



OESTERREICHISCHE NATIONALBANK
EUROSYSTEM

FINANCIAL STABILITY REPORT 34



The OeNB's semiannual Financial Stability Report provides regular analyses of Austrian and international developments with an impact on financial stability. In addition, it includes studies offering in-depth insights into specific topics related to financial stability.

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Opinions expressed by the authors of studies do not necessarily reflect the official viewpoint of the OeNB or of the Eurosystem.

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Call for applications: Visiting Research Program

The Oesterreichische Nationalbank (OeNB) invites applications from external researchers (EU or Swiss nationals) for participation in a Visiting Research Program established by the OeNB's Economic Analysis and Research Department. The purpose of this program is to enhance cooperation with (preferably postdoc) members of academic and research institutions who work in the fields of macroeconomics, international economics or financial economics and/or whose research has a regional focus on Central, Eastern and Southeastern Europe.

The OeNB offers a stimulating and professional research environment in close proximity to the policymaking process. Visiting researchers are expected to collaborate with the OeNB's research staff on a prespecified topic and to participate actively in the department's internal seminars and other research activities. They will, as a rule, have access to the department's computer

resources, and they will also be provided with accommodation on demand. Their research output may be published in one of the department's publication outlets or as an OeNB Working Paper. Research visits should ideally last between three and six months, but timing is flexible.

Applications (in English) should include

- a curriculum vitae,
- a research proposal that motivates and clearly describes the envisaged research project,
- an indication of the period envisaged for the research visit, and
- information on previous scientific work.

Applications for 2018 should be e-mailed to eva.gehringer-wasserbauer@oenb.at by May 1, 2018.

Applicants will be notified of the jury's decision by mid-June. The following round of applications will close on November 1, 2018.

Financial stability means that the financial system – financial intermediaries, financial markets and financial infrastructures – is capable of ensuring the efficient allocation of financial resources and fulfilling its key macroeconomic functions even if financial imbalances and shocks occur. Under conditions of financial stability, economic agents have confidence in the banking system and have ready access to financial services, such as payments, lending, deposits and hedging.

Reports

The reports were prepared jointly by the Foreign Research Division, the Economic Analysis Division, the Financial Stability and Macroprudential Supervision Division, the Supervision Policy, Regulation and Strategy Division as well as the Off-Site Supervision Division – Less Significant Institutions, with contributions from Andreas Breitenfellner, Sophia Döme, Gernot Ebner, Eleonora Endlich, Robert Ferstl, Andreas Greiner, Manuel Gruber, Sheida Hassani, Stefan Kavan, Stefan Kerbl, Eva Maria Peterlik, Elisa Reinhold, Konrad Richter, Josef Schreiner, Michael Sigmund, Eva Ubl and Walter Waschiczek.

Management summary

International macroeconomic environment: strengthening global and European growth outlook

The global upswing in economic activity is strengthening. Growth is projected to rise this year and next both in emerging and developing markets and in advanced economies. Financial market sentiment has also been strong overall, with continued gains in equity markets despite gradually less supportive monetary policy.

Growth rates in the countries of Central, Eastern and Southeastern Europe (CESEE) are on the uptick, as consumption is strong and investments are picking up. Unemployment is low, while inflation rates are moderate in most markets. As a consequence, banks in the region are recovering and expanding lending to firms and households. However, several banks active in the region are still burdened by high ratios of nonperforming loans, keeping profitability in the first half of 2017 at the previous year's level.

Corporate and household sectors in Austria: benign financing conditions

The Austrian economy gathered momentum in the first half of 2017, underpinned by both domestic and foreign demand. The exceptionally strong investment cycle fueled the financing needs of nonfinancial corporations. Reflecting the upturn in economic growth, the gross operating surplus of Austrian nonfinancial corporations started to rebound. Internal financing remained the most important and most stable source of funds, but external financing picked up briskly in the first half of 2017. Although firms continue to have substantial liquidity buffers, corporate lending by Austrian banks increased. Supported by historically low bank lending rates, loans with medium-term and longer maturities expanded in particular.

The saving ratio of households edged up in the first half of 2017, which was reflected in a moderate rise of households' financial investments. Amid the low interest rate environment, households continued to prefer highly liquid assets. The expansion of bank lending to households gained momentum, too, with housing loans making the largest contribution to loan growth. Foreign currency loans and the proportion of variable rate loans contracted further. But despite this recent decline, the share of variable rate loans is still very high by international comparison, which implies a considerable exposure of the household sector to interest rate risks over the medium term. Currently though, credit terms remain favorable, as bank interest rates decreased slightly from last year's already very low levels. As the household sector's total liabilities grew at a somewhat slower pace than disposable income, however, the debt-to-disposable income ratio contracted somewhat.

Residential property prices in Austria continued to rise in the first half of 2017, albeit at a slightly slower pace than in the year before. This moderation was mainly driven by developments in Vienna, where prices remained almost flat in the first two quarters of this year.

Austrian financial intermediaries: reaping the benefits of improving market conditions

After major restructuring and a decrease in the number of Austrian banks by nearly one-fifth over the past five years, the Austrian banking sector entered calmer waters in the first half of 2017, as the decline in its total assets and market share in CESEE came to a halt. Also, structural changes began to have positive effects on profitability while consolidated profits improved further in the first half of 2017, spurred by higher operating income and signifi-

cantly lower write-downs and credit risk provisioning. The profitability of Austrian subsidiaries in CESEE continues to support overall results, with the highest profit contributions coming from subsidiaries in the Czech Republic, Russia, Hungary and Slovakia.

In line with the European trend, Austrian banks improved their loan quality in the first half of 2017. Ratios for nonperforming loans (NPLs) in the domestic and foreign business further declined. However, the heterogeneity in NPL ratios of Austrian banking subsidiaries in CESEE remains high, with some host countries still experiencing elevated ratios.

The capitalization of the Austrian banking sector continued to increase in the first half of 2017. This improvement, which further strengthens banks' loss-absorbing capacity and hence also financial stability, is the continuation of an established trend. Since the end of 2014, Austrian banks have expanded their CET1 capital, while risk-weighted assets have declined despite increasing lending activity. The improvement in risk-bearing capacity was also confirmed by OeNB stress tests, which showed solid results thanks to a reduction in foreign exposures, a decline in foreign currency loan volumes and a stable liquidity situation. These positive results notwithstanding, individual banks could still face idiosyncratic risks. Real estate-induced systemic risks remain subdued in Austria, although some developments warrant heightened supervisory vigilance. An increasing proportion of new mortgage loans is granted with relatively high loan-to-value, debt service-to-income and debt-to-income ratios. These developments

confirm the importance of the Financial Market Stability Board's recommendation on applying sustainable lending standards to real estate loans. In this context, the OeNB welcomes the recent amendment to the Austrian Banking Act. It forms the basis for issuing a regulation specifying upper limits to maturities or the above-mentioned ratios, which aims at containing systemic risks.

Recommendations by the OeNB

Despite the above-mentioned improvements, it is crucial for the Austrian financial sector to continuously work on strengthening its sustainable recovery and further increase its resilience, as risks for financial stability still exist. Political uncertainties are on the rise in several regions in the world, and legacy issues such as nonperforming loans and foreign currency loans require continued attention from the banks.

Against this background, the OeNB recommends that banks take the following measures:

- Use the window of opportunity which the currently benign market environment provides to further improve structural efficiency. This will strengthen banks' profitability and help them further increase their risk-bearing capacity.
- Address potential risks emanating from the low interest rate environment.
- Apply sustainable lending standards in real estate lending, both in Austria and in CESEE.
- Continue efforts to resolve the remaining nonperforming loans in CESEE.
- Maintain compliance with the FMA minimum standards regarding foreign currency and repayment vehicle loans and the sustainability package.

International macroeconomic environment: strengthening global and European growth outlook

Global economic growth gains traction on the back of supportive financial conditions

The expansion in global economic activity is broadening, with worldwide GDP growth expected to rise slightly to 3.7% in 2018,¹ after a temporary slowdown in some countries in early 2017. Improvements are visible in investment, trade, industrial production as well as business and consumer confidence. International financing conditions remain benign amid an environment of still accommodative, albeit in many cases gradually tightening, monetary policies. Financial markets in emerging market economies remain resilient and capital inflows continue to be robust.

Still, the pace of global expansion remains below pre-crisis rates as lower growth potential across most advanced and emerging economies reflects trends in demographics, investment, trade and productivity. Although output gaps are narrowing or have even closed in some cases, inflation is below target in most advanced economies. Commodity exporters start to recover from a sharp drop in foreign revenues with prices of raw materials, including crude oil, picking up.

Risks to global growth are still tilted to the downside, reflecting threatening trade protectionism, economic policy uncertainty, possible financial market disruptions and weaker potential growth.

In the United States economic activity is increasing at a solid pace. The pick-up in growth in 2017 and 2018 is buoyed by private consumption and investment. However, strong job

creation is not triggering upward pressure on wage growth and inflation, partly due to higher labor force participation and part-time working. The growth effects of future tax cuts and regulatory reforms currently under consideration remain uncertain. Household debt is firmly rising but still below pre-crisis levels in terms of GDP. Monetary policy is gradually tightening as the Federal Reserve System raised its key interest rate twice, in March and June 2017, and started to normalize its balance sheet in October 2017 by no longer reinvesting all of its maturing assets.

In Japan public investment and exports support the growth upturn in 2017. However, fiscal consolidation is likely to dampen economic activity in 2018. While business investment benefits from rising corporate profits, the tight labor market does not boost wage growth as yet. The Bank of Japan expects inflation to stay at current very low levels, and it continues to maintain its accommodative monetary policy.

In China economic growth is likely to exceed the official target in 2017, particularly driven by credit-financed consumer spending. High and fast rising debt of households and state-owned enterprises is raising financial stability concerns, but net capital inflows have turned positive. The pace of economic expansion is expected to remain steady in 2018 amid recent regulatory measures effectively tightening financial conditions and rebalancing the economy.

In the U.K. the economy has lost some steam as Brexit-related economic uncertainty and the connected slide in

Solid expansion in U.S.A., Japan and China; muted growth in U.K. and Switzerland

¹ IMF. 2017. *World Economic Outlook Fall 2017*.

the exchange rate of the pound sterling are taking their toll, while consumer credit has increased rapidly.

The Swiss economy shows relatively weak GDP momentum and very low inflation levels. The Swiss franc has weakened to around CHF 1.16 against the euro, helping to reduce the significant overvaluation of the currency. Imbalances on the mortgage and real estate markets persist. The Swiss National Bank has maintained its expansionary monetary policy with negative key interest rates and is ready to intervene in foreign exchange markets.

Euro area recovery becomes stronger and more broad-based

In the euro area economic growth momentum continues to be robust and broad-based, driven by private consumption and business investment. Furthermore, growth is supported by steadily rising income and profits as well as expanded lending spurred by favorable financing conditions. Additionally, euro area exports benefit from stronger foreign demand offsetting the effect of the euro appreciation (5% in nominal effective terms since early 2017). The euro area fiscal stance is expected to be mildly expansionary in 2017 and turn neutral in the following two years. Given recent upward surprises in GDP data the ECB has revised its growth projections for 2017 upwards to 2.2%, but has maintained the forecast for 2018 at 1.8%.² Risks to the growth outlook are considered to be balanced. External risks are rather negative and relate to an overshooting euro exchange rate, geopolitical tensions, trade protectionism, vulnerability of emerging markets to global monetary policy tightening, adverse implications

of Brexit, and the rebalancing of crude oil markets. Internal risks point in both directions and refer to an underestimated recovery, de-anchoring inflation expectations and increasing banking vulnerabilities.

The negative output gap is expected to close in the second half of 2018 as potential output is estimated to grow at below its pre-crisis pace, which is related to historically moderate investment over recent years. Labor market recovery continues, with sustained employment creation. However, labor underutilization, in terms of involuntary part-time employment and discouraged workers, might explain why wages are rising slowly and why underlying inflation is subdued. The ECB forecasts headline (HICP) inflation to even decline, from 1.5% in 2017 to 1.2% in 2018, driven mainly by base effects in the energy component, before rising again to reach 1.5% in 2019. Market-based long-term inflation expectations (five-year forward inflation swaps starting in five years) have increased slightly, to 1.6%.

