capital, driven mainly by net portfolio investment outflows. Compelling evidence suggests that the ECB’s quantitative easing and asset purchase programme (APP) catalysed substantial cross-border capital flows by decreasing domestic excess returns and creating incentives to invest in foreign securities. Portfolio rebalancing and cross-border portfolio investment flows were important conduits for the ECB’s quantitative easing and APP. Foreign direct investment (FDI) increased as a proportion of the EU’s stock of external liabilities, thereby underpinning financial stability.¹ Equity and bond mutual fund flows recovered in 2017.

1.1 Economic and financial market developments

1.1.1 Macro-economic developments

Economic activity in the EU strengthened gradually throughout 2017, with all Member States experiencing economic growth.² Propelled by supportive macroeconomic policies and improving labour market conditions, growth surpassed expectations. It was further supported by a still favourable euro exchange rate and the upswing in global growth (see Chart 1.1), including increased world trade and the economic recovery of emerging economies. In addition, the adjustment of pre-crisis competitiveness imbalances continued. At the beginning of 2018, there was scope for maintained robust growth of the EU economy without inflationary pressures, as recovery was less advanced in the EU than in other developed economies such as the US. This was the case even though the output gap was set to become positive.³

Investment surprised on the upside, stimulated by greater global demand, upbeat demand expectations, and supportive financing conditions. Also, policy initiatives — such as the Investment Plan for Europe and tax incentives in several Member States — provided support

¹ FDI flows are traditionally the most stable type of capital flow, as they tend to represent long-lasting financial and production relationships between companies across borders.

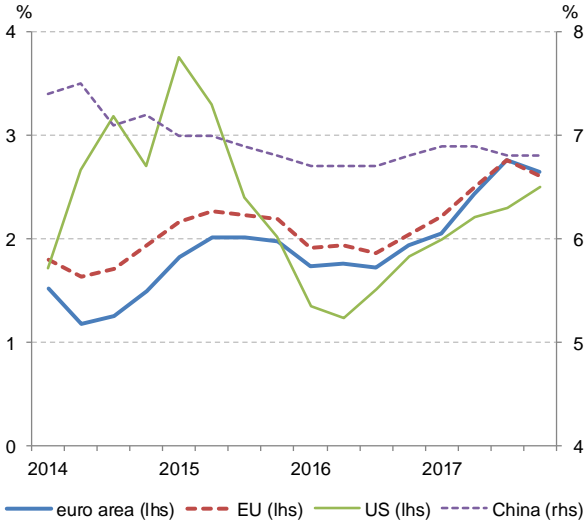
² The EU experience year-on-year growth of 2.2%, 2.5%, 2.8%, and 2.6% in the first, second, third and fourth quarter of 2017, respectively. In the same period, the euro-area year-on-year growth rates were 2.1%, 2.4%, 2.8%, and 2.7% respectively.

³ A positive output gap where growth is above the trend rate of growth is expected to result in inflationary pressures.

for corporate investment. Still, the high, albeit declining, stock of non-performing loans (NPLs) in some countries and the need for further corporate deleveraging continued to weigh on investment decisions (although to a lesser extent, as both were gradually receding).⁴

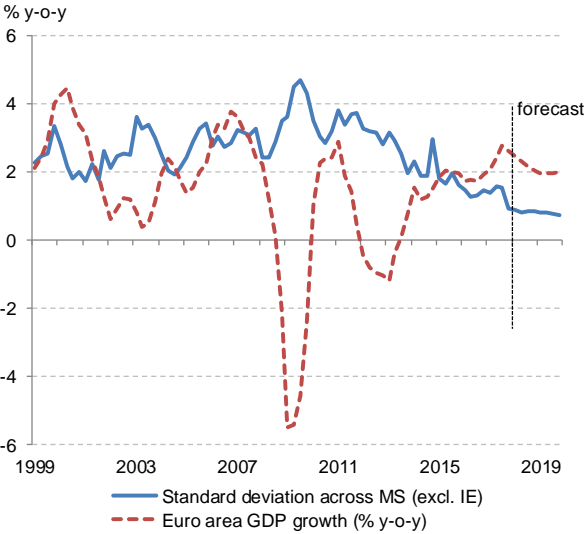
The labour market in the EU and the euro area has continued to recover. Employment has increased recently at a robust pace, and unemployment has fallen to a 9-year low.⁵ In some Member States, the labour market has even become increasingly tight, as economic growth has been running significantly above potential. In others, however, unemployment has remained much higher than before the crisis. Other labour market indicators, such as working hours per employee and the level of ‘involuntary’ part-time work, suggest that labour market slack persists.⁶

Chart 1.1: Real GDP growth, quarter-on quarter



Source: Eurostat

Chart 1.2: Real GDP growth, euro-area convergence



Source: European Commission
 Note: Ireland is excluded from the calculation of the standard deviation across Member States.

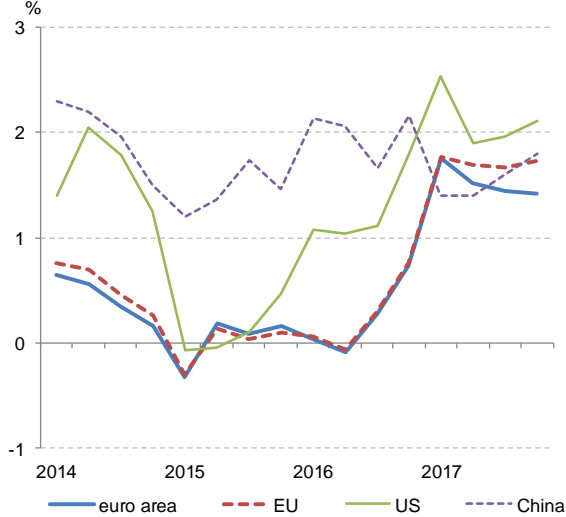
Private consumption remained strong, although its growth slowed towards the end of 2017. There are signs that the gradual convergence in growth rates has resumed (see Chart 1.2). Households’ nominal disposable income increased thanks to higher labour and non-labour incomes that profited from improved labour market conditions and higher corporate profits. The fall in consumption growth can be explained by the rise in inflation, which dampened households’ purchasing power (an effect only partially mitigated by lower savings).

More specifically, euro-area inflation fluctuated between 1.3% and 2.0%, mainly as a result of rather volatile energy prices.⁷ On the other hand, core inflation remained moderate (around

⁴ NPLs are defined as loans and advances past due over 90 days or unlikely to be repaid.
⁵ The EU (euro-area) unemployment rate fell to 7.3% (8.7%) in December 2017. The previous lowest unemployment rates were in November 2008 for the EU (7.2%) and December 2008 for the euro area (8.3%).
⁶ ‘Labour market slack’ is the unmet demand for paid labour in a population and can be defined as the shortfall between the volume of work desired by workers and the actual volume of work available. The level of working hours per employee remained low compared with pre-crisis levels, while the level of ‘involuntary’ part-time work was still relatively high.
⁷ In 2017, the harmonised index of consumer prices increased to 1.4% in the euro area and to 1.7% in the EU as a whole.

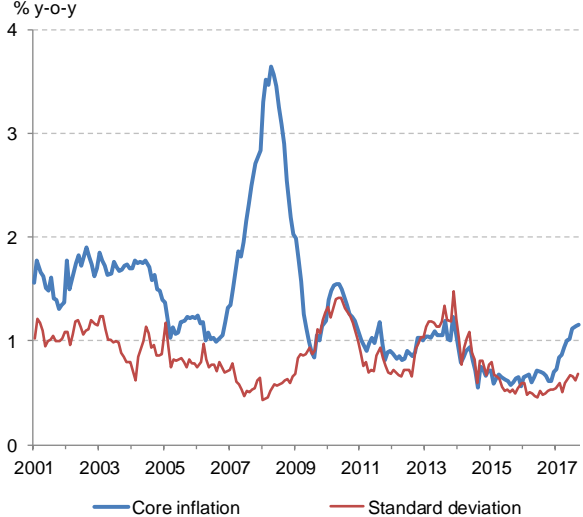
1%) through most of 2017 (see Chart 1.3 and Chart 1.4).⁸ While US inflation surprised to the downside, a growing number of countries saw inflation picking up to levels that were close to targets, or even above in some cases (e.g. in the UK and Spain).

Chart 1.3: HICP inflation, quarterly, year-on-year



Source: Eurostat

Chart 1.4: HICP inflation, euro-area convergence



Source: European Commission
 Note: Core inflation is reported based on the unweighted simple average.

The current economic recovery has several relatively unusual features. Most notable is the strong policy support from accommodative monetary policy. The recovery also has to overcome opposing factors such as the risk of fiscal and financial fragilities stemming from the crisis. Other factors also have been stronger than they were in the past. For example, domestic demand remains weaker than in past recoveries, while the positive effect from (particularly public) investment is subdued; it still accounts for a relatively low share of GDP. Also, compared with that of other economies, the EU recovery relied less on the credit lever to shore up growth. Only at the end of 2017, loan growth accelerated, fuelled by continued improvements in economic sentiment and banks’ increased willingness to lend after years of deleveraging and capital preservation.

Looking forward, the broad-based expansion of the EU economy is expected to continue in 2018, although the momentum is likely to be more moderate in view of the slackening growth of household purchasing power and job creation. A more pronounced acceleration in wages, underpinned by productivity gains, would be an important signal of the economy’s ability to continue to expand at a robust pace.

Global economic activity accelerated, with growth cycles relatively well synchronised across advanced economies and emerging markets. Global GDP grew by 3.8% in 2017, following a seven-year low of 3.2% in 2016, clearly beating the end-2016 consensus forecast of 3.3%. The recovery in emerging markets was supported by a gradual increase in commodity prices, attractive financing conditions, resilient Chinese growth and steadier activity in advanced economies. The recovery in economies that were previously in recession (e.g. Russia and Brazil) has also been stronger than anticipated, thanks to increased commodity prices.

⁸ Excluding volatile energy and unprocessed food prices.

1.1.2 Monetary policy developments

Monetary policy in the euro area remained very accommodative, thanks to extremely low interest rates (see Chart 1.5) and the ECB's APP. In view of the economic recovery, the ECB took small steps towards a recalibration of its policy. The shift was gradual, as the recovery remained dependent on significant monetary support. In addition, inflation remained low, with core inflation well below the ECB's medium-term target.

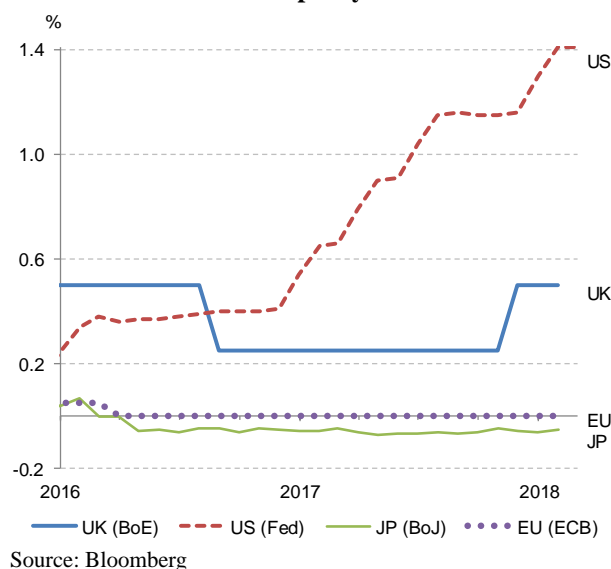
In June 2017, the ECB confirmed that it expected key policy rates to remain at current levels or below for an extended period — even beyond the end of the APP — in order to preserve the very favourable financing conditions necessary to secure sustained convergence of inflation rates towards levels of just under 2% over the medium term.⁹ At the end of 2017, market expectations were that the first interest rate increase would not take place until 2019.

The APP was cut back in 2017,¹⁰ although the ECB signalled that it could extend it again (in terms of both size and duration) if the outlook become less favourable or monetary policy goals were not met. The ECB also indicated that it would reinvest the principal payments from maturing securities purchased under the APP over an extended period after the definitive end of the programme in order to smooth out the unwinding process.

Last, the ECB conducted the fourth and last targeted long-term refinancing operation (TLTRO) of the second series of TLTROs in March. It provided long-term refinancing of about EUR 234 billion with a maturity of four years, thereby raising the total amount lent to euro-area credit institutions through refinancing operations to more than EUR 780 billion.

Monetary policy also remained accommodative in Member States outside the euro area. In Hungary, the central bank cut its overnight deposit rate to ease monetary conditions further. In Sweden, the *Riksbank* signalled that it would not raise the repo rate until the middle of 2018, to keep its inflation rate close to 2%. However, it announced an end to its net new debt purchases. Other Member States, such as the Czech Republic, appear to be moving towards a gradual moderation of monetary conditions amid growing evidence of increased price pressure. However, the Bank of England started to tighten its monetary policy modestly to curtail inflation, which has started to rise above the 2% target. In November, it not only decided to raise the bank rate by 0.25% to 0.50% for the first time in a decade, but also

Chart 1.5: Central bank policy rates



⁹ The ECB's interest rate on the main refinancing operations and interest rates on the marginal lending facility and the deposit facility were 0%, 0.25% and -0.40% respectively.

¹⁰ As of April 2017, the ECB lowered monthly purchases from EUR 80 billion to EUR 60 billion. In October, it decided further to halve its monthly asset purchases from January 2018 onwards and continue monthly acquisitions until the end of September 2018.

emphasised the need for two further increases over the next three years. This shows its willingness to tackle rising inflation despite a slowdown in the economy.

The divergence from US monetary policy widened further in 2017, despite the fact that the ECB (and other central banks) stepped up policy normalisation efforts. US monetary policy appears to be moving faster towards policy normalisation, with successive interest rate increases.¹¹ It gradually increased the target range for its policy rate by 75 basis points to 1.25-1.50% and announced that it expects three additional interest rate hikes in 2018. It appears that, with continued economic expansion and improving labour market conditions, the US Federal Reserve has been increasingly focusing on inflation risk amid diminishing downside risks to growth. In addition, it started to cut down on its bond-buying programme. From October onwards, it will gradually unwind its USD 4.5 trillion balance sheet position by ceasing to reinvest the proceeds of the programme.

1.1.3 Financial market developments

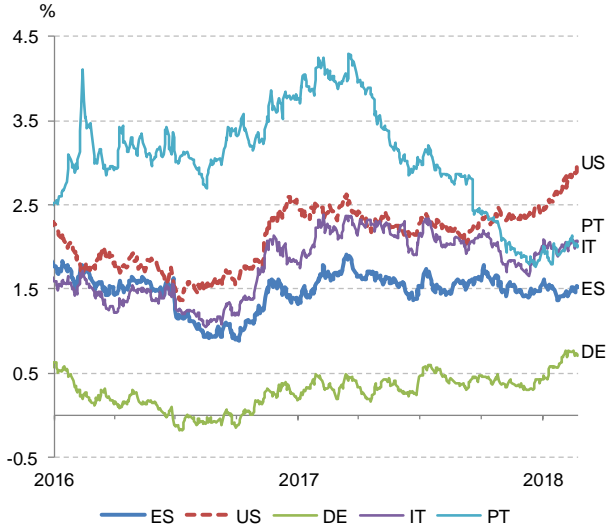
Investors continued to be driven by a ‘search for yield’, with central banks around the world maintaining their bond purchasing programmes and thus suppressing yields. Investors were willing to take on risk, further re-assured by central banks announcements in the US and Europe that any monetary policy adjustments would be gradual. Only ongoing (geo)political and policy uncertainties appeared as potential threats, but they emerged only a few times and without lasting impact.

Meanwhile, the uncertainties surrounding the economic outlook and the future path of inflation amid the release of subdued inflation data, also stressed by central bankers at several occasions, led bondholders to maintain their positions.

In sovereign bond markets, EU benchmark yields trended higher over 2017, amid positive macro-economic data and rising expectations of a gradual normalisation of the ECB’s accommodative monetary policy following its announcement in June (see Chart 1.6).¹² However, inflation figures over the summer — showing that inflationary pressures remained very compressed — partly reversed the earlier pick-up in yields. In early 2018, EU benchmark yields moved higher in response to further signs of economic expansion.

Perceived higher political risk continued to have a negative impact on sovereign bond spreads, as reflected in the widening of

Chart 1.6: 10-year sovereign bond yields



Source: Bloomberg

¹¹ The US Central Bank started a gradual normalisation of its monetary policy as early as December 2015.
¹² Introductory speech by ECB President Draghi at the Sintra ECB Forum, where he said that the ECB might ‘slowly withdraw its large monetary stimulus as the euro-area economy picks up and deflationary forces have been replaced by reflationary ones’. (<https://www.ecb.europa.eu/press/key/date/2017/html/ecb.sp170627.en.html>).

spreads in some EU sovereign bond markets in early 2017. As political risks abated and the economic recovery broadened, sovereign bond spreads (and their respective credit default swap spreads) narrowed significantly.

In addition, rating agencies' credit rating upgrades and positive outlook revisions fuelled renewed foreign and domestic investors' appetite for euro-area bonds. In September, Standard & Poor's was the first agency to restore Portugal's rating to investment grade (the country had fallen out of that important category in 2011). Portuguese sovereign spreads decreased throughout 2017, thanks to improving macro-economic conditions, strengthened fiscal discipline and public debt reduction. Italian spreads remain impacted by political uncertainty and weakness in the Italian banking sector.

Euro-area corporate bond spreads narrowed, helped by bond investors venturing into new bond segments and also down the credit quality spectrum in search of yield, and by sustained support from the ECB's APP.

Outside the euro area, Hungarian sovereign bond yields narrowed significantly, driven in part by expectations for further easing by the Hungarian central bank. Czech sovereign bond yields countered the trend and saw spreads widening amid a government crisis. In the UK, gilt yields picked up in the second half of 2017, following unexpectedly higher inflation numbers and subsequent relatively aggressive policy guidance from the Bank of England.

In the US, 10-year Treasury yields also fluctuated, but on balance remained mostly flat over 2017, as receding inflation expectations and concerns about the growth outlook tempered the Federal Reserve's tightening of monetary policy. However, entering 2018, the 10-year US Treasury yield broke out of its decades-long downward trend, to yield over 2.90% in response to the release of stronger-than-expected core inflation data and rising wage inflation concerns. Also, the easing fiscal policy stance and the larger-than-expected (and largely unfunded) budget deal beyond the tax package passed at the end of 2017 exerted further upward pressure on US sovereign bond yields.

EU equity markets moved higher, reflecting improved economic conditions. Euro-area investor confidence reached its highest level since August 2007. On aggregate, bank shares moved in line with the broad market. However, EU equity indices underperformed relative to their peers, as the appreciation of the euro clouded the corporate earnings outlook for euro-area multinationals. US stock indices reached two new records, first in March, on the back of prospects of new economic stimulus and tax cuts, strong corporate earnings reports and inflation picking up in a contained manner, and a second time towards the turn of the year, following the US Government's announcement of tax

Chart 1.7: Stock market performance in local currency



Source: Bloomberg and own calculations

cuts. Neither record-high asset valuations nor geopolitical and international trade risks surrounding the US administration were able to dampen the market euphoria. However, a sharp and sudden global stock market correction took place in early February 2018, sparked by higher-than-expected wage inflation data in the US, which came on top of the previous months' increase in US bond yields. Nevertheless, the correction appeared to be more technical (a consequence of volatility targeting strategies, de-risking and market-makers hedging option positions, etc.) and did not reflect broader macro political, economic growth or valuation concerns. The market jitters originated in the US, but also affected EU markets. Note, during the February correction the US dollar did not serve as a safe haven (as it often does) and neither did sovereign bonds.

Looking forward, as monetary policy is expected to tighten in 2018, financial conditions might not loosen further, as was the case in 2017. Historically, financial conditions have loosened slightly in the early stage of monetary tightening cycles, but tightened later on. This cycle may be somewhat different, in that monetary tightening is taking place later in the cycle (in the EU and elsewhere), but the level of debt and leverage is also higher, in particular in advanced economies' corporate sectors, but also in emerging markets. This may make financial conditions more sensitive to monetary tightening than in previous cycles.

1.1.4 Financial stability risks

While the low-interest-rate environment has eased funding conditions for firms and contributed to economic growth, it has also affected equity and bond valuations, and the demand for real estate. In addition, changes in investor sentiment towards risk could lead to an abrupt increase in risk premia.

EU stock market valuations are moderately heightened, but appear to be less stretched than those of other equity markets. The US stock market seems to be vulnerable to a substantial price reversal, even if one accounts for robust corporate earnings and fiscal stimulus measures. It appears that the low-interest-rate environment¹³ could only partially justify these high market valuations, because current valuation levels do not account sufficiently for reduced long-term nominal economic growth prospects, and thus a more moderate growth of expected cash flows.¹⁴

Bond market valuations also seem stretched, especially in view of the prospect of a gradual normalisation of monetary policy. In the EU, nominal yields remain very low, or even negative, for short- to medium-term maturities, while real yields for the highest rated sovereigns remain negative for all maturities. Bond market volatility is also subdued by historical standards. The term premium¹⁵ for 10-year German bunds has been negative since 2015, largely on account of unconventional monetary policy measures. In the US, higher

¹³ If interest rates increase, stock markets could be affected significantly, in particularly in the US where corporates' incentives to buy back their stocks would be strongly reduced. This phenomenon has been a substantial driver of the bull market. Due to spill-over effects, EU markets would also be affected.

¹⁴ Between 1940 and 2008, interest rates were at or below present levels about 15% of the time (US data). In that period, the most reliable valuation measures were all about half of the present levels. In fact, the correlation between interest rates and market valuations is weak or non-existent, and is the reverse in most periods of US history, except for the inflation-disinflation cycle between 1970 and 1998.

¹⁵ The term premium is the excess yield investors usually require to compensate for holding long-dated bonds.

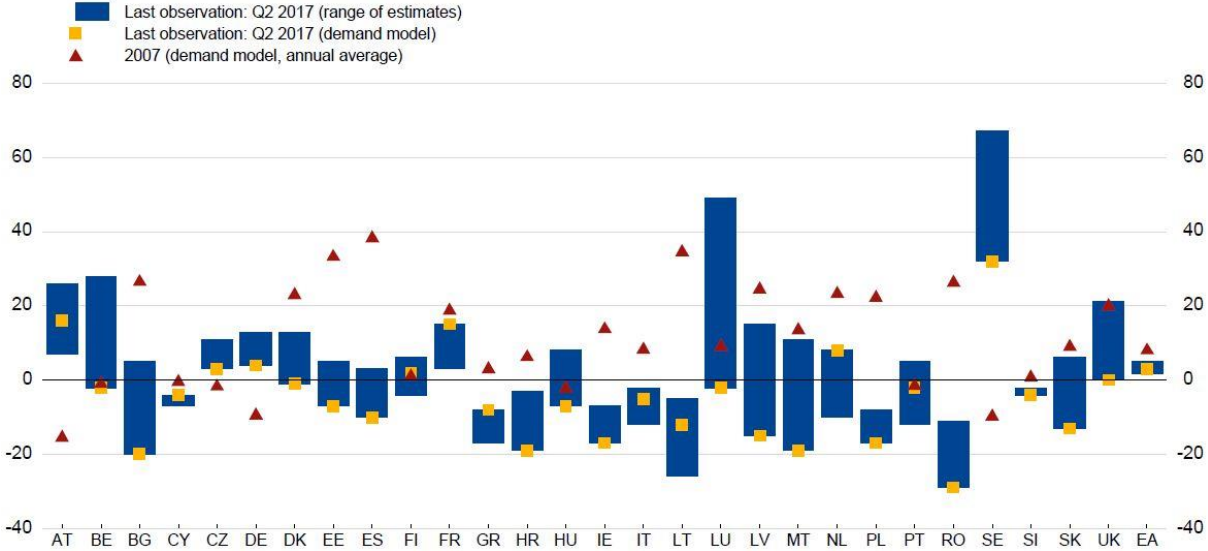
nominal yields reflect the more advanced stage of tapering, but the term premium itself is almost as depressed as in the EU.

These subdued levels signal increased confidence in central banks’ ability to achieve their inflation aims, but from a financial stability perspective they may indicate investors’ complacency about future interest rate adjustments. A reappraisal of investors’ inflation expectations could therefore cause a sharp correction of global risk premia.¹⁶

Overall, equity and bond markets around the world appear to be operating on the assumption of an orderly unwinding of the unconventional monetary policy measures. This process should gradually raise risk-free interest rates and help to take some air out of risk pockets in other market segments. The low volatility in markets suggests that market participants expect this process to unfold smoothly, with central banks reacting effectively in the event of stress.

If expectations worsen as market participants re-assess the risks, a sudden increase of risk premia in some market segments and spill-over effects to others may materialise. Because the bond term premia are highly correlated globally, spill-over risks are particularly high between bond markets. Risk premia and yields could increase significantly and rapidly if market participants become more worried about central banks phasing out or reversing their bond purchase programmes. Greater uncertainty as to future inflation could trigger a similar effect.¹⁷ Moreover, some factors may amplify the effects. A lack of market liquidity in some bond market segments (especially corporate bonds) could exacerbate the impact of a reversal in risk premia.

Chart 1.8: Over- and undervaluation of residential property markets in per cent



Source: National sources, ECB and ECB calculations
 Note: Estimates based on four different valuation methods: price-to-rent ratio, price-to-income ratio, asset pricing approach and a Bayesian estimated inverted demand model. For further details, see Box 3, Financial stability review (ECB, June 2011) and Box 3, Financial stability review (ECB, November 2015). For each country, the blue bars represent the range of estimates across the four valuation methods. The last observation refers to Q4-2016 for BE and to Q1-2017 for CY, PT, SK, FI, HU and RO.

¹⁶ Cœuré (2018).
¹⁷ The inflation outlook depends on how the economic recovery develops. If, for instance, the output gaps tighten, commodity prices increase, wage growth picks up or expectations in economic and fiscal policy change significantly, the term premia could increase.

Investor sentiment towards risk could also be affected by changing macro-economic conditions or the materialisation of political risks. A disorderly adjustment of imbalances in China is one eventuality that could lead to higher risk premia. Examples of political risk include concerns linked to the uncertainty of the Brexit process and the rise of anti-democratic political movements.

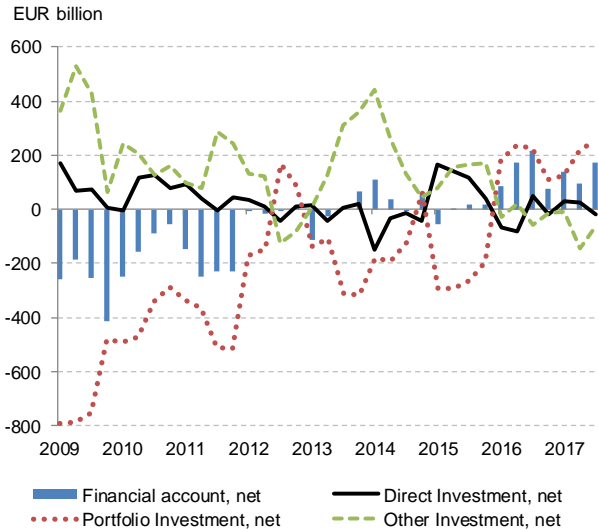
Real-estate markets have continued to excel, thanks to the increased preference for housing investments. Low yields on interest-bearing assets, in combination with favourable financing conditions and increased household disposable income, have supported this trend. Residential property markets continued to expand in 2017. Although this has resulted in broad-based price increases, there are notable differences across Member States (see Chart 1.8). At the end of 2016, the European Systemic Risk Board (ESRB) issued warnings to eight Member States on prevailing medium-term vulnerabilities in their residential real-estate sectors. Meanwhile, in the commercial property markets, prices are also well above long-term averages. Recently, the buoyant price developments in some Member States have seemed increasingly driven by direct investment from institutional investors and funds, rather than bank financing. In principle, this should reduce the EU banking system’s exposure to direct negative spill-overs of a correction in commercial real-estate valuations.

1.2 International capital flows

1.2.1 EU and global developments

The EU continued to be a net exporter of capital in 2017.¹⁸ The financial account balance showed a surplus of approximately EUR 140 billion in 2016-2017 (see Chart 1.9). Net outflows rose further in 2017, mostly as a result of increasing net portfolio investment outflows. Extra-EU bank-related net inflows showed some increase, but were not sufficient to compensate for the increase in portfolio investment outflows, which resulted in a net outflow position for the overall financial account. FDI flows contributed little to the overall net balance: although they were the outcome of robust and relatively (to other types of investment) sizeable gross flows; inflows and outflows almost offset each other.

Chart 1.9: Extra-EU net financial account flows by standard components



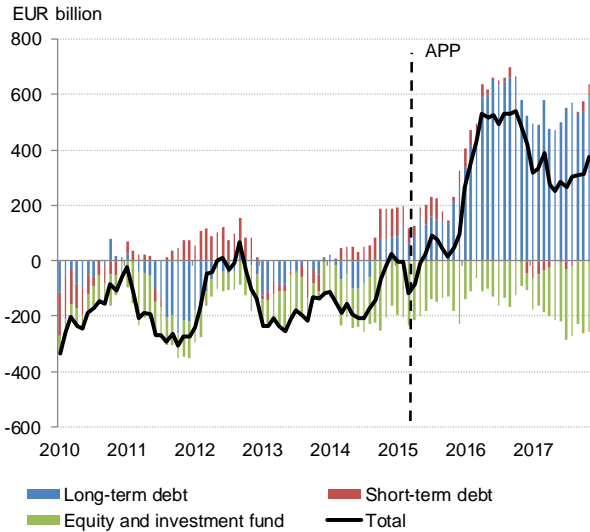
Source: Eurostat (bop_eu6_q)
 Notes: The data are presented as four-quarter rolling sums. Last available data point was Q3-2017. The net financial account balance excludes reserve assets and financial derivatives transactions; it also excludes intra-EU flows; net flows are equal to the difference between outflows and inflows, so a positive (negative) figure indicates net outflows (inflows).

¹⁸ As of the cut-off date for this report balance of payments data were available until Q3-2017 for the EU (from Eurostat and the ECB) and until Q4-2016 for non-EU countries (from IMF balance of payment statistics). Weekly data for mutual fund flows from the EPFR database are available up to the first week of February 2018.

Portfolio rebalancing and cross-border portfolio investment flows were important conduits for the ECB’s quantitative easing and APP.¹⁹ Asset purchases by central banks can be considered as policy-induced portfolio rebalancing that can have direct implications for the expected supply of and demand for internationally traded bonds and for the level of exchange rate that, all other things being equal, would clear the resulting capital flows. Portfolio investments, as reflected in the euro-area investment balance, switched from net inflows to net outflows. For non-residents, the impact of the programmes has been influenced by the structure of local markets, as in some Member States a relatively large proportion of bonds is held by foreign investors. They participated significantly in the APP and, to the extent that they did not re-invest in other euro-area securities, this was reflected in a reversal of portfolio investment inflows.

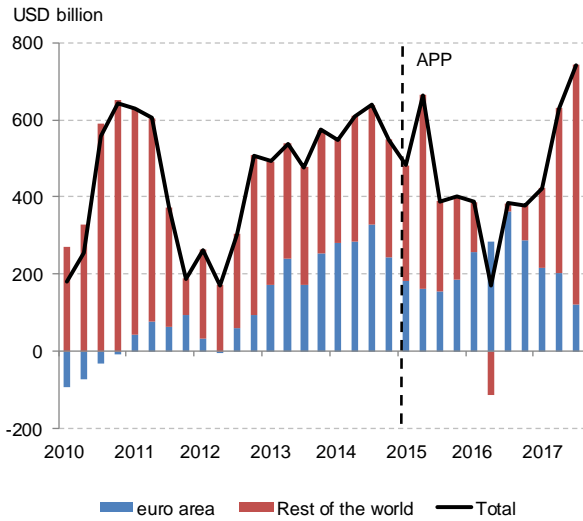
As regards euro-area residents, evidence suggests that ECB programmes have been a catalyst for substantial cross-border capital outflows by reducing domestic returns and creating incentives to invest in foreign securities that are the closest substitutes in terms of risk. Net portfolio investment outflows accelerated sharply in 2016-2017, reaching around 5% of euro-area GDP, mostly at the expense of net outflows of long-term debt securities (see Chart 1.10). Portfolio investments, as reflected in the euro-area portfolio investment balance, switched from net inflows to net outflows.

Chart 1.10: Breakdown of euro-area net portfolio investment flows



Source: ECB and own calculations
 Notes: The data are presented as 12-month moving sums. Euro-area portfolio investment flows and APP. Last available data point was November 2017. A positive (negative) number indicates net outflows (inflows) from (into) the euro area.

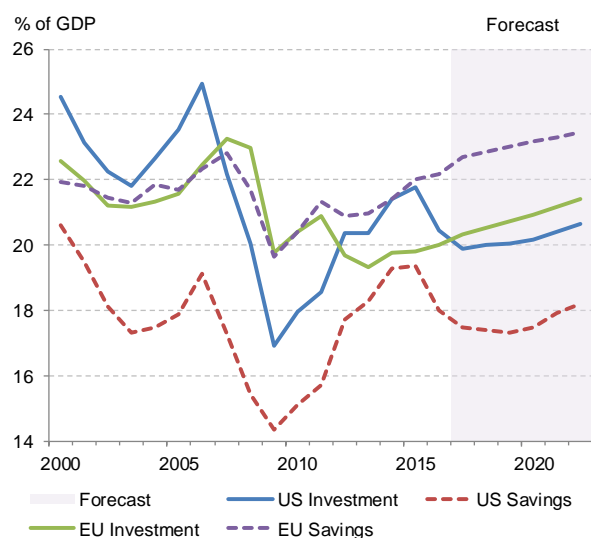
Chart 1.11: Foreign net purchases of US portfolio debt securities



Source: Bureau of Economic Analysis and own calculations
 Notes: The data are presented as four-quarter moving sums. Euro-area portfolio investment flows and the APP. Last available data point was December 2017. A positive (negative) number indicates net purchases (sales) of US debt securities by foreign investors.

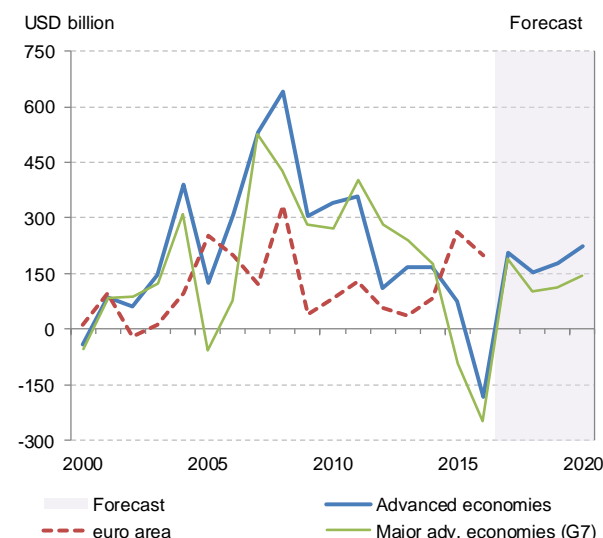
¹⁹ Coeuré (2017).

Chart 1.12: Investment and savings in the EU and the US



Source: IMF WEO and own calculations
 Note: Based on global net financial account developments.

Chart 1.13: Financial accounts for the euro area, G-7 and advanced economies



Source: IMF WEO and own calculations
 Notes: Based on global net financial account developments. A positive (negative) number indicates net outflows (inflows) from (into) the respective region.

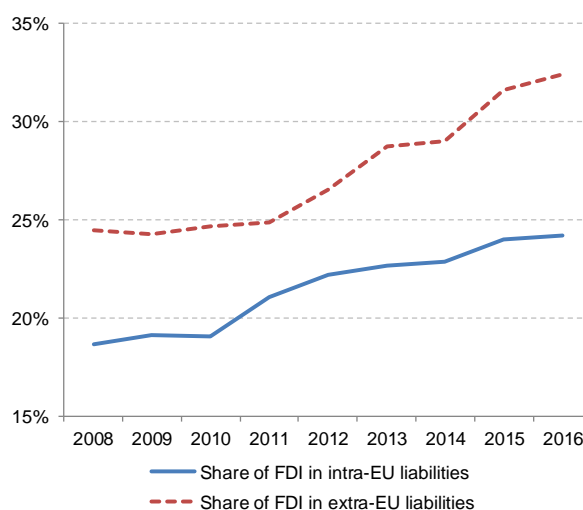
Euro-area residents purchased more US securities: in 2016-2017 euro-area, investors accounted for more than half the foreign purchases of US securities (see Chart 1.11), which is unusually high from a historical perspective.²⁰ These capital flows could have contributed to the flattening of the term premium for US Treasuries.²¹

Based on projections for the savings-investment gap, the EU is expected to continue to export capital in net terms 2017-2020 (see Chart 1.12). Nevertheless, the EU and the US investment-to-GDP ratios are both expected to rise somewhat over the forecast period, although they will stay well below their pre-crisis levels. The EU's ratio is projected to be higher than the US's. In contrast, the G-7 economies are expected to have a net outflows position in 2017-2020, after an almost neutral balance position in 2016 (see Chart 1.13).

1.2.2 Composition of capital flows and implications for financial stability

The composition of capital flows has changed in the post-crisis period, in particular with regard to FDI. Although EU gross FDI flows were negatively affected

Chart 1.14: Share of FDI in the stocks of intra- and extra-EU foreign liabilities, in per cent



Source: Eurostat
 Notes: Excluding reserves and financial derivatives.

²⁰ Euro-area residents have traditionally bought significant volumes of US Treasuries and government agency bonds, as these assets were considered to be the closest substitutes for risk-free assets.

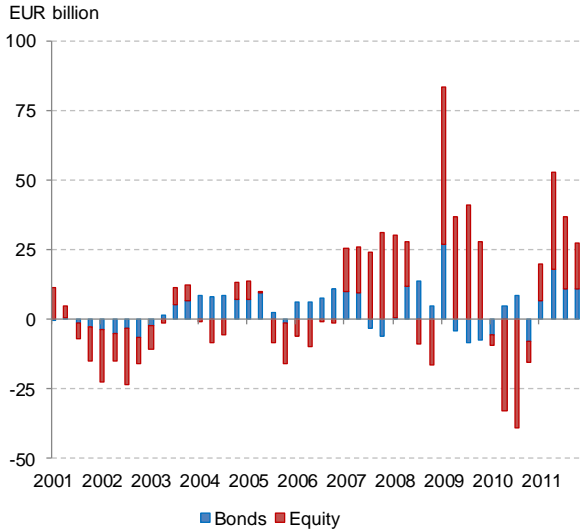
²¹ Coeuré (2018).

by the crisis, FDI remains the most stable type of capital flows, as it represents long-lasting financial and production relationships between companies across borders.²² As a proportion of the total stock of the EU’s external liabilities, FDI has been increasing (see Chart 1.14) with respect to both intra-EU and extra-EU positions, although the increase in the proportion of FDI in extra-EU foreign liabilities has been much faster recently. In 2008-2016, it increased from 19% of total stocks of intra-EU liabilities to close to 25%, and from 23% to 33% of the total stock of extra-EU liabilities.²³ In contrast, bank-related debt flows recovered much slower, resulting in a decrease as a proportion of the stocks of intra-EU and extra-EU foreign liabilities. Overall, the more prominent role of FDI in the structure of the EU financial account is expected to support financial stability and risk-sharing.

1.2.3 Cross-border equity and bond fund flows

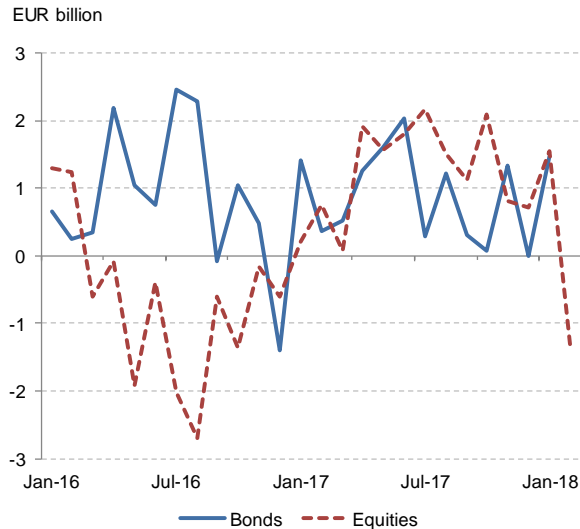
In 2017, EU equities and bond funds experienced net inflows, recovering from a period of net outflows for almost the whole of 2016 (see Chart 1.15). Seven euro-area Member States (Austria, Belgium, France, Finland, Germany, Luxembourg and the Netherlands) received the largest inflows for both asset classes, followed by Denmark, Sweden and the UK. At the beginning of February 2018, global sentiment reversed and European equity funds²⁴ suffered record high redemptions, as fears of rising inflation fed concerns about a possible ending of the prevailing accommodative monetary policy (see Chart 1.16).

Chart 1.15: Fund flows in European equities and bonds — quarterly data



Source: EPFR and own calculations

Chart 1.16: Fund flows in European equities and bonds — weekly data



Source: EPFR and own calculations
 Note: EPFR data collected on 9 February 2018. Last available data point for weekly equity and bond flows were in the first week, February 2018 and the fourth week, January 2018.

²² Buissonière, Schmidt, and Valla (2016).
²³ The higher proportion of FDI in the stock of extra-EU foreign liabilities compared with that in intra-EU liabilities can be explained by the fact that non-EU investors maintained their interest in entering the EU market by acquiring control of European companies and extending intra-company loans.
²⁴ As of the cut-off date for this report, data for bond flows was not available for the first week of February 2018.

Chapter 2 CAPITAL MARKETS AND MARKET FUNDING

Market funding continued to expand in the euro area in 2017. Non-financial corporations (NFCs) — which are the predominant issuers of equity and are fast increasing their bond market prominence — have increasingly relied on market-based funding at the expense of bank lending. Equity issuance by NFCs in the EU nevertheless grew more slowly, while bond issuances increased due to the low cost of bond funding.²⁵

2.1 Bond market funding

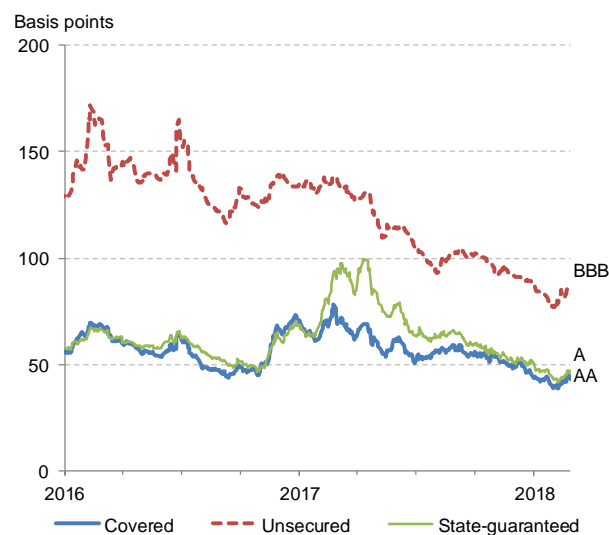
Net issuance on European fixed-income markets rose throughout 2017 amid still-low yields in all market segments. Sovereign bond yields for EU benchmark bonds have oscillated within a narrow range at relatively low levels over the past year (see Chart 1.6), while peripheral spreads narrowed further in 2017. Corporate bond yields have declined further over the past year, while spreads have also narrowed for all rating classes. Accordingly, spreads for European financial institutions' bond, particularly unsecured bonds, also narrowed.

Chart 2.1: Corporate bond spreads, euro area, 5-year maturity



Source: Bloomberg

Chart 2.2: Spreads of bonds issued by banks



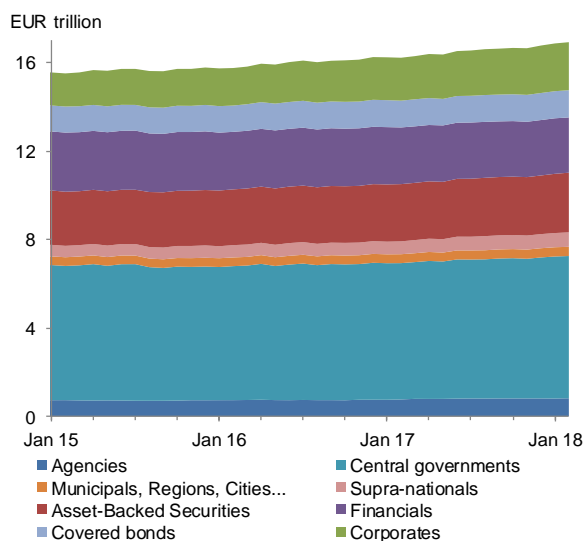
Source: Thomson Reuters Eikon / Markit iBoxx

Thanks to these very favourable market conditions, net bond issuance in the euro area continued to expand. The increase in non-rated issuance and slight lengthening of bond maturities reflect bond investors' increased risk appetite.

As regard categories of issuer, non-financial corporate sector issuance expanded the quickest, with an annual growth rate of 9%. Conversely, net bond issuance by monetary and financial institutions (MFIs) continued to decline in 2017, although less than in previous years. This reflects a deceleration in banks' deleveraging, which coincided with an increase in their lending to the private sector.

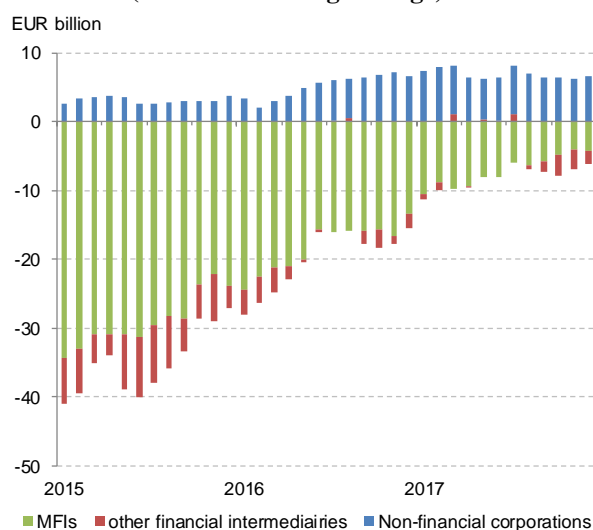
²⁵ Low bond yields are related to the accommodative monetary policy and the inclusion of investment-grade NFC corporate bonds in the ECB asset purchase programme (see Chapter 1).

Chart 2.3: Outstanding euro-denominated bonds by issuer type



Source: Bloomberg

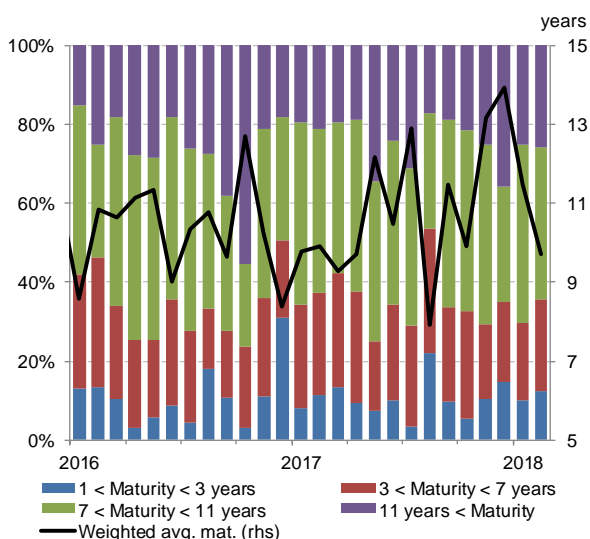
Chart 2.4: Net issuance of private euro-denominated long-term debt securities (12-month moving average)



Source: ECB / Thomson Reuters DFO & Eikon

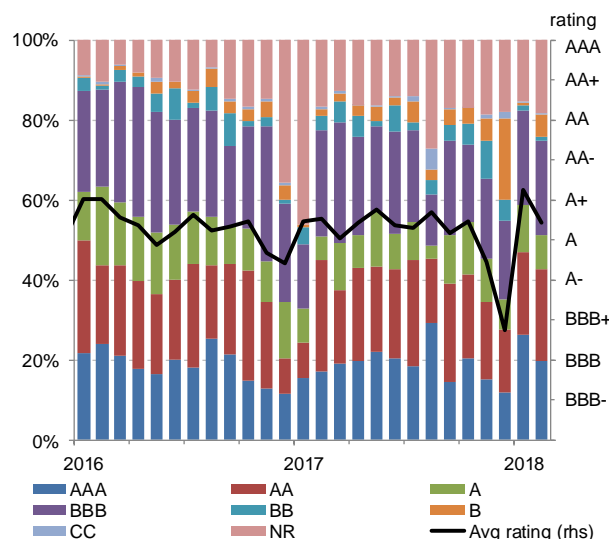
Despite the rising importance of the corporate sector as a bond issuer, the structure of the fixed income markets remains tilted towards sovereigns and MFIs (see Chart 2.3).²⁶ Bond issuance by the public sector showed moderate expansion in 2017 and remained the most important category in the euro area. Sovereign funding needs are tied with Member States' public finances. Thanks to the economic recovery, the latter improved in 2017, with estimated deficit-to-GDP and debt-to-GDP ratios of 1.1% and 89.3% respectively.²⁷

Chart 2.5: Maturity of euro-denominated issuance



Source: Bloomberg and own calculations

Chart 2.6: Credit quality of euro-denominated issuance



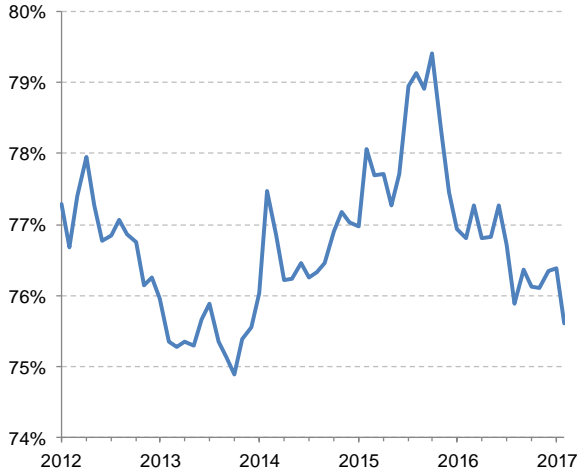
Source: Bloomberg and own calculations

²⁶ The Commission's expert group on corporate bond markets brought together experts representing different perspectives of the functioning of these markets. The expert group delivered 22 recommendations to foster the development of corporate bond markets in the EU. The Commission will follow up on some recommendations and issue a communication on corporate bonds in the autumn of 2018.

²⁷ See European Commission (2017a).

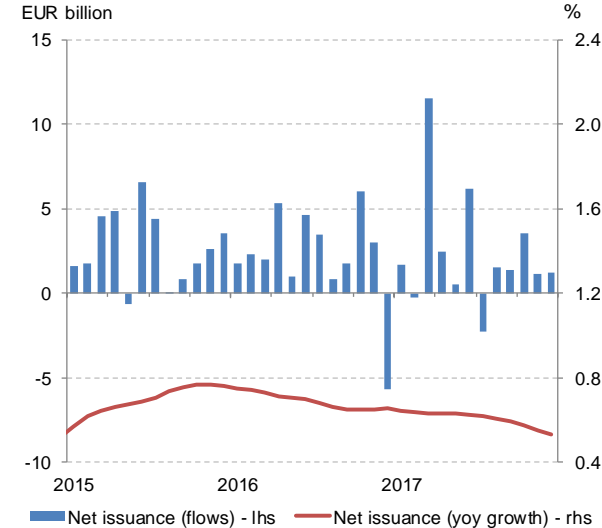
The buoyant fixed income markets draw attention to the potential risks of over-indebtedness and high leverage, in particular in the corporate sector. Although corporates have deleveraged in recent years, corporate indebtedness remains high in several Member States. Hence, the funding structure of the corporate sector remains vulnerable to potential shocks. The ESRB, for instance, raised concerns about the sustainability of NFC debt in the event of interest rate increases. If debt servicing difficulties emerge in the private sector, the declining trend in banks' NPLs could reverse.

Chart 2.7: Proportion of NFCs in total outstanding equity



Source: ECB

Chart 2.8: Equity issuance by NFCs, euro area



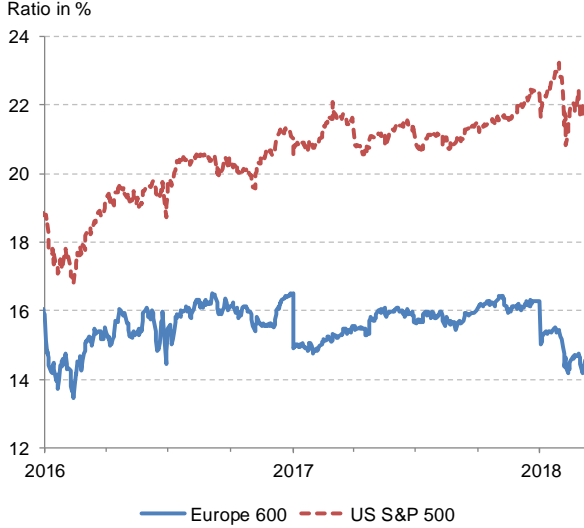
Source: ECB

2.2 Equity market funding

NFCs are the main issuers of equity, accounting for 76% of total outstanding equity in the euro area at the end of 2017 (see Chart 1.7). Over the last year, MFIs issued relatively more equity than NFCs, which may reflect banks' continued efforts to adapt capital structure to the higher capital requirements. Meanwhile, equity net issuance by NFCs stayed more moderate, with annual growth of 0.6% (see Chart 1.8).

European share prices rose further in 2017, supported by low interest rates and renewed optimism over the economy (see Chapter 1). The average price-earnings ratio increased in the EU, but more modestly than in the US (see Chart 2.9). Overall, this seems to curtail the risk of a

Chart 2.9: Price/earnings ratios of equity indices



Source: Bloomberg

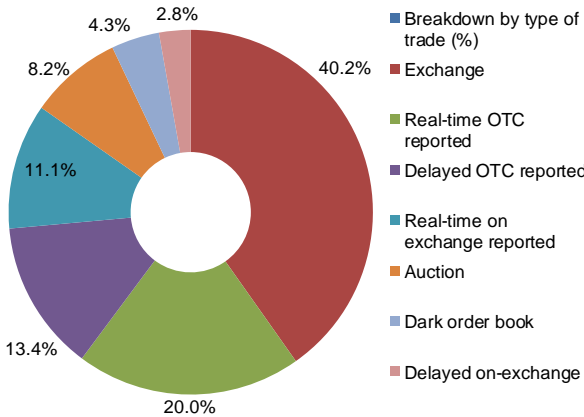
significant price correction in the EU. Price formation is also influenced by prevailing trading practices. In this respect, equity trading practices appear to be changing as a result of the Markets in Financial Instruments Directive (MiFID II) (see Box 1).

Box 1: Changing landscape of equity trading

Equity trading via regulated exchange still remains dominant, accounting for 40% (in volume) of all shares traded. However, other ways of trading exists and it appears that, while MiFID II has been applicable only since 3 January 2018, market participants seem to have changed their trading behaviour significantly. The MiFID II framework, which is aimed *inter alia* at reducing the opacity of ‘over the counter’ markets, is an important step towards safer and more transparent markets.

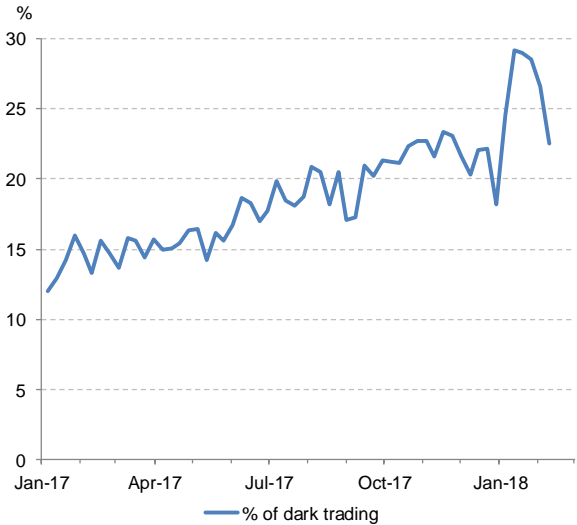
To improve transparency, MiFID II introduces a double-volume cap for trade execution in ‘dark pools’. Over a rolling 12-month period, only 4% of total trading in an individual stock can take place in anyone dark pool. Trading of any stock across dark pools is limited to 8% of total volume. A breach of either rule will lead to trading in that security — either from the dark pool responsible or from all dark pools — being suspended for six months. This measure should address concerns about insufficient pre-trade transparency²⁸ that might also compromise efficient price formation.

Chart B1.1: How Europe’s EUR 100 billion-a-day equity is traded, breakdown by type of trade (%)²⁹



Source: Thomson Reuters

Chart B1.2: Large-in-scale trades, % of dark trading



Source: Fidessa

The application of the double-volume cap has led to significant shifts in trade execution and market participants’ choice of execution venue. This process already started over the course of 2017, with market participant preparing for the application of MiFID II. Overall, trading in dark

²⁸ Whereas MiFID II retains the pre-trade transparency waivers under MiFID I, trading which makes use of the reference price and negotiated trade waivers (RPW and NTW) will be restricted by the double-volume cap mechanism. The large in scale waiver is not subject to the cap. These changes have increased demand from buy-side firms for MiFID II-compliant functionalities that enable large trades with minimal market impact. Many exchanges started offering solutions to cater to the buy-side’s requirement for executing large orders that range from functionalities in the lit markets such as variants of iceberg orders and periodic auction facilities to functionalities in the dark market that entail block trading facilities.

²⁹ Stafford (2018).

pools approximately halved following the application of the double-volume cap in March. Block trading (under the large-in-scale waiver i.e. not subject to the double-volume cap) now represents 29% of all dark pool trading in January 2018, compared to with 12% a year before (see Chart B1.2). This indicates a move away from using the reference-price or negotiated-trade waivers.

At the same time, systematic internalisers that are subject to a less stringent transparency regime than regulated markets and multilateral trading facilities, also gained market shares. In Europe, about 109 systemic internalisers are currently registered or in the process of being registered, as compared with less than 20 pre-MiFID II. This proliferation is due in part to the prospect of the twin-volume cap for dark pools and the extension of asset classes beyond equities that are eligible for trading via a systemic internaliser. According to Fidessa, their share of European equity trading reached a fifth of the market in February.

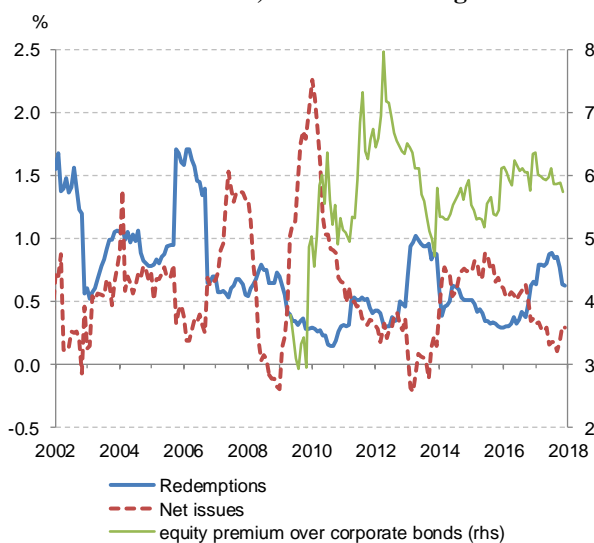
Notably, trading flows shifted to periodic auction facilities, with volumes increasing dramatically on these venues in Q1-2018. Many market operators also launched or intend to launch new periodic auction systems in 2018. Total notional value traded on the periodic-auction books, reached EUR 7 billion in February, up from EUR 6.5 billion in January and a monthly average of only EUR 760 million in Q4-2017.

The cost of equity is traditionally higher than the costs of alternative funding instruments. Over the past couple of years, the equity premium (here defined as the difference between the equity earnings yield and the corporate bond yield) has stabilised, as the decline in the equity yield broadly matched the decline in the corporate bond yield (see Chart 2.10). There is also a negative correlation between the equity premium and net issuance:³⁰ the latter tends to be low when the former is high and *vice versa*.³¹ However, this correlation is imperfect, as corporations may need to issue equity at high premiums when alternatives such as debt financing are no longer possible. The equity premium also influences share buybacks and redemptions, as corporations tend to buy back their own shares when the equity premium is high or during periods of rapid decline in corporate bond yields (such as in 2013). Conversely, corporations slowed down their buybacks of shares when the earnings premium was low, such as in 2007, or during periods of low and uncertain earnings, such as the second half of 2009 and 2010. Currently, the level of share buybacks by EU corporations is high, thereby contributing substantially to the low levels of net issuance. This is part of a global phenomenon that is particularly prevalent in the US.

³⁰ 'Net issuance' is defined as gross issuance minus redemptions. Other factors will also influence the capital structure decision. These include the fact that equity issuance changes a firm's ownership structure, which might make incumbent shareholders reluctant to widen the investor base. In addition, debt financing has a tax advantage (interest rate payments are tax-deductible), while equity issuance costs are higher than debt issuance costs. For a more comprehensive overview, see (for example) Harris and Raviv (1991).