At its October 2017 meeting, the Governing Council of the ECB kept interest rates on main refinancing operations, the marginal lending facility and the deposit facility unchanged at 0.00%, 0.25% and –0.40%, respectively. Key interest rates are expected to remain at the present levels well past the horizon of the Eurosystem's asset purchase programme (APP), which was extended until the end of September 2018, or beyond, if needed – subject to the decision to reduce the monthly pace of net asset purchases from currently EUR 60 billion to EUR 30 billion as of January 2018. At the same time, the Governing Council stands ready to re-increase APP purchases, depending

ECB prolongs accommodative monetary policy stance

² ECB staff macroeconomic projections for the euro area, September 2017. <https://www.ecb.europa.eu/pub/pdf/other/ecb.ecbstaffprojections201709.en.pdf?13047040af5611b7e0cda69c6a88bf2>.

on whether the inflation path approaches the Eurosystem's medium-term objective of below, but close to, 2%. Furthermore, maturing securities will be reinvested as long as deemed necessary. Finally, main and three-month longer-term refinancing operations with commercial banks will be continued as fixed rate tender procedures with full allotment at least until the end of the last reserve maintenance period of 2019.³ The APP has had an easing effect on credit terms and conditions. Its impact on banks' liquidity position has also been positive, whereas its impact on their profitability has been negative. With regard to the second half of 2017, banks reported to have left their credit standards for loans to enterprises

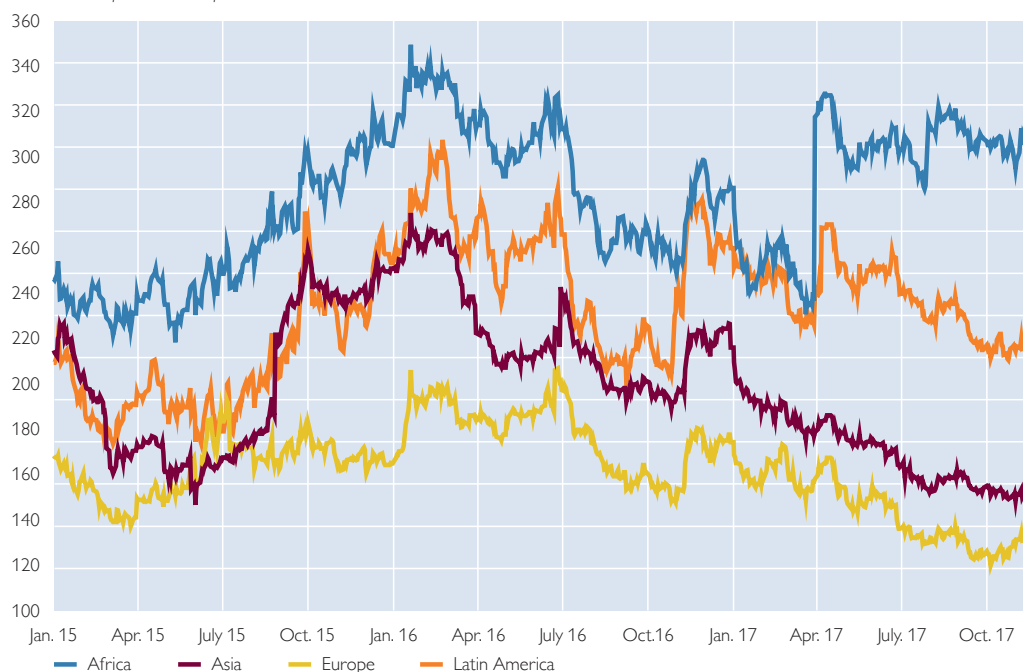
broadly unchanged, but to have eased their standards for loans to households. The low general level of interest rates contributed to continuously increasing net loan demand across all loan categories.

Since early 2017 the yields of German ten-year government bonds have increased by some 20 basis points, to 0.41%. The spreads of Portuguese and Greek bonds to German benchmark yields have substantially narrowed. Less pronounced declines were observed with regard to the spreads of Italian and French bonds. During the same period, the exchange rate of the euro in nominal terms appreciated by some 11.5% to roughly USD 1.17 per EUR and 6% against the Japanese yen. International stock exchanges indices rose to new

Chart 1

Spreads of euro-denominated sovereign bonds issued in selected emerging market regions

Euro EMBIG spread in basis points



Source: Macrobond.

Note: EMBIG = Emerging Market Bonds Index Global.

³ Mario Draghi, Introductory statement at press conference on October 26, 2017. <https://www.ecb.europa.eu/press/pressconf/2017/html/ecb.is171026.en.html>.

highs. By end-October 2017, the representative stock index DJ Euro Stoxx had gained more than 8% since January. Over the same period, the Dow Jones Industrial Index gained 19% and the FTSE 100 around 4%, both being at or close to all-time highs. Price-earnings ratios well above their historical averages, low stock market volatility and compressed corporate yield spreads increase the risk of market sentiment reversals. Brent crude oil prices rose by more than 12% in 2017 to above USD 63 per barrel, as increasing demand was tightly matched by constrained supply amid geopolitical tensions.

CESEE: credit growth accelerates against the backdrop of an improving macroeconomic environment

Global macroeconomic and financial market conditions remained favorable in the review period. Equity prices were on an upward trend amid strong earnings, improvements in consumer and business confidence, and favorable macroeconomic data. At the same time, market volatility remained low and risk appetite strong. Capital flows to emerging market economies have remained resilient in recent months and continued their recovery. This was reflected in a notable and rather broad-based decline in spreads of euro-denominated sovereign bonds across most emerging market regions throughout 2017 (see chart 1). In Central, Eastern and Southeastern Europe (CESEE), spreads remained substantially below the level observed in other peer regions, and most other financial market segments performed broadly positive as well.

At the same time, the acceleration in the global momentum appears to be well entrenched with notable upward revisions in major regions of the world

economy (including the euro area, Japan, China and Canada) pushing up global GDP growth to its highest level since 2011. Moreover, global trade also returned to its most dynamic level in years despite constant fears of a return of protectionist tendencies: The upturn in emerging markets and advanced economies, reviving investment activity and moderately higher commodity prices lifted world trade growth to 5% annually in summer 2017. Further, several risks for the CESEE region have not materialized so far: Brexit has not yet altered the functioning of the European economy and common European principles (including the free movement of persons). Also more narrowly confined problems like the Volkswagen emission violations have not acted as a game changer: So far, passenger car registrations in the EU have continued their upward trend, with a drop in diesel sales offset by an increase in petrol vehicles. This development supports the region's key automotive sector. Finally, while geopolitical risks for CESEE remain elevated, they have not intensified over the review period, and increasing anti-European sentiment and rising populism in some countries have not yet shown an impact on economic developments.

The favorable international environment has provided the backdrop for a continuing strong growth momentum. Average GDP growth in the CESEE EU Member States accelerated noticeably in the first half of 2017 and the region's economies reported one of the fastest expansions since the downturn in 2008. Economic growth was driven by private consumption in an environment of record employment, tightening labor markets and rising real wages. Gross fixed capital formation also gained speed amid capacities approaching their limits, strong industrial confidence and

Strong GDP growth in CESEE EU Member States supported by domestic demand

improved credit market conditions. Furthermore, investment in construction and public investment picked up, being supported by stepped-up utilization of EU funds in several countries. The CESEE EU Member States' trade openness and integration into international production networks provided for a quick and comprehensive absorption of external growth impulses. Several rating and/or rating outlook upgrades substantiated the favorable economic situation (e.g. Bulgaria, Croatia, Hungary and Slovenia). On a more negative note, labor shortages are beginning to emerge in several countries and strong wage growth is increasingly cutting into price competitiveness. Further, current strong growth dynamics are increasingly supported by a pro-cyclical fiscal policy stance.

After a prolonged period of deflation, inflation in the CESEE EU Member States finally started to rise again in mid-2016 and was clearly positive by September 2017 in all countries. With inflation rates ranging between 1.3% in Romania and Bulgaria and 2.5% in the Czech Republic and Hungary, however, price rises remained moderate in historical comparison. While the pick-up in inflation was initially mainly driven by rising energy prices, other and less volatile components – especially processed food (including alcohol and tobacco) and services – started to play a bigger role more recently. This might be an indication of increasing domestic price pressures emanating from a rising utilization of domestic means of production and an increasingly positive output gap.

Against this backdrop, some countries took first steps to end the period of monetary accommodation. Most importantly, the Czech central bank (CNB) increased its policy rate by 20 basis points, to 0.25% in August 2017.

Monetary conditions already tightened somewhat as the Czech koruna appreciated by around 4.5% after the CNB discontinued the observance of an exchange rate floor against the euro in April 2017.

The Romanian central bank (NBR) in September 2017 decided to narrow the symmetrical corridor of interest rates on its standing facilities around the policy rate to ± 1.25 percentage points from ± 1.5 percentage points. Accordingly, it raised the deposit facility rate to 0.5%, lowered the interest rate on the lending facility to 3% and kept the monetary policy rate unchanged at 1.75%.

In contrast, a favorable price outlook provided policy space for the Hungarian central bank (MNB) to further selectively loosen its monetary policy. In September 2017, the overnight deposit rate was cut from -0.05% to -0.15% . The MNB also repeatedly reduced the cap on its three-month deposit facility and extended its foreign currency swap facility in order to boost forint liquidity in the system.

Turning to the non-EU CESEE countries, growth also picked up in Turkey and Russia. In Turkey, dynamics benefited especially from expansionary fiscal policies. In addition, a rebound in external demand, not least related to a more competitive lira and the lifting of the Russian ban on certain Turkish goods and services, and abating political uncertainty after the April referendum supported the economy. The Turkish central bank (CBRT) tightened policy between November 2016 and May 2017 in response to sharp falls in the value of the lira in November 2016 and January 2017. The strong depreciation contributed to a surge in inflation: Price rises reached levels of close to 12% in April and May 2017 and have been hovering between 10% and 11% in recent

Turkey remains susceptible to currency depreciation

First countries start to tighten monetary policy

months. By raising its late liquidity window lending rate and reducing the volume of its lending to banks at lower rates, the CBRT increased the weighted average cost of its funding to banks from less than 8% in late 2016 to around 12% in October 2017. Recently, the Turkish lira again embarked on a downward trend following political tensions between Turkey and the U.S., depreciating by 3% against the euro and by 4.8% against the U.S. dollar between September 28 and October 9, 2017. This underlines the continuing vulnerability of the Turkish economy to changes in political risks amid an elevated current account deficit and external financing needs.

Russian economic growth accelerated in line with a recovery of private consumption and fixed investment. The economic upturn was also certainly helped by the partial recovery of the oil price, which on average gained almost one-third in the first half of 2017 from its low level of a year before. However, the ruble also revalued in this period, by about one-fifth. Both the revaluation of the Russian currency and the Central Bank of Russia's (CBR) continued tight monetary policy contributed to the historically low level of CPI inflation (3.0% at end-September 2017). Easing inflation, conservative bank lending and firming economic recovery allowed the CBR to resume its cautious key policy rate cuts in late April, mid-June and mid-September, by a cumulative 125 basis points to 8.5%.

The Ukrainian economy continued its moderate recovery and grew at a similar rate as in 2016 despite adverse shocks related to the still unresolved conflict in parts of Eastern Ukraine (trade embargo imposed by Ukraine vis-à-vis the non-government controlled area, seizure of enterprises by Russian-backed separatists). In 2017, the

Ukrainian central bank (NBU) cut its key policy rate by 50 basis points twice, in April and May, to 12.5%. Yet, after falling to single digits in the course of 2016, the annual inflation rate accelerated to 16.2% in August, mainly due to food and administered prices. A noteworthy aspect is that Ukraine regained access to international markets in September. The Ukrainian government sold USD 3 billion in 15-year bonds with a 7.375% percent annual yield, partially to buy back USD 1.6 billion of 2019 and 2020 bonds, alleviating forthcoming repayment spikes somewhat. The bond issue was more than three times oversubscribed. The smooth issuance is a sign of macroeconomic stabilization, but also of benign global liquidity conditions and low risk aversion.

As regards credit growth in CESEE, lending to the private sector (nominal lending to the nonbank private sector adjusted for exchange rate changes) gained further speed in the review period, reflecting solid general economic conditions in an environment of low interest rates, monetary accommodation in the euro area and ample global liquidity (see chart 2). Lending surveys suggest that demand for loans picked up strongly. Notably, investment accounted for a good part of the strengthening in demand, while debt restructuring was almost irrelevant. At the same time, aggregate supply conditions remained broadly unchanged over the first half of 2017. Across the customer spectrum, supply conditions eased partially in the corporate segment, including SME lending, while credit standards have tightened on mortgage loans and consumer credit. The mismatch between rising demand and broadly unchanged supply conditions may imply that credit allocation has become more prudent and that most of the new credit can be

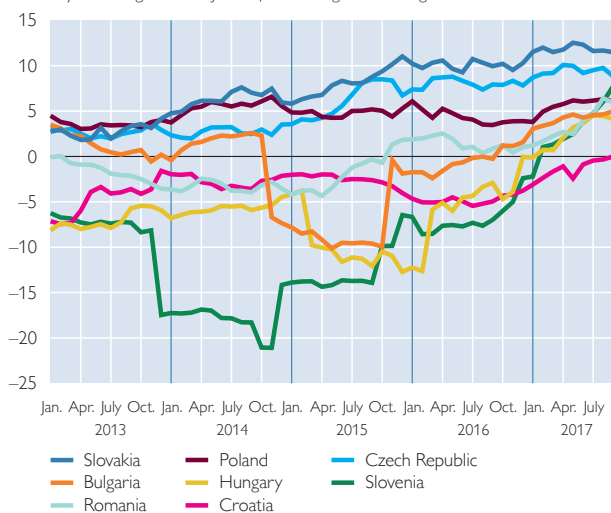
Oil price bolsters recovery in Russia

Strong and broad-based acceleration of credit growth in CESEE

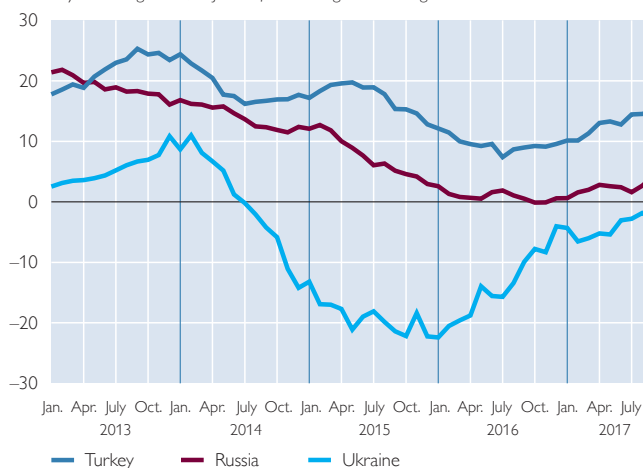
Ukraine regains access to international markets

CESEE: growth of credit to the private sector

Year-on-year change in %, adjusted for exchange rate changes



Year-on-year change in %, adjusted for exchange rate changes



Source: ECB, national central banks.

considered to be of a better quality on average than in prior credit cycles.

Credit growth picked up especially in Bulgaria, Hungary, Romania and Slovenia, which had experienced only very moderate or even negative credit expansion back in 2016. All of these countries reported improving banking sector conditions in recent years. Credit developments also benefited from reduced uncertainty (e.g. in Romania) and central bank measures (e.g. in Hungary).

Among the CESEE EU Member States, the Czech Republic and Slovakia reported the strongest loan growth at or above 10% in annual terms. Central banks in both countries introduced a countercyclical capital buffer of 0.5% of total risk exposure as of January and August 2017, respectively, to counter rash credit expansion. This capital buffer is to be raised to 1% in the Czech Republic by July 2018, and to 1.25% in Slovakia by August 2018. Rapid growth in loans went hand in hand with strong growth in real estate prices. The CNB, for example, considers residential property in the Czech Republic to be

moderately overvalued and lending standards for the provision of mortgage loans to be highly relaxed, which is why it has issued recommendations on loan-to-value limits. The Slovak central bank also introduced a package of measures to address the strong growth in housing loans, including limits on the loan-to-value ratio and on the debt service-to-income ratio, as well as maturity limits.

Among the CESEE countries that are not members of the EU, credit growth was highest in Turkey, where fiscal measures and incentives pushed up credit expansion to close to 15%. The volume of private sector loans in Ukraine shrank by about 2% year on year in September 2017, but month-on-month growth rates have shown a stabilizing private sector loan volume since April. Lending growth in Russia remained broadly unchanged in the review period at roughly 2%.

Almost all CESEE countries made progress in shoring up their banking sectors in recent years and continued doing so in the review period. For example, credit risk was reduced

Czech Republic and Slovakia to raise countercyclical capital buffer

NPLs continue their downward trend

further. Nonperforming loans (NPLs) decreased in all CESEE EU Member States when compared to a year earlier (see chart 3). In several countries, NPL ratios reached their lowest levels since 2009. This positive momentum was attributable to the pick-up in credit growth on the one hand and to active portfolio cleansing measures – including writing off bad debt, selling NPL portfolios as well as restructuring and forbearance agreements and the transfer of NPLs to bad banks – on the other.

In Turkey, NPLs remained broadly unchanged, while in Russia they increased moderately to 18.9% in the second quarter of 2017. In September 2017, the CBR nationalized Russia's eighth- and twelfth-largest bank, which together accounted for 5% to 6% of total sector assets. Both banks had been expanding aggressively in recent years, suffered from swelling bad loans, and became subject to runs on their deposits.

The doubling of the NPL ratio in Ukraine to above 50% can be explained by a change in methodology. The new framework captures loans that are more than 90 days past due as well as loans

with a low probability of repayment. NPLs are especially high in the country's largest bank at 88.8, which was nationalized in December 2016. This brought the share of state-owned banks in the banking sector to over one half.

The reduction of NPL ratios in many CESEE countries was accompanied by a further decrease in foreign currency denominated credit. This is especially true for households, whose share of foreign currency denominated credit in total credit is already close to zero in the Czech Republic, Hungary, Russia and Slovakia. In the other countries, the average share declined by around 10 percentage points since early 2016, to a level of 30%.

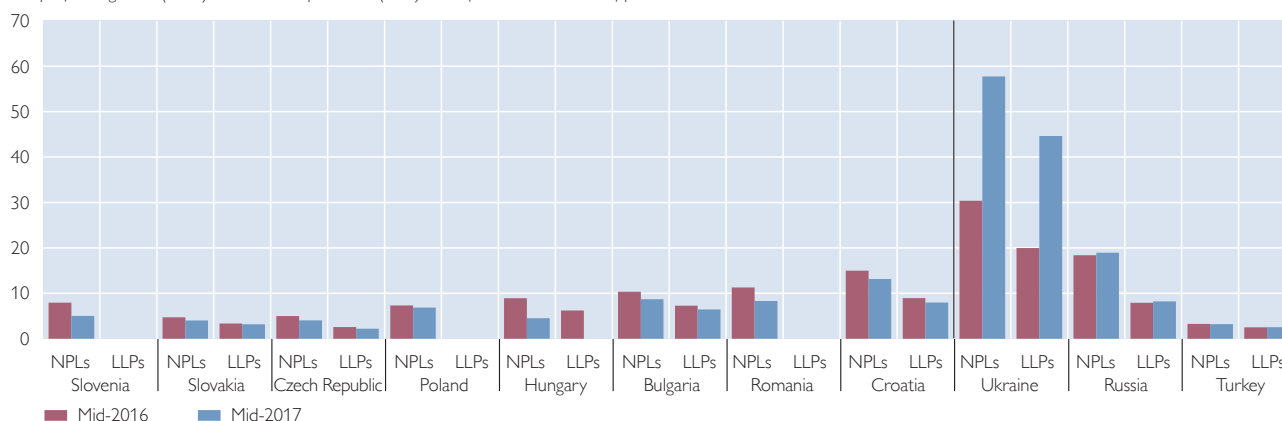
The refinancing structure of CESEE banking sectors has increasingly shifted toward domestic deposits over the past few years and continued doing so in the review period. This is especially true for the CESEE EU Member States that had no substantial gap or a negative gap between total outstanding domestic claims and total domestic deposits relative to GDP as at mid-2017 (see chart 4). However, this trend has

Funding gaps stay moderate in most CESEE countries

Chart 3

CESEE banking sector: credit quality

Nonperforming loans (NPLs) and loan loss provisions (LLPs) in % of total credit at end of period

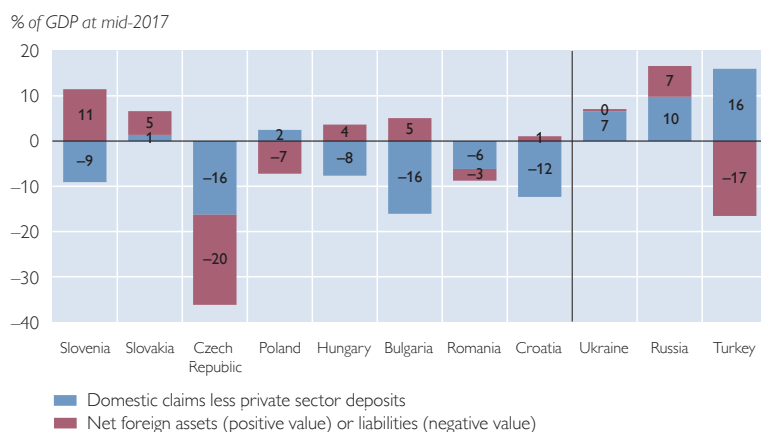


Source: IMF, national central banks, OeNB.

Note: Data are not comparable across countries. NPLs generally refer to loans that are in arrears for more than 90 days except for the Czech Republic, Poland, Russia, Slovakia and Turkey, where NPLs refer to substandard, doubtful and loss loans.

Chart 4

CESEE banking sector: gap between claims and deposits, and net external position



Source: ECB, Eurostat, national central banks, national statistical offices, OeNB.

Profitability is broadly comparable to 2016

already come to a halt in Slovakia, where the gap widened in the review period (from -2.8% of GDP in mid-2016 to 1.4% in mid-2017) against the background of strongly expanding claims amid a stable depository base.

Compared to the CESEE EU Member States, Ukraine, Russia and Turkey exhibited positive and large funding gaps of between 7% and 16% of GDP. While the gap narrowed in Russia and especially in Ukraine (by some 4% of GDP within a year) against the backdrop of moderate or negative credit growth, it widened notably in Turkey as deposit growth could not keep pace with strongly expanding claims.

Most CESEE banking sectors remain well capitalized

The banking sectors of four of the eleven CESEE countries under observation reported net external liabilities by mid-2017. Liabilities were especially high in the Czech Republic, where they shot up in anticipation of the abolition of the exchange rate floor of the koruna against the euro in the first quarter of 2017. In Turkey, external liabilities

increased moderately compared to a year earlier and remained on a high level.

Banking sector profitability remained broadly satisfactory in the CESEE EU Member States. Return on (average) assets (ROA) amounted to 1.2% at mid-2017 (see chart 5). This is somewhat below mid-year figures for 2016, but broadly in line with the results for 2016 as a whole. The ROA declined especially in Croatia against the backdrop of the banking sector's provisioning for its exposure to Agrokor, the country's ailing retailer. Several other countries of the region reported a moderate decline in profitability as well, mainly related to lower interest and non-interest income. At the same time, the need for provisioning declined throughout the region.

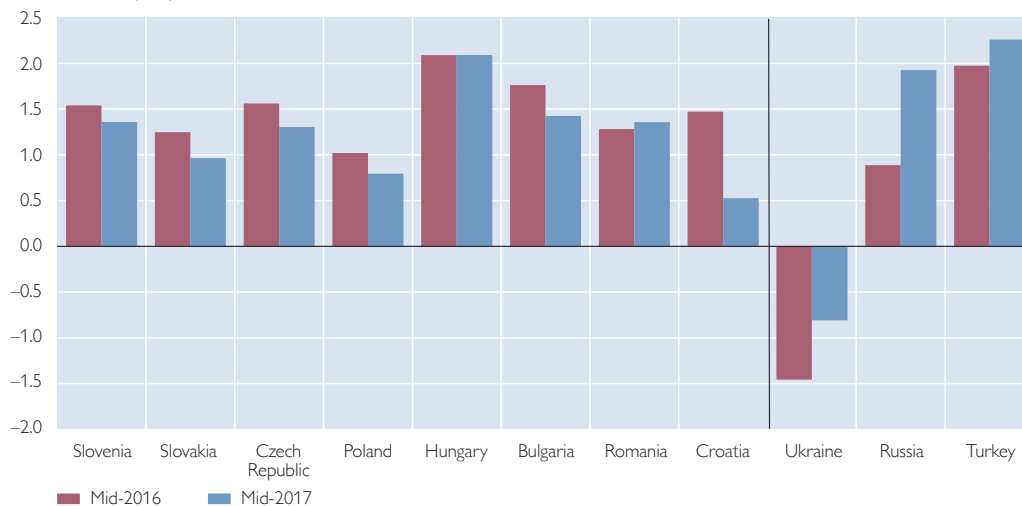
The ROA increased moderately in Turkey and strongly in Russia. In both countries, profitability reached the highest level since 2013. The Turkish banking sector benefited from higher interest income, while the recovery of interest rate margins, intensified cost control measures and lately also the pick-up in economic growth supported profitability in Russia. After a substantial loss in 2016, mainly due to provisioning needs at the country's largest bank, the ROA in Ukraine recovered to -0.8% in mid-2017.

Capital adequacy ratios (CARs) remained high and even increased further in most CESEE EU Member States. By mid-2017, CARs ranged between 17.9% in Poland and 23.2% in Croatia. In the other countries of the region, capitalization was markedly lower (between 12.4% in Ukraine and 16.4% in Turkey) but also increased somewhat in Turkey and Russia.

Chart 5

CESEE banking sector: profitability

Return on assets (ROA) in %



Source: IMF, national central banks, OeNB.

Note: Data are not comparable across countries. They are based on annual after-tax profits, except for Russia's data, which are based on pretax profits.

Corporate and household sectors in Austria: benign financing conditions¹

Nonfinancial corporations' financing volumes expand

Equipment investments reach cyclical peak

Strong growth of the Austrian economy

Rising corporate profits

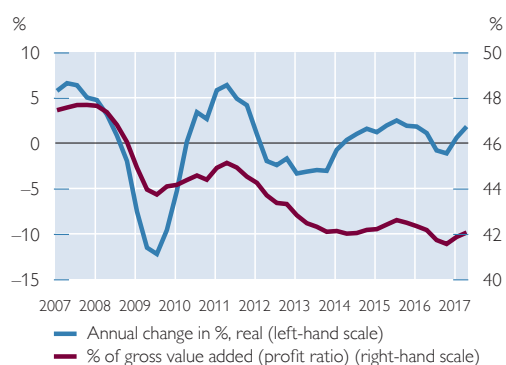
The Austrian economy gathered further momentum in the first three quarters of 2017, underpinned by both domestic and foreign demand. A number of economic risks, which had reduced business confidence and the propensity to invest in recent years, abated. Austrian exporters were able to profit from improved prospects for the global economy and world trade. The favorable export development provided a sizeable impetus for domestic producers, who also benefited from strong domestic demand. The investment cycle that had set in already in late 2015 reached its peak in 2017. While replacement had initially been the main investment motive, high capacity utilization rates eventually resulted in an increasing need for investment in capacity expansion. Investments in machinery and vehicles that had already risen significantly in

2016 expanded further in the first three quarters of 2017, albeit at a slightly slower pace. Housing investment moderated somewhat in the course of this year, after very strong growth in the first quarter.