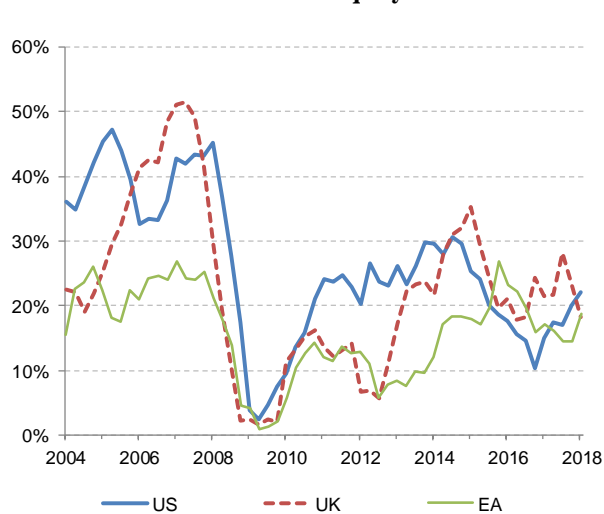
³¹ See Baker and Wurgler (2002).

Chart 2.10: Equity issuance and buybacks, euro area, % of outstanding



Source: ECB

Chart 2.11: IPO vs. established firms, proportion of IPOs in total equity issuance



Source: Dealogic

In line with the CMU objective of stimulating market-based funding (see Box 2), the proportion of corporations that become listed for the first time is an important indicator of the extent to which corporations diversify their funding. Traditionally, seasoned offerings by listed firms are more important than initial public offerings (IPOs), although the proportion of IPOs in total new issuance varies with the economic cycle (see Chart 2.11). At the top of the economic cycle, both firms and investors are more likely to transact: prosperous economic times coincide with high equity valuations while investors search for rewarding investments and are willing to take on more risk.

Historically, the euro-area's ratio of IPOs to total equity issuance has been lower than the US's or the UK's, but between 2015 and 2017 it was higher than the US's. Another notable feature is the recent strong decrease in the UK.

The recent increase in IPO activity is concentrated to large enterprises, while IPOs from SMEs continued to develop in a sluggish manner. IPOs from SMEs have increased slightly over the past five years, but EU SME focused multilateral trading facilities still only generate approximately half as many IPOs per year as prior to the financial crisis. In turn, SMEs have remained heavily reliant on bank financing, especially from smaller local banks that are usually more susceptible to financial shocks.

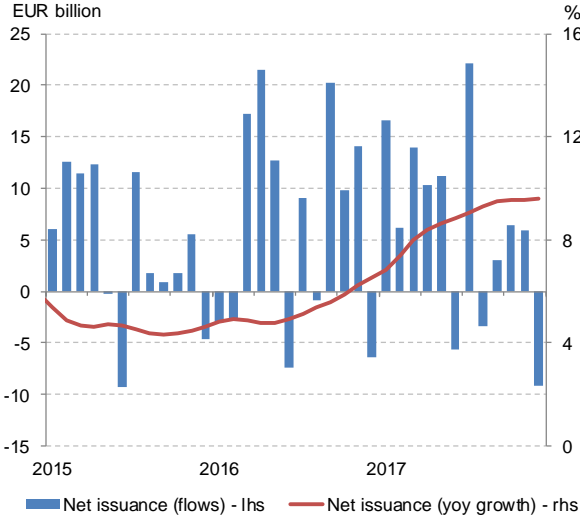
Box 2: Transition from bank-based to market funding: cyclical or structural change?

In the aftermath of the crisis, market-based funding became more attractive, because bank loans became more expensive as a result of the necessary balance-sheet adjustment in the banking system. Acting as a substitute for bank loans, corporate bonds have witnessed rapid development since the crisis. Over the past year, net-issuance flows of corporate bonds have increased further, leading to annual growth of close to 10%.

Since 2015, bank lending and bond funding have complemented each other, growing in tandem and contributing to a comparable degree to overall NFC debt funding. Previously, however, corporate bond funding acted more as a substitute for bank lending, cushioning somewhat the funding cycle in the euro area (see Chart B2.2). This suggests a structural change in NFC funding

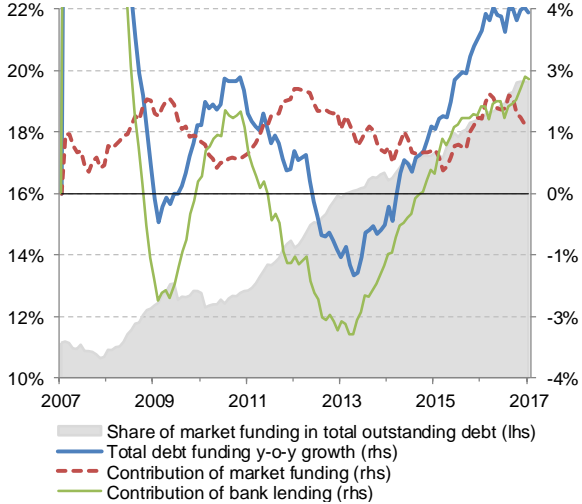
models towards greater reliance on market-oriented funding, as NFCs have not fully reverted to bank lending, despite easing lending conditions and economic expansion. This trend has been supported by the favourable price conditions on bond markets. In 2017, the average cost of bond funding stayed low, thanks to the low risk-free rate and the ongoing purchase of investment-grade corporate bonds under the APP (see Chapter 1).

Chart B2.1: Debt securities to NFCs, euro area



Source: ECB and own calculations

Chart B2.2: NFC debt-funding structure, euro area



Source: ECB

2.3 Alternative sources of funding

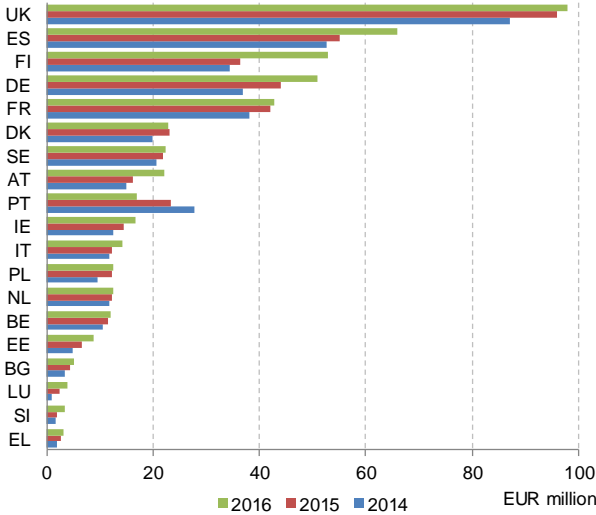
More diversified funding channels have come to play a more important role in fuelling firms’ development and supporting financial stability and economic growth in the wake of the 2008 financial crisis. Venture capital, business angel financing and online alternative finance market comprising crowdfunding are all alternative sources of funding. The aggregate volume has grown consistently over last years and equals almost half of the value of European IPOs in 2016.³²

Especially in the early stages of development, entrepreneurs and promising firms such as start-ups and scale-ups need specific financing to fund their innovation and expansion. Nevertheless, European start-ups have difficulty in scaling up their businesses due to the relatively low availability of venture capital (VC) funding.³³ Not only is the total volume of VC funding in Europe low, but the ‘ticket size’ (the average size of the venture capital deal) also tends to be rather small. This makes it even more challenging for firms that seek financing. VC of EUR 4.4 billion was invested across 3 134 deals in 2016.³⁴ Technology and artificial intelligence will be key drivers, with areas such as healthtech, biotech and autotech expected to continue to grow rapidly and artificial intelligence expected to have an impact across industries.³⁵

³² PwC (2016).
³³ European Commission (2018a).
³⁴ Invest Europe (2017).
³⁵ KPMG (2018).

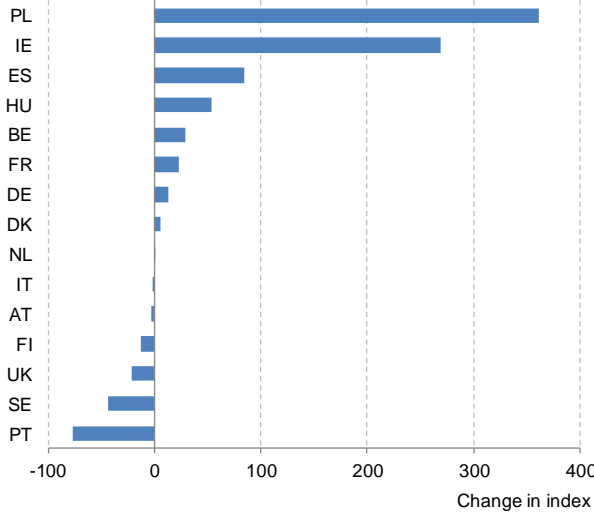
As part of CMU action plan, the Commission and the European Investment Fund have set up an ambitious VC fund-of-funds programme³⁶ to increase the size of VC funds in the EU, while increasing private investment in VC, and encouraging cross-border VC activity.³⁷ The Commission has amended the VC regulation to facilitate cross-border investments within the EU and increase the breadth of investable companies under this regime.³⁸

Chart 2.12: Angel investment by country (2014-2016)



Source: EBAN early stage market statistics (2016)

Chart 2.13: Change in VC investments 2010-2016



Source: OECD, *Entrepreneurship at a Glance* (2017)

Note: Changes as compared with 2010, where 2010 is equal to 100.

VC can play an important role in allowing firms to scale up, but other sources of funding, such as business angels and crowdfunding, might be more relevant in the early phases of a firm’s development. In 2016, the business angel community grew to 312 500 investors closing 38 230 deals.³⁹ Investments by business angels in the EU are small and highly concentrated: the visible part of their outstanding investment amounted to EUR 667 million in 2016, 9.9% more than the 2015 figure.⁴⁰ There is still considerable variation across the Member States in terms of VC and business-angel investments. This manifests itself not only in the volume of alternative finance (see Chart 2.12), but also in the evolution of individual markets. Chart 2.13 shows how the VC market since 2010 has grown most in Poland, Ireland and Spain, while it shrank in countries such as Portugal, Sweden and the UK.⁴¹

³⁶ Through the European Investment Fund, the EU will provide cornerstone investments in one or more independently managed VC fund-of-funds, up to a maximum budget of EUR 400 million for all fund-of-funds. For details, see <http://ec.europa.eu/research/index.cfm?na=na-070217&pg=newsalert&year=2017>.

³⁷ The average size of VC funds is around EUR 60 million, only half of the average size in the US. Public funding in Europe is high and represents over 30% of total VC investments in Europe. At least 50% of investments raised by the fund-of-funds must be from private capital. The fund-of-funds must also operate across at least five Member States, whereas most VC funds currently operate in one Member State.

³⁸ Regulation (EU) 345/2013.

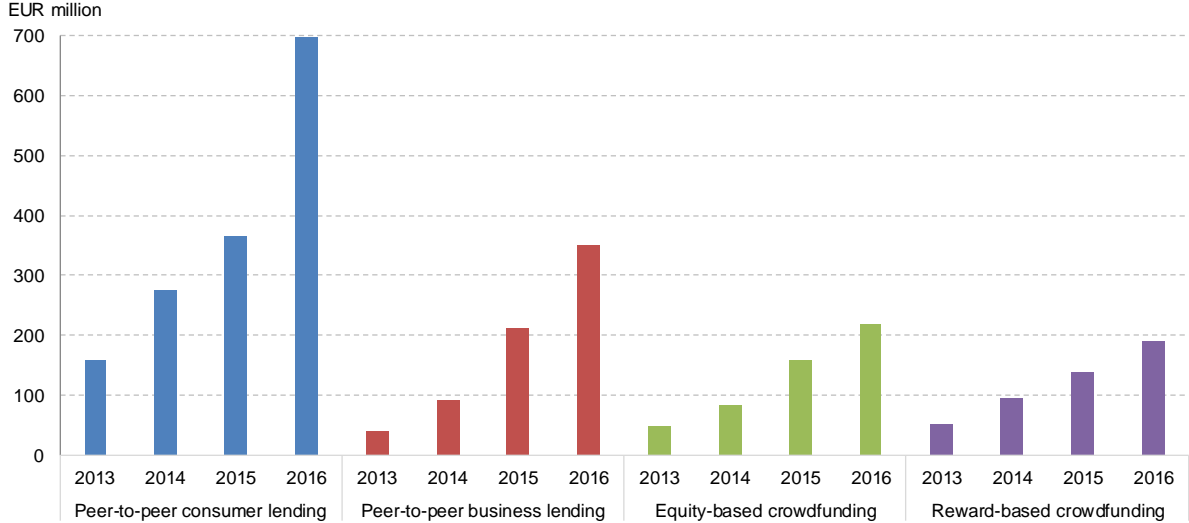
³⁹ EBAN (2017).

⁴⁰ The visible part of the angel investment market refers to those investments made through an angel network or syndicate (OECD (2016)). Due to the informal nature of the investment and the absence of any official definition of angel investment, the overall size of the market of business angel investments is difficult to estimate.

⁴¹ The diverging growth rates reflect that in some countries VC investments come from very low levels. However, there are also differences in the behaviour of corporations and government support. For example, in Germany smaller banks have

The total online alternative finance market in Europe has grown 41% year-on-year and reached a value of EUR 7.7 billion in 2016.⁴² Peer-to-peer consumer lending grew rapidly in 2016 and accounted for around a third (EUR 697 million) of total market activity, followed by peer-to-peer business lending (EUR 350 million).⁴³ Equity-based and reward-based crowdfunding continued to account for a fifth of total activity. Overall, the European market is still relatively modest compared to the online alternative finance markets in the US and Asia.⁴⁴ In March 2018, the Commission presented a proposal for a Regulation on crowdfunding service providers as part of its fintech action plan.^{45,46} The proposal is aimed at enabling the market by addressing problems relating to market fragmentation and the difficulty of scaling up platform operations across the EU.

Chart 2.14: Volume for selected alternative finance models in Europe (excl. UK), 2013-2016



Source: Ziegler *et al.* (2018)

Note: Other alternative financing models not depicted are invoice trading, real-estate crowdfunding, P2P property lending, balance-sheet business lending, donation-based crowdfunding, deb-based securities, balance-sheet consumer lending, mini bonds and profit-sharing.

Box 3: Capital markets union

The capital markets union is a key pillar of the Commission’s Investment Plan for Europe, which aims to unlocking investment in the EU and creating a single market for capital by removing regulatory and non-regulatory barriers to investments. By deepening financial integration and fostering a more resilient financial system, CMU aims to creating more opportunities for investors and connecting financing to the real economy. *Inter alia*, this involves corporates (especially small

begun to follow the lead of their larger competitors by setting up VC funds and big manufacturers have increasingly invested in start-ups in order to innovate and maintain their market position. The UK government’s support for innovation has also helped promote VC investments. The new Payment Service Directive is expected to affect investment patterns (see KPMG, 2018).

⁴² Without the United Kingdom, by far the largest market in Europe, the market size amounted to around EUR 2 billion (Ziegler *et al.* (2018)).

⁴³ Ziegler *et al.* (2018) and European Commission (2018d).

⁴⁴ In 2016, the volume for the Asia-Pacific region was EUR 221.7 billion and EUR 31.8 billion for the Americas. China (EUR 219 billion) and the US (EUR 31 billion) are the dominant market for the Asian-Pacific region and the Americas, respectively.

⁴⁵ European Commission (2018d).

⁴⁶ European Commission (2018d).

and medium-sized enterprises (SMEs) and start-ups) making more use of alternative sources of finance, including capital markets, VC, crowdfunding and the asset management industry.

The Commission has delivered almost all of the actions in the original 2015 CMU action plan (i.e. 29 of 33 actions).⁴⁷ The 2017 CMU mid-term review set out an agenda for updating and complementing the action plan by strengthening existing actions and introducing new measures in response to evolving priorities and challenges. It identified nine priorities:⁴⁸

1. improving the effectiveness of supervision by revising the functioning of the European supervisory authorities;
2. introducing a more proportionate regulatory environment to support SME listing on public markets;
3. introducing more proportionate and effective rules for the prudential treatment of investment firms;
4. developing a legislation on crowdfunding and a fintech action plan to harness the fintech potential;
5. proposing measures to support secondary markets for NPLs and the protection of secured creditors by allowing value recovery from secured loans through accelerated extrajudicial collateral enforcement (AECE);
6. issuing an action plan on a sustainable finance strategy and associated legislative measures;
7. proposing legislation to facilitate the cross-border distribution of investment funds;
8. considering an impact assessment with a view to setting out a suitable framework for the amicable resolution of investment disputes;
9. proposing an EU strategy on supporting local and regional capital market developments.

The Commission has developed two specific action plans that bundle actions in fintech and sustainable finance that will transform the financial system and impact society at large.

The fintech action plan⁴⁹ is aimed at enabling the financial sector to make use of the rapid advances in new technologies by: (i) hosting an EU fintech laboratory; (ii) developing a comprehensive strategy on distributed ledger technology and blockchain;⁵⁰ (iii) facilitating information-sharing with regard to cybersecurity; and (iv) presenting a blueprint with best practices on regulatory sandboxes.

In addition, the Commission has tabled a draft Regulation on crowdfunding.⁵¹ The proposal focuses on enabling platforms to scale up cross-border by creating a licensing regime that can be used across the EU without requiring further authorisation in each Member State.

The high level expert group on sustainable finance presented its recommendations on sustainable finance in January 2018. On the basis of its report, the Commission presented its action plan on sustainable finance, presenting a comprehensive EU strategy, in March.⁵² Among other measures, the Commission will propose concrete actions to ensure that the regulatory framework supports private capital flows towards sustainable investments while ensuring that financial stability is safeguarded.

⁴⁷ For an overview of the actions, see European Commission (2015a), Annex 1.

⁴⁸ European Commission (2017b).

⁴⁹ European Commission (2018b).

⁵⁰ See also Chapter 5.

⁵¹ European Commission (2018d).

⁵² European Commission (2018c).

Chapter 3 BANK AND NON-BANK FINANCIAL INSTITUTIONS

3.1 Banks

European banks were resilient in 2017 and managed to improve their performance slightly. They took steps to reduce balance-sheet risks and continued to prepare for compliance with new regulatory rules (see Box 4). The restructuring of banks' balance sheets re-aligned their business model with the traditional operating model of deposit-taking and lending: total assets and liabilities decreased, while overall loans and client deposits increased. At the same time, banks limited their market risk exposure by reducing their bond and derivatives portfolios. Despite significant differences across Member States, credit risk declined, while asset quality improved slightly, as most Member States took measures to reduce the remaining stock of NPLs.

On the liability side, the banks increased their reliance on deposits to boost stable funding. Bank capital positions strengthened, driven mostly by a decrease in risk-weighted assets and more specifically in their credit risk component. They also improved earnings by cutting funding and operational costs, and increasing net income relating to fees and commissions, amid favourable financial market conditions. Despite these positive developments, profitability remains an important challenge for EU banks given the prevailing low yields, tight interest margins and high provisions to cover NPLs. On a more positive note, a better functioning secondary market for NPLs — which would increase the likelihood of obtaining higher prices when selling NPL portfolios — could mitigate some of the banks' losses. Also, EU banks will probably continue to implement technological innovations in order to become more effective and further reduce operating costs.

Box 4: The Commission's call to complete all parts of the banking union

In October 2017, the Commission published a Communication that takes stock of what has been achieved in creating the Banking Union and what measures are still needed to complete it.⁵³ It urges the European Parliament and the Council to make progress in adopting the measures needed to tackle remaining risks in the banking sector. It also suggests new actions to reduce NPLs (see Box 6) and to help banks diversify their investments in sovereign bonds. The purpose of the Communication was also to give new impetus to the negotiations on the European deposit insurance scheme (EDIS) and map out the path to setting up a last-resort common fiscal backstop for the single resolution mechanism.

Beside the actions to reduce NPLs, the Communication also refers to:

- seeking a quick agreement on the banking package, which incorporates the remaining elements of the rules agreed by the Basel Committee on Banking Supervision and the Financial Stability Board;
- facilitating the creation of a single EDIS and encouraging progress in the ongoing negotiations by suggesting possible steps with regard to the phases and timeline of EDIS;
- promoting an efficient decision-making process that will allow for swift deployment of a fiscal backstop to the banking union;

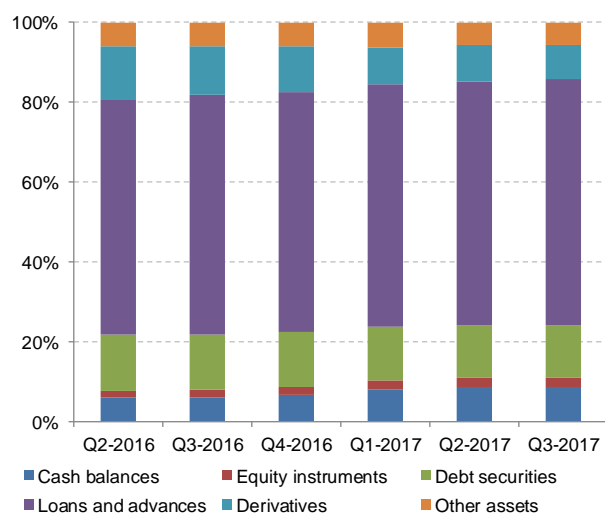
⁵³ European Commission (2017d).

- reducing the bank-sovereign loop — the Commission recalled the ESRB’s work on sovereign bond-backed securities (SBBS); and will consider the outcome with a view to putting forward a proposal in 2018 to enable SBBS;
- proposing in December 2017 that large investment firms carrying out bank-like activities be considered credit institutions and be subject to bank supervision.

3.1.1 Asset composition

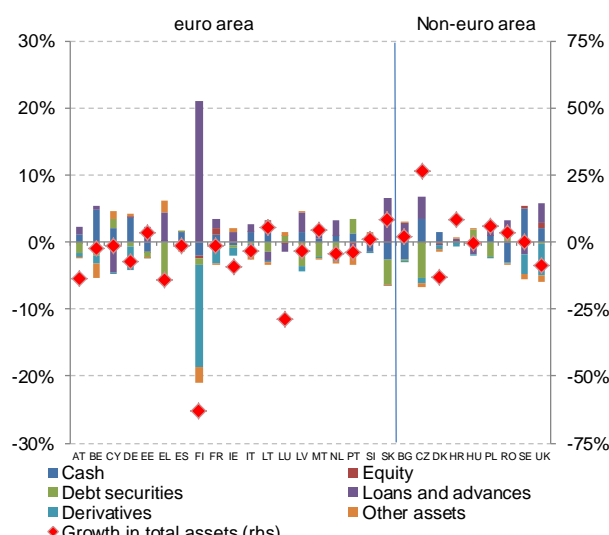
The economic upturn and accommodative monetary policy, combined with an ongoing transition towards stronger positions in bank capital, changed the structure and size of banks’ balance sheets. In the year to end September 2017, EU banks’ total assets had declined by 4.1%, mainly due to lower volumes of debt securities and derivatives.⁵⁴ However, Chart 3.2 shows an unequal pattern across the EU. Within the euro area, most banks continued to shift away from debt instruments on the back of the APP (more specifically, the corporate sector purchase programme), which continued to create an opportunity for banks to acquire additional liquidity.

Chart 3.1: Asset structure of EU banks, total



Source: EBA and own calculations

Chart 3.2: Change in share of asset components and growth in total assets, by Member State



Source: EBA and own calculations

In order to reduce market risk, EU banks cut the proportion of derivatives in their assets to 8.5% on average as of end September 2017, from 11.3% at the end of 2016. EU banks have been quite consistent in reducing their holdings of derivatives, although the initial proportion of these financial instruments differs across Member States. In line with the reduction in derivatives, the amount of financial assets held for trading dropped, constituting 15.7% on average of total bank assets at end September 2017, as compared with 17.2% at the end of 2016.

Meanwhile, EU banks’ cash balances continued to increase, helped by the accommodative monetary policy and low interest rates. In turn, higher levels of liquid assets boosted bank

⁵⁴ Most data used in this section are taken from EBA’s November 2017 *Risk assessment report*.

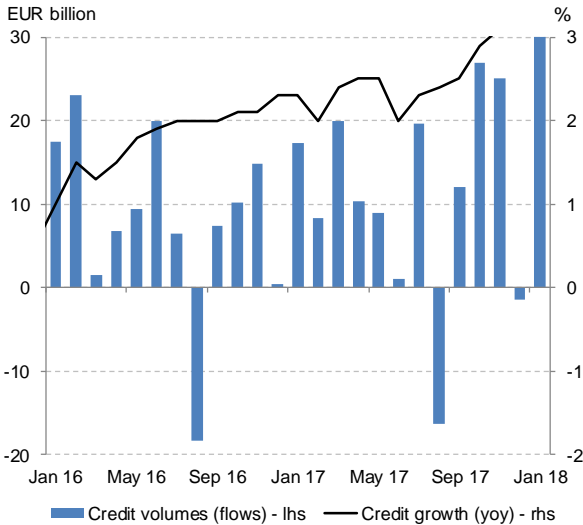
liquidity coverage ratios, which reached on average 158% in 2017, clearly surpassing the 80% threshold required by the Basel III phase-in arrangements.

The decrease of debt securities and derivatives on bank balance sheets led to a slight increase in the proportion of loans in total assets (from 60.0% at the end of 2016 to 61.5% in September 2017). Meanwhile, there were some signs of national banking systems converging. While total loans and advances for EU banks increased by 1.3% on average between Q4-2016 and Q3-2017, banks in Member States below the EU average had an increasing proportion of loans in total assets, while banks in Member States above the EU average (mostly) had a declining proportion.

Box 5: Development of credit to NFCs and households

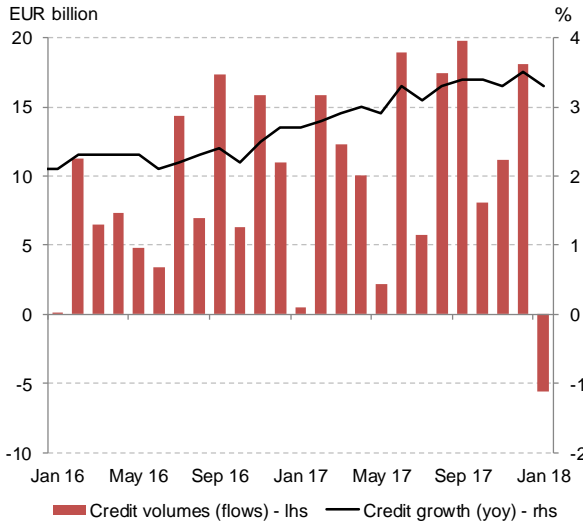
Private credit in the EU continued to recover in 2017, due to increasing demand from corporations and individuals, and improving supply conditions. The annual growth rate of MFI loans to the euro-area private sector (adjusted for loan sales and securitisation) accelerated to 2.9% in November 2017. In particular, the annual growth rate of adjusted loans to households stood at 2.8% in November and the annual growth rate of adjusted loans to NFCs rose to 3.1%. Such positive lending volumes in the euro area were supported by further declines in bank interest rates. Moreover, interest rate differentials between euro-area countries narrowed further over the last couple of months for both households and NFCs. Such trends in interest rates suggest a functional transmission of the ECB’s accommodative monetary policy through the euro-area banking system.

Chart B4.1: Bank credit to NFCs (adjusted) in the euro area



Source: ECB

Chart B4.2: Bank credit to NFCs (adjusted) and bank mortgage credit



Source: ECB

The ECB’s latest (October 2017) bank lending survey confirms the positive trends in bank lending. Credit standards remained broadly unchanged for loans to companies and eased for loans to households, driven mainly by competitive pressures and banks’ risk perceptions. Looking ahead to Q4-2017, banks expect unchanged credit standards on loans to companies and a further net easing of credit standards on loans to households. Loan demand continued to increase across all loan categories, mainly due to low interest rates, the growth in fixed investment, favourable housing market prospects and improved consumer confidence. Banks expect net demand to have increased further in Q4-2017 for all types of loan. Banks reported that access to both wholesale funding and retail funding improved in net terms in Q3-2017.

3.1.2 Liabilities

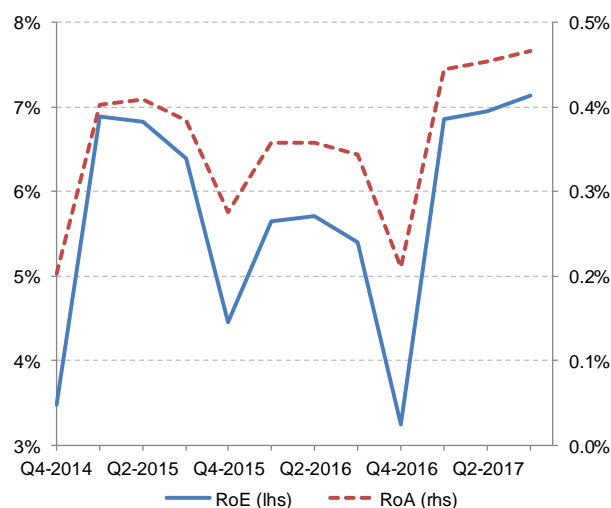
EU banks adapted their funding strategies to comply with upcoming regulatory requirements relating to loss-absorbing capacity and stable funding ratios. More specifically, they relied more on deposits and bank liquidity at the expense of market funding.⁵⁵ Their total liabilities decreased by 1.8% on a yearly basis in Q3-2017: all components shrank except customer deposits. Deposits from financial institutions declined, which lowered their share in total liabilities to 7.1%, while the issuance of debt securities remained virtually unchanged, representing 19.0% of total liabilities in Q3-2017.

Looking at individual Member States, the relative fall in total liabilities of the banking sector was greatest in Finland (nearly two thirds). Analysts commonly attribute the change to Nordea Bank's conversion of all its Nordic subsidiaries into branches at the beginning of 2017. In Denmark, Greece and Luxembourg, banks' total liabilities had decreased by more than 10% year-on-year by Q3-2017. In contrast, total liabilities rose in some non-euro countries. The largest increase was registered in the Czech Republic (nearly a third) and Sweden (approximately 8%). As regards specific components of liabilities, customer deposits increased or remained virtually unchanged in all Member States except Cyprus, the Czech Republic and Lithuania. Banks in Finland and Luxembourg recorded a significant decline in deposits from credit institutions, partly compensated by an increase in the issuance of debt securities and — in the case of Finland — by a rise in customer deposits.