Reflecting the upturn in economic growth, the gross operating surplus² of Austrian nonfinancial corporations started to rebound in 2017, posting a year-on-year increase of 1.8% in real terms in the second quarter of 2017 (based on four-quarter moving sums; see chart 6). In real terms, gross operating surplus rose by 1.8% as the growth in nonfinancial corporations' value added just outpaced that of compensation of employees. The downward trend in corporate profitability (as measured by gross operating surplus divided by gross value added), which had been observed since mid-2015, eventually came to a halt. In the second quarter of 2017, the gross profit ratio amounted to 42.1%, up 0.5 percentage points compared with the post-crisis low registered in the third quarter of 2016. However, the operating surplus – which is the income earned in production by the factor capital – does not include interest received or paid. Therefore it does not reflect the fact that the low interest rate environment has reduced the net interest burden of indebted nonfinancial corporations (see below) and thus supported the nonoperational part of corporate income. Overall, increased earnings not only alleviated the debt-servicing difficulties of vulnerable firms, but also augmented the internal financing potential of the corporate sector.

Chart 6

Gross operating surplus of Austrian nonfinancial corporations¹



Source: Statistics Austria.

¹ Moving four-quarter sums.

¹ Due to changes in the methodology applied in the compilation of banking statistics, there are breaks in the time series in a number of banking-related items as of October 2016.

² Gross operating surplus and mixed income (self-employed and other unincorporated business income).

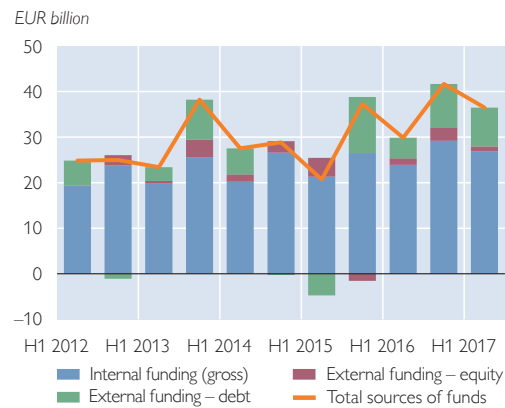
Financing volumes of nonfinancial corporations continued to expand

The recovery in investment fueled the financing needs of nonfinancial corporations. Internal financing (measured as the sum of changes in net worth and depreciation) remained the most important and most stable source of funds for Austrian nonfinancial corporations (see chart 7). It increased by 12.3% year on year in the first half of 2017, and hence slightly more than gross fixed capital formation, to reach EUR 26.9 billion. At the same time, nonfinancial corporations' recourse to external financing picked up briskly in the first half of 2017, which, at EUR 9.6 billion, was up 61.7% compared with the value recorded in the first half of the preceding year. Yet, external financing volumes remained below pre-crisis figures, reflecting the ample liquidity on the assets side of firms' balance sheets.

Adding internal and external financing, total financing of nonfinancial corporations continued to expand in the first half of 2017 and was up 22.1% against the first half of 2016. The significant role of internal financing is corroborated by the fact that, at 74%, its proportion of total financing continued to be higher than before the crisis. Thus, adding the – albeit small – contribution of equity-based external financing, the overall structure of corporate financing was again marked by a significant prominence of own funds (internal financing and equity), which accounted for 77% of financing in the first half of 2017.

Looking at the structure of external financing in the first half of 2017, less than one-eighth of total external financing came in the form of equity, falling short of the – already rather low – corresponding 2016 figure by roughly one-quarter. Almost all equity financing stemmed from net new issu-

Chart 7
Sources of funds of Austrian nonfinancial corporations



Source: OeNB, Statistics Austria.

Internal financing slightly surpasses capital formation

ance of listed shares, which amounted to EUR 1.0 billion. There were two new listings of Austrian firms on the Vienna stock exchange and one in Zurich, accompanied by a number of capital increases. However, this was offset by a slightly greater slump worth EUR 1.1 billion of unlisted shares. Other equity instruments (mainly purchases by foreign strategic investors) registered increases by EUR 1.2 billion. Not only did firms have enough cash reserves to finance investment projects, but debt financing also continued to be very attractive in the light of low interest rates.

Debt financing continues to recover

In view of the modest recourse to equity, debt instruments provided the bulk of nonfinancial corporations' external financing in the first half of 2017, almost doubling to EUR 8.5 billion from the same period in the previous year, but falling short of the amount registered in the second half of 2016 by 12%. Other nonfinancial corporations (both domestic and foreign) remained the primary source of debt financing for the Austrian corporate sector. This financing consisted mostly in loans

Debt is dominated by long-term financing

Small contribution of equity to external financing

Buoyant growth in longer-term bank loans

from other (domestic) enterprises, which largely reflect transactions within corporate groups. Moreover, despite a decrease by 45% compared with the volume of the first half of last year, trade credit – including cross-border trade credit – still played a prominent role in corporate debt financing even though this form of finance is comparatively more expensive in a low interest rate environment.³ One reason for the strong recourse to trade credit might be that, as a main part of firms' working capital, trade credit is particularly relevant in the early stages of a cyclical upswing. In sum, domestic nonfinancial corporations provided half of the external financing for the corporate sector in the first half of 2017. Other domestic sectors and foreign funding accounted for around one-

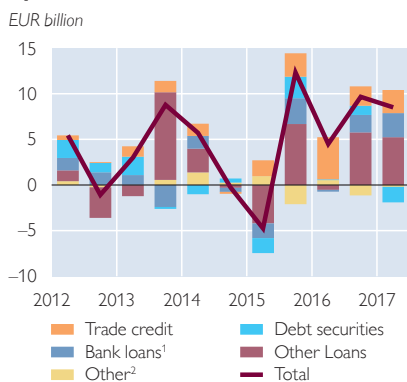
tenth each, and close to one-third was provided by the domestic financial sector. While short-term bank loans continued to be reduced significantly, half of nonfinancial corporations' total debt financing was accounted for by long-term instruments, i.e. with a maturity of over one year.

With regard to long-term debt financing, financial institutions accounted for more than half of the external financing provided to nonfinancial corporations in the first six months of 2017, thereby exceeding financing by nonfinancial corporations.⁴ The lion's share of this type of financing was supplied by Austrian monetary financial institutions (MFIs). Over the past few months, lending by Austrian banks to nonfinancial corporations has gained further momentum. In September

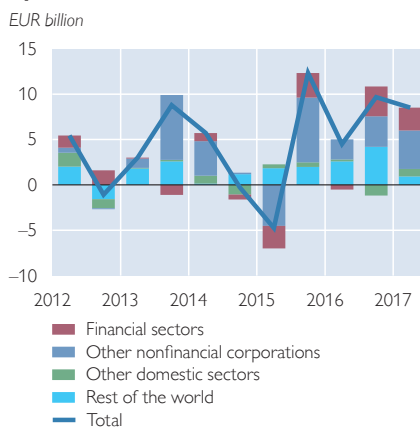
Chart 8

Debt financing of Austrian nonfinancial corporations

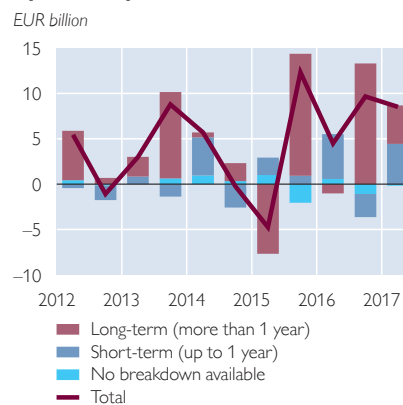
By instrument



By sector



By maturity



Source: OeNB.

¹ By domestic and foreign banks.

² Pension entitlements and other accounts payable.

Note: H1 2017 data are preliminary.

³ Trade credit is often used as a means of sales financing. Usually, the supplier grants the buyer a credit period, which can range from a few weeks up to several months. However, if it pays immediately, the firm will be granted a cash discount. While trade credit does not entail any outright interest, foregoing this cash discount implies substantial costs. In relative terms, these increase as the costs of other forms of finance, such as bank loans, go down. Data are unavailable, however, due to the opaque nature of these relationships.

⁴ At the cutoff date, financial accounts data were available up to the second quarter of 2017. More recent developments of financing flows are discussed on the basis of data from the MFI balance sheet statistics and the securities issues statistics.

2017, its annual growth rate (adjusted for securitization as well as for reclassifications, valuation changes and exchange rate effects) reached 3.8% in nominal terms, the highest value in more than eight years (see the left-hand panel of chart 9). Short- and long-term loans continued to follow opposite trends: loans with medium-term and longer maturities (more than one year), which are most relevant for business fixed investment, went on to expand, growing by 6.1% year on year in September 2017. At the same time, short-term loans (with maturities of up to one year) have been decreasing for the past two and a half years. Apart from the exceptionally low interest rates, the greater prominence of long-term loans can most likely be attributed to the economic upswing and expectations about a rise in interest rates in the future. In contrast, the reduction in short-term loans should be seen against the backdrop of the abundant funds currently available from alternative sources of financing.

Austrian banks continued their cautious lending policies in 2017 according to the euro area bank lending survey (BLS), tightening their credit standards for loans to enterprises in the

third quarter of 2017 as well as for most of 2016 (see the right-hand panel of chart 9). Respondent banks attributed their tighter standards primarily to reduced risk tolerance, in addition to citing costs related to their capital position and risk related to the collateral demanded. Thus, firms with poor credit ratings and higher insolvency probabilities may have experienced difficulties in obtaining a bank loan. In contrast, other factors reflecting banks' risk perception, such as their assessment of the general economic situation and of borrowers' creditworthiness, which had been named frequently in the past, played a minor role in recent survey rounds, reflecting the cyclical upswing of the Austrian economy.

At the same time, corporate loan demand continued its recovery that had begun last year. From the second quarter of 2016 onward, the banks surveyed in the BLS reported a slight pickup in corporate loan demand. Reflecting the current cyclical situation, banks named funding requirements for fixed investment as one of the drivers of the increase in loan demand in recent quarters; previously, these requirements had since 2008 almost invariably been cited as a dampening factor. Stepped-up

Loan demand recuperates

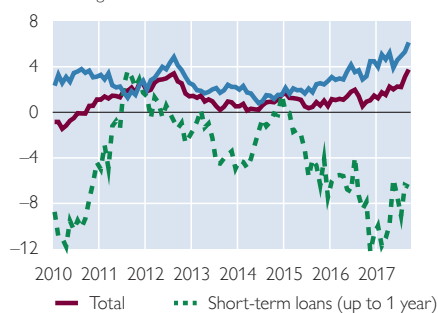
Cautious lending policies persist

Chart 9

MFI loans to Austrian nonfinancial corporations

Volumes

Annual change in %¹



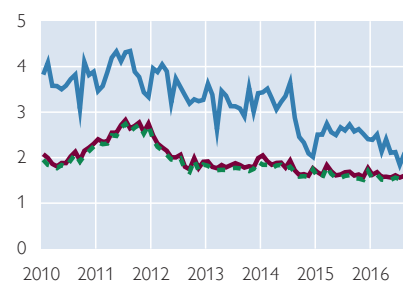
Source: OeNB.

¹ Adjusted for reclassifications, valuation changes and exchange rate effects.

² Interest rate fixation periods for new euro-denominated loans.

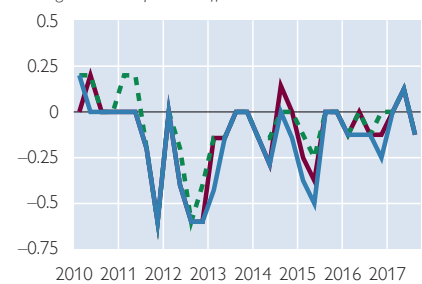
Interest rates²

%



Credit standards

Change over last quarter, diffusion index



Bank interest rates
decline further

loan demand was also attributable to merger and acquisition activities and debt restructuring and renegotiations, while internal financing continued to dampen loan demand.

Historically low bank lending rates continued to support lending to the corporate sector. Moreover, lower bank funding costs, most likely supported by higher capital ratios and improved ratings in the Austrian banking sector, translated into reduced lending rates. Between end-2015 and September 2017, interest rates on new loans to nonfinancial corporations dropped by 48 basis points (see the middle panel of chart 9). In the first nine months of 2017, the spread between interest rates on smaller and on larger loans, which – given the lack of other data – is commonly used as an indicator of the relative cost of financing for SMEs, averaged 36 basis points, which was 1 basis point lower than in the same period last year.

According to the BLS, the margins on average-risk loans have been eased (i.e. lowered) in most of 2016 and 2017 so far. In contrast, the margins on riskier loans were largely left unchanged during the last few quarters, which points to an increasingly differentiated risk assessment by banks. The latter cited a more competitive environment as a reason for easing the margins on average-risk loans.