3.1.3 Profitability

The profitability of EU banks remained under pressure. High levels of NPLs, which increased bank impairment and provisioning costs, weighed on total expenses. While the accommodative monetary policy provided cheap liquidity, it also exerted pressure on banks' interest margins. Banks' efforts to strengthen their capital and liquidity position also had a negative effect on their profitability. Nevertheless, the average return on equity for EU banks continued to increase, reaching 7.1% in Q3-2017, up from 5.4% a year earlier. The improvement came mainly from a substantial and stable reduction of impairment costs in several Member States, combined with a slight increase in total operating income and a marginal decline of expenses. However, in spite of these improvements, profitability in the EU banking system remains rather low by historical

Chart 3.3: EU banks' average return on assets (RoA) and return on equity (RoE)



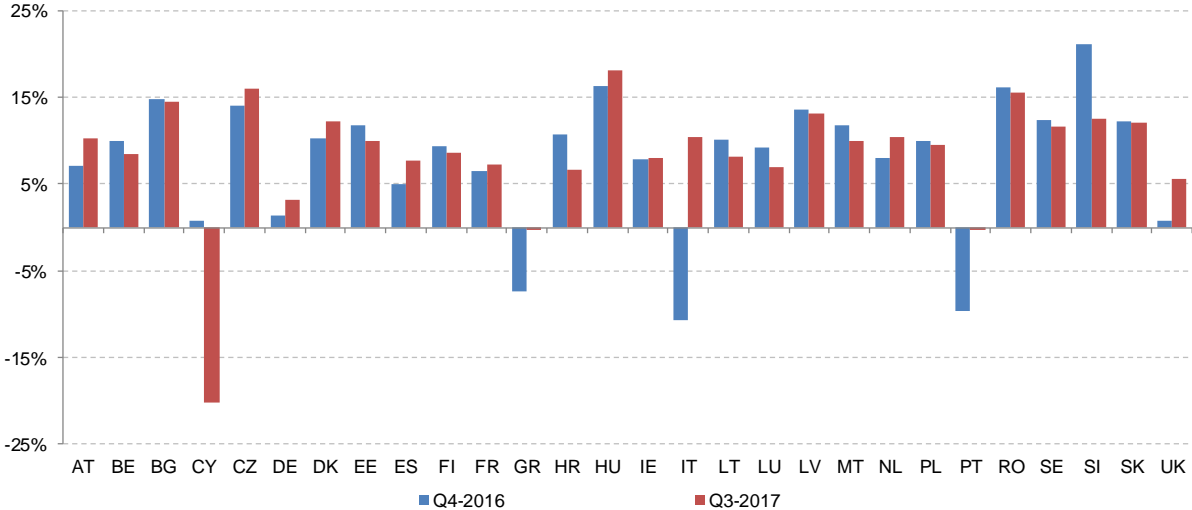
Source: EBA

⁵⁵ An important redistribution among the funding instruments has taken place in 2017, where eligible instruments satisfying the minimum requirement for own funds and eligible liabilities (MREL) have increased. This includes issuances attempting to anticipate the more conservative eligibility criteria proposed by the Commission as part of the banking package for compliance with the upcoming standards for total loss absorbing capacity (TLAC) and updated MREL.

standards. For comparison, the average return on equity for euro-area banks over the last 10 years exceeded 9.0%.

Bank profitability remains unevenly spread across Member States. Several banking systems — mainly those outside the euro area — reported strong profitability ratios helped by higher interest margins, lower impairment expenses and lower cost-to-income ratios.

Chart 3.4: Banks’ return on equity, by Member State



Source: EBA

Net interest income, which is traditionally the main source of bank income, increased as proportion of total operating income, to 56.5% in Q3-2017. The increase came along with an increase in banks’ loan stocks and despite low interest rates on both loans and deposits in most countries. At the same time, interest margins stabilised in 2017 and even increased slightly in some Member States.

Total operating income in 2017 increased, mainly thanks to net trading income generated by EU banks and, to a lesser extent, higher net income linked to fees and commissions. The increase was backed by positive capital market trends in the first half of the year. The shares of net fees and commission income rose from 27.1% to 27.7% and net trading income from 6.2% to 8.9% year on year. EU banks made progress in addressing their NPL problems. As a result, NPLs have recently weighed less on profitability in most EU countries, except those with the highest NPL levels. The impact of NPLs on profitability could be due to the still-underdeveloped and fragmented secondary markets for NPLs, which limit the returns for banks selling NPLs. In this context, the Commission’s efforts to enhance the functioning of secondary markets for NPLs can be considered an important step towards further mitigating the negative impact of NPL sales on bank profitability (see Box 4 for more details on the Commission’s initiatives).

3.1.4 Asset quality

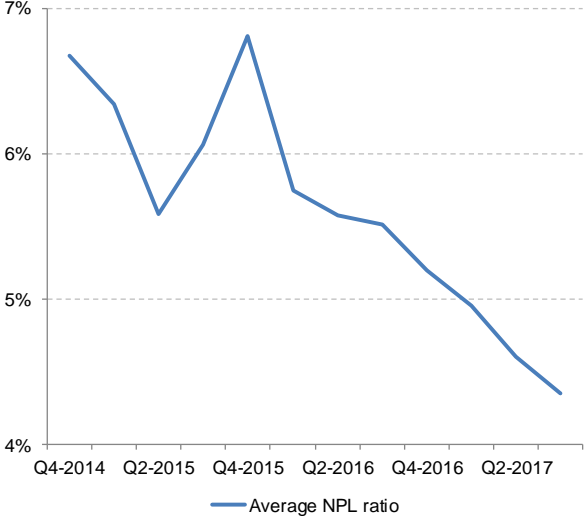
The total amount of NPLs stood at EUR 910 billion in Q3-2017, down by nearly 17% from Q3-2016. Thanks to increased efforts by EU banks and relevant authorities, the average gross NPL ratio came down from 5.5% to 4.4% over the same period. The systematic recovery in the credit market should help support the decreasing trend in NPL ratios going forward. NPL

ratios continued to differ significantly across countries, ranging from approximately 1% in Finland and Sweden to nearly 47% in Greece. Most Member States registered lower NPL levels in Q3-2017 than in Q3-2016. Exceptions were Estonia and Sweden where the NPL ratio increased marginally.

On average, 51% of all NPLs in the EU were covered by provisions as of Q3-2017, but the coverage ratio varied widely across Member States, from around 32% in Finland to around 70% in Croatia, Romania, Slovakia and Slovenia. For bank credit risk, represented by net NPL ratios (reflecting the amount of NPLs not covered by provisions), the trends look comparable to that for gross NPL ratios.

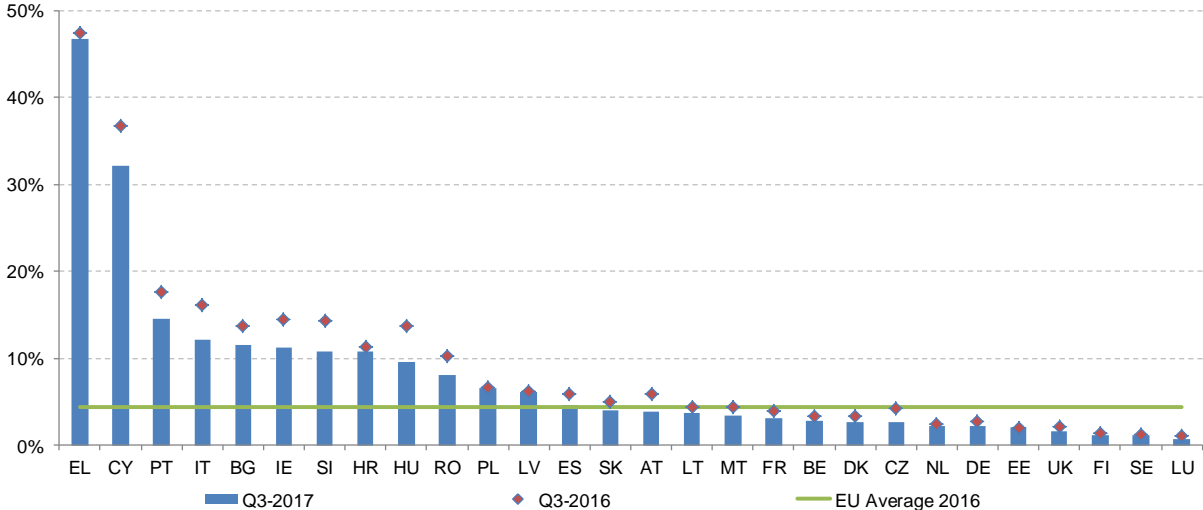
Comparing ‘NPLs to gross loans’ ratios with the size of national economies, shows that, in isolation, the ratio may underestimate the NPL volume and related problems, particularly in countries such as Cyprus, Greece, France, the Netherlands and Spain. At the same time, for countries such as Bulgaria, Hungary, Romania and Slovenia, the NPLs to GDP ratio is lower than the ratio of NPLs to gross loans. The reason for the discrepancy may be that this latter group of Member States are open economies. They are in the process of converging to the EU average in terms of income, for which a sizable proportion of financing is acquired via FDIs. Therefore, the ‘NPLs to gross loans’ ratio may overestimate the NPL problem in those countries.

Chart 3.5: EU banks’ average NPL ratio



Source: ECB
 Note: The average NPL ratio is calculated as gross non-performing loans and advances / gross total loans and advances

Chart 3.6: Banks’ NPL ratio, by Member State



Source: ECB

Box 6: The Commission's comprehensive measures to tackle NPLs

Despite good progress, further legislative measures appear necessary to address the remaining problems linked to high levels of NPLs. In this context, the Council's NPL action plan identifies the need for a comprehensive approach to tackling the problems; this should focus on a mix of complementary policy actions in four areas:

- bank supervision and regulation;
- further reforms of national restructuring, insolvency and debt recovery frameworks;
- developing secondary markets for distressed assets;
- fostering, as appropriate and necessary, restructuring of the banking system.

Action in these areas should be taken at national level, and at EU level where necessary. The Commission has shown its commitment to deliver on those elements for which it has direct responsibility.

Building on a solid foundation of risk-reducing measures already taken by the Union, on 14 March the Commission put forward a comprehensive package to accelerate the resolution of NPLs in Europe and to prevent their build-up in the future. The package consists of two legislative proposals and a staff working document providing a technical blueprint for how national asset management companies (AMCs) can be set up.

Together, these proposals will:

- enhance the prudential tools needed to address NPLs effectively;
- facilitate debt recovery, as a complement to the insolvency law proposal put forward in November 2016;
- encourage the development of secondary markets for NPLs;
- assist the Member States that so wish in the restructuring of their banks by means of the establishment of AMCs dealing with NPLs.

This package covers a significant part of the Council action plan. In combining several initiatives, it creates the appropriate environment for dealing with NPLs on banks' balance sheets and reducing the risk of future NPL accumulation. The impact of the initiative is expected to differ across Member States and institutions. Some will have a stronger impact on banks' *ex ante* risk assessment at loan origination, some will foster swift recognition and better management of NPLs, and others will enhance the market value of such NPLs.

The new regulations will require banks to put aside sufficient resources when new loans become non-performing, creating appropriate incentives to work out NPLs at an early stage and avoid excessive accumulation of NPLs.

If loans nevertheless become non-performing, more efficient enforcement mechanisms for secured loans will allow banks to work them out, subject to appropriate safeguards for debtors and (in particular) consumers.

Should NPL stocks nevertheless become too high (as is currently the case for some banks in certain Member States) banks will be able to sell them to other operators on efficient, competitive and transparent secondary markets. Supervisors will guide banks in these endeavours, on the basis of their existing bank-specific ('pillar 2') powers under the Capital requirement regulation.

Member States where NPLs have become a significant and broad-based problem can set up national AMCs or take other measures in the framework of current state aid and bank resolution rules.

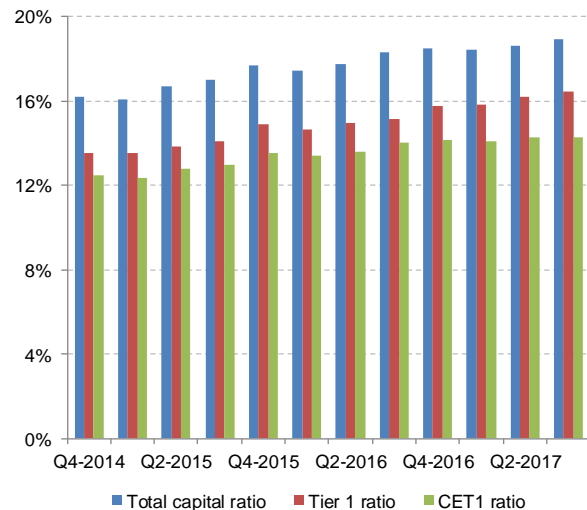
These initiatives are mutually reinforcing and would be less effective if implemented in isolation. The statutory prudential backstop will ensure that credit losses on future NPLs are sufficiently covered, making their resolution or sale easier. These effects are supplemented by the push for the further development of secondary markets for NPLs, as these would make demand for NPLs more competitive and raise their market value. Furthermore, as a swift mechanism for the recovery of collateral value, accelerated collateral enforcement reduces the costs of resolving NPLs.

Together with the ECB and the EBA, the Commission is exploring the way forward to foster the transparency of NPLs and markets for NPLs in the EU by improving the availability and comparability of data on NPLs, and potentially supporting market participants' efforts to develop NPL information platforms or credit registers.

3.1.5 Solvency

EU banks continued to strengthen their capital position in 2017, implementing the phase-in arrangements of Basel III and requirements under the Bank Recovery and Resolution Directive. As an illustration of this adjustment, all major capital ratios increased thanks to a decrease in risk-weighted assets and, to a lesser extent, a slight increase in capital. The core tier-1 ratio reached 14.3% on average in the EU as of Q3-2017, approximately 30 basis points higher than a year earlier. Accordingly, the total capital ratio increased by approximately 30 basis points from Q3-2016 to reach 18.9% in Q3-2017.

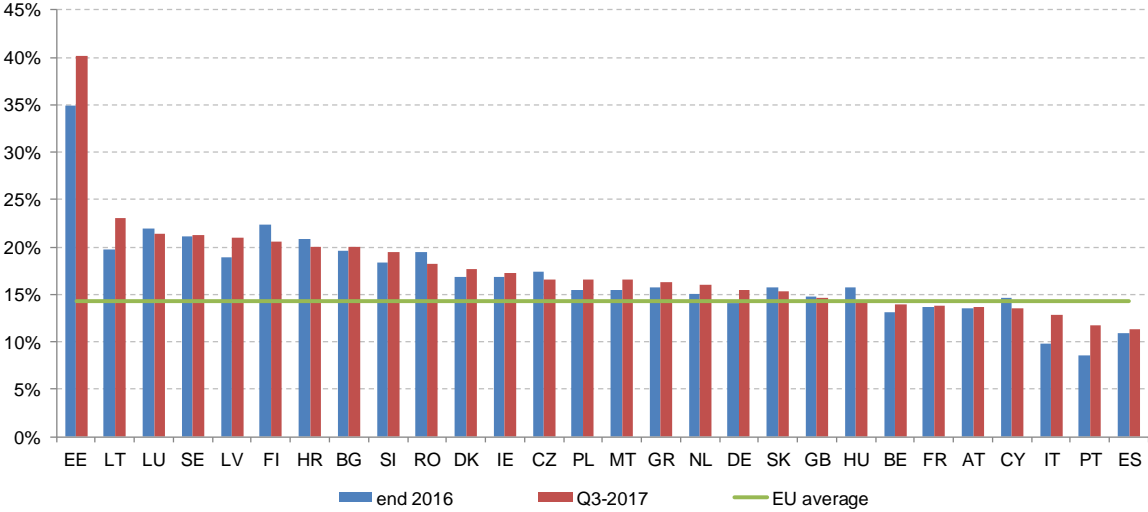
Chart 3.7: EU banks' average capital ratios



Source: EBA

At country level, capital ratios differed across Member States, according *inter alia* to the magnitude of balance-sheet restructuring, differences in profitability and the level of provisioning. As shown in Chart 3.8, central and eastern European and Baltic countries registered higher capital ratios than other Member States. This can be partly attributed to the fact that they were more profitable, which allowed their banks to use retained earnings to increase capital. At the same time, euro-area Member States most affected by the crisis bore higher costs relating to NPLs, which weighed on their capital positions.

Chart 3.8: CET1 capital ratio by Member State



Source: EBA

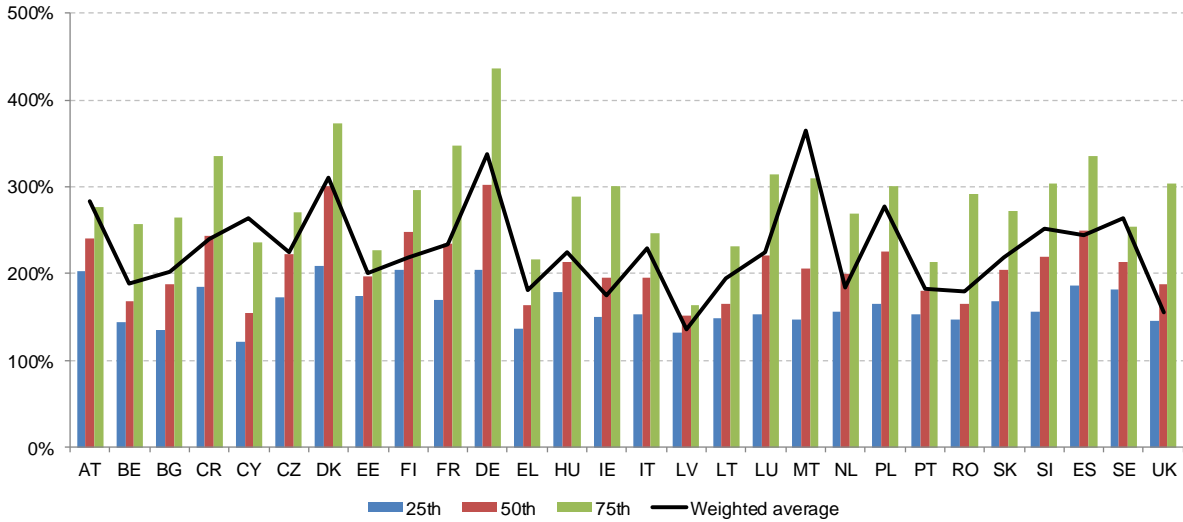
The decline in risk-weighted assets was the key driver behind higher capital ratios for EU banks. This was linked to an overall decrease in total assets and a decrease in some of their components, which in turn lowered the requirements for the type of risk in question. The biggest contribution came from lower credit risk requirements, linked to the reduction of the overall NPL stock in the EU. Despite their key contribution to the shrinkage of total assets, the declining stocks of securities and derivatives had less of an effect on risk-weighted assets due to their relatively small share. EU banks’ capital ratios are expected to stabilise going forward, as the impact of declining risk-weighted assets and NPL stocks could be compensated by their efforts to increase provisioning in the context of new regulatory requirements.

3.2 Non-bank financial institutions

3.2.1 Insurance sector

The solvency of EU insurance companies remained strong in 2017 as the sector continued to adjust to the new Solvency II (SII) regime: as of Q2-2017, the solvency capital requirement (SCR) ratio exceeded 200% for the majority of the companies, twice as much as the regulatory requirement. While differences in solvency remain across Member States, SCR ratios were well above the prudential requirement of 100% for the median insurance company in all Member States, ranging from 154% in Cyprus to 304% in Denmark. However, a small number of insurers (mostly in the non-life segment) reported SCR ratios below 100%.

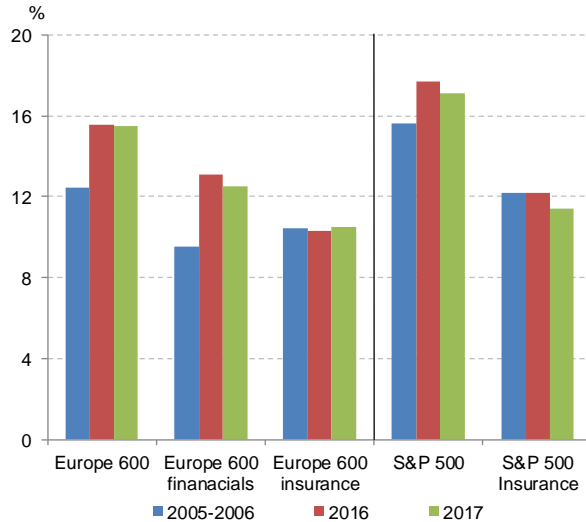
Chart 3.9: SCR ratios by country (%; weighted average, percentiles)



Source: EIOPA

Profitability remained a challenge for the insurance sector in the prevailing low-interest-rate environment. The return on equity in the sector oscillated slightly above 10% in 2017, close to pre-crisis levels, and little changed from 2016. Compared to other financial sectors, the broader market and US peers, the insurance sector underperformed. In addition, profitability performance was unequal across subsectors, where life insurers, smaller companies and those operating in niche markets experienced difficulties in maintaining profitability.

Chart 3.10: Average return on equity



Source: Bloomberg.

Box 7: The green supporting factor

The issue of incorporating sustainability considerations into bank prudential regulation (sometimes referred to as a ‘green supporting factor’) has attracted increasing interest from public and private stakeholders in recent years, in parallel with growing public concern over the risks to the planet by climate change and unsustainable CO₂ emissions.

The underlying assumption of these considerations is that sustainability factors (‘green value’) improve the performance of ‘green’ assets and thus reduce the risk borne by the bank, justifying more preferential prudential treatment. Evidence is emerging to support this view. For example,

some recent studies show that environmental, social and governance performance is positively associated with higher credit ratings.⁵⁶ More broadly, aggregated evidence from related empirical studies shows a positive correlation between sustainability factors and corporate financial performance.⁵⁷

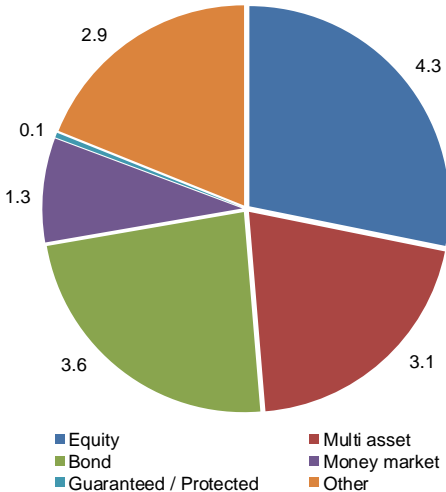
Integrating sustainability factors into bank prudential regulation would require appropriate risk calibration in order to preserve financial stability and the integrity of prudential regulation. In particular, some green investments (e.g. energy efficiency in buildings) are relatively low-risk, but others (e.g. offshore wind parks involving new technologies) seem rather high-risk. Hence, an appropriate analysis of risks is crucial. At the same time, it should be borne in mind that 'green' investments might on aggregate strengthen financial stability, which might otherwise become subject to major risks, including those of stranded assets.⁵⁸

Equally important in this context is the task of identifying a legally enforceable taxonomy to ensure that incentives are directed to appropriate, ('green') assets. From the point of view of financial stability, efforts to incentivise green lending go hand in hand with banks' efforts to ensure that their risk assessment and management cover both financial and non-financial risks.

3.2.2 Investment and pension funds

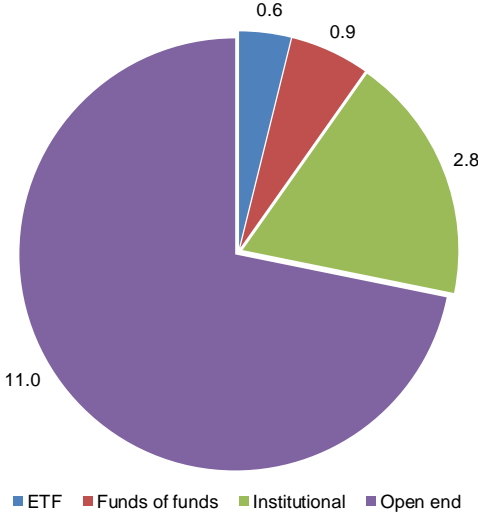
EU investment funds managed EUR 15.2 trillion in Q3-2017, representing a market share of 35.3% measured by assets under management, an increase of 1.6 percentage points year on year.⁵⁹ For all fund categories, except guaranteed/protected ones, total assets under management increased. Equity funds — with 28%, the largest EU fund category — had managed assets worth EUR 4.3 trillion, a 17.7% increase year on year (see Chart 3.11).

Chart 3.11: EU investment funds by category (EUR trillion, Q3-2017)



Source: EFAMA

Chart 3.12: EU investment funds by type (EUR trillion, Q3-2017)



Source: EFAMA

⁵⁶ Devalle, Fiandrino, and Cantino (2017).
⁵⁷ Friede, Busch and Bassen (2015).
⁵⁸ For more information, see ESRB (2016).
⁵⁹ The total fund industry worldwide managed more than EUR 43 trillion at Q3-2017.

Bond funds managed EUR 3.13 trillion in Q3-2017, up 7% year on year. Multi-asset and other investment funds managed around EUR 3 trillion. Given the very low interest rates at short maturities, it is not surprising that investors preferred other funds to money market funds: as a result, money market funds grew by less than 6%. The various types of investment fund have not grown in parallel: money market funds grew the least, while investors' appetite for equity or multi-asset funds was well above average. The bulk of assets (72%) are managed by open-end funds, followed by institutional funds (18%).

Undertakings for collective investment in transferable securities (UCITS) accounted for assets worth EUR 9.4 trillion. They represented 62% of all investment funds' assets in 2017, down from 68% in 2016. They are mainly concentrated in equity and bond investment funds, which account for 65% of all UCITS assets. Apart from UCITS, alternative investment funds (AIFs, i.e. hedge funds, VC and private equity funds) have EUR 5.8 trillion assets under management.

Table 3.1: EU investment funds and pension fund assets by country (EUR billion)

Member State	UCITS (EUR bn)	Change over previous year	AIFs (EUR bn)	Change over previous year	Pension funds (EUR bn)	Investment funds/GDP	Pension funds/GDP
AT	81	0.4%	99	6.4%	21	50.8%	5.9%
BE	90	21.4%	47	-0.5%	27	32.4%	6.4%
BG	1	32.6%	0	12.5%	6	1.3%	11.5%
HR	2	10.2%	0	23.9%	0	6.4%	0.0%
CY	0	61.8%	2	10.6%	3	13.0%	14.8%
CZ	10	22.5%	1	45.9%	:	6.2%	0.0%
DK	126	12.0%	167	6.8%	8	105.7%	2.9%
FI	98	18.9%	15	-22.7%	5	52.7%	2.2%
FR	885	14.3%	1 047	9.7%	14	86.7%	0.6%
DE	366	16.1%	1 650	8.3%	224	64.1%	7.1%
GR	5	12.0%	3	8.8%	1	4.4%	0.7%
HU	2	167.7%	18	1.1%	4	17.1%	3.3%
IE	1 746	20.5%	551	11.3%	61	833.9%	22.1%
IT	250	8.4%	65	20.3%	124	18.8%	7.4%
LU	3 381	10.8%	656	14.9%	2	7 616.6%	3.0%
MT	3	18.2%	7	-2.0%	0	101.3%	0.0%
NL	37	-2.4%	802	6.4%	1 291	119.4%	183.7%
PO	24	13.9%	39	-3.6%	0	14.9%	0.1%
PT	8	19.7%	14	-0.2%	16	12.3%	8.6%
RO	5	1.9%	4	-1.9%	0	5.4%	0.0%
SK	5	12.7%	2	5.5%	:	7.8%	:
SI	3	10.5%	:	:	2	6.5%	5.8%
ES	216	15.1%	72	-0.3%	36	25.8%	3.3%
SE	310	16.9%	23	6.1%	19	71.5%	4.0%
UK	1 161	10.6%	428	16.9%	1 637	66.3%	68.3%
Other	602	4.4%	132	-3.0%			
Total	9 417	12.8%	5 847	9.1%	3 499	103.0%	23.6%

Source: ECB statistical warehouse (pension assets), EIOPA (pension assets), Pension Funds Association (pension assets), EFAMA (investment funds) and Eurostat (GDP)

Note: Data for investment funds are from Q3-2017 and data for pension funds and GDP are from end 2016.

Luxembourg and Ireland (the two main centres for cross-border fund distribution in the EU) continue to grow, accounting for EUR 4.0 trillion and EUR 2.3 trillion in Q3-2017, respectively. Other Member States with investment fund assets worth over EUR 1 trillion are Germany (EUR 2.0 trillion), France (EUR 1.9 trillion) and the UK (EUR 1.6 trillion).

In terms of the composition of the investment funds industry, Member States have different structures. In some (e.g. the UK, Luxembourg and Ireland), most assets are held by UCITS, while in others (e.g. Cyprus, Germany, Hungary and the Netherlands) AIFs are more relevant. In Germany, AIFs' assets account for EUR 1.6 trillion, or 82% of the local market. AIFs also have a significant market share in France and the Netherlands (with EUR 1 trillion and EUR 801 billion of managed assets respectively).

EU exchange-traded funds (ETFs) caught up somewhat, but are still underdeveloped in global terms. They manage 4% of EU investment fund assets, as compared with 10% of fund assets managed by ETFs globally. Although their assets saw a strong (24.7%) increase last year, this lagged behind the 27.6% growth of ETFs globally.

EU pension fund assets (EUR 3.5 trillion) are modest in comparison with the size of the EU investment fund sector (EUR 15.3 trillion). In line with differences in Member States' retirement systems, national private pension fund markets varied widely in size. With pension fund assets of EUR 1.6 trillion and EUR 1.3 trillion respectively, the Dutch and UK markets for private pension funds are by far the most developed. Pension fund assets in the Netherlands are 1.8 times the country's GDP, while in other Member States the pension fund sector is much smaller.⁶⁰

⁶⁰ Germany reports EUR 224 billion (7.3% of GDP), Italy EUR 123 billion (7.4% of GDP) and Ireland EUR 60 billion (22.0% of GDP). The remaining Member States record volumes of under EUR 40 billion.

Chapter 4 DEVELOPMENT OF LOCAL CAPITAL MARKETS

4.1 Introduction

Through the capital markets union (CMU) initiative seeks to increase the benefits to the economy that derive from capital markets and non-bank financial intermediation. One important objective is to deepen the single market for financial (in particular of non-banking) services. This involves providing firms and households with access to financial services and fostering market integration across the EU. This chapter provides an overview on the state capital markets development in the EU.

While there has been economic convergence in the EU since 1999⁶¹, many Member States are still at different stages of economic and financial development. In several respects, the central, eastern, and south-eastern European (CESEE) Member States⁶² in particular are still lagging behind. However, these countries are among those that have the potential to reap significant benefits from CMU, as their capital markets are structurally less developed than those in other Member States, and there is a strong need for investment in several of these Member States. Capital needs to be raised in order to continue structural reforms, invest in infrastructure, and support productivity improvements and growth in *per capita* income. More developed capital markets are essential to the financing of investments from both domestic and foreign sources. This analysis focuses on the specific characteristics of the CESEE Member States and argues the case for supporting local capital markets as a means of fostering their further integration into the single market.⁶³

4.2 Why does capital market development matters?

4.2.1 Capital markets and growth

The nexus between financial development and economic growth is extensively covered in international economic research.⁶⁴ Since the 1970s, numerous studies have examined the correlation between the development of banking, insurance, and stock and bond markets, on the one hand, and GDP growth and disposable income, on the other.⁶⁵ Although results are

⁶¹ For example, see ECB (2015) or Halmai and Vasary (2010).