Liquidity buffers are
still on the rise

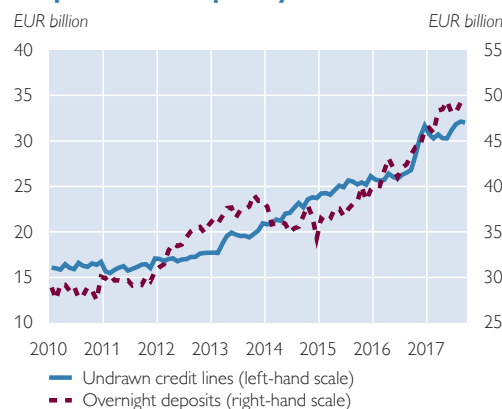
Moreover, firms continued to have substantial liquidity at their disposal. According to the OeNB's statistics on new lending business, the total amount of undrawn credit lines available to enterprises increased further in 2017 so far, although a change in the data collection method as of October 2016 complicates direct comparison with previous time periods (see chart 10). Undrawn credit lines still expanded more strongly than the overall volume of credit lines, which implies a significant

increase in unutilized liquidity, which enterprises could have had recourse to if necessary. Additionally, firms' transferable deposits continued to rise (+12.8% year on year in September 2017). Over the past years, firms have built up sizeable deposits. Total corporate deposits outstanding in September 2017 almost equaled annual gross investment in 2016. Apart from the small yield difference relative to longer-term deposits, these strong inflows into transferable deposits are also likely to reflect nonfinancial corporations' improving earnings position. In the current environment of recovering loan demand, these liquidity buffers suggest that the cautious lending policies of Austrian banks are unlikely to constitute a binding constraint for the Austrian corporate sector.

The net contribution of debt securities to corporate financing was negative in the first half of 2017 (see the left-hand panel of chart 4). According to financial accounts data, corporate bond issuance decreased by EUR 1.7 billion, low corporate bond yields notwithstanding.

Chart 10

Indicators of Austrian nonfinancial corporations' liquidity



Source: OeNB.

Note: Break in time series in October 2016 due to changes in data collection methodology.

In sum, the recent expansion in financing volumes – both internal and external – implies that the Austrian nonfinancial corporations had sufficient means to fund their investments in the current cyclical upswing. This is also reflected by the fact that net lending by the corporate sector was again positive in 2016 and the first half of 2017, which indicates a persistent surplus of funding over gross fixed investment.

Interest rate risk remains elevated for the corporate sector

In the second quarter of 2017, growth in financial debt (measured in terms of total loans raised and bonds issued)⁵ of the corporate sector accelerated to 3.3% year on year. Relating indebtedness of nonfinancial corporations to their income, which is the primary source for servicing debt, provides an indication of debt sustainability. At 2.9%, the nominal expansion rate of gross operating surplus was slightly lower than that of financial debt, which caused the debt-to-income ratio of the corporate sector to increase by 1.5 percentage points over the past year. This ratio reached 392% at the latest reading (see the upper left-hand panel of chart 11). Whereas the debt-to-income ratio is lower in Austria than in the euro area as a whole, the debt-to-equity ratio, which fell slightly to 91.5% in 2016 according to financial accounts data⁶, is higher in Austria than in the euro area. This is attributable to the generally low degree to which

companies finance their activities out of equity (which also explains their low equity ratio).

The low interest rate environment, together with the economic recovery, continued to support firms' current debt-servicing capacity, as lower interest rates are likely to reduce the interest-service burden on both variable rate loans and new debt. In the first half of 2017, the ratio of interest payments on domestic bank loans to gross operating surplus continued to decline slightly, reaching 3.1% in the second quarter. This reduction reflected the still high share of variable rate loans in new loans, despite a 13-percentage-point contraction to 84% between mid-2014 and the third quarter of 2017. While Austrian companies are therefore currently experiencing lower interest expenses than their euro area peers, they face a higher exposure to interest rate risk. A rebound of interest rates could become a burden, especially for highly indebted companies, even if increasing debt-servicing costs are accompanied by higher corporate earnings on the back of economic recovery.

The Austrian corporate sector's exposure to foreign exchange risk edged further down, landing at 2.7% in the third quarter of 2017. Over the past three years, the proportion of outstanding foreign currency loans in Austria was below the figure for the euro area as a whole.

The declining trend in insolvencies of the past years continued as the insol-

Proportion of variable rate loans is still high

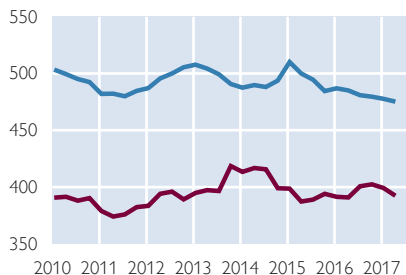
Insolvency ratio lessens further

⁵ This measure follows Eurostat and the European Commission's debt measures for the macroeconomic imbalance procedure (MIP) surveillance mechanism. It excludes pension scheme liabilities, which are not very significant in Austria, and other accounts payable, such as trade credit and other items due to be paid, mostly on a short-term basis. These items essentially constitute operational debt, i.e. liabilities that a firm incurs through its primary activities.

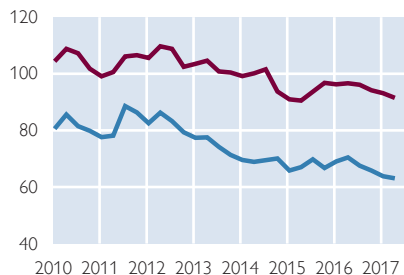
⁶ According to international conventions, financial accounts value equity on the liabilities side of nonfinancial corporations' balance sheets at market prices. The fact that the debt-to-equity ratio decreased, although debt financing grew more strongly than equity financing in 2016 and the first half of 2017, reflects price increases in Austrian stocks.

Risk indicators for Austrian nonfinancial corporations**Debt**

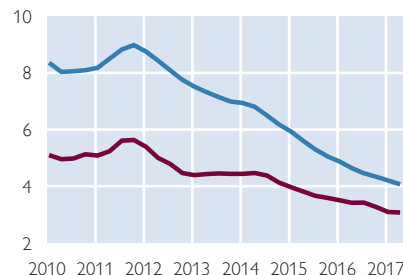
% of gross operating surplus

**Debt-to-equity ratio**

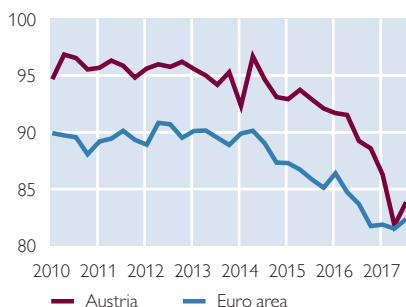
%

**Interest expenses¹**

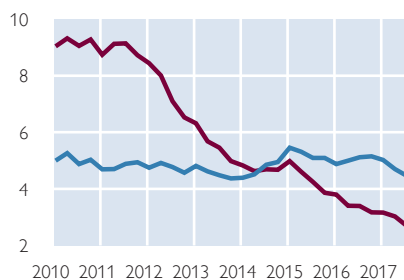
% of gross operating surplus

**Variable rate loans**

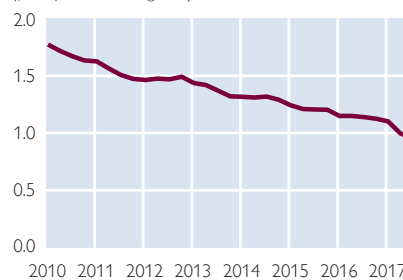
% of total new (euro-denominated) lending

**Foreign currency loans**

% of total loans

**Insolvencies**

Number of insolvencies in % of companies (four-quarter moving sum)



Source: OeNB, ECB, Eurostat, KSV 1870.

¹ Euro area: euro-denominated loans only.

vency ratio (i.e. the number of corporate insolvencies in relation to the number of existing companies) came down further in 2017 so far, based on a moving four-quarter sum to account for seasonality. This downward trend may be attributed to the moderate recourse to debt financing in the past years and the low interest rate level, which makes debt servicing easier even for highly indebted companies.

Household loans: foreign currency and variable rate loans decline further**Household income improves**

The favorable cyclical position of the Austrian economy was reflected in the labor market, with the number of payroll employees growing by 1.9% in the first three quarters of 2017. The improved

labor market situation boosted household incomes and buoyed consumer sentiment. Growth in real private consumption accelerated slightly in the course of this year, even though the positive stimulus of the tax reform – that had come into force at the beginning of 2016 – wore off and inflation went up because of rising crude oil prices. Compared to the historical average, private consumption growth is still weak. Having increased in 2016 as a result of lagged spending of the additional income arising from the tax reform, the household saving ratio continued to rise, albeit slightly, from 8.1% in 2016 to 8.4% in the first half of 2017 (based on moving four-quarter averages). Additionally, the emphasis on the non-wage elements in the income trend – which usually go hand in hand with a

Households' saving ratio increases in the first half of 2017

relatively low propensity to save – contributed to the increase in the saving ratio.

Households' preference for liquid assets persists

The slight increase in the saving ratio was reflected in a moderate rise of households' financial investments in the first half of 2017, which reached EUR 4.5 billion. This was 1.8% above the figure recorded for the first six months of the preceding year, and still about less than two-thirds of the values

seen before the onset of the crisis (see chart 12).

In the low nominal interest rate environment, households continued to display a strong preference for highly liquid assets. In the first half of 2017, they shifted EUR 7.4 billion into overnight deposits with domestic banks and another EUR 0.2 billion into cash holdings, thereby exceeding total financial investments, which implies a considerable substitution of other financial assets. In contrast, bank deposits with an agreed maturity continued to decline, namely by EUR 2.7 billion in the same period (see the left-hand panel of chart 13). When we take a longer-term perspective, households increased their overnight deposits by EUR 82 billion between end-2008 and mid-2017 (which was the equivalent of 85% of total financial investment in that period), while deposits with an agreed maturity were reduced by EUR 37 billion. As a result, the share of overnight deposits in total financial assets has almost doubled to 20.9% since end-2008, while the proportion of deposits with an agreed maturity has plummeted from 31.7% to 17.3%.

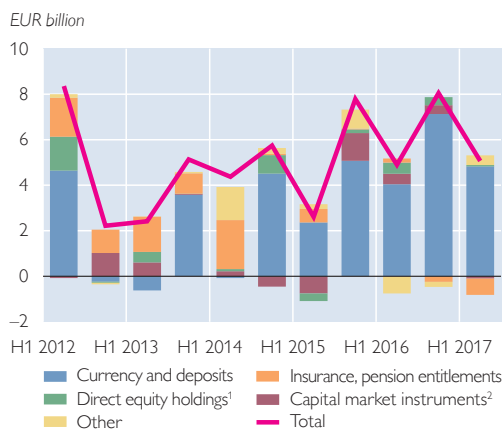
In the same vein, households continued to reduce their direct holdings

Transferable deposits continue to expand strongly

Households' financial investments increase moderately

Chart 12

Net financial investments



Source: OeNB.

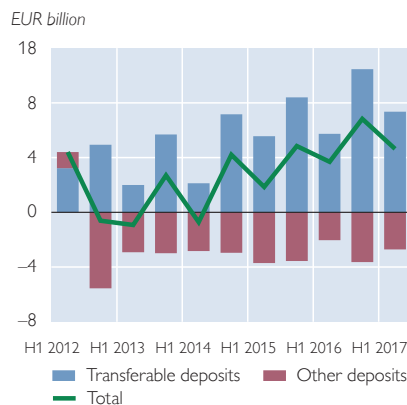
¹ Unlisted shares and other equity.

² Debt securities, mutual fund shares and listed shares.

Chart 13

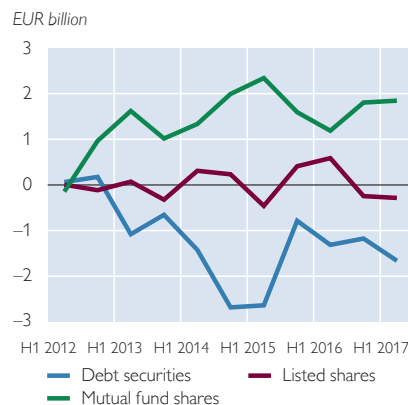
Net investments by households in selected financial instruments

Deposits



Source: OeNB.

Capital market instruments



Life insurance and pension entitlements

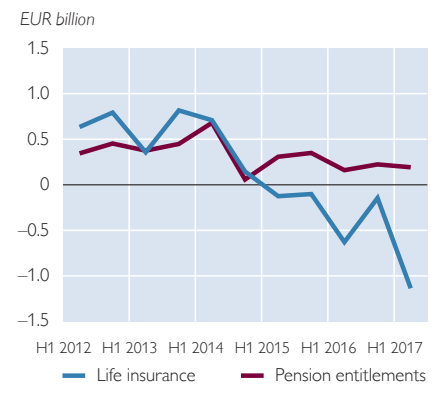
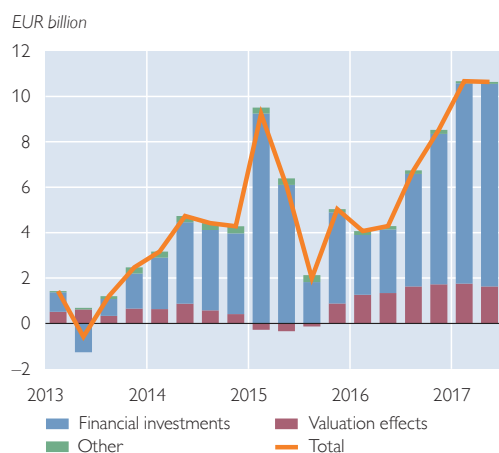


Chart 14

Cumulative change in capital market instruments held by Austrian households



of long-term debt securities in the first half of 2017, by EUR 1.7 billion to be precise. Since 2013, the portfolio of securities has been cut by EUR 13.4 billion (see the middle panel of chart 13). In the same period, net investments in mutual funds reached almost EUR 15 billion (of which EUR 0.3 billion in the first half of 2017). Net investments in listed shares remained muted, at a mere EUR 0.3 billion as of 2013, and were even negative in the first six months of this year. Totaling EUR 1.6 billion between 2013 and mid-2017, households' net financial investments in capital market instruments were quite moderate (see chart 14). This weak development is all the more remarkable since, at the same time, the Austrian household sector recorded sizeable unrealized valuation gains on its securities portfolios. These gains have amounted to EUR 8.9 billion since 2013, EUR 2.3 billion of which were observed in the first half of 2017. In the six months ending June 2017, rising stock prices caused listed shares to account for the majority of the valuation gains, with the latter amounting

to 10.2% of the holdings of listed shares at end-2016. In the case of mutual fund shares, the gains equaled 0.6% of the household portfolio. Thus, unrealized valuation effects were the main driver of the increase in the Austrian household sector's capital market exposure, contributing more than 80% to the rise seen between 2013 and the second quarter of 2017. So, while there are few indications that households made up for low interest rates by investing in riskier assets in a search for yield, the assets they hold contain increasingly risky elements in the form of unrealized valuation gains. However, capital market investments in general and stocks in particular are very much concentrated in the portfolios of households with higher income, which have a higher risk-bearing capacity, as the results of the Household Finance and Consumption Survey (HFCS) for Austria show.