⁶² The CESEE Member States are Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Romania, Lithuania, Poland, Slovakia and Slovenia.

⁶³ The chapter is related to work in the context of the Vienna Initiative under the auspices of which a working group was created to foster capital market development in central, eastern and south-eastern Europe. The working group's report was published in March 2018. For more information, see www.vienna-initiative.com.

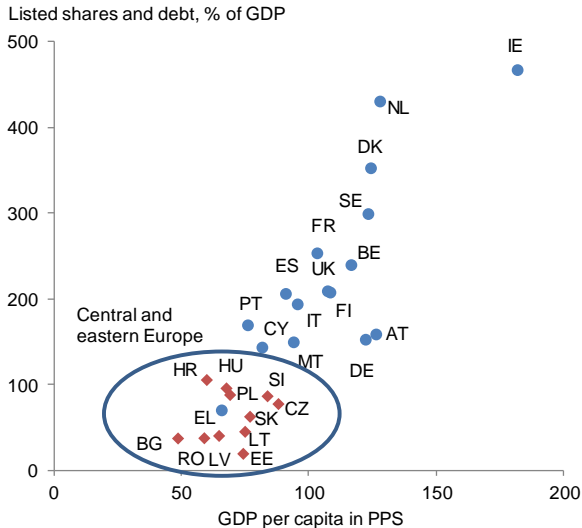
⁶⁴ Financial systems provide five functions: (i) ex ante information production about possible investments and capital allocation; (ii) ex-post monitoring of investments and the exertion of corporate governance; (iii) facilitation of trading, diversification and risk management; (iv) mobilization and pooling of savings; (v) enabling the exchange of goods and services. See Levine (2005) for further details.

⁶⁵ See for example, Cooray (2010) who reports a positive relation; Pradhan *et al.* (2017) who argue that financial development and economic growth stimulate each other, leading to synergy effects; or Narayan and Narayan (2013) who report no short-run relationship between the financial system and economic growth for several regions in the world. Broadly speaking, a positive impact of financial development on economic growth is retrieved. See Levine (2005) for further details and an overview of the relevant literature. Recent studies yield some interesting insights. For example, Durusu-Ciftci *et al.* (2016) find that debt from credit markets and equity from stock markets both have positive long-run effects on the level of GDP *per capita*. The authors recommend that policy makers place specific emphasis on the deepening of financial markets, including institutional and legal measures to strengthen creditor and investor rights and contract enforcement. Several studies indicate that although both bank- and market-based financial systems contribute to economic growth, market-based systems are relatively more important as countries become more developed or

ambiguous, most authors conclude that there is a positive correlation between financial sector development and economic growth. The positive impact of financial development on economic growth appears to be more pronounced for economies with a lower level of economic development compared to those with higher levels of development.⁶⁶

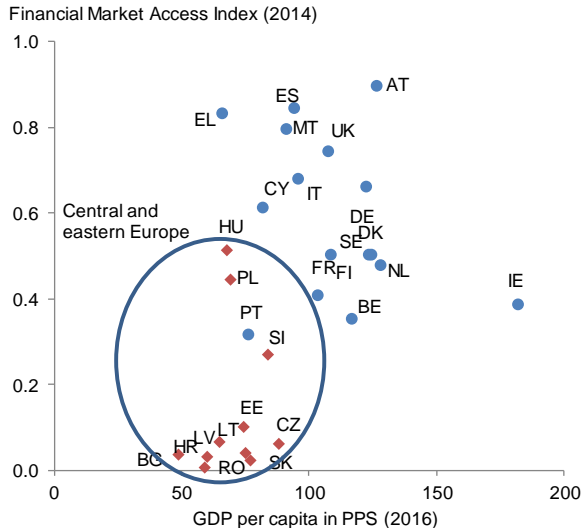
Against this background, the Commission is working on deepening CMU in order to unlock funding for Europe’s businesses and boost growth in EU countries by creating a true single market for capital. The relevant issues are discussed in the economic analysis accompanying the CMU action plan (September 2015)⁶⁷, with the focus on the benefits of capital markets as a complement to banking intermediation in the economy. The analysis also emphasises the gains from cross-border integration of capital markets in creating a larger pool of instruments for investors and issuers. The economic analysis accompanying the CMU mid-term review (June 2017)⁶⁸, includes a specific discussion on the case for supporting the development of local capital markets.

Chart 4.1 Size of capital markets and economic development



Source: ECB
 Note: Luxembourg is out of range in the chart with the coordinate (259, 943)

Chart 4.2 Financial market access and economic development



Source: ECB and IMF

Well-developed and integrated capital markets can contribute to jobs and growth through various channels. It appears that the larger and more accessible financial markets are, the higher is the country’s income level (see Chart 4.1 and Chart 4.2). The fact that central and eastern Europe are lagging behind justifies focused action. Properly functioning capital markets open up investment and diversification opportunities for investors across the EU, improve access to risk capital for borrowers, and allow greater competition (releasing corresponding benefits such as productivity gains, lower costs, greater choice and financial

innovation driven (see, e.g., Demirgüç-Kunt, Feyen and Levine (2013) or Hsu, Tiang and Xu (2014)). Finally, Hou and Cheng (2017) show that the effects of financial activities (banking, insurance and stock market) on growth vary over time, income level and financial development. They conclude that countries at different levels of development should engage in different financial activities to ensure sustainable growth.

⁶⁶ See, for example Rioja and Valev (2002) or Shen and Lee (2006).

⁶⁷ European Commission (2015b).

⁶⁸ European Commission (2017c).

innovation). Unobstructed capital flows within the single market allow financial resources to reach the most profitable investments. Cross-border integration increases the size of the relevant market, which allows for scale effects based on lower costs to run market infrastructures, higher market liquidity, and reduced search costs. In turn, large and integrated financial markets enhance the possibilities for portfolio diversification and risk sharing among households, firms, and economies at large.⁶⁹

Deep, accessible and efficient capital markets bring advantages to both borrowers and investors. Companies seeking finance benefit through (i) improved access to funds; (ii) reduced capital costs thanks to increased competition among investors; and (iii) reduced risk of disruption in financing by a better diversification of funding sources. Investors profit thanks to increased investment opportunities: more efficient capital markets offer investors a broader set of assets to (i) meet their investment objectives; (ii) diversify and manage their risks; and (iii) optimise their risk-return profile within the investment constraints faced (whether in terms of risk, duration, or other asset characteristics). Overall, capital markets facilitate entrepreneurial and other risk-taking activities, which have a positive effect on economic growth.

Capital markets complement bank financing. Non-bank financing is not merely a substitute source of finance for investments that was previously funded by banks: it also enables additional investment that banks would not be ready to fund. Market financing is usually regarded as being better for dealing with an uncertain environment and therefore more suited to funding riskier and more innovative investment projects (with a higher required rate of return). Banks usually lend against collateral that often cannot be sufficiently provided to large, long, or innovative projects. It is here that capital markets can step in.

Box 8: Indicators of capital market development

There are several measures to approximate financial development. Among the most common are the ratio of private credit to GDP and stock market capitalisation. However, financial development is multi-faceted and not easily captured by a single variable. A few datasets, e.g. the World Bank's global financial development database (GFDD), provide a broad set of indicators that can be used to analyse financial development from more than one angle. Others have produced composite indicators, often based on the GFDD. In 2012, the World Economic Forum published one such dataset in the form of a financial development index composed of seven sub-indices.⁷⁰ Staff at the International Monetary Fund (IMF) has produced another broad-based financial development index on which this chapter is partly based.⁷¹

This consists of a set of composite indicators that can be used to assess the development of financial institutions and financial markets. Financial development is defined in terms of depth (size and liquidity), access (ability of individuals and companies to access financial services) and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues, and level of activity of capital markets).

⁶⁹ Deeper financial integration had therefore been regarded as an essential complement to an efficient functioning of EMU. See European Commission (2008) and the literature quoted therein.

⁷⁰ World Economic Forum (2012).

⁷¹ Svirydzienka (2016).

This chapter focuses mainly on depth and access, and less on efficiency. The composite development indicators are based on the following variables:

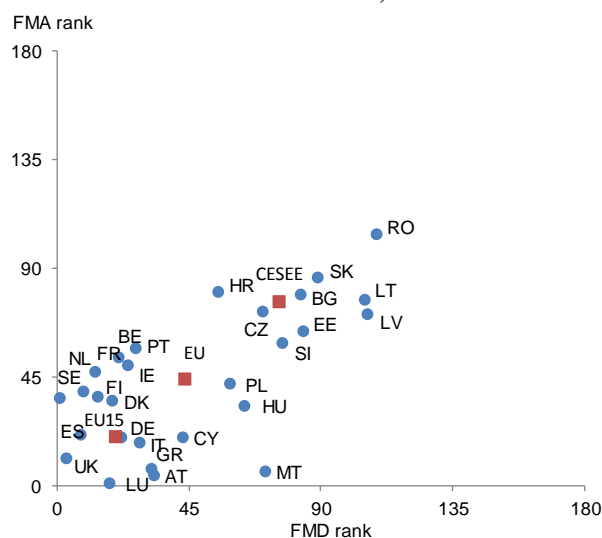
- *market depth*:
 - stock market capitalisation to GDP;
 - stocks traded to GDP;
 - international debt securities of financial corporations to GDP;
 - total debt securities of financial corporations to GDP; and
 - total debt securities of non-financial corporations (NFCs) to GDP; and
- *market access*:
 - percentage of market capitalisation outside the top 10 largest companies; and
 - total number of issuers of debt (domestic and external, NFCs).

Other measures of financial development focus more on market liquidity and market dynamism. An example of a liquidity measure would be the turnover velocity of stocks or debt securities, expressed as percentage (annual turnover in euro to market capitalisation in euro). One measure of market dynamism would be the number of initial public offerings (IPOs) in a year.

According to a set of composite indicators created by IMF staff, the financial development of EU Member States is rather diverse.⁷² Their rankings (among 180 countries) range from 6 (UK) to 99 (Lithuania). Chart 4.3 shows the rankings of Member States according to the two sub-indices for financial market depth (size and liquidity) and access (ability of individuals and companies to access financial services) (see Box 6). For the sub-indices, Sweden and the UK have the highest rank among Member States, and Romania the lowest. It also shows average rankings in the overall financial market development index for three groups of Member States marked with red squares: the EU as a whole, the EU-15 and the CESEE Member States.

The ranking shows that the CESEE Member States are less developed and more heterogeneous in terms of financial market development than the other Member States. Average overall rankings are 76 for CESEE Member States and 20 for the EU-15. The heterogeneity among CESEE Member States is mainly explained by market depth, for which the dispersion (standard deviation) in ranking is greater. The dispersion in ranking for access to financial markets is about the same for the two groups.

Chart 4.3 Ranking based on the FMD and FMA indices across the EU, as of 2014



Source: Svirydzenka (2016)

Note: In the chart FMA stands for the Financial Market Access Index and FMD for the Financial Market Depth Index, as described in Svirydzenka (2016). The maximum rank displayed on the horizontal and the vertical axis corresponds to the total number of countries in the sample (180).

⁷² Svirydzenka (2016).

The CESEE Member States seem to be less integrated with the bigger capital markets in the EU and may be more dependent on locally developed markets before being able to take the next step towards further integration. This is supported by the relatively strong positive link between market depth and market access as compared with the EU-15. The correlations between the depth and access indices are 0.6 and -0.1 for the CESEE Member States and the EU-15, respectively. The low correlation for the EU-15 is an indication of their relatively high level of integration. For example, Sweden is among the highest ranked countries in terms of depth, but average in terms of access. This may illustrate how the bigger markets in Sweden serve neighbouring countries such as Finland and Denmark, which are ranked at par in terms of access. At the other end of the range, Austria is ranked among the highest in terms of access, but average in terms of having a deep local market. This may illustrate the degree of integration into German markets, which can provide the services. For the CESEE Member States, similar examples are more difficult to produce, illustrating a lower degree of integration.

4.2.2 Arguments for supporting local capital markets

Member States' economic and financial structures differ. This diversity means that all Member States are expected to benefit from further capital market development, but gains will materialise differently across countries, and depend on the specific national characteristics. In this context, the development of local capital markets could be as important as facilitating access to foreign financial markets.

Synergies exist between local market development and cross-border integration. Developed capital markets may benefit more from integration, which enlarges the pool of potential investors and increases the depth of and access to financial markets. For underdeveloped markets it might be more difficult to take advantage of integration, as larger local issuers and investors are tempted to bypass local markets and access foreign markets directly. This leaves out small and medium-sized enterprises (SMEs) that cannot easily reach out across borders. Thus SMEs⁷³ would benefit the most from stronger local capital markets with upgraded market infrastructure, a sound regulatory framework and a thriving financial ecosystem. With these elements in place, local markets will find it easier to open up to cross-border trading and establish links to market infrastructures in other Member States.

The geographical proximity could matter for several reasons. In order to create liquidity, capital markets need volumes and so rely on economies of scale. As a result, partly due to recent technological developments, capital markets tend to consolidate around clusters of liquidity, which are usually located in big Member States or regional trading hubs.⁷⁴ Nonetheless, not all forms of financial services need centralisation to develop. Geographical proximity matters for many types of financial services and for specific categories of users, such as start-ups.

⁷³ Statistically defined as companies with less than 250 employees and a turnover of less than EUR 50 million or a balance of no more than EUR 43 million.

⁷⁴ Pandit *et al.* (2002).

Access to capital markets, particularly local ones, improves the availability of long-term financing for local investment projects.⁷⁵ It allows firms to manage more effectively the maturity and interest-rate risks associated with long-term investments (e.g. in equipment, buildings, research and development, and intangible assets). Thanks to capital markets, the duration of assets (companies' investments) and financial liabilities (issued securities) may be better aligned. In particular, this could result from the development of a local bond market and, to some extent, a derivatives market.

Local equity markets are particularly relevant for SMEs, which are typically too small and too illiquid to be attractive for international investors. Some studies examine whether national equity markets for SMEs are more beneficial than centralised regional hubs. Spatial proximity between financial intermediaries and SMEs facilitates information exchange; it also lowers transaction costs and non-cost barriers for capital provision.⁷⁶ Some specialised regional stock markets can attract the interest of other providers of finance (such as private equity), which find in these markets either an exit opportunity or a means to price SME risk.

More developed local capital markets may attract foreign investors, at least if there are no barriers to foreign investment. The greater access to funding could reduce a firm's cost of capital, while the wider market access would also improve risk-sharing across countries.⁷⁷ As foreign investors need to evaluate and monitor their investments, their search for information may also put pressure to raise local transparency and disclosure standards and improve the local business and regulatory environment in general. This triggers a 'virtuous cycle' in which additional foreign investors are attracted by these improvements in the institutional framework, which in turn improves access to finance of local companies. Finally, local companies may benefit from the intensified screening activity by investors and the discovery process this entails, which may encourage innovative activity.

4.2.3 Determinants of capital market development

The factors influencing capital market development include capital demand and supply, and regulation. The demand factors relate mainly to the prevailing types of companies, their funding needs and their preferences for access to finance. The supply factors are determined by the size and activity of institutional investors, and by the saving preferences of households. Finally, the regulatory environment is crucial for enabling the development of all capital market segments and functions.

Companies' overall capital demand is broadly correlated with their size: the larger a company, the more likely they will issue shares or bonds. Small companies have a natural tendency to rely on self-generated resources and local bank credit, given that they can borrow modest amounts more cheaply from banks than from markets. The cost of an IPO, and the recurring transparency and disclosure requirements, discourages many SMEs to make use of public market funding. Given that the funding requirements of larger companies may surpass the

⁷⁵ Laeven (2014).

⁷⁶ Klagge and Martin (2005).

⁷⁷ See, for example Borensztein *et al.* (2006). At the same time, studies also show that the liberalisation of financial markets can trigger the migration of trading to international financial sectors, hampering domestic market development. For example, high-quality firms may try to escape local markets, lowering the average quality of local issuances. For more details, see Laeven (2014) or De la Torre *et al.* (2006).

loan capacity of local banks (e.g. due to the regulatory limits on the concentration of exposures), they have a greater interest in issuing equity or bonds.

More advanced economies tend to have more firms that have reached a critical size or have sufficient growth potential in order to be interesting candidates for local stock exchanges.⁷⁸ Also, the industry structure plays a role. Unlike the services industry, manufacturing is characterised by economies of scale that support the growth of large firms. Many manufacturing sectors, e.g. cars, machinery, chemicals, mining, and oil processing are also capital-intensive and therefore need more funds.

Government action, e.g. treasury operations or privatisation, also influences local capital markets: high and more frequent issuances of sovereign bonds will result in liquid local bond market. Its existence facilitates the development of corporate bond and other debt instrument markets; it provides the trading ecosystem and benchmark indexes. Government policy choices may also support the local equity market. Privatisation of state-owned companies through an IPO on the local stock exchange is an example.

Growth of capital markets requires a solid supply of funds. Institutional investors are essential in this respect, as retail investors only tend to invest relatively small amounts directly in shares or bonds.⁷⁹ The main reason is the riskiness of such investments when carried out on own account. Other reasons include high cost and poor access to professional investment advice. Hence, retail savers tend to put their money in saving accounts, or invest in collective investment schemes managed by various institutions, most commonly investment funds (such as UCITS and alternative investment funds) and insurance companies (life insurance products).⁸⁰ These collective investment schemes often follow a more international asset allocation strategy and will thus rely less on local capital markets.

Pension funds are a special category of institutional investor. Saving for retirement is often subject to regulatory obligations or (tax) incentives that ensure regular inflows to these funds. Even in less affluent societies, pillar 2 pension funds may acquire relatively large assets under management in just a few years. In some countries where occupational pension funds have existed for a number of decades, they have accumulated portfolio holdings exceeding the country's annual GDP. They are not only important investors channelling large amount of capital towards capital markets, but also play a role in stabilising markets in view of their long-term investment horizon.

Private equity funds complement the capital market ecosystem. They provide equity to unlisted companies. In particular, VC funds and business angels invest in companies in their early stages of development. This entails higher risk, but also higher potential returns. Well-developed capital markets are important for private equity investors, as they provide them with a viable exit strategy, and thus more incentives to invest in unlisted firms in the first

⁷⁸ The average size of a company in the economy is correlated with the overall level of economic development, measured for example in GDP *per capita*.

⁷⁹ See European Commission (2016), Chapter 3.

⁸⁰ The wealthier a society is, the more savings are put in instruments other than bank deposits and more assets will be available for institutional investors to invest on the capital market.

place.⁸¹ When they actually do exit by means of an IPO, they contribute to the further development of the public market.

Foreign entities may play a significant role in the development of local capital markets. The search for risk diversification may attract foreign investors, especially if the market is in a different region or stage of development. Also private equity investors may come from abroad. Large foreign capital inflows contribute to market growth, but foreign portfolio investments also increase market volatility and the market's vulnerability to financial stability risks, because abrupt reversals are more likely with foreign investors with a weaker link to the country.

The regulatory environment is crucial for capital market development: for example, the more effective a country's regulation and supervision of securities exchanges, the deeper its capital markets are. Also, an effective insolvency framework is necessary to attract cross-border investment and to facilitate more predictable and orderly outcomes for corporate restructurings.

Other factors that may influence capital market development include households' saving preferences, the level of financial literacy, the industrial structure of the economy and the importance of institutional investors. For all these variables (including a proxy for regulatory quality), the CESEE Member States rank lower than the EU-15⁸² in a broad sample of 85 countries.⁸³ The average difference in ranking between the two groups for all five variables is 20 places. This preliminary result suggests that it is worth exploring how improvements in these determinants of capital market development could help CESEE Member States to foster deeper integration and gain economically.

4.3 The case of the CESEE Member States

4.3.1 *Catch-up potential*

The CESEE Member States have a high catch-up potential given that they are lagging behind other Member States in terms of depth of and access to capital markets. With still relatively low *per capita* income and less developed financial sector, they have a strong need for investment, in particular in infrastructure. The privatisation of state-owned enterprises that started in the 1990s is well advanced, but not yet complete. In addition, further capital inflows and foreign direct investment (FDI) are necessary to continue the reform process, support productivity improvement and boost *per capita* income. Further growth in the CESEE economies requires critical 'enablers' such as investments in infrastructure, education and innovation as well as regulatory and institutional reforms.⁸⁴

⁸¹ World Bank (2015).

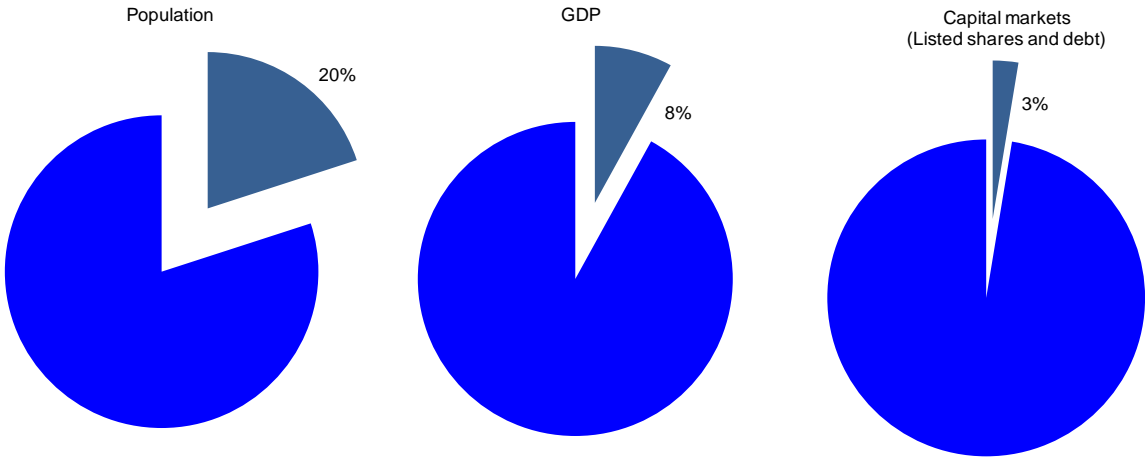
⁸² The EU-15 comprised the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom.

⁸³ The variables were examined on the basis of the following proxies: financial literacy index (S&P); manufacturing value added/ services value added in % (GFDD) — structure of industry; regulatory quality index (WGI); bank deposits to GDP in % (GFDD) — saving preferences of households; fund assets in % of GDP (GFDD) — institutional investors (the sum of assets of mutual funds, pension funds and insurance companies). Data were taken from the GFDD, World Bank world governance indicators and Standard & Poor's *Global financial literacy survey*.

⁸⁴ See, for example, McKinsey (2013).

Capital markets help the CESEE economies to catch up faster. These Member States account for 20% of the EU’s population, 8% of its GDP and only 3% of its capital markets (see Chart 4.4). As of end 2015, debt market capitalisation in the EU-11 countries stood at 52% of GDP, as compared with 159% of GDP in the EU, and stock market capitalisation accounted for 18% of GDP, as compared with 66% of GDP in the EU.

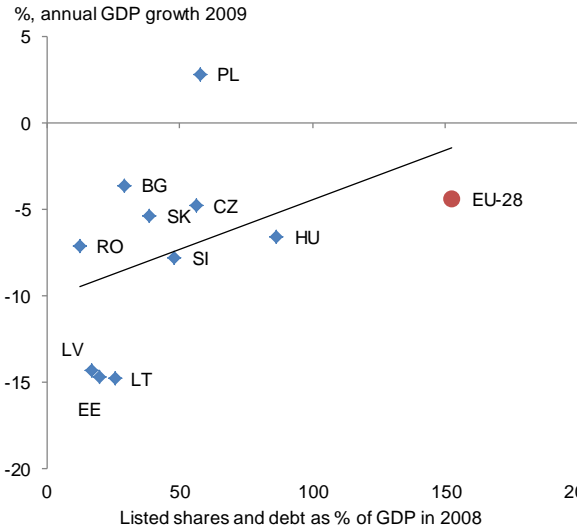
Chart 4.4: The underdevelopment of capital markets in central and eastern Europe as per cent of EU



Source: Eurostat and ECB

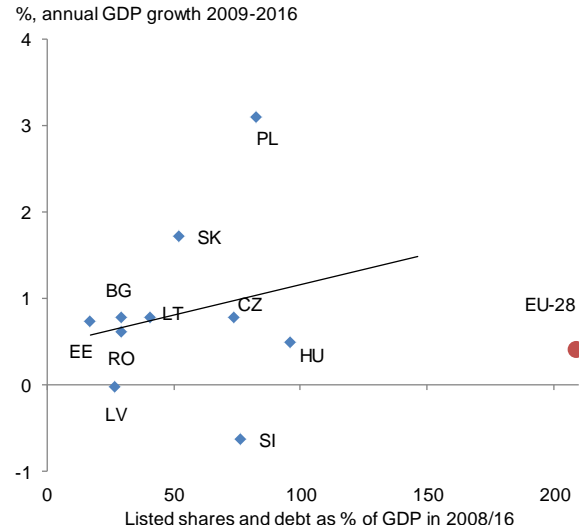
While economic resilience is a complex issue, CESEE Member States with deeper capital markets at the onset of the crisis appear to be suffering less GDP contraction than some of their peers (see Chart 4.5). Since then, the region has picked up, with economic growth at 3% on average, down from about 7% before the crisis. The CESEE Member States with deeper capital markets seem to grow stronger (see Chart 4.6), but generalisations are difficult as there are many drivers of economic development.

Chart 4.5: Capital market depth in CESEE Member States and resilience to shocks



Source: ECB

Chart 4.6: Capital markets depth in CESEE Member States and GDP growth



Source: ECB

Mobilising the local investor base in the CESEE Member States requires more than the presence of a local capital market. Some Member States need to strengthen the institutional

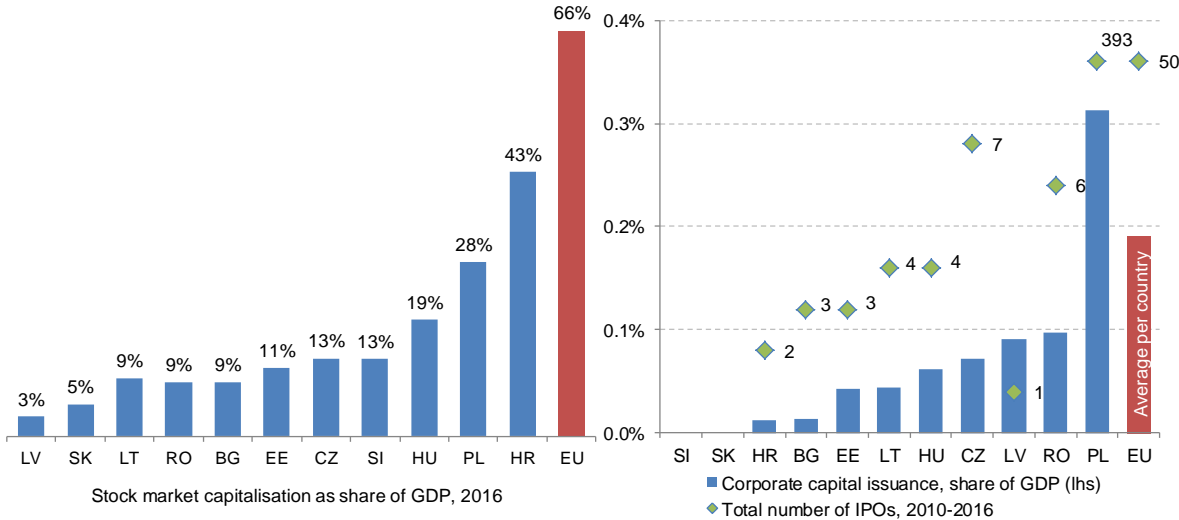
framework by putting in place adequate local supervision, facilitating capital mobility and creating an environment in which clusters of venture capital, private equity or other forms of finance like crowdfunding can develop. In these Member States, particular attention has to be paid to the regulatory framework, public financial support, and innovative products and solutions.

4.3.2 Structural characteristics of the capital markets

Financing through capital markets is less developed in CESEE Member States than the EU average. The equity and bond markets are small compared with those in western Member States, both in absolute terms and relative to GDP. All CESEE Member States have a stock exchange with a central securities depository (CSD) for post-trading clearing and settlement of securities, but only a few of them operate a central clearing counterparty (CCP).⁸⁵ Most run separate multilateral trading facilities that are subject to lighter regulatory requirements and are usually dedicated SME markets.

CESEE stock markets vary significantly with regard to capitalisation and turnover. Equity markets in the region were strongly hit at the onset of the financial crisis and have yet to recover to pre-crisis levels. They also lag behind the EU as a whole (see Chart 4.7, left panel). In absolute terms, Poland’s stock market has remained by far the largest stock market of all CESEE Member States (with market capitalisation of the Warsaw stock exchange of EUR 132.8 billion at end-2016), followed by the Czech Republic and Hungary. In terms of market capitalisation as a proportion of GDP, Croatia (43%) and Poland (28%) have the deepest equity markets, whereas Latvia and Slovakia (5% or less) lag significantly behind.

Chart 4.7: Provision of finance through equity markets — stock market capitalisation and Corporate capital issuance



Source: ECB, Association for Financial Markets in Europe
 Note: Corporate capital issuance is initial public offerings based on nationality of issuer. The EU values in the right panel are the averages per country, i.e. the EU values divided by the number of Member States.

The raising of capital through IPOs is also behind the EU average except in Poland, partly reflecting the buoyant economic activity in the country over the past decade (see Chart 4.7,

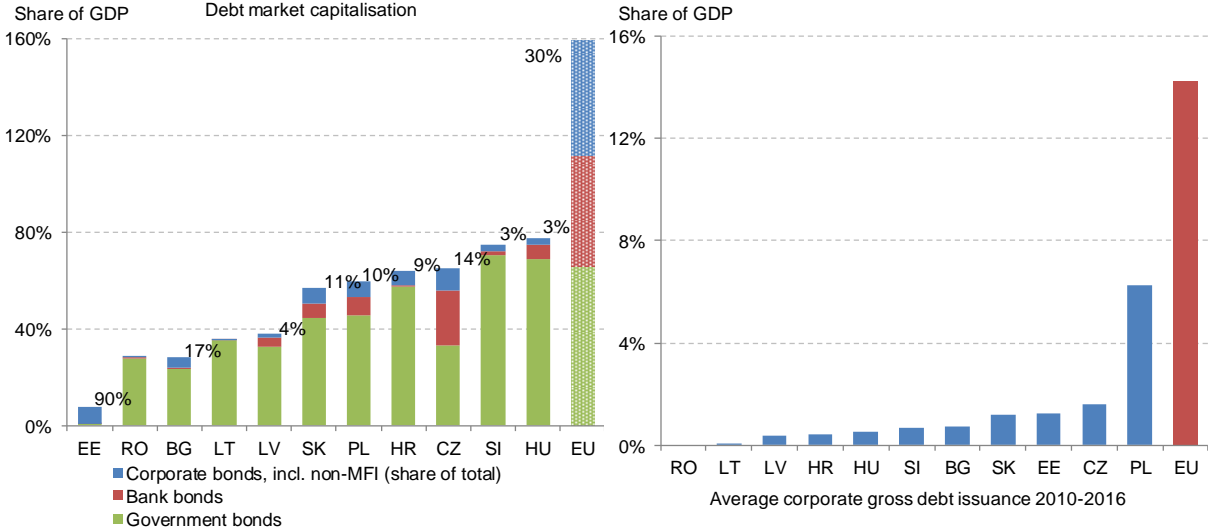
⁸⁵ Poland with KDPW, Hungary with KELER and Croatia with SKDD.

right panel). Actual issuance on the local market may be overstated as the data are based on the nationality of the issuer and large companies in smaller markets may seek to raise finance on larger exchanges abroad. While domestic bias in equity issuance (language barriers, research coverage, documentation, etc.) leads companies to issue on their national exchange, the lack of liquidity and deep pools of capital may lead them to go abroad.