Investments in life insurance and pension entitlements remained subdued in the first half of 2017 (see the right-hand panel of chart 13). In the case of life insurance policies, disbursements outstripped contributions by EUR 0.8 billion. The negative net investment in life insurance can be attributed to the sharp slump in single-premium life insurance policies due to the current low interest rates and changes in tax treatment of life insurance policies.⁷ Gross inflows into these instruments were to a large extent not an outcome of current investment decisions but rather reflected past decisions, given the long maturities and commitment periods involved. Life insurance policies often serve as repayment vehicles for foreign currency bullet loans, even when the latter are converted into euro loans. By contrast, investments in pension entitlements (including both claims

Net investments in life insurance policies remain negative

Considerable unrealized valuation gains in households' capital market-related assets

⁷ Insurance premiums paid under insurance policies taken out after December 31, 2015, are no longer tax deductible.

on pension funds and direct pension benefits granted by private employers) continued to expand, amounting to EUR 0.8 billion in 2016.

Expansion of household loans gains momentum

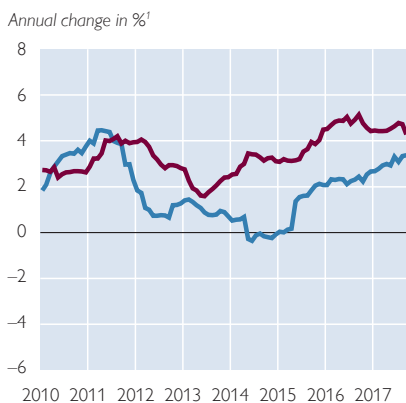
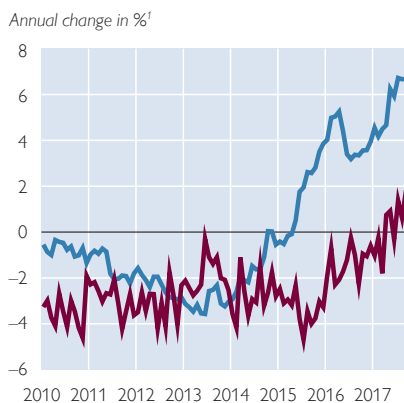
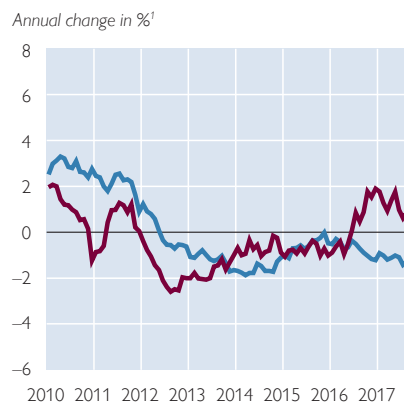
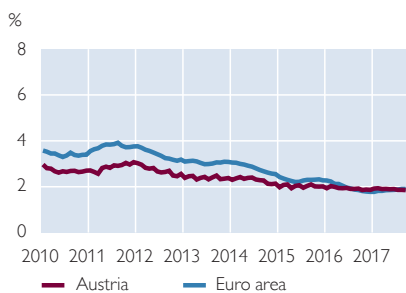
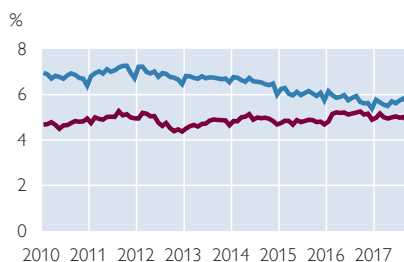
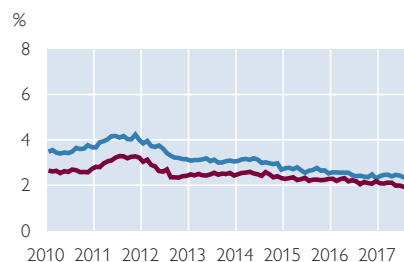
The expansion of bank lending to households gained momentum in recent months. In September 2017, bank loans to households (adjusted for reclassifications, valuation changes and exchange rate effects) increased by 3.1% year on year in nominal terms. A breakdown by currency shows that euro-denominated loans continued to grow briskly (by 6.5%), whereas foreign currency loans continued to contract at double-digit rates. By September 2017, the latter had fallen by 16.8% year on year, partly reinforced by the depreciation of the Swiss franc against the euro. The dynamism in loan growth is reflected by the fact that for some months now loans for all purposes showed positive nominal year-on-year growth rates (see chart 15). In September 2017, consumer loans, which had been shrinking for almost ten years, grew by 0.4% year on year, and other loans firmed by 1.8%. However, the main contribution to loan growth came from housing loans. For one thing, they are the most important loan category for households, accounting for almost two-thirds of the outstanding volume of loans to households. For another, their growth rate accelerated somewhat, reaching 4.3% year on year in September 2017. In the first two quarters of this year, year-on-year growth rates of housing loans to households slightly surpassed that of property prices but stayed below pre-crisis growth rates (see the upper left panel of chart 15).

Credit terms continued to be favorable as bank interest rates decreased slightly from last year's already very

low levels. At 1.85%, average interest rates on euro-denominated housing loans to households were 7 basis points lower in September 2017 than one year earlier. The interest rate on variable rate housing loans (with a rate fixation period of up to one year) decreased by 14 basis points to 1.73%. The effective annual rate of interest on housing loans, which reflects total borrowing costs (interest rate component and related charges), dropped by 12 basis points year on year, to reach 2.27% in September 2017.

The conditions for taking out housing loans also remained supportive. According to the results of the BLS, banks' credit standards for housing loans to households were stable overall in the first three quarters of 2017. At the same time, banks reported a slight increase in household demand for housing loans in the first three quarters of 2017, after flat demand in the year before. Ever since this factor was included in the BLS in 2015, banks have largely regarded the general level of interest rates as having a positive impact on the demand for housing loans. Improving housing market prospects, including expectations of rising house prices, and increasing consumer confidence were also mentioned in recent survey rounds. The strong uptick in house prices registered over the past years (see the subsection on residential property prices below) may have boosted the funding needs for real estate investment. In the first half of 2017, transaction volumes on the residential property market in Austria increased by roughly 6% year on year in nominal terms according to data published by RE/MAX and compiled from the land register by IMMOUnited. Although the rate of increase was lower than in the two preceding years, it still implies rising financing needs.

Loan growth is driven by housing loans

MFI loans to households: volumes and interest rates**Housing loans: volumes****Consumer loans: volumes****Other loans: volumes****Housing loans: interest rates****Consumer loans: interest rates****Other loans: interest rates**

Source: OeNB, ECB.

¹ Adjusted for reclassifications, valuation changes and exchange rate effects.

Households' debt-to-income ratio dips slightly

Proportion of variable rate loans declines further

Households' currency and interest rate risks

By mid-2017, the household sector's total liabilities amounted to EUR 181.6 billion according to financial accounts data, up 2.7% in nominal terms against one year earlier. As liabilities expanded at a somewhat slower pace than disposable income, the households' debt-to-income ratio contracted slightly to 90% (see the upper left-hand panel of chart 16). Accordingly, the debt ratio of households in Austria remained lower than that of households in the euro area as a whole. This is in part traceable to the comparatively small

percentage of Austrian households that have a loan outstanding.⁸ Thus, it is not the absolute level of Austrian households' indebtedness that is of primary concern, but rather the still high proportions of variable rate and foreign currency loans.

In the third quarter of 2017, variable rate loans (with an initial rate fixation period of up to one year) accounted for 60% of new euro-denominated lending to households, compared to 88% in the same quarter three years earlier. Over the same period, their share in housing loans narrowed from 85% to 51%.⁹ Despite this recent decline, the propor-

⁸ According to data from the Household Finance and Consumption Survey (HFCS), in Austria only 34% of households have taken up a loan, compared to 42% in the euro area as a whole.

⁹ In contrast, the proportion of new housing loans with very long interest fixation periods (more than ten years) increased from less than 2% three years ago to more than one-quarter.

tion of variable rate loans is still very high by international standards. On the upside, this implies lower current interest expenses resulting from a positive slope of the yield curve and swifter pass-through of the ECB's monetary policy measures to banks' lending rates. In the second quarter of 2017, households' interest expenses equaled 1.7% of aggregate disposable income, 0.8 percentage points less than in 2010 (and more than 2 percentage points less than in 2008, i.e. the year before interest rates started to decline). Low interest rates as well as improving household income had a beneficial effect on debt servicing. The flip side is, however, that given the high proportion of variable rate loans in total lending households

are to a considerable extent exposed to interest rate risks over the medium term.

Likewise, and despite a substantial decrease in past years, the still high proportion of foreign currency loans in the total stock of lending remains a risk factor, especially for vulnerable households. By the end of the third quarter of 2017, the proportion of foreign currency loans sank to 11.3%, thus amounting to just over one-third of the peak value reached about ten years ago. The foreign currency ratio varies considerably depending on a loan's purpose. For housing loans, it was 14.6%, for consumer loans 3.4 % and for other loans 5.9%. Almost all outstanding foreign currency-denominated loans are in Swiss franc (close to 97%).

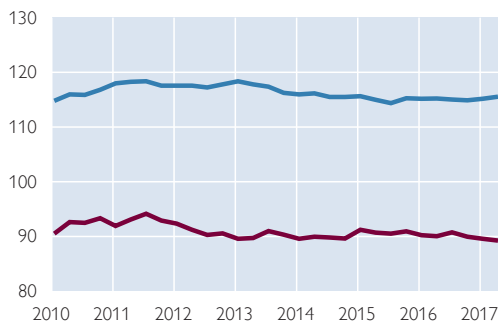
Foreign currency loans remain a concern

Chart 16

Indicators of household indebtedness

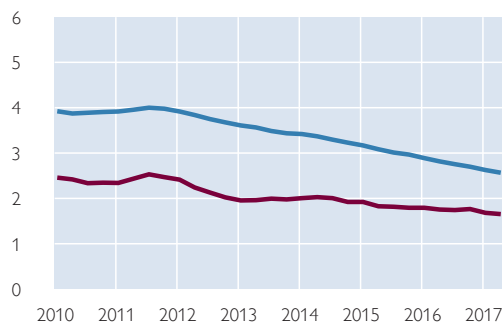
Liabilities

% of disposable income



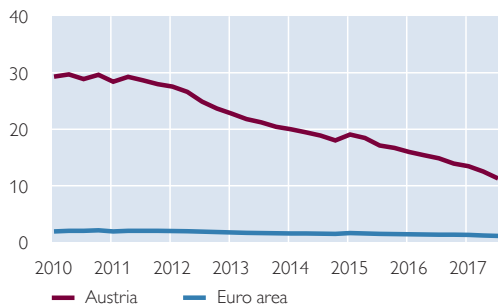
Interest expenses¹

% of disposable income



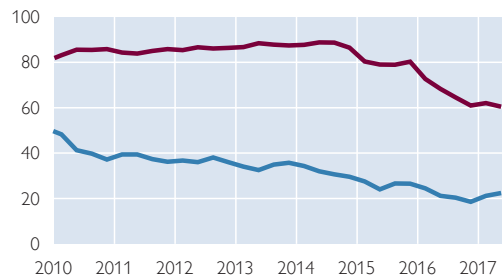
Foreign currency loans

% of total stock of outstanding loans



Variable rate loans

% of total new euro-denominated loans



Source: OeNB, Statistics Austria, ECB, Eurostat.

¹ Figures for the euro area represent only interest rate expenses on euro-denominated loans.

Property price growth rate in Vienna remains below the national value

Residential property prices in Austria continue to increase

Residential property prices in Austria continued to rise in the first three quarters of 2017, albeit at a slightly slower pace than in the year before, reaching 4.5% year on year in the second quarter. This moderation was mainly driven by developments in Vienna, where prices were up 3.4% against the same period of the previous year. This is all the more remarkable given that price increases had long been significantly more pronounced in Vienna than in the rest of Austria. However, this trend reversed three years ago, and the “Austria excluding Vienna” aggregate has since shown stronger residential property price growth, reaching 4.5% year on year in the third quarter of 2017.

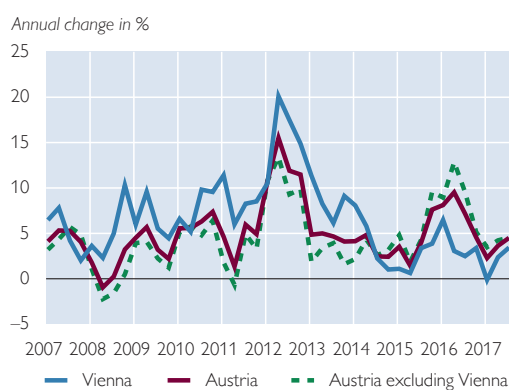
Cost pressures, arising, for example, from building costs, remained moderate and edged up in the first half of 2017. At the same time, housing supply, which had not kept up with population growth in recent years, eventually started to catch up as housing investment accelerated against the previous year. The number of building permits in Austria was up 2.5% in the first half of 2017 against the – already very high – corresponding 2016 figure.

Reflecting the moderate price rises in recent quarters, the OeNB fundamentals indicator for residential property prices in Vienna remained unchanged at 21.0% in the third quarter of 2017. For Austria as a whole, the indicator reached 9.2%, implying that residential property prices increasingly depart from their fundamentally justified values.¹⁰

Chart 17

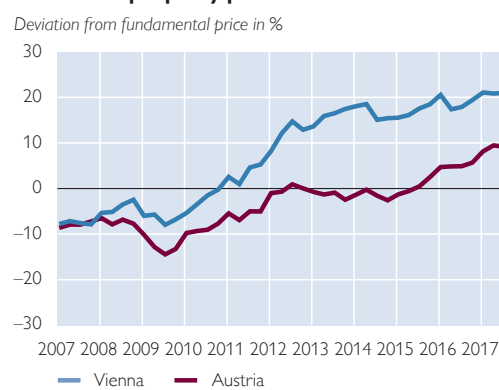
Austrian residential property market

Residential property prices



Source: Vienna University of Technology, OeNB.

OeNB fundamentals indicator for residential property prices



¹⁰ For more analyses and data on the Austrian real estate market, see <https://www.oenb.at/en/Monetary-Policy/real-estate-market-analysis.html>.

Austrian financial intermediaries: reaping the benefits of improving market conditions

Banking sector enters calmer waters after major restructuring

Over the past years, the Austrian banking system has undergone some major adjustments and a de-risking process, which was driven by two needs: the need to respond to cyclical factors, such as the low-growth and low-yield environment, and the need to address factors that are more of a structural nature, such as capacity, competitiveness, efficiency and capitalization – in other words, weaknesses in domestic operations masked earlier by profit contributions from CESEE markets.

In this process, the size of the Austrian banking sector declined by 18% as measured by consolidated total assets from its peak in 2012, stabilizing at levels around EUR 960 billion in mid-2017. Expressed as a percentage of GDP, the changes are even more pronounced: this ratio declined from 370% in 2012 to around 265%. The decline was driven by restructuring at individual banks (such as UniCredit Bank Austria AG) as well as in particular segments of the banking industry (Raiffeisen and Volksbanken cooperatives), and the orderly wind-down of failed banks. The total number of credit institutions in Austria decreased to 669 at end-2016, down 23% from 2008. The pace of consolidation was highest in 2016 (driven by the cooperative banks) and markedly slowed down in the course of 2017. The ongoing rationalization within the banking system is most apparent in the downsized branch networks. Since 2013, the number of branches has fallen steadily at an increasing speed, reaching 3,820 in mid-2017, i.e. the lowest level since 1995. In the first half of 2017, 106 branches were

closed, compared to 170 in the entire year of 2016.

While remaining committed to doing business in CESEE, Austrian banks have reorganized their business in that region by withdrawing from noncore markets and by rightsizing and repositioning their operations in selected markets. In one instance, CESEE business operations were moreover transferred to the foreign parent bank. These measures had significant effects on Austrian banks' exposure and risk profile in CESEE. The largest exposures of Austrian banks to CESEE are now linked to higher-rated countries such as the Czech Republic and Slovakia, while operations have shrunk in more volatile banking markets like Russia and Ukraine. The total assets of Austrian CESEE subsidiaries decreased by almost one-third over the past five years, to close to EUR 200 billion. They now account for about one-fifth of consolidated total assets.

The Raiffeisen und Volksbanken group structures have been made less complex, accompanied by measures to improve capital market access. Loan portfolio de-risking has made significant progress. At the same time Austrian banks have remained a solid source of credit to the real economy in Austria and the CESEE region. In Austria, the growth rate of loans to households did not fall into negative territory even during the global financial crisis and remained between 2.5% and 3.5% over the last 18 months. Growth in loans to nonfinancial companies accelerated to about 3% over the last year.

Despite these developments, there is no room for complacency. Austrian banks still need to improve their risk-bearing capacity by further increasing

efficiency through various measures including rationalization, digitalization and consolidation, in particular in the

domestic market. All in all, they have to remain prudent in terms of their lending policies.

Box 1

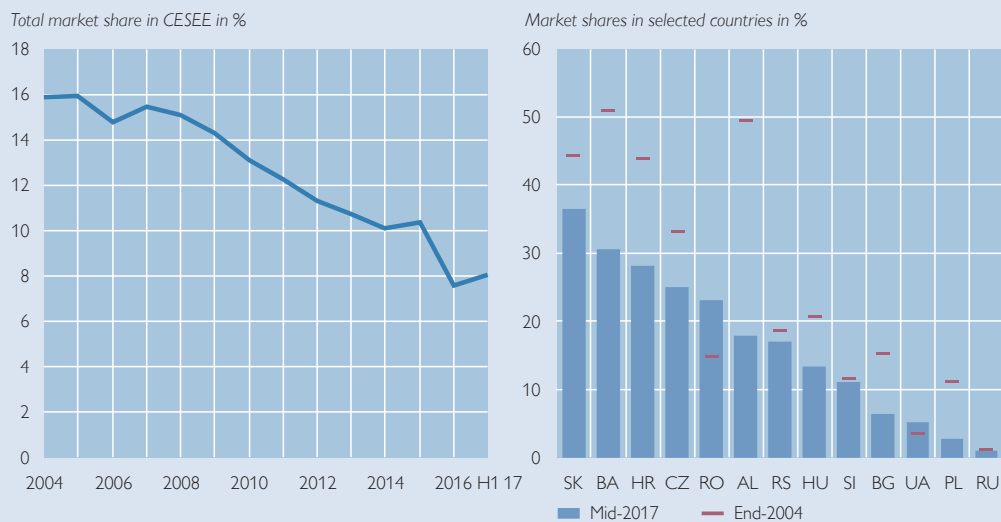
The market share of Austrian banks in CESEE is declining

Having moved into the CESEE market at an early stage, Austrian banks were able to gain significant market shares in local banking sectors. However, over the years, the importance of domestic banks increased and other European competitors entered these markets. After the financial crisis, Austrian banks realigned their activities, refocusing on core markets. As a consequence, the market share of Austrian banks in CESEE decreased slowly but steadily to around 10% as at end-2015 and has since decreased further, to around 8% following the restructuring at UniCredit Bank Austria AG in late 2016.

Since the exposure of Austrian banks in CESEE is not evenly distributed and the size of local markets differs substantially, the market shares of Austrian banks are very heterogeneous across the region: In major host countries such as Slovakia, Croatia, the Czech Republic and Romania, market shares are close to or above one-quarter. In half of the countries in which Austrian banks are active through subsidiaries, market shares are below 15%.

Chart 18

Market shares of Austrian subsidiaries in CESEE



Source: OeNB, national central banks, S&P Global Market Intelligence.

In Bosnia, the Czech Republic, Romania and Slovakia, Austrian subsidiaries have the highest market shares. Especially in the Czech Republic and Slovakia, but also in the Baltic countries and several countries in the Western Balkans, their major foreign competitors are Dutch, Spanish, Italian or French banks. In general, banking groups from other European countries have scaled back their exposure to CESEE, but some of these banks still hold considerable market shares. Besides, banks from Arabic and Asian countries also compete with Austrian banks for market share in several CESEE countries, even though their local activities are still limited.

Strong half-year results for Austrian banks

In the European Union, banks' return on (average) assets (ROA) was 0.4% as at mid-2017 (compared to 0.3% a year before). Higher profits, together with a reduction in administrative and depreciation expenses, contributed to an improvement of the cost-to-income ratio to 62%.¹

In Austria, banking operations continued to be characterized by a positive trend in the first half of 2017, as banks' consolidated profit rose to EUR 3.4 billion (+EUR 0.5 billion year on year) and their annualized ROA stood at 0.8%. On an adjusted basis,² higher profits were the result of several effects. Consolidated operating income rose by 4%, driven primarily by increases in fees and commissions and other income, while net interest income remained flat year on year. Adjusted operating profits grew even stronger (+17% year on year), as operating costs fell. This was, however, not caused by falling staff expenses or general administrative expenses, which account for the bulk of all operating costs and actually rose slightly, but by a significant reduction in asset write-downs, namely by one quarter. Finally, another 25% reduction in credit risk provisioning as well as higher profits from direct investments contributed to the rise in adjusted profits after taxes and minority interests (+32%). These strong results point

to the continuation of a positive recent trend. It should be noted, however, that the key income and cost factors did not contribute to this development and that some improvements (e.g. in risk provisioning) are a reflection of the benign state of the macrofinancial cycle.

To put these developments in a medium-term perspective, chart 19 (left-hand panel) displays the Austrian banking system's adjusted profit and loss items for 2014 and 2017, based on annualized mid-2017 figures. Although operating income declined slightly as net interest income fell, banks did not manage to cut staff and administrative expenses, but instead profited from lower asset write-downs, which improved their operating profits. Furthermore, the much lower credit risk costs proved to be the biggest profit driver and helped turn the loss incurred in 2014 into a substantial profit in the first half of 2017. The right-hand panel of the chart completes the picture by highlighting the corresponding trends in the main drivers of Austrian banks' consolidated ROA. It shows that over the past two and a half years, the operating income margin was flat at roughly 2.5%,³ while the volatile cost-income ratio and especially credit risk costs declined (the latter from close to 90% of operating profits to less than 10%), which led to a significant improvement in Austrian banks' ROA.

Austrian banks' consolidated profitability continues its upward trend

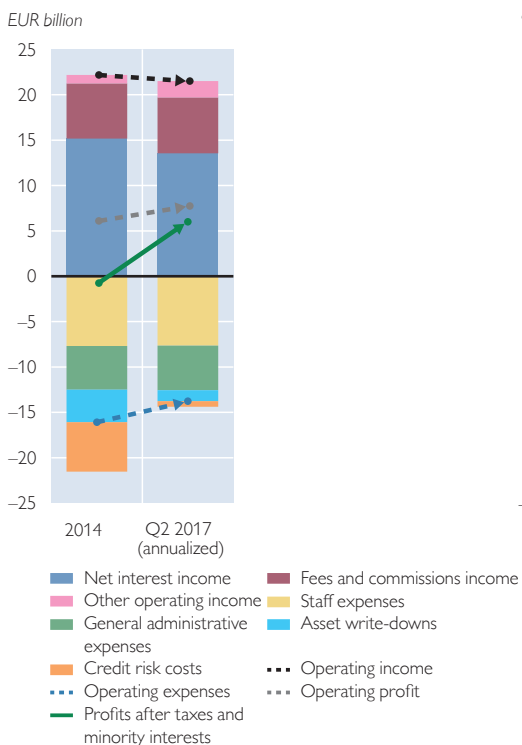
¹ Source: ECB consolidated banking data, data as of Q2 2017.

² The restructuring at UniCredit Bank Austria AG, during which the ownership of CESEE subsidiaries was transferred to the Italian parent bank, has a substantial impact on the profit and loss figures of the entire Austrian banking system. The information in the following section has therefore been adjusted for this one-off effect, to exclude UniCredit Bank Austria AG.

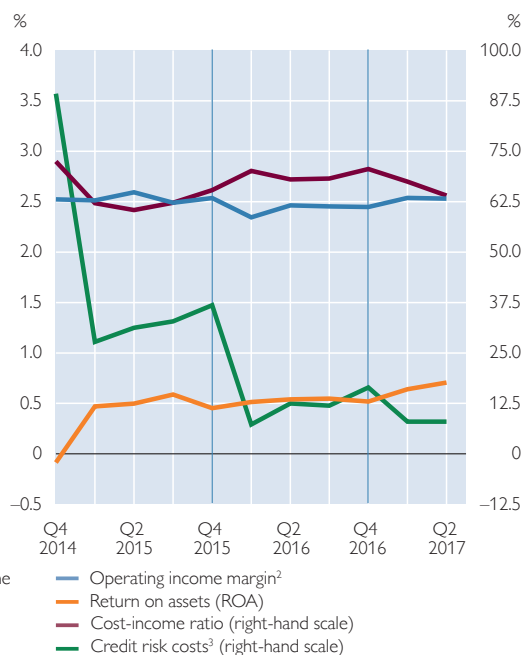
³ The operating income margin is defined as operating income over average total assets. For further details regarding the dissection of banks' return on assets or equity based on an adapted DuPont analysis, please refer to Gruber, M., S. Kavan and P. Stockert. 2017. What drives Austrian banking subsidiaries' return on equity in CESEE and how does it compare to their cost of equity? In: OeNB. Financial Stability Report 33. 78–87. The same period saw a decline in the adjusted consolidated net interest margin of Austrian banks, measured by their net interest income over average total assets.