The lack of liquidity remains a significant disincentive for potential issuers and investors. In the majority of CESEE stock markets, the share turnover ratio in 2015 (measured as the value of annual turnover to total capitalisation) remained below or close to 10%. Only in Poland and Hungary was the average liquidity significantly higher, with ratios above 40%. For comparison, the turnover ratio at the Vienna Stock Exchange in the same year was 33% and in Athens 52%. Ratios on some of the largest European stock exchanges were much higher (98% (Euronext), 97% (*Deutsche Börse*), and 67% (Nasdaq Nordics and Baltics, including Estonia, Latvia and Lithuania)).

Whereas the development of equity markets has remained subdued since the onset of the financial crisis, debt markets have expanded. In Poland, the Czech Republic and Romania the volume of bonds has grown significantly in recent years, although this has been driven mainly by the increase in government securities (see Chart 4.8, left panel). In line with its size, Poland has the highest amount outstanding of securities other than shares in absolute terms in CESEE Member States (EUR 211.2 billion) and Estonia the lowest (EUR 1.6 billion). In relation to GDP, Hungary (77%) and Slovenia (75%) have the deepest long-term debt markets (see Chart 4.8a), albeit still far below the EU average (159%). Debt issuance as a means to attract finance also remains under-developed in the region (see Chart 4.8, right panel). The highest annual gross provision of funding during 2010-2016 is 6.3% of GDP in Poland, still well under the 14.3% observed in the EU on average. In consequence, the outstanding stock of corporate bonds as a proportion of the total in most countries is far behind the 30% observed in the EU on average.

Chart 4.8: Provision of finance through debt securities markets — debt market capitalisation and corporate gross debt issuance



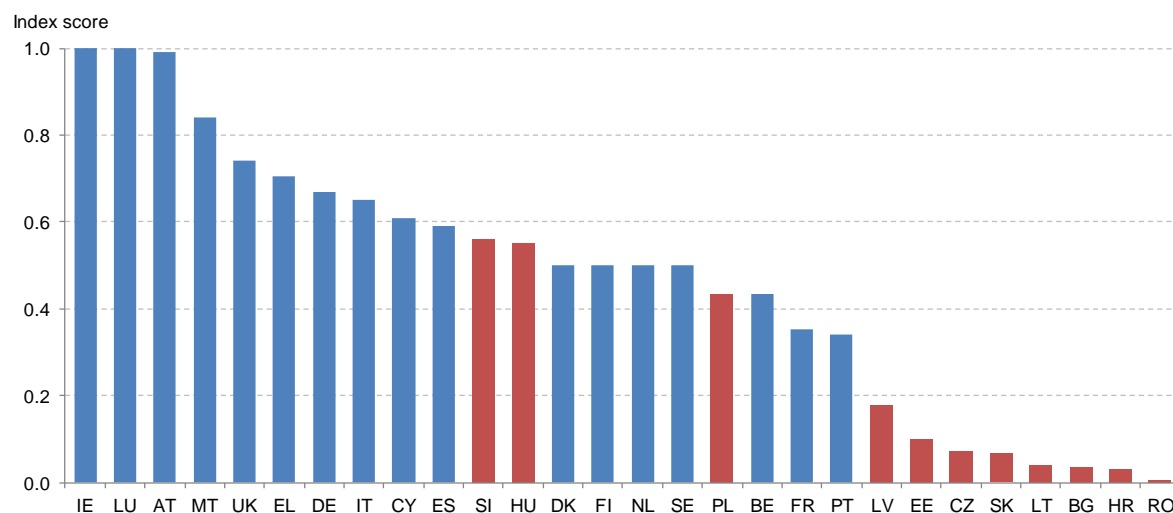
Source: ECB, Association for Financial Markets in Europe
 Note: Corporate gross debt issuance includes non-monetary financial institutions and is the average over 2010-2016.

4.3.3 Capital market development factors

Role of demand for finance

NFCs' access to CESEE's capital markets is on average more difficult than in other EU Member States, but the access varies largely between CESEE Member States (see Chart 4.9). The CESEE Member States have a higher degree of stock market concentration in the hands of a few big companies, also reflecting the difficulty that smaller companies have in accessing the stock market. Similarly, the number of corporate bond issuers in CESEE is much lower than in western Europe.

Chart 4.9: Financial Market Access Index



Source: Svirydzhenka (2016)

Note: The score is based on percent of market capitalisation outside the top 10 largest companies and the total number of issuers of debt.

As in the EU as a whole, enterprises in CESEE Member States rely mostly on own resources to meet their financing needs. Firms in Croatia and Poland use listed shares the most, but to a degree still well below the EU average. Firms in the Czech Republic and Poland depend predominantly on debt securities, while these securities are the least important for firms in Romania, Lithuania and Latvia. By contrast, loans play a very important role in the external financing of non-financial corporations in all CESEE Member States. Financing through loans is important in Members States like Croatia, Bulgaria, Latvia and Slovenia.

SMEs are economically important to CESEE Member States given that they account for around 70% of employment and produce about 60% of value added.⁸⁶ This warrants paying special attention to their financing demands. Although not the main concern, access to finance is an issue for many SMEs.⁸⁷ Notwithstanding progress in recent years, some 6-15% of SMEs in CESEE Member States mention access to finance as a major problem in the 2016 *SAFE survey*, as compared with an EU average of 9%. Croatia and Lithuania are among the

⁸⁶ Note that in the region almost all firms are SMEs, statistically defined as companies with less than 250 employees combined with turnover smaller than EUR 50 million or a balance of not more than EUR 43 million.

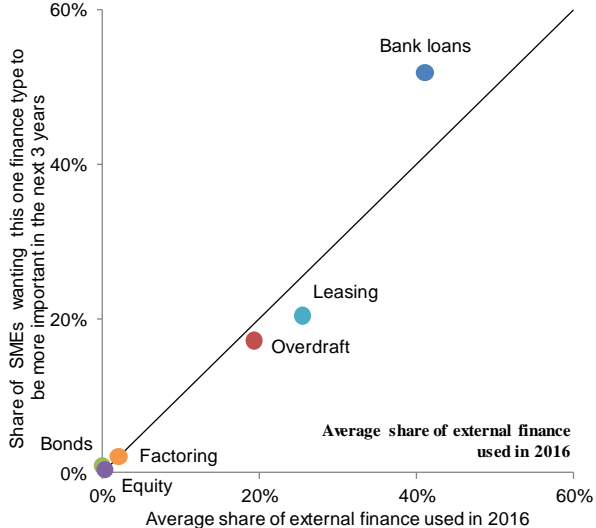
⁸⁷ To be complete, finding customers and the capacity to attract qualified staff are the concerns most often mentioned. *Survey on the access to finance of enterprises (SAFE)*; http://ec.europa.eu/growth/access-to-finance/data-surveys_en

countries where SMEs report the most difficulties with access to finance, whereas the least issues are encountered in Estonia and Slovakia.

SMEs prefer loans in order to meet their funding needs. According to the 2016 *SAFE survey*, the vast majority of SMEs in CESEE Member States consider debt and equity issuance to be irrelevant. Similarly, the *EIB Investment survey*⁸⁸ of 4 881 firms in CESEE Member States showed that firms prefer to stick with bank loans to finance their investments (see Chart 4.10). Hence, it would require more proactive measures in order to shift the prevailing funding practices towards increased capital market financing.

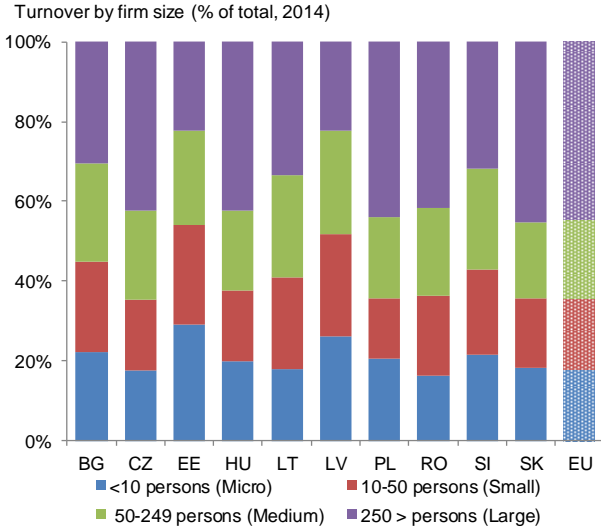
The structure of the economy in terms of sectoral specialisation and size distribution within sectors also influence how corporate financing is distributed across sources. Industry plays a bigger relative to services in Slovakia (53%), the Czech Republic (52%), Hungary (50%) and Poland (46%). Manufacturing is investment-intensive and a large manufacturing sector may imply a higher demand for capital.

Chart 4.10: Types of finance in CESEE: actual versus desired change



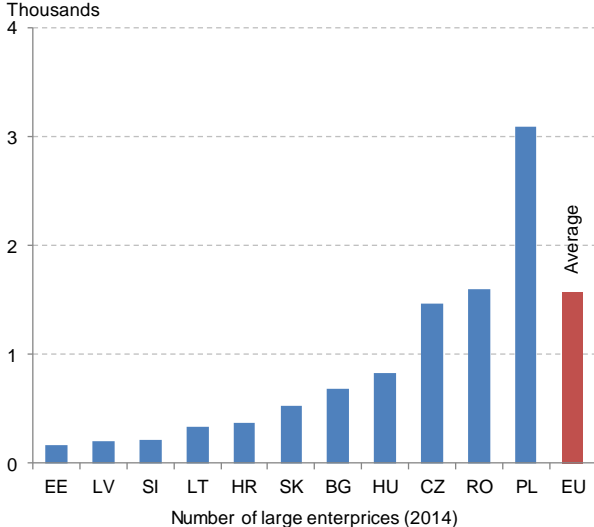
Source: EIB (2018)

Chart 4.11: Importance of firm size for turnover in CESEE



Source: Eurostat

Chart 4.12: Importance of the number of large companies in CESEE



Source: Eurostat

Large firms have easier access to capital markets, as size matters when it comes to coping with information and cost requirements. In CESEE Member States, SMEs are relatively more important in generating output, and there are fewer large companies than in the EU as a whole

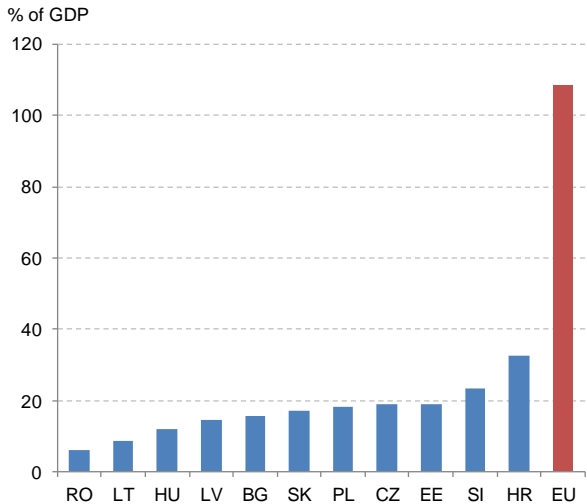
⁸⁸ <http://www.eib.org/about/economic-research/surveys-data/investment-survey.htm>

(see Chart 4.11 and Chart 4.12). SMEs account for between 78% (Estonia, Latvia) and 55% (Slovakia) of production, as compared with 56% in the EU as a whole. In particular, micro and small firms are important in the region for the production process, while large firms are typically less numerous. Only Poland (with over 3 000 large firms) is significantly above the EU average. SMEs are often owned by a single person or by family members whose financing preferences often differ from large firms concerning financing than more dispersed or external capital providers.

Role of supply of funds

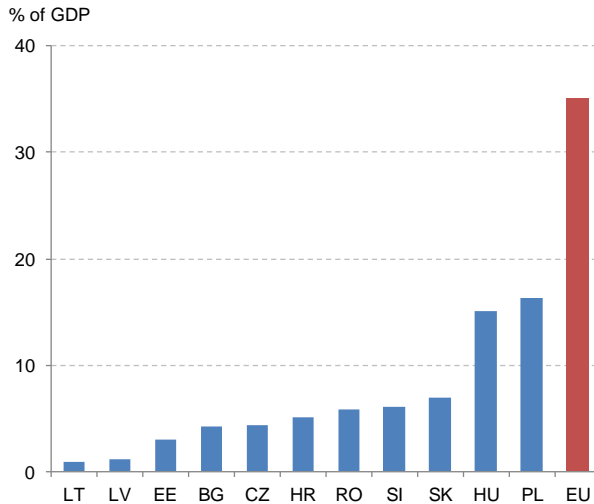
Insurance companies, pension and investment funds play less of a role in the region than in the EU as a whole. There is also wide variation among countries. Assets of insurance undertakings and pension funds as a proportion of GDP (see Chart 4.13) stood at roughly 33% in Croatia in 2016, as compared with 6% in Romania (108% in the EU). The investment fund industry is more developed in Poland (with assets amounting to 16% of GDP) and Hungary (15%), but less so in Baltic states (less than 3%); the EU-28 figure is 82% (see Chart 4.14). Occupational pension funds are relatively small in the region, with the exception of Romania, Slovenia and Slovakia.

Chart 4.13: Provision of finance by insurance companies and pension funds



Source: ECB, Association for Financial Markets in Europe
 Note: Assets of insurance companies and pension funds as share of GDP, 2016.

Chart 4.14: Provision of finance by investment funds (non-monetary)



Source: ECB, Association for Financial Markets in Europe
 Note: Assets of investment funds (non-monetary) as share of GDP, 2016.

Institutional investors in CESEE Member States prefer to hold debt securities, mostly government debt. In most CESEE Member States they represent more than 50% of the assets held by occupational pension funds in 2015, in line with the EU average of 49%. The share of equity in the portfolio of occupational pension funds varies significantly, ranging from 34% in Poland to nearly negligible in Hungary, Latvia and Slovenia.⁸⁹

Private equity is a medium- to long-term financing option that could bridge the financing needs of unlisted firms between the early start-up phase and the expansion phase where some of the more mature firms could make use of public market financing. Private equity remains

⁸⁹ Own calculations based on EIOPA data.

small in the CESEE Member States as it does in the EU as a whole. In 2015, it reached EUR 1.6 billion and was concentrated in Poland, Hungary and Romania. This compares with EUR 47.5 billion in the EU as a whole. Relative to the size of the economies, private equity investment in most CESEE countries remains below the EU average in most countries (0.32% of GDP). Some CESEE Member States perform well as regards the availability of VC, in particular some Baltic states like Hungary, Poland and Slovakia. In several countries, VC investments benefited from public support, e.g. the public-private Baltic Innovation Fund.

The modest role of capital markets in CESEE Member States is reflected in households' financial assets that are predominantly held in bank deposits (see Table 4.1). This is especially the case in Slovakia (62% of total financial assets) and Croatia (55%), but most CESEE Member States are above the EU average (30%). As a corollary of this, equity, insurance and pension investments by households are below the EU average. Notable exceptions are Estonia, Bulgaria, Hungary and Lithuania where equity and investment fund shares represent between 38% and 52% of financial assets. Investments in insurance or pension products are highest in Croatia (24%), still below the EU average of 39%.

Table 4.1: Structure of households' financial assets in per cent of total, 2016

Country	Currency and deposits	Debt securities	Equity and investment fund	Insurance and pensions	Other
Bulgaria	37.5	0.1	43.2	9.9	9.3
Czech Republic	51.4	3.7	29.3	13.1	2.6
Estonia	29.5	0.3	52.1	15.6	2.5
Croatia	52.3	0.2	19.7	24.6	3.2
Latvia	34.1	0.9	25.4	13.5	26.2
Lithuania	36.9	1.6	37.8	10.3	13.4
Hungary	27.0	10.2	41.3	8.5	13.0
Poland	47.6	0.4	26.6	15.1	10.2
Romania	36.7	1.0	24.9	7.7	29.7
Slovenia	49.7	0.3	26.0	17.3	6.7
Slovakia	60.7	3.1	8.5	20.1	7.6
EU	30.4	2.3	24.8	39.7	2.7

Source: Eurostat

Note: The data are for the consolidated household sector.

Financial assets accumulation and capital market participation are also influenced by pension system reforms. In several CESEE Member States (e.g. Bulgaria, Estonia, Latvia, Lithuania, Hungary, Poland and Slovakia) the state-organised 'pay-as-you go' pension schemes was complemented with capitalised pension funds (taking the form of sector-based compulsory pillar 2 or individual pillar 3 schemes), although recent reforms in some of the Member States have made these schemes less attractive.⁹⁰

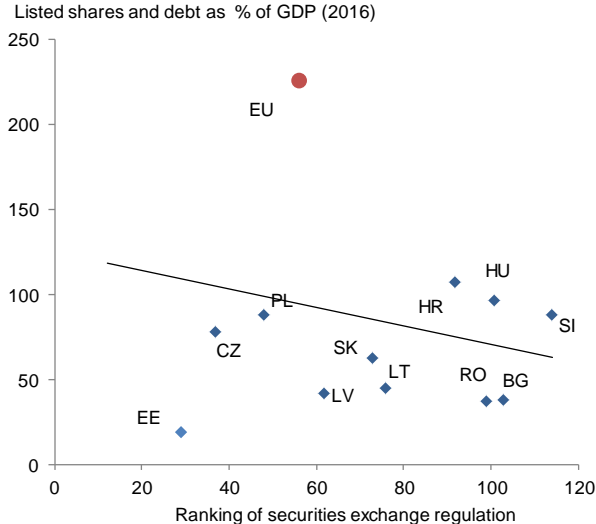
Role of regulatory environment

Effective regulation could contribute to capital market development. The CESEE Member States' rankings by effectiveness securities exchanges regulation suggest that this ranking is positively correlated with the country's market depth (see Chart 4.15). Market-specific laws,

⁹⁰ In Hungary, for example, private pension fund assets have decreased on the back of legislative changes in 2010-2012. In Slovakia, tax allowances have been reduced as part of a fiscal consolidation drive. In Romania, the government is discussing amendments to the pillar 2 (i.e. a reduction in mandatory contributions or making the mandatory contributions to pillar 2 voluntary) which would significantly impact the long-term sustainability of pension funds.

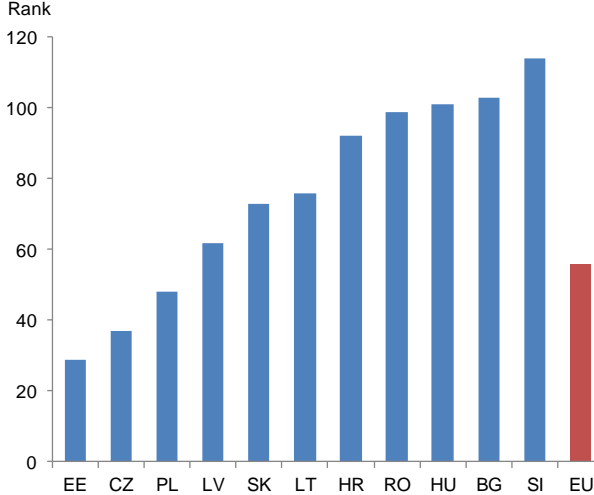
institutional reforms and economic openness foster the development of equity markets in CESEE. There is wide country variation, but most of the CESEE Member States rank below the EU average (see Chart 4.16).

Chart 4.15: Capital market depth and regulatory environment



Source: World Economic Forum, ECB
 Note: The regulation variable is the ranking of 140 countries, 2016. A low rank number implies a better ranking.

Chart 4.16: Ranking of security exchange regulation



Source: World Economic Forum, ECB
 Note: The regulation variable is the ranking of 140 countries, 2016. A low rank number implies a better ranking.

The prevailing business environment also matters. The CESEE Member States have, for instance, reformed their insolvency procedures. In several, the average recovery rate from a liquidation of assets is below the EU-28 level of about 65%, while the time to finalise an insolvency procedure is mostly longer than the EU average of two years⁹¹. The combination of relatively low and uncertain recovery rates and long insolvency procedures give rise to higher risk and a higher risk premium. In turn, this may repel investors and hamper the development of capital markets.

Regulatory changes will also shape demand for funding in the coming years. For example, in the banking sector, regulatory minimum requirement for own funds and eligible liabilities, according to which banks have to hold a certain minimum of ‘bail-in-able’ liabilities, could provide some boost to markets for bank bonds. In particular, domestically owned banks will have to increase their issuance volume. In this context, there may also be a role for parent banks with respect to the debt issued by their local subsidiaries, if this in line with the supervisory framework and resolution strategy pursued for the bank. The development of bond markets for both banks and NFCs poses a risk of mutual crowding-out. Unless international demand for CESEE bonds strengthens, an increased issuance of bank bonds, induced by regulatory requirements, might counteract efforts to develop and deepen the corporate bond market.

⁹¹ World Bank (2017).

4.3.4 Market integration

Efforts to foster the development of local capital markets will facilitate their integration. Some regional initiatives in CESEE are already under way. Three cross-border stock market cooperation clusters have emerged.⁹² Including neighbouring markets in various parts of the region, these groupings differ by degree of integration, and legal and operational structures:

- **Nasdaq Baltic Market:** is made up by the stock exchanges in Estonia, Latvia and Lithuania. Nasdaq Baltic Market is a common equity market with harmonised trading rules and market practices, a single trading system, joint trading lists, harmonised indices, single membership, and single trading and settlement currency, facilitating investors to access all Baltic listed financial instruments through any of the member exchanges;⁹³
- **CEESEG:** the stock exchanges of Prague and Vienna are two subsidiaries of equal standing within a central holding company, CEESEG AG. Previously, the Ljubljana and Budapest stock exchanges also belonged to CEESEG, but in 2015 they were sold to the Zagreb stock exchange and the Hungarian National Bank, respectively; and
- **SEE Link:** SEE Link is a project started by the stock exchanges of Bulgaria, the former Yugoslav Republic of Macedonia and Croatia with the objective of creating a regional infrastructure for trading securities, seated in Skopje and supported by the European Bank for Reconstruction and Development. The Ljubljana, Belgrade, Sarajevo and Banja Luka stock exchanges joined in 2016-2017. The idea behind this cross-border initiative is to integrate regional equities markets without merger or corporate integration. The objective is to allow investors easier and more efficient access to those markets through a local broker.

4.4 Conclusions

Well-developed capital markets contribute to jobs and growth by enhancing allocative efficiency, increasing investment and diversification opportunities for investors, improving access to risk capital for borrowers and stimulating competition. Without barriers, capital flows will flow to the most value-creating investments in the single market. Cross-border integration lowers the costs to run market infrastructures, increases market liquidity and lowers search costs.

Fostering the development of local capital markets facilitates Member States' integration in the CMU. For under-developed markets, it might be harder to reap the benefits of fully integrated capital markets, as larger issuers and investors will be tempted to bypass local markets and access the more liquid foreign markets directly. This would also leave out the SMEs that are more dependent on well-developed local markets, operating within a strong regulatory framework and a thriving ecosystem. With these elements in place, local markets

⁹² The other markets in the region (Warsaw, Budapest, Bratislava and Bucharest) are not part of any regional alliance. They cooperate with other exchanges by using their trading systems (supplied by Euronext for Warsaw and *Deutsche Börse* for Budapest) or through arrangements for clearing derivatives (Athens' CSD for Sibex stock exchange before the merger with the Bucharest stock exchange).

⁹³ In November 2017, the Ministers of Finance from Latvia, Estonia and Lithuania signed a joint memorandum of understanding on cooperation for regional capital market development in the Baltics: https://ec.europa.eu/commission/commissioners/2014-2019/dombrovskis/announcements/baltic-states-create-pan-baltic-capital-market-joint-initiative-supported-european-commission-and_en.

will more easily open up to cross-border business and be ready to engage in clusters where market infrastructures are linked.

Capital markets in the CESEE Member States are lagging behind those in the other Member States, in terms of depth and access. At the same time, this indicates a high growth potential. Local capital market development may help them to catch up faster by providing more diversified sources of finance for growth and development. To that end, improved access to local capital market is important, especially for the dominant SME sector. As regards to the supply of funds, conducive business conditions are needed for institutional investors as well as for private equity and VC funds. Last but not least, a sound regulatory and supervisory environment, including strong institutions, a stable legal system and upholding of the rule of law are key flanking conditions.

Chapter 5 CRYPTO-TOKEN MARKET DEVELOPMENTS: WHAT ARE INITIAL COIN OFFERINGS ALL ABOUT?

5.1 Introduction

This chapter seeks to shed light on the phenomenon of initial coin offerings (ICOs), which have recently become topical due to the substantial funds raised by blockchain start-ups. In 2017, EU blockchain start-ups raised some EUR 750 million through ICOs, representing over a fifth of all funds raised through ICOs globally.⁹⁴ From the economic and regulatory perspective, this phenomenon merits closer examination to establish whether it offers a truly new and innovative way of raising capital for early-stage start-up companies. As the topic is relatively new, the chapter starts with introducing some basic terminology and economic considerations concerning ICOs.

5.2 Crypto-token market developments

Chart 5.1: Aggregate market capitalisation of crypto-tokens



⁹⁴ This chart is based on the funds raised by start-up founders in the EU, of which some 40% were raised by founders in the UK. See <https://2017.stateofeuropantech.com/> for more details.

The second half of 2017 was characterised by a spectacular rise in the price of bitcoin and the emergence of hundreds of crypto-currencies and tokens (henceforth referred to as ‘crypto-tokens’).⁹⁵ Apart from intense public attention, this also attracted regulatory scrutiny across the globe. On the face of it, these developments presented signs of an asset bubble. The aggregate ‘market capitalisation’ of all types of crypto-tokens went up from USD 18.3 billion on 1 January 2017 to USD 832 billion on 7 January 2018 — a 45-fold increase (see Chart 5.1).^{96,97}

The bitcoin price reached some USD 10 000 at the end of November 2017, yielding a market capitalisation of USD 167 billion.⁹⁸ This corresponded to a bitcoin price increase of over 4 300% since the latest trough, most of which occurred in the second half of 2017. By mid-December 2017, the average price of bitcoin across various exchanges had rallied to almost USD 20 000, resulting in a market capitalisation of around USD 334 billion. However, at the beginning of February 2018, it dropped to USD 6 048 (implying USD 101.9 billion market capitalisation) before rebounding.

Chart 5.2: Bitcoin price compared to other asset price increases, November 2017

⁹⁵ At the end of February 2018, a total of more than 1 500 different crypto-tokens were listed on <https://coinmarketcap.com>. See section 5.3.2 for an overview of the basic crypto-token types.

⁹⁶ Market capitalisation of crypto-tokens tends to be measured as the price of a single crypto-token multiplied by the number of crypto-tokens in circulation. This is somewhat similar to the notion of ‘public float’ in traditional equity markets. Locked, reserved or otherwise immobilised crypto-tokens cannot affect the price of crypto-tokens, which is determined through live trading on exchanges.

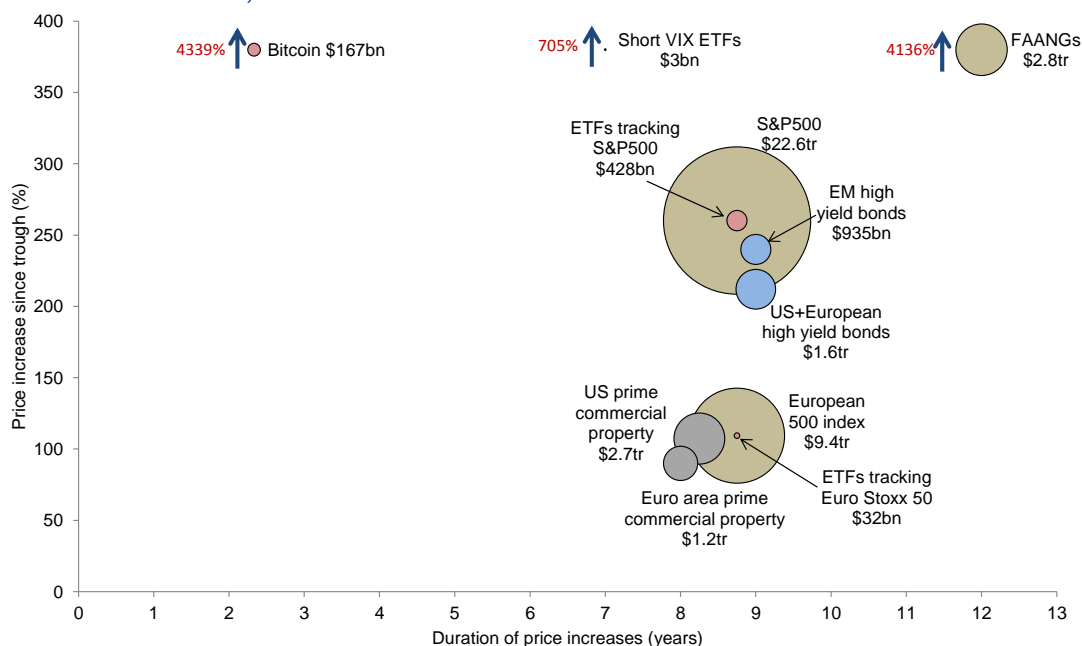
⁹⁷ Unless otherwise noted, the data referred to appear as quoted at <https://coinmarketcap.com>.

⁹⁸ Note that crypto-currency prices at the different exchanges vary considerably.

Significant broad-based asset price increases since the global financial crisis ...

Duration and magnitude of asset price increases

(bubble size = size of market)



Source: ECB calculations.