Consolidated profitability of Austrian banks

The main items of Austrian banks' consolidated P&L statement¹



Austrian banks' consolidated ROA and its main drivers¹



Source: OeNB.

¹ Both panels exclude data for UniCredit Bank Austria AG.

² Operating income divided by average total assets.

³ Credit risk costs divided by operating profit.

Unconsolidated results show an improvement in operating efficiency

In the first half of 2017, Austrian banks generated operating profits of EUR 3.8 billion on an unconsolidated basis, i.e. from their domestic business, including direct cross-border activities. This corresponds to an increase of nearly 32% year on year and was supported by a slight increase in operating income and declining expenses. It should be noted that the magnitude of this increase was strongly influenced by a one-off effect. Adjusted, the increase shrinks to around 11% year on year.

Higher operating income resulted from lower net interest income being compensated by fees and commissions income, trading income and securities and investment earnings, which grew compared to the previous year. A fur-

ther breakdown of the data reveals that the continued decline of net interest income was due to markedly lower results from cross-border activities, whereas domestic results increased slightly. Fees and commissions income improved due to higher profits from the securities business as banks profited from positive financial market developments, while securities and investment earnings went up as income from affiliated companies rose. On the cost side, the strong decrease in staff expenses was driven by a one-off effect, but a slight decrease remains even following adjustment for the one-off effect – and all other expense categories declined as well.

As a result of the above-mentioned trends, overall operating efficiency –

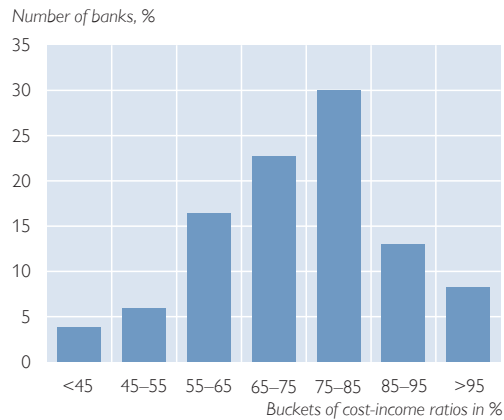
measured by the cost-income ratio – improved from 71% to 62% year on year. When comparing this ratio on a bank-by-bank basis, however, more than three quarters of Austrian banks exhibit above-average ratios, pointing to weaker efficiency. This is due to the fact that the biggest institutions are more cost efficient than smaller local banks.

Regarding the current outlook for 2017, based on the results of the third quarter, Austrian banks expect net new risk provisioning amounting to EUR 1.1 billion. Although up on last year's provisioning, this amount is only around one-third of the average provisioning recorded over the past ten years. Overall, Austrian banks expect an unconsolidated ROA of around 0.6% in 2017, which would be slightly above the figure for 2016 and well above the average for the post-crisis years.

More information on the profitability and efficiency of banks in Austria can be found in a dedicated study further on in this Financial Stability Report, which differentiates between various business models and draws on data from 1995 to 2016 (see p. 52).

Against the backdrop of ongoing economic recovery in several key CESEE host markets, the first half of 2017 was characterized by solid growth in loan volumes and stabilizing or improving asset quality at Austrian banking subsidiaries. Their half-year profit came to EUR 1.5 billion, which translates into an ROA of 1.6%. The highest profits were earned by subsidiaries in the Czech Republic, Russia, Hungary and Slovakia. Adjusted for the restructuring at UniCredit Bank Austria AG, net profits went up by about 8% year on year (see chart 21). Since adjusted operating profits decreased by 6% year on year, to EUR 1.8 billion, this rise was mainly attributable to a further and massive reduction in loan loss provi-

Chart 20
Distribution of cost-income ratios of Austrian banks (unconsolidated data)

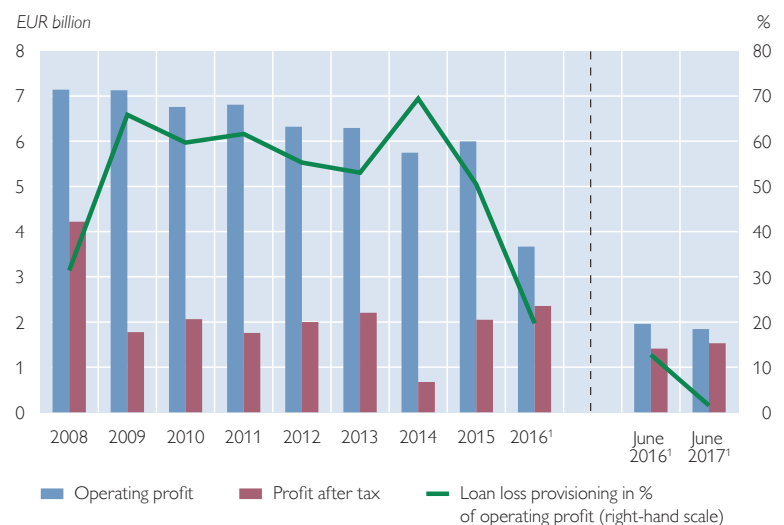


Source: OeNB.

sioning by almost 90% year on year, to a historically low level of EUR 27 million, driven in particular by subsidiaries in Russia and the Czech Republic. In some countries loan loss provisions were released, causing net provisioning to turn negative (Hungary, Ukraine, Czech Republic). Loan loss provisioning accounts for a mere 1% of aggregated operating profits, which is clearly

Profits of Austrian banking subsidiaries in CESEE boosted by very low risk provisioning

Chart 21
Austrian banks' CESEE subsidiaries: profitability and loan loss provisioning



Source: OeNB.

¹ Data excluding the subsidiaries of UniCredit Bank Austria AG.

beneficial for banks' profitability. At the same time, these very low risk costs have yet to prove their sustainability over the medium term.

Regarding the subsidiaries' operating profitability in the first half of 2017, adjusted net interest income edged up (+1.6% year on year) due to an increase in loan volumes (+15% year on year), and fees and commissions income increased as well. This could not offset the decrease in trading income (–63% year on year), however, so that the half-year operating income of Austrian banking subsidiaries in CESEE fell by 1.3% year on year. As staff expenses increased by 4.5% year on year and depreciations also went up, overall operating expenses rose by 3% and led to a worsening of the subsidiaries' cost-income ratio from 51% (mid-2016) to 53% (mid-2017).

A sectoral breakdown of the Austrian NPL portfolio

Credit quality and capitalization are improving further

The quality of European banks' loan portfolios continued to improve in the first half of 2017, but the slow progress and wide dispersion among countries remain a concern. Even though the overall nonperforming loans (NPL) ratio continued its downward trend and reached its lowest level since end-2014, current levels remain elevated in several European markets and continue to hamper banks' profitability and new lending. Banks' efforts to reduce their NPLs are still being hampered by structural impediments. For example, although there has been an increase in NPL transactions, secondary market activity is not yet sufficient to materially contribute to NPL reductions in the banking sector. The EU Council's 2017 action plan to tackle nonperforming loans in

European NPL volumes continue their downward trend, but NPL ratios remain high in several countries

Europe,⁴ which encourages banks to further shrink their NPL portfolios and supports them in this process, is a significant and welcome step forward in this context, alongside ongoing initiatives by the ECB, the European Systemic Risk Board (ESRB) and the Vienna Initiative.

In line with the European trend, Austrian banks improved their loan quality in the first half of 2017. NPL ratios for the domestic business and consolidated NPL ratios further declined to 3.3% and 4.6%, respectively. This improvement was especially pronounced for corporate loans, but NPL ratios for retail loans also declined. Within the SSM, Austrian SIs have managed to reduce their NPL ratio to below-average.

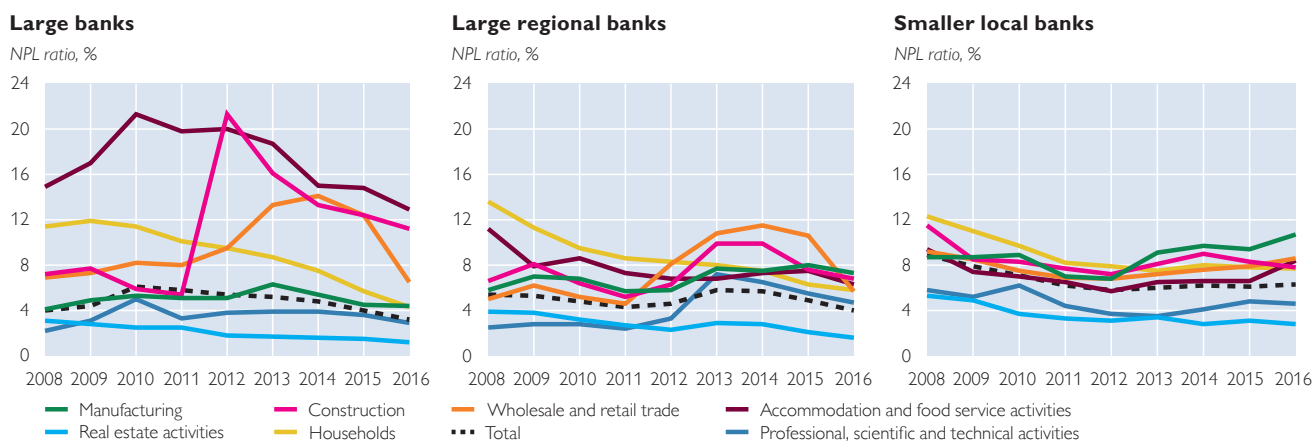
A sectoral decomposition of the loan portfolio with a focus on NPLs provides insight into the soundness of loans extended to different economic sectors in Austria. Based on data from the Austrian central credit register (CCR), the loan portfolio is concentrated in seven sectors accounting for nearly 80% of the total⁵ and including real estate activities, manufacturing, construction, wholesale and retail trade, households, professional, scientific and technical activities, and accommodation and food service activities. At the end of 2016, NPL ratios were especially elevated in the construction (8.4%) and accommodation and food services sectors (7.7%), and in the trade, households and manufacturing sectors (6.2% each), compared to an average NPL ratio of 4.0%. Loans to the real estate activities sector, which accounts for the largest proportion of total lending in the CCR, showed a substantially below-average NPL ratio of 1.6% in 2016.

⁴ www.consilium.europa.eu/en/press/press-releases/2017/07/11/conclusions-non-performing-loans/.

⁵ Note: Only loans above a threshold of EUR 350,000 are reported to the central credit register. Due to this reporting limit, the sample is not entirely representative, especially with regard to loans to the household sector and small and medium-sized enterprises. In addition, the sample only covers domestic activities.

Chart 22

NPLs: a sectoral breakdown of the Austrian loan portfolio



Source: OeNB.

As at end-2016, large banks exhibit elevated but declining NPL ratios in the accommodation and food services (13%), construction (11%) and wholesale and retail trade sectors (7%). At the same time, large regional banks showed above-average NPL ratios in the manufacturing and construction sectors (each 7%). The highest NPL ratios at smaller local banks were observed in the manufacturing (11%), wholesale and retail trade (9%) and food and accommodation sectors (8%). In contrast to large and large regional banks, which recorded a downward trend in their NPL ratios to below the 5% threshold in recent years, smaller local banks recorded a flat trend at more than 5%.⁶

The average NPL ratios of Austrian banking subsidiaries in CESEE have declined over the past twelve months, but some countries are still experiencing elevated levels. At the end of June 2017, the ratio stood at 7.5% for the total loan portfolio (June 2016: 8.6%)

and 11.7% for foreign currency loans (June 2016: 15.3%). Notwithstanding this improvement, the heterogeneity in credit quality across countries remains high. In the Czech Republic and Slovakia, the NPL ratios of Austrian banking subsidiaries are already close to or even below Austrian levels, at 2.8% and 4.1%, respectively, while in other important host markets, such as Romania, Hungary and Croatia, NPL ratios still range between 10% and 17%.

While the overall NPL stock is therefore still elevated, the associated risk has been partly mitigated by high provisioning, with the NPL coverage ratio⁷ of Austrian banking subsidiaries in CESEE standing at 65% in mid-2017. The NPL coverage ratio for foreign currency loans is higher at 68%, reflecting intensified risk provisioning in recent years.

In the European Union, banks' common equity tier 1 (CET1) ratio reached 14.5% as at mid-2017.⁸ By comparison, the Austrian banking system's

NPL ratios of Austrian banks' subsidiaries in CESEE improved further

CET1 ratio reaches all-time high beyond 15%, surpassing the EU average

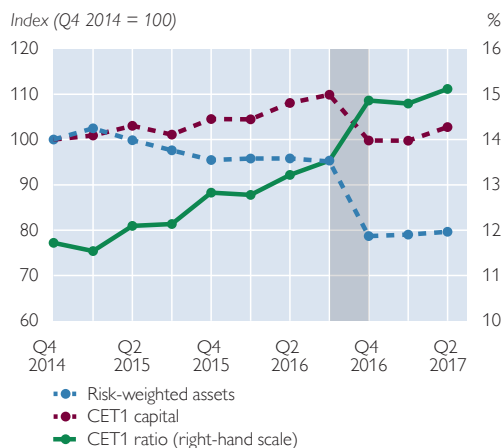