Notes: FAANGs = equity prices of Facebook, Apple, Amazon, Netflix, and Google

www.ecb.europa.eu ©

Source: ECB

There is evidence that this latest bout of volatility was caused at least partly by the bankruptcy of the Mt. Gox crypto-token exchange, since its bankruptcy trustee has been liquidating crypto-currency positions to pay off creditors.⁹⁹ On 18 December 2017, the trustee started gradually selling some of the bitcoins in its possession on crypto-token exchanges, causing a pronounced negative downward trend in the market price. By 6 February 2018, the trust had liquidated a total of almost 36 000 bitcoins. However, it still holds more than 166 000 bitcoins, the eventual sale of which is also likely to have a dampening effect on the price.¹⁰⁰

Figure 5.1 puts the bitcoin price dynamics and market size into perspective.¹⁰¹ Even when priced in the USD 10 000 range, the size of the market remains relatively modest compared with other assets. At the same time, no other asset category has shown such sharp price increases in such a short period of time. Other crypto-tokens have also seen equally dramatic price increases and volatility.¹⁰² For many of them, the prices move in the same direction, but the magnitude of the changes can be different. As a result, the relative market value of bitcoin dropped significantly, as other crypto-tokens rose faster in value (see Chart 5.3). In early 2018, however, bitcoin remained by far the largest crypto-token, at some 40% of the aggregate market capitalisation.

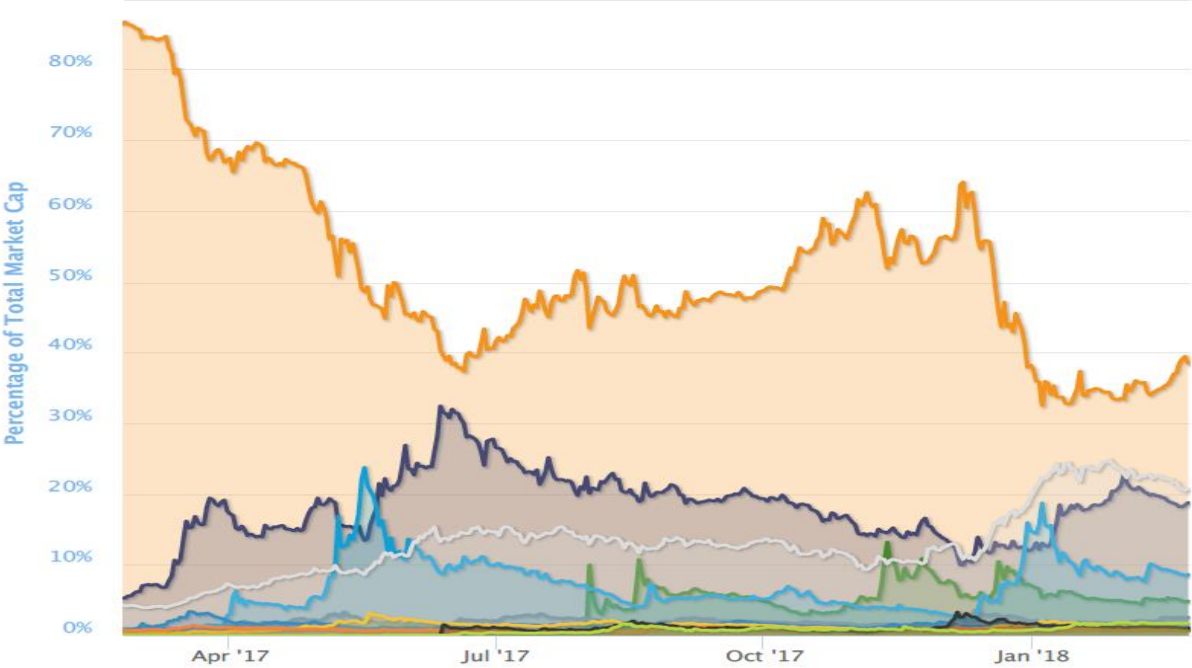
⁹⁹ Mt. Gox was the largest bitcoin exchange in the world until hackers stole around 850 000 bitcoins from it in February 2014. As a result of this hack, Mt. Gox was forced into bankruptcy. A criminal investigation and attempts to refund the aggrieved investors are still ongoing.

¹⁰⁰ See https://www.mtgox.com/img/pdf/20180307_report.pdf.

¹⁰¹ Note that the 'market capitalisation' measure used in crypto-token markets differs substantially from the traditional measure used in capital markets. See footnote 90 for more details.

¹⁰² Note that the observed volatility of crypto-currency prices is highest when expressed in USD and other fiat currencies. The price of bitcoin expressed in other digital currencies, for example, has been more stable.

Chart 5.3: Share of individual crypto-tokens in terms of aggregate market capitalisation



Source: coinmarketcap.com

Currently there is no established methodology for valuing crypto-tokens. Traditional discounting methods cannot be applied given that they do not entail regular future cash flows. However, there have been some first attempts at framing possible valuation methodologies with respect to crypto-currencies (see Box 9).

Box 9: Uncertainties in crypto-token valuation

As the crypto-token phenomenon is relatively new, and there are very little data (see also Box 10), literature on crypto-token valuation is virtually non-existent. Nevertheless, some first tentative attempts have been made to develop a theoretical framework around crypto-currency valuation.

As an example, Bolt and van Oordt (2016) develop an economic framework to analyse the value of a crypto-currency. The researchers applied Fisher’s quantity relation to show how the value of a crypto-currency responds to changes in the speculative position of investors.¹⁰³ Their theoretical framework shows that three components are important for its value: (i) the current use of crypto-currency to make payments; (ii) the decision of forward-looking investors to buy crypto-currency, thereby effectively regulating its supply; and (iii) the elements that jointly drive future consumer adoption and merchant acceptance of crypto-currency.

On the consumer side of the market, private benefits may be large for those who frequently execute cross-border payments, such as remittances. In addition, consumers who value privacy and anonymity more, and those who are technologically more adept are likely to gain from using virtual currencies. On the other side of the market, large merchants may experience considerable private benefits from avoiding the high fees charged by traditional payment providers. Internet stores may gain as well, since they face relatively low implementation costs when accepting virtual currencies. The model predicts that, as a crypto-currency becomes more established, its

¹⁰³ Fisher (1911).

value will become less sensitive to the impact of shocks to speculators' beliefs and their inflow into and outflow from the crypto-currency market. This prediction undermines the notion that the current high volatility of the value of crypto-currencies will prohibit their widespread usage in the long run.

However, the model represents just one of many possible models, and it should be interpreted with caution, especially since research in this field is still emerging. For example, the model does not capture the effect on the crypto-currency price of feedback from transaction costs, which became significant as networks became congested in late 2017. The additional use of native crypto-currencies to reward miners, which effectively reflects the cost of maintaining the network, makes their modelling very complex.

More generally, blockchain is sometimes described as the dawn of the internet of value. There is a belief that, just as the internet has revolutionised the sharing and transfer of information, the next wave of internet development will do the same for the sharing and transfer of value. Blockchain technology is central to this story, underlining why people attach value to crypto-tokens.

Several ideas argue in favour of crypto-tokens having value, notably the 'fat protocol proposition'.¹⁰⁴ The previous generation of shared protocols (TCP/IP, HTTP, SMTP, etc.) produced vast amounts of value, but most of it was captured at the applications layer, largely in the form of data by such internet giants as Google and Facebook. Thus, in terms of how value is distributed, the current internet stack is composed of 'thin' protocols and 'fat' applications. Therefore, investing in applications produced high returns, whereas investing directly in protocol technologies generally produced low returns. This was particularly due to the fact that most protocols represent open-source software, whereas applications are proprietary. According to the 'fat protocol' view, the relationship between protocols and applications in the blockchain application stack is reversed. In other words, it is a stack with 'fat' protocols and 'thin' applications where value is concentrated at the shared protocol layer and only a fraction is distributed along the applications layer. Importantly, the crypto-tokens that enable access to the protocol will reflect the value distributed at the protocol level. By extension, everyone holding crypto-tokens can capture a share of this future value.

Others argue that the only reason the protocol layer today appears 'fat' is because blockchain technology is in its early development stages and very few decentralised applications have yet been built on top of it. Once this happens, the application layer will become as 'fat' as it appears in today's internet world.¹⁰⁵ Moreover, the 'fat protocol' view concerns only 'protocol' (i.e. native) crypto-tokens, whereas the general public seems to be investing in all kinds of crypto-tokens without discrimination.

In sum, we are still far from even agreeing that crypto-tokens have any value at all, let alone devising robust methodologies for their valuation.

5.3 The basics of blockchain technology

Despite a much longer pre-history, development of the main elements that blockchain technology relies on started in earnest in the 1990s, and has evolved over time.¹⁰⁶ In 2008, the technology finally saw a breakthrough and was introduced to the public in a nine-page

¹⁰⁴ See for example <http://www.usv.com/blog/fat-protocols>.

¹⁰⁵ See for example <https://www.evanvanness.com/post/166666272011/theres-no-such-thing-as-fat-protocols>.

¹⁰⁶ See Diedrich (2016) for comprehensive historical context.

document describing Bitcoin.¹⁰⁷ Among other things, the timestamping, hashing and encryption that blockchain technology uses have long been used in digital signatures, which are timestamped hashes that are encrypted using the signer's private key.^{108,109,110} To verify whether the signature is valid, all one has to do is decrypt the signature using the signer's public key, which is identified in the digital certificate, and to compare the obtained hash to a locally generated hash based on the same underlying data.¹¹¹ The validity of the digital signature is confirmed if both hashes match (see Figure 5.1).

A crucial element of blockchain technology is that it avoids the 'double spending' problem. Generally, any digital object can be copied and this is a problem if one wants to attach proprietary rights to a specific digital object. To prevent illegal copying, the entire history of

¹⁰⁷ See Nakamoto (2008). For the remainder of the text, 'Bitcoin' (capital B) refers to the Bitcoin blockchain, whereas 'bitcoin' (lower case b) refers to the crypto-currency.

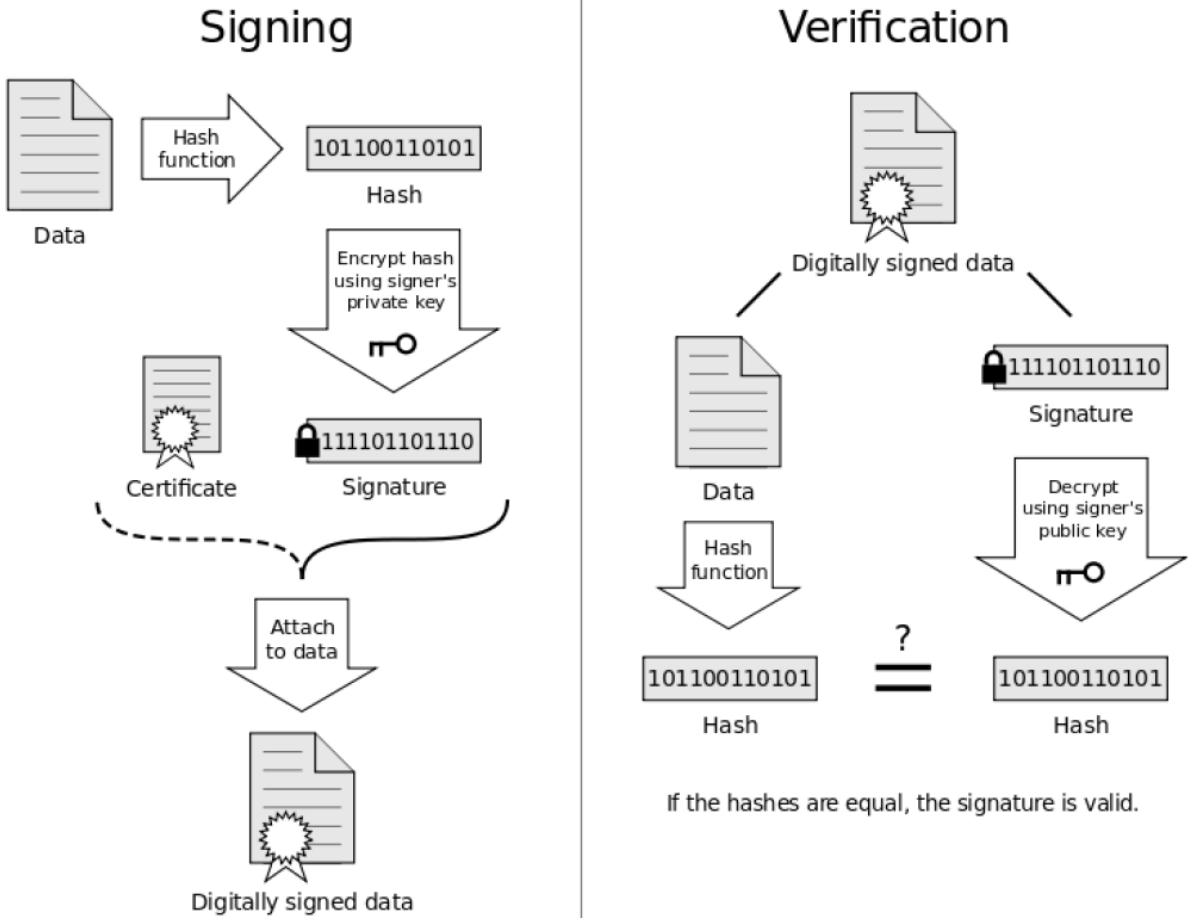
¹⁰⁸ A digital signature is a mathematical scheme for demonstrating the authenticity of digital messages or documents. A valid digital signature should assure (i) the recipient that the message was created by a known sender (authentication), (ii) that the sender cannot deny having sent the message (non-repudiation) and (iii) that the message was not altered in transit (integrity). Digital signatures are commonly used for software distribution, financial transactions, contract management software and in other cases where it is important to prevent and detect forgery or tampering.

¹⁰⁹ A cryptographic hash function is a mathematical algorithm that maps data of arbitrary size to a bit string of a fixed size (a hash) and is designed to be a one-way function in the sense that the function should be impossible to invert.

¹¹⁰ In cryptography, a key is an alpha-numerical string that determines the functional output of a cryptographic algorithm. For encryption algorithms, a key specifies the transformation of plain text into cypher text, and *vice versa* for decryption algorithms. Keys also specify transformations in other cryptographic algorithms, such as digital signature schemes and message authentication codes.

¹¹¹ Digital certificates are used to link public keys to natural or legal persons. Without certificates, the recipient would not know which public key belongs to the sender. The digital certificate itself is signed by a trusted third-party 'certificate authority', such as VeriSign.

Figure 5.1: Use of hashing and encryption in digital signatures



Source: Wikimedia

transactions (the ledger) is copied on every computer (node) in the network.¹¹² This means that if one wants to change anything in the ledger, the change has to be accepted by the majority of network participants. The way in which such a consensus can be established without the need to trust other network participants was one of the main innovations of the Bitcoin blockchain. The distributed nature of the network also serves as a natural defence against cyberattacks, since having a copy of the same data on all the computers in the network eliminates central points of failure. Even if some computers on the network were to be neutralised, the rest would continue to perform the network functions as long as there is at least one node left, since a single surviving copy of transaction history is sufficient to reconstruct the entire network.¹¹³

Blockchain technology has attracted a lot of attention precisely due to this ability to promote user trust without the need for centralised market infrastructures. Its potential applications also go far beyond financial services, with the technology being successfully tested in an increasing number of economic sectors, including energy and logistics. The potentially wide

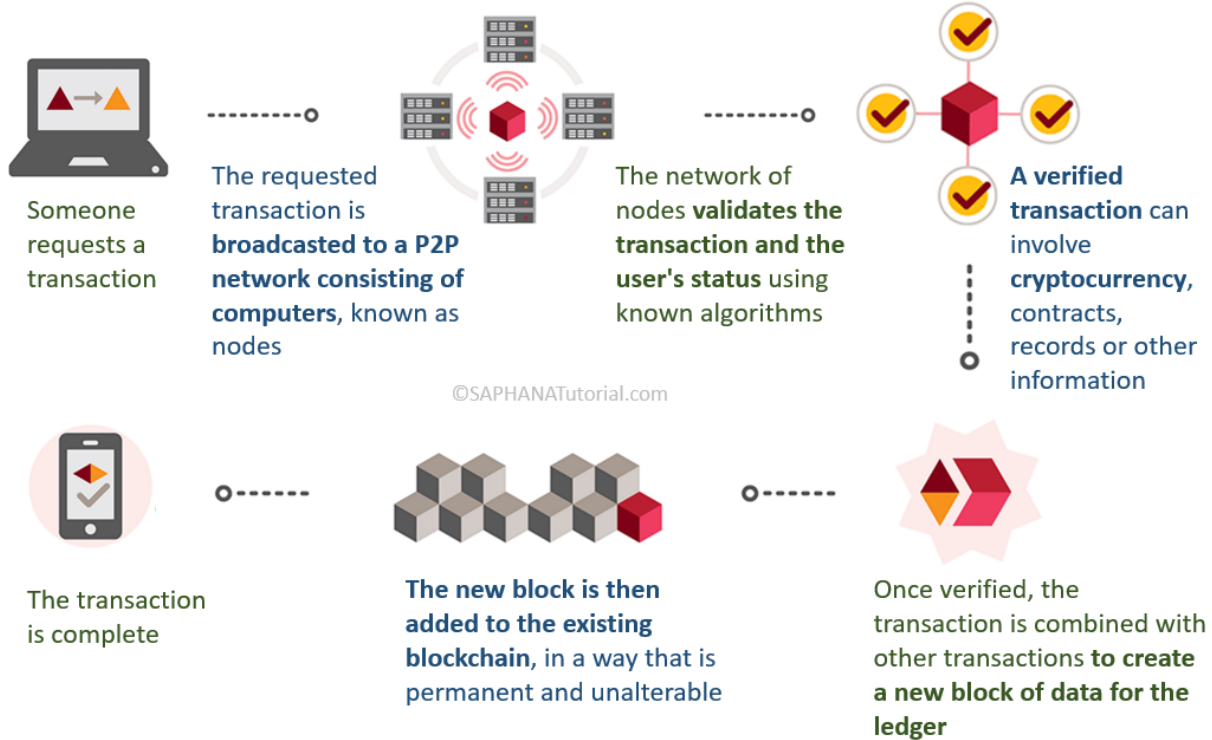
¹¹² The solution was first proposed by W. Dai in the concept of b-money in 1998, but it was found impractical. See <http://www.weidai.com/bmoney.txt>. The real innovation behind blockchain technology was the consensus protocol to keep all those ledger copies in sync. The special protocol invented for Bitcoin uses proof-of-work, while Ethereum uses a faster, improved version named GHOST.

¹¹³ This feature adds value to crypto-tokens, reflecting the strength of the community supporting it. The stronger this support, the more resilient these crypto-tokens are when faced with external shocks.

range of applications includes automatic contract execution functionality, which is made possible by the use of ‘smart contracts’. The latter are self-executing pieces of computer code that reflect at least some terms and conditions of an agreement.¹¹⁴ Typically, smart contracts do not focus on a comprehensive description of conditions that will be critical in court proceedings, but rather on the automaticity of execution. They are intended for machine-to-machine contracting, e.g. in the case of the ‘internet of things’, but also for use in highly automatised financial market applications where most communication takes places between machines.

The original idea behind the Bitcoin blockchain was to enable a peer-to-peer version of electronic cash for online payments without the need to go through a financial institution. Traditionally, a trusted third party (such as a financial institution) was required to prevent double-spending. By removing this requirement, the blockchain technology has enabled market dis-intermediation. Although blockchain technology theoretically enables peer-to-peer markets, in practice growth of the network may have the effect that only very powerful computers are capable of adding new blocks of transactions to the chain.¹¹⁵ The nodes that add these new blocks are called miners, since they need to invest substantial computational power to find a specific hash that gives them the privilege of adding a new block of

Figure 5.2: Transaction cycle on blockchain



Source: Seemit

¹¹⁴ A significant number of legal terms may be carried along in the form of text, but may not be used in the execution. The question as to which parts of a legal agreement need to be explicitly coded is an area of active research at the intersection of law and computer science. For example, see De Filippi and Wright (2018).

¹¹⁵ For example, in the early days it was possible to add new blocks to the Bitcoin blockchain using a simple laptop. Now, however, the sheer computational power required effectively prevents anyone without specialised and costly equipment from doing so.

transactions to the chain.¹¹⁶ In turn, this entitles them to a reward in the form of bitcoins released from the blockchain itself and transaction fees paid by those that initiated the transactions. The basic transaction cycle on a blockchain is depicted in Figure 5.2.

5.3.1 The basic blockchain types

Blockchains can be public, permissioned or private, depending on who is allowed to participate in the network, execute the consensus protocol and host the distributed ledger.¹¹⁷ Anyone can be a user or host on a public blockchain, while participants in permissioned and private blockchains belong to a defined group. Public blockchains are not owned and are based on open source software. A private blockchain has a well-defined owner, resembling a distributed database controlled by a central entity. Permissioned blockchains are usually owned by a consortium of independent entities and fall between private and public blockchains given that they are partly decentralised, but still not fully public.

Nowadays, there are numerous blockchains, but currently the two most prominent public blockchains are Bitcoin and Ethereum.¹¹⁸ As Bitcoin was the first publicly known blockchain to emerge, it has the longest history, and the widest network of nodes. At the same time, its on-chain functionalities are limited to bitcoin transfers. Ethereum covers a wider range of functionalities and enables the smart contracts referred to above.¹¹⁹ For example, it enables its users to create their own tokens — a feature that is decisive in making it the preferred ICO infrastructure (see below).

5.3.2 The basic types of crypto-tokens

While there is no commonly agreed classification, crypto-tokens can be broadly viewed as representing a specific asset on a blockchain and/or as offering some utility. Blockchain technology enables both native crypto-tokens, as well as ‘mirror’ crypto-tokens that represent real-world assets.¹²⁰ As such, crypto-tokens generally encompass payment tokens, investment tokens and utility tokens (although many forms of hybrid token are also possible, which may not fit into any of these categories).

- ***Payment tokens*** are also known as crypto-currencies,¹²¹ virtual currencies, or simply coins (see Box 10). These are crypto-tokens that are intended to fulfil one or several of the

¹¹⁶ To avoid manipulation, the node that validates the next block must not be known to anyone in advance. Therefore, the Bitcoin blockchain assigns the role of miner to node operators on a random basis. The more computing power a node has, the faster it is able to find the correct cryptographic solution and the more likely it is thus to earn crypto-currency as a reward. Because of this, the Bitcoin’s algorithm adjusts the level of computation difficulty automatically, to ensure that no more than a single block is generated every 10 minutes. This time limitation was introduced to prevent particularly powerful nodes from always finding the solution, thereby making the process predictable and exposing the nodes to corruption and/or vulnerability.

¹¹⁷ For more details, see <https://www.ibm.com/blogs/blockchain/2017/05/the-difference-between-public-and-private-blockchain/> and <https://www.mojix.com/private-blockchain/>.

¹¹⁸ See <http://bitcoin.org> and <http://www.ethereum.org>, respectively.

¹¹⁹ Specific functionalities can be coded directly on the blockchain itself or as part of dedicated software that interacts with the blockchain. The functionalities are referred to as ‘on-chain’ or ‘off-chain’ accordingly.

¹²⁰ ‘Native’ means that the crypto-token, such as bitcoin, is embedded in the blockchain at protocol level. Hence, native crypto-tokens are also referred to as protocol tokens.

¹²¹ Crypto-currency is intended to serve as decentralised digital money that cannot be copied, thereby eliminating the double-spending problem without recourse to a trusted third party. Although blockchain itself is not encrypted, cryptography is used to secure and verify transactions. Bitcoin was the first crypto-currency and it is embedded in the Bitcoin blockchain. Hence, it is also referred to as being native to the Bitcoin blockchain. Ethereum also has its native

three main functions associated with traditional money.¹²² For the moment, payment tokens have, if any, only attained very limited acceptance as a medium of exchange, although they may be accepted for specific transactions. Moreover, normally payment tokens do not have the status of legal tender. They are not redeemable, in the sense that they do not represent a claim on the issuer and do not have other conventional economic characteristics of money. However, their existence is crucial for rewarding the community of blockchain miners, i.e. the suppliers of computer power. They thereby play an important role in ensuring sufficient investment in maintaining the blockchain infrastructure and protecting it from abuse.¹²³

- **Investment tokens** are also referred to as security tokens and represent a debt or equity claim on the issuer, giving investors rights similar to those stemming from traditional securities, such as equities, bonds or derivatives.¹²⁴ They can, for example, promise an ownership stake or a dividend stream, like company stock. From a policy point of view, this is a controversial category in the sense that issuance of traditional securities is subject to strict regulations, which should be respected irrespective of the technology used.
- **Utility tokens** are sometimes referred to as ‘consumer tokens’ and grant some functional utility to their holders, such as access to a product or service provided directly by the token issuer. For a long time, consumers have used physical tokens in coffee machines, car washes, slot machines, casinos, etc. Similarly, buyers of utility tokens can be seen as prepaying for a product or service.

Box 10: Coins, crypto-currencies and ICOs: reflections on terminology

The term ‘coin’ implies the same thing as crypto-currency; it simply comes from the term ‘bitcoin’ (= bit + coin). Thus, the term ‘crypto-currency’ can be seen as a description of an intended functionality, whereas the term ‘coin’ refers to a name given to a specific crypto-currency. Since bitcoin was the first, all other crypto-currencies are referred to as altcoins (= alternative + coins). A distinguishing feature of altcoins is that they each have their own dedicated blockchain, be it a variant of Bitcoin built by modifying the underlying code of its open-source protocol to allow for a different set of features or one that is built from scratch. Creating tokens is much less cumbersome than creating coins. Instead of modifying (forking) an existing blockchain protocol or even creating a new one, tokens can be created by following a standard template on a blockchain, such as Ethereum; this is a big factor in the popularity of ICOs.^{125,126}

‘Initial coin offering’ is a misnomer used for marketing purposes, to resemble ‘IPO’. The term

crypto-currency ether. Whereas the Bitcoin blockchain was conceived with the sole purpose of enabling bitcoin transactions, Ethereum also needed a crypto-currency to enable its smart contract functionality. Automatic and guaranteed payments can only be made in crypto-currency.

¹²² i.e. a medium of exchange, a unit of account and a store of value.

¹²³ Whenever a transaction is executed on a blockchain, such as Bitcoin or Ethereum, it involves a transaction fee denominated in the blockchain’s native crypto-currency. This has the fully intended effect that the blockchain is spared a proliferation of malicious or abusive transactions, because they are costly. By analogy, one can imagine how much less spam there would be if each sent e-mail cost something.

¹²⁴ Depending on the source, security tokens are also referred to as ‘tokenised’ securities or ‘crypto-securities’.

¹²⁵ Ethereum offers a ready-made functionality to this end, known as ERC20 token standard.

¹²⁶ See <https://masterthecrypto.com/differences-between-cryptocurrency-coins-and-tokens/>.

‘token sale’ would reflect the substance of the phenomenon far better, since the vast majority of ICOs are implemented on Ethereum.¹²⁷ Any parallels drawn between ICOs and IPOs may be highly misleading, since most ICOs to date have come at a much earlier stage of a firm’s life cycle in terms of raising-capital than IPOs. The more appropriate benchmarks for ICOs would, therefore, appear to be various types of risk capital, which are relevant during the inception, seed, early growth and expansion stages of company development. In other words, it makes more sense to compare ICOs to virtually any other type of capital-raising, including equity crowdfunding and VC, than IPOs (see Section 5.5).

5.4 The mechanics of ICOs

5.4.1 ICO basics and market development

Any analysis of how ICOs work and their market development is affected by the quality of available data, which reflects the early stage of a nascent financial ecosystem emerging around a new funding technology. At this stage, it is impossible, for both qualitative and methodological reasons, to assess the robustness of the data retrieved from the internet (see Box 11).

Box 11: Data issues

There is no official statistics in this nascent internet-based financial ecosystem. This situation will certainly change over time, as more data relating to the use of digital tokens are collected. While on-chain transaction data recorded directly on blockchains are very reliable in some respects, the same cannot be said of off-chain transaction data. As a result, it is very difficult to gauge orders of magnitude and assess the degree of leverage currently prevailing in the system. For example, additional data on tax revenues generated from token trading would put the economic relevance of these assets into perspective. As merchants start recording transactions involving digital tokens, we will be able to understand better the relevance of such assets from a consumer and business perspective, as well as their points of entry and exit into and from the rest of the economy. The following examples illustrate how reporting on digital tokens is plagued by a lack of clarity on data definitions and methodology.

It is often reported that token holdings are highly concentrated, i.e. that very few individuals hold a large proportion of all tokens, especially in the case of ICOs. However, it is the concentration of such holdings by addresses that is actually observed. An address is an alpha-numerical string and is the only identity known to the network. Any physical or legal person may hold many such addresses. As a result, a simple assimilation of an address with a person could be misleading, as effective levels of concentration may actually be much higher. It also fails to account for the possibility of off-chain transactions to transfer ownership, since nothing prevents a swap of ownership behind an address. Such a side transaction in exchange for fiat currency or other assets would not be visible on the blockchain. While data remains highly uncertain, it is nevertheless reasonable to expect high levels of asset concentration with founders in the case of ICOs.

All data in this chapter should therefore be interpreted with caution, as there is considerable uncertainty due to the absence of tested and validated data-gathering methodologies.

¹²⁷ In general, the term ‘ICO’ is synonymous with ‘token sale’, ‘token launch’, ‘token generating event (TGE)’ and ‘initial token offering (ITO)’.

Token sales represent a crypto-token placement process, whereby an entrepreneur sells tokens to fund a start-up, usually in exchange for established crypto-currencies. Tokens can be sold in several rounds, typically starting with a ‘pre-sale’ (i.e. private sale) to institutional and accredited investors, followed by a public sale to retail investors. Token sales can be capped or not capped. When they are capped, the number of tokens to be sold is determined in advance and the sale ceases once this number is reached. It is claimed that the first ICO took place in 2013, when Master Coin¹²⁸ raised some USD 500 000. Also, Ethereum — the platform for issuing most tokens today — raised funds through an ICO in 2014, selling ether in exchange for bitcoins.

It is also possible that an ICO will fail to attract sufficient interest and the process will be halted altogether. As shown in Table 5.1, only about half of all ICOs in 2017 were successfully completed.¹²⁹ Overall, the market has become less transparent, while the number and proportion of failed ICOs has increased over time. In the first quarter of 2017, 30% of ICOs failed and all founders reported the number of tokens sold. By the fourth quarter, the aggregate share of unreported or failed ICOs had increased to 46%, with a total of 182 ICOs not reporting the number of tokens sold.

Table 5.1: ICO completions and failures in 2017

Time period	Total number of ICOs	Completed	Failed	Unreported	Aggregate proportion of unreported or failed ICOs (%)
		Absolute number (relative proportion in %)			
1st quarter	20	14 (70)	6 (30)	:	30
2nd quarter	72	63 (88)	6 (8)	3 (4)	12
3rd quarter	235	131 (56)	40 (17)	64 (27)	44
4th quarter	260	108 (42)	37 (14)	115 (44)	58
2017 total	587	316 (54)	89 (15)	182 (31)	46

Source: Commission services based on data published by <http://www.tokendata.io/> and <http://coinmarketcap.com>.
 Note: Data as of 9 January 2018.

Token sales involving an ICO require substantial preparatory work.¹³⁰ Apart from the token issuer, the process often involves fiscal advisers, law firms, VC funds and business angels, brokers and dedicated online exchanges known as ‘crypto-token’ (or ‘crypto-currency’) exchanges. Rather than issuing a formal prospectus (as in the case of IPOs), ICO issuers will typically only publish a ‘white paper’ to inform potential investors about the idea behind the project and technical details of the required software (code). However, this white paper is often rather thin and vague in content: the team of developers required to implement the idea is not yet contracted and there is no viable product or prototype.

5.4.2 The intermediary role of crypto-token exchanges

For a successful ICO, crypto-token exchanges play a crucial role in providing secondary market liquidity, which is an important consideration for many ICO investors. Following an ICO, trading on secondary markets is common for many types of token, including utility tokens. Transactions are agreed and executed on crypto-token exchanges, which were at first not regulated. As a result, investors were fully exposed to the cybersecurity risks borne by

¹²⁸ See <https://mastercoins.co/>.
¹²⁹ It is highly probable that the unreported ICOs also failed, as failure is a strong motive for non-reporting.
¹³⁰ For example, see <https://techcrunch.com/2017/05/24/how-to-stage-an-ico-and-other-related-questions-you-might-like-answered/>.

these exchanges, many of which have materialised in multi-million euro losses of client tokens. As a result of these incidents and due to ever-growing trading volumes, crypto-token exchanges have been gradually made subject to legislation applying to payment institutions (see Section 5.7.1).

A controversial issue is that crypto-token exchanges represent central points of failure. As they pool client data, they become a target for cyberattacks, just as any other pool of data, which weakens the entire digital token ecosystem.¹³¹ This is in stark contrast with the very essence of blockchain technology, which derives its potential from its decentralised transaction processing.¹³² In other words, there is little sense in implementing blockchain solutions to avoid the need for a trusted third party in transaction processing, only to replace it with another, in the form of centralised crypto-token exchanges. Usually, clients have to transfer their tokens to the exchange to be able to start trading, and it is only when they withdraw the tokens from the exchange that funds are safely back in their digital wallet.¹³³

Centralised exchanges still dominate, but there are also decentralised exchanges for crypto-tokens, where buy and sell orders are matched and transferred directly between peers.¹³⁴ Instead of charging fees, these exchanges are financed through the sales of tokens, which customers must purchase to use their services, like in a utility token ICO. Centralised exchanges have so far been more popular, as they are perceived to be more user-friendly and offer greater liquidity in terms of trading volumes than decentralised exchanges.¹³⁵ Although a decentralised exchange would be attractive from a data security perspective, it remains to be seen if its benefits can outweigh the costs once transaction volumes get closer to those of modern centralised exchanges process.

5.5 ICOs vs other forms of risk capital

5.5.1 ICOs vs business angels and VC

According to TokenData,¹³⁶ entrepreneurs raised USD 4.3 billion through ICOs globally in 2017. The 10 most successful ICOs raised between USD 50 million and USD 230 million

¹³¹ Whereas a blockchain with many nodes is robust to cyberattacks, as copies of the data stack are always available on other nodes if one node goes down, hackers have found ways to steal crypto-tokens from digital wallets. A digital wallet contains the cryptographic data (public and private keys) of the crypto-token owner that are needed to initiate crypto-token transfers. If hackers succeed in compromising a digital wallet by stealing the private key, they can initiate a crypto-token transfer and effectively steal all tokens in the wallet. This vulnerability of digital wallets to cybercrime must be distinguished from the robustness of the blockchain itself. Theft is a widely discussed problem of the entire crypto-token ecosystem.

¹³² Without the latter, the blockchain technology is merely relegated to a distributed database. In this respect, one could even argue that only public blockchains represent the real invention, whereas private and permissioned consortium blockchains may only offer a marginal improvement over classical distributed databases, which are controlled by a central entity.

¹³³ In this context, a digital wallet is a software application, website or hardware device that securely stores and manages the user's private keys for transactions in the respective crypto-tokens. The digital wallet represents a single point of access to the crypto-tokens and the wallet owner is the sole holder of the private key that enables such access. Without a wallet, one cannot receive, store or transfer any crypto-tokens.

¹³⁴ For example <https://shapeshift.io/>, <https://openledger.io/>, <https://bisq.network/> and <https://stellarterm.com>.

¹³⁵ Importantly, this concerns the ability to convert fiat currencies into tokens, which decentralised exchanges do not provide. Hence, apart from token mining, centralised exchanges have so far served as the only public entry point to tokenised assets. See <https://www.coindesk.com/changing-exchanges-will-coinbase-tomorrow-decentralized/> for more insights.

¹³⁶ <https://www.tokendata.io>

each. As of mid-2017, the pace of ICO fundraising had surpassed that of business angels and VC investment in web-based businesses at the seed capital stage. This booming investor interest has been partly driven by high short-term profit expectations from token resale on secondary markets. However, realised profits from such strategies have been on a clear declining trend, with the highest returns experienced in Q1-2017 (see Table 5.2).

Table 5.2: Crypto-token returns from secondary trading in 2017

Time period	Total amount raised		Day-1 return (times)		Current return (times)	
	(USD million)	Number of ICOs	Average	Median	Average	Median
1st quarter	16	6	5.1	3.9	18.3	13.3
2nd quarter	892	43	3.5	1.9	3.5	1.8
3rd quarter	812	52	1.6	1.1	1.9	0.8
4th quarter	341	14	1.6	1.1	1.3	1.1
2017 total	2 061	115	2.5	1.4	3.2	1.2

Source: TokenData.io

Traditionally, start-ups have combined several forms of funding sources throughout their lifecycle, as depicted by the funding escalator model: using own funds and raising money from family and friends in the very early stages, followed by seed capital from angel investors and several rounds of institutional funding through VC firms.¹³⁷ Once VC firms support a start-up in a second or third round, banks may also start granting loans. An ICO can simplify that process by enabling the entrepreneur to raise more substantial financing at the early seed stage.

The average amount raised by ICOs in 2017 was around EUR 15 million (USD 18 million). At the seed capital stage, a start-up company can usually not expect to raise such amounts from venture capitalists, as the typical ticket size in the EU is only EUR 1.3 million or below, even at the expansion stage.¹³⁸ Thus, ICOs can offer an opportunity for start-ups to raise more substantial amounts of funding earlier on in their lifecycle. Analysis of 2017 VC statistics suggests that ICO funding comes on top of VC funding, not instead of it.¹³⁹

Founders may also choose to crowdfund their start-up through an ICO to avoid losing control. VC firms typically request far-reaching control over the company they invest in. A less disturbing factor, but still a nuisance from the founders’ perspective, is the frequent requirement that companies move their headquarters to a location close to the VC firm. Angel investors also typically invest in the vicinity of their geographical location, which is partly due to varying tax incentives across Member States.¹⁴⁰ An ICO may thus represent an interesting alternative for founders who prefer to keep the company where it was established.

Finally, ICOs and VC require significantly different processes for screening start-ups. The vetting, if any, in an ICO is decentralised and global in nature (as is its funding). Vetting by VC firms, on the other hand, is carried out by a handful of experts that the VC firm relies on.

¹³⁷ See, for example, European Commission (2017c).

¹³⁸ See AFME (2017).

¹³⁹ During the ICO boom in mid-2017, business angels and VC funds continued to invest amounts comparable to those invested in the summer of 2016. See PwC & Insights (2017).

¹⁴⁰ See AFME (2017).

5.5.2 ICOs vs equity crowdfunding

In 2017, ICOs may have proved more popular than equity crowdfunding due to perceived regulatory arbitrage opportunities. To raise EUR 15 million through equity crowdfunding, an EU start-up would have to comply with the EU regulatory framework on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market.¹⁴¹ The existing regulatory framework on equity crowdfunding exempts firms from this requirement only as long as the funds raised do not exceed a certain capped amount.¹⁴² To raise additional funds once this cap is reached, a firm would either have to prepare a fully-fledged prospectus or approach VC firms. The latter may not necessarily appreciate a firm having numerous small investors and may thus effectively first have to buy out these minority shareholders, complicating and slowing down the scaling up process.

On the contrary, token purchase through ICOs does not normally make the investor an equity holder in a firm. As a result, not only have firms seen no need for prospectus when raising funds above the applicable equity crowdfunding cap, but they even seemed to believe until late 2017 that they have not been issuing securities altogether and that any amount could potentially be raised through an ICO outside the regulatory framework. This perceived advantage of ICOs over equity crowdfunding was clearly misguided and short-lived.¹⁴³ Although regulatory debate is still ongoing as regards utility tokens, any exemption from applicable laws and regulations in the securities field does not hold for the issuance of investment tokens.¹⁴⁴

As regards secondary market liquidity, tokens can theoretically be swapped for crypto or fiat currencies on crypto-token exchanges. The prospect of being able to sell tokens shortly after their acquisition in an ICO attracts speculators who usually refrain from start-up funding. However, the secondary market liquidity of tokens is not guaranteed. If there is no demand for a specific token on a crypto-token exchange, the investment is as illiquid as crowdfunded equity. In addition, token liquidity is a double-edged sword, as it induces retail investors to buy tokens with less consideration for the long-term viability of the project, which may incentivise proliferation of 'pump and dump' schemes. This is why the industry now recommends the introduction of technical lock-up periods that preclude secondary market trading for a certain period of time following the ICO.

5.6 The economics of ICOs

In economic terms, it is crucial for the success of a particular ICO to strike the right balance between the supply and demand of tokens. Whereas the supply side is managed by capping

¹⁴¹ Regulation (EU) No 2017/1129.

¹⁴² In its proposal for an EU Regulation on European crowdfunding service providers for business, the European Commission has proposed to set this cap at EUR 1 million per crowdfunding offer, which shall be calculated over a period of 12 months with regard to a particular crowdfunding project. In Germany, it is currently set at EUR 2.5 million, whilst in the US this cap has been set at USD 1 million.

¹⁴³ In December 2017, the US Securities and Exchange Commission ordered California-based Munchie Inc. to refund all tokens sold in an ICO because it had failed to comply with the exemptions stipulated in the SEC Act for crowdfunding campaigns. On 6 February 2018, SEC chairman Clayton stated in a public Senate hearing that 'every ICO I have so far seen is a security'.

¹⁴⁴ To protect retail investors, financial regulations in most jurisdictions limit investments in early stage start-ups to institutional and accredited (i.e. high net worth individual) investors.

the number of tokens issued and controlling their gradual release, linking commercial benefits (e.g. discounts) to token usage may help manage the demand side of utility tokens. When holders of utility tokens exchange these for the relevant product or service offered by the issuer, the latter can resell the tokens on the secondary market to generate income. As a result, the tokens become available again for further purchase to potential customers on the secondary market. Thus, utility tokens resemble a form of IOU that is only accepted for payment by the issuing company.^{145,146}

5.6.1 Potential advantages of ICOs

In 2017, ICOs raised more significant risk capital for blockchain start-ups than VC firms were able to provide. As the funds are raised at global rather than national or regional level, the potential supply of risk capital is larger. Traditional business angel and equity crowdfunding investments suffers from insufficient exit opportunities.¹⁴⁷ In this respect, ICOs offer founders and early investors more flexibility, as they can reduce their stake in the project simply by selling their tokens on the secondary market. Reducing a position in VC or equity crowdfunding investment would require a private transfer or preparation of a full-scale IPO at a much later stage. Moreover, sales on the secondary market can be more easily conducted on a cross-border basis given that many crypto-token exchanges are easily accessible from anywhere in the world. Thus, the global liquidity that comes with an ICO is important for both founders and investors.

Notwithstanding the important role that centralised crypto-token exchanges have played so far in providing ICOs with secondary market liquidity for crypto-tokens (see section 5.4.2), ICOs themselves are deemed to be particularly well suited to the decentralised nature of organisations operating in the blockchain ecosystem. Just as the developers of such platforms live in different parts of the world, so do their future users. By selling tokens to future users, the blockchain developers can pre-finance the project and at the same time align incentives of their future user base with those of the founders. ICOs may also attract retail investors who would normally not invest in start-ups at all, but who may be willing to take higher risks, because the crypto-token is tradeable on secondary markets, giving them more control over when to exit their investment (see Section 5.5.2).

Another potential advantage of token sales concerns the very nature of blockchain projects, which are usually based on open-source software.¹⁴⁸ Blockchain projects may find it harder to attract VC funding than is the case for projects based on proprietary software, which is protected by intellectual property rights.¹⁴⁹ Crowdfunding investors are equally less likely to

¹⁴⁵ IOU is the abbreviation for ‘I owe you’ (usually an informal document acknowledging debt). IOUs may also be redeemable for a specific product or service rather than a quantity of currency.

¹⁴⁶ See Sehra, Smith, and Gomes (2017) for a wider discussion.

¹⁴⁷ See AFME (2017).

¹⁴⁸ The source code of ‘open-source software’ is made available by the copyright holder with a licence providing the rights to study, change and distribute the software to anyone for any purpose. Open-source software development (or collaborative development) from multiple independent sources generates an increasingly more diverse scope of design perspective than any one company is capable of developing and sustaining over the long term.

¹⁴⁹ VC firms will typically invest in open-source projects only if they see a prospect of the start-up quickly capturing network externalities that would make the platform unique. Unless such externalities arise, competitors can easily copy the open-source protocol and free-ride on its development. By pre-financing the development of open-source blockchain protocols via utility tokens, entrepreneurs can raise risk capital even when it is less certain that their solution can prevail on the market.

invest in open-source projects than in corporate entities with proprietary software protected by patent rights. At the same time, open-source software is productivity-enhancing, in the sense that it enables regular upgrades and improvements by a community of dedicated developers that no single organisation holding proprietary rights would be able to deliver. The availability of open-source software is of particular benefit to SMEs which have limited resources to buy proprietary software.

5.6.2 Potential disadvantages of ICOs

The potential disadvantages of ICOs appear to relate mainly to adverse selection and investor protection issues. In its current form, the ICO market, including investment token sales, is an immature market, which suffers from such deficiencies as information asymmetry, skewed incentives and the lack of a disclosure framework.¹⁵⁰

First, vetting by VC firms is much wider in scope than the mere technical screening of blockchain projects' code in social media, such as Reddit. Second, getting the token economics right for a start-up also appears to be a very challenging task. Third, the regulatory risks involved in selling crypto-tokens to the general public across the globe are significant, since the seller must comply with the applicable rules and regulations of all the countries where the crypto-tokens are marketed to retail investors.

As for the vetting by VC firms, the process is more robust than any question and answer session that precedes an ICO, helping the founders to improve their product or service. For example, VC firms would not only submit the code to a technical audit, but also screen and improve the business model and its governance, if and where required. The vetting by VC firms increases the chances of success once the company is on the market. Conversely, foregoing such solid screening and assistance may increase the chances of business failure. This 'sanity check' is currently lost when an early stage start-up is crowdfunded through an ICO. Since the last quarter of 2017, however, VC firms have increasingly been buying tokens of blockchain start-ups in private sales rounds (i.e. 'pre-sales') that precede an ICO. In such instances, the vetting of the start-up takes place, as usual. It would appear that this more recent model combines the upsides of VC funding (in the form of support for the start-up) with those of token sales (in terms of global reach and secondary market liquidity).

The potential disadvantages for retail investors are also significant. As opposed to equity, crypto-tokens are regularly stolen when hackers manage to break into users' digital wallets. Users are also reported to lose their private keys themselves, losing access to their crypto-tokens. Unlike bank account holders who have forgotten their PIN code, such users have no support and their crypto-tokens are permanently lost. The contents of ICO white papers are often erratic and misleading, sometimes even fraudulent. As they are rarely audited by trusted third parties, their reliability cannot be guaranteed. Recent enforcement action by financial regulators has demonstrated the high risk of fraud in this emerging asset class.

As regards information asymmetry, the flow of information appears to be mostly in one direction: from the issuer to the investor. To capitalise on the strong market sentiment, social media celebrities are often hired to promote ICOs. As token buyers usually know little or

¹⁵⁰ See Sehra, Smith and Gomes (2017) for a wider discussion.

nothing about the issuer and the technical concepts behind the offering, they must rely on the issuer being truthful, competent and committed to delivering what is offered. Apart from the issuer, nobody can truly know whether this trust is warranted, so the issuer can say anything to maximise the demand for tokens. The issuer has currently no fiduciary duty of any kind with respect to the utility token holders.

When it comes to incentives, issuers may benefit from presenting low-quality products as high-quality ones. The long list of factors bringing about the skewed incentives of issuers includes: (i) perceived zero accountability; (ii) limited ongoing responsibilities; (iii) low cost of organising ICOs and their complexity; (iv) no requirements in terms of minimum viable product or technical specifications; (v) and scarcity and liquidity of tokens. Less than 10% of the tokens sold by November 2017 had any immediate use, with the majority being purely speculative instruments that were tradeable on secondary markets.¹⁵¹

Unless an ICO qualifies as a security offering, there are also no minimum disclosure standards on the type, structure and quality of information provided as part of an ICO process, except for those stipulated in general consumer protection legislation.¹⁵² Funds raised through a securities offering would involve a prospectus and substantial investor protection rules. As explained in Section 5.4, there are no regulatory or industry standards as to the content and the level of detail of ICO white papers. Moreover, white papers often come with numerous disclaimers and waivers, which effectively relieve the issuers of any liability with respect to the project. ICOs also rarely involve independent review of the accuracy and reliability of disclosures, except for some third-party service providers.

5.7 Regulatory response and scope for self-regulation

5.7.1 Regulatory response

As trading volumes grew and substantial amounts of crypto-tokens got stolen from exchanges by hackers, many jurisdictions started pushing for their regulation. For example, the Japanese authorities took action in response to the infamous hacking of the Mt. Gox exchange in 2014 (with some USD 400 million of client funds stolen) by subjecting crypto-token exchanges to its Payment Services Law. Following the 2017 amendments to this law, bitcoin is now recognised as a type of prepaid payment instrument and the Japanese Financial Services Agency has already licensed many exchanges. The effect of this change is that licensed crypto-token exchanges are now subject to applicable anti-money-laundering and ‘know your customer’ rules, and to minimum capital requirements and operational standards in the area of cybersecurity. In addition, exchanges are now also required to undergo to annual audits.

While an improvement, this regulatory approach has yet to prove its robustness, especially because the trading activities of these exchanges remain essentially unregulated.¹⁵³ In the EU,

¹⁵¹ <https://www.bloomberg.com/news/articles/2017-10-23/only-one-in-10-tokens-is-in-use-following-initial-coin-offerings>

¹⁵² For example, the EU’s e-Commerce Directive requires the persons behind an offer to be clearly defined, which is not the case in many ICOs.

¹⁵³ However, the latest (2018) hack of the Japanese Coincheck exchange (with some USD 530 million of client funds stolen) should not be taken as proof that this type of approach is failing. Coincheck was already in business before the 2017 rules on licensing came into effect and it had not yet been licensed in accordance with the new standards.

crypto-token exchanges also tend to opt either for a payment or electronic money institution licence,¹⁵⁴ or for working in partnership with entities that have such licences.¹⁵⁵

As for ICOs, in particular, regulatory response has so far mainly taken the form of investor warnings. A swift regulatory response has been difficult, because ICOs are technically complex and have been predominantly marketed as dissimilar to traditional securities. Nevertheless, a July 2017 report from the US Securities and Exchange Commission conclude that some ICOs are economically equivalent to securities offerings and therefore subject to federal securities laws. In Asia, China banned ICOs in September 2017, as did South Korea.

The European Securities Market Authority published two statements on ICOs in November 2017: one warning to firms, which stated that tokens may qualify as securities, and another to investors, which expressed concern about the speculative nature and risks involved in ICOs. Issuers were advised to seek legal advice on whether their ICO is exempt from the application of the EU Prospectus Regulation. In the context of the speculative frenzy on crypto-token markets in December 2017, Vice-President Dombrovskis urged the three European supervisory authorities to carry out further work to assess the applicability of the EU regulatory framework to crypto-tokens. He highlighted the risks faced by investors and consumers; these include price volatility, a complete loss of investment, operational and security failures, market manipulation and liability gaps. Many supervisory authorities in Member States (e.g. Germany and the UK) have issued similar warnings to investors. At the end of 2017, the French financial markets regulator (Autorité des marchés financiers) concluded a public consultation and is currently continuing work on a specific legal framework for ICOs.

For the issuance of investment tokens, the most relevant parts of EU legislation are the Prospectus Directive/Regulation, the Market Abuse Directive/Regulation, the Markets in Financial Instruments Directive II/Regulation, the Undertakings of Collective Investment in Transferable Securities Directive and Alternative Investment Fund Managers Directive, and the European Markets Infrastructure Regulation.¹⁵⁶ Given the non-standardised nature of tokens, however, each case has to be evaluated separately. This is particularly challenging for regulators and supervisors, since it requires substantial resources and knowledge, especially considering that the entire process is performed online and tokens are marketed across the globe. In other words, regulators not only need to establish continuous monitoring mechanisms, but also cooperation agreements with regulators in other jurisdictions.

To this end, Commission Vice-President Dombrovskis recently confirmed that, due to the global nature of crypto-token markets, the EU needs to work together with its partners in the G20 and international standard-setters. Based on the assessment of risks and opportunities presented by crypto-tokens, and the suitability of the existing regulatory framework for these

¹⁵⁴ For example, Bitstamp (the most prominent European crypto-token exchange) holds a payment institution licence in Luxembourg, effective as of July 2016. This enables it to offer its services across the EU. In January 2018, the Japanese crypto-token exchange bitFlyer obtained a similar EU licence. A notable difference between the two types of licence is that payment institutions cannot issue their own electronic money.

¹⁵⁵ For example, a French bitcoin exchange, Paymium, has set up such a partnership with S-money, which holds an electronic money institution licence.

¹⁵⁶ For a comprehensive analysis of the potential applicability of EU law to specific types of tokens, see Hacker and Thomale (2017).

instruments, the Commission will determine whether regulatory action at EU level is required.¹⁵⁷ There have been other calls for close cooperation on crypto-token regulation at international level by the G20, the International Monetary Fund and International Organization of Securities Commission, notably from France and Germany.¹⁵⁸

As regards crypto-token exchanges and wallet providers, the Commission has proposed amendments to the EU Anti-Money Laundering Directive, whereby exchange platforms and custodian wallet providers will have to apply customer due diligence controls, ending the anonymity hitherto associated with such activities. On 20 December 2017, a political agreement on these amendments was reached between the EU Council and the European Parliament.

5.7.2 Self-regulation and ancillary investor services

Recognising the problems with ICOs, the sector itself has stepped up efforts to bring some order to the ICO process, gathering and recommending best practice to issuers (see Table 5.3). Such initiatives are welcome, but they cannot replace compliance with existing securities laws and anti-money laundering provisions.

Table 5.3: Recommended best practice for organising ICOs

Process	Best practices	
Detailed white paper	<ul style="list-style-type: none"> • Clear technical description of the project 	<ul style="list-style-type: none"> • Explanation of the token's role and issuance modalities
Clear development roadmap	<ul style="list-style-type: none"> • Project is divided into stages with separate budget allocation • Funds are escrowed and released against reaching milestones 	<ul style="list-style-type: none"> • Transparent communication and reporting on progress, covering both technical development and financial aspects
Published open-source code	<ul style="list-style-type: none"> • The code is open-source and the team contributes to development, using established standards 	<ul style="list-style-type: none"> • Private code or overly centralised control may signal ulterior motives
Clear and fair pricing	<ul style="list-style-type: none"> • The amount to be raised is clearly defined and the ICO closes once it is reached 	<ul style="list-style-type: none"> • Raising substantially more than needed for project development may corrupt founders' incentives
Developer percentage	<ul style="list-style-type: none"> • The developers are founders who own tokens, aligning interests 	<ul style="list-style-type: none"> • 'Skin in the game' for developers is consistent with best practice in early-stage investing
Independent review	<ul style="list-style-type: none"> • Trusted technical experts vet the contents of the white paper • The code undergoes security audits, including bug bounties 	<ul style="list-style-type: none"> • ICO rating and diligence firms scrutinise the offering process
Good faith marketing	<ul style="list-style-type: none"> • Promotion focuses on the network's function and the token's role 	<ul style="list-style-type: none"> • Tokens are not marketed as speculative investment with high upside potential

Source: Debevoise, Consensys, Coinbase, Coin Center, Union Square Ventures

Ancillary investor service providers, such as ICO rating firms, have also stepped in, producing ICO ratings based on the details disclosed during the ICO campaign.¹⁵⁹ These ratings assess the product development and the project team, and whether the stated information is accurate, and whether the project objectives are realistic. ICO ratings may also offer an assessment of the technological component of the project and the specific role of the token.

¹⁵⁷ See http://europa.eu/rapid/press-release_SPEECH-18-1242_en.htm.
¹⁵⁸ See <https://www.politico.eu/wp.../G20-Letter-on-crypto-assets-tokens.pdf>.
¹⁵⁹ See, for example, <https://icorating.com>.

5.7.3 Securities law legislation implications

Historically, the financial system has evolved from being non-intermediated towards the intermediated system we know today. Although this has brought about substantial cross-border liquidity in securities markets, there is no full legal certainty on the applicable securities law in cross-border situations. Research postulates that blockchain technology has the potential to achieve both liquidity and legal certainty by re-enabling the non-intermediated acquisition, holding and disposition of securities. In legal terms, the most relevant difference between traditional securities and investment tokens is that the latter are not pooled and mirrored throughout the intermediary holding chain. Instead, each investment token remains unique and directly identifiable, embodying its respective rights. In this respect, investment tokens come very close to the traditional concept of bearer securities.¹⁶⁰

5.8 Conclusions

This chapter has attempted to provide insights into the recent investment exuberance over ICOs. Since the ICO market is only nascent and still largely unregulated, it is full of attempts to take advantage of the current frenzy by simply collecting money with no underlying project or idea, including outright fraud. More importantly, however, there are legitimate innovative projects that seem to have discovered a new way of rapidly raising substantial amounts of finance, including for open-source software development, which has hitherto been very challenging. Although ICOs are currently being promoted as a means to fund open-source blockchain applications, they could potentially also be used to fund more mainstream start-ups. For example, there is evidence that media and real-estate firms are making increasing use of this new funding mechanism.¹⁶¹

The rising popularity of ICOs throughout 2017 also suggests that there is significant retail demand for liquid investment in early stage start-ups. Nevertheless, even well-intended ICOs are very risky investments (as is generally any start-up) with only a very small share of start-ups expected to survive, let alone be successful. In addition, start-ups are applying blockchain technology, which is an immature technology and prone to be exposed to hacking risks. However, blockchain projects are generally less exposed to cybersecurity risks, due to their distributed nature. Retail investors, nevertheless, take significant risks when investing in ICOs. To safeguard retail investors, market supervisors, together with regulators, should make sure that the regulatory objectives of applicable consumer protection and financial services legislation are fully respected.

First and foremost, to reap the full potential of ICOs as a new funding vehicle for innovative start-ups and scale-ups, the ICO market needs more transparency to overcome the data-related constraints described in Box 10. This would allow market supervisors to have better access to timely and credible information on current market developments. Transparency would also empower potential investors to separate the wheat from the chaff when it comes to selecting individual ICOs for investment. Given their global nature, cooperation at global level will be essential for developing regulation that allows ICOs to retain their global scope and avoid regulatory arbitrage.

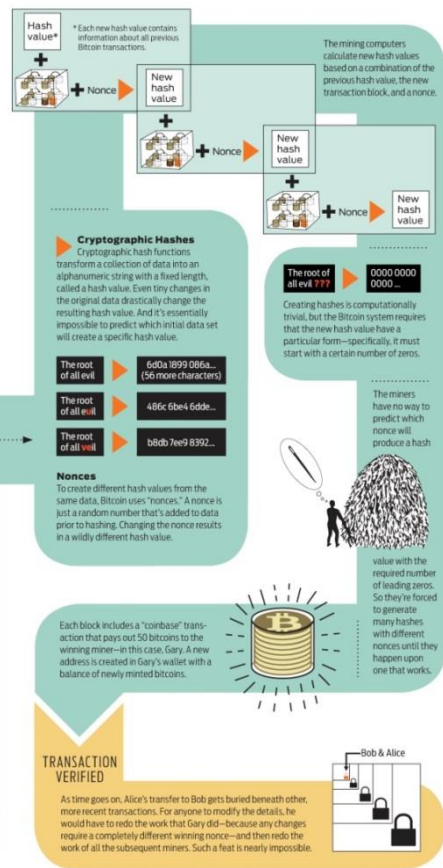
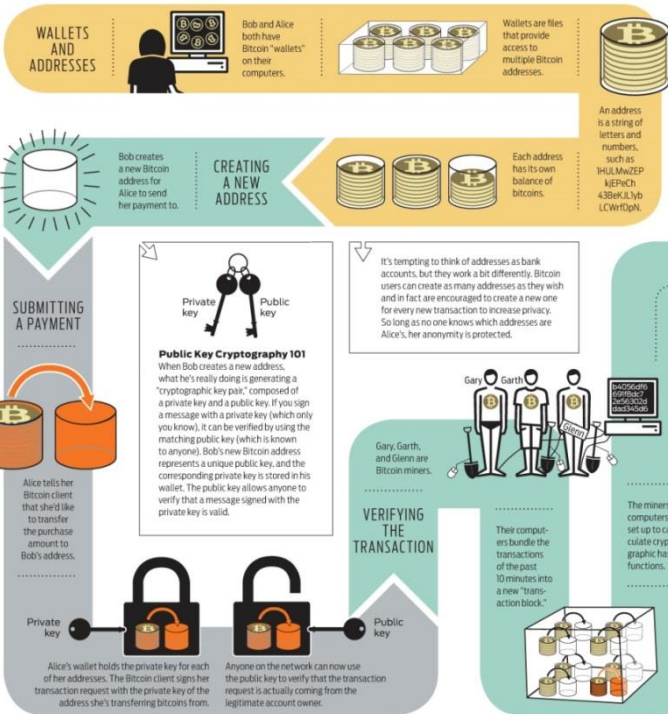
¹⁶⁰ See Paech (2016) for a wider discussion.

¹⁶¹ See Sokolin (2017).

Annex 1: A typical bitcoin transaction

How a Bitcoin transaction works

Bob, an online merchant, decides to begin accepting bitcoins as payment. Alice, a buyer, has bitcoins and wants to purchase merchandise from Bob.



Source: IEEE Spectrum

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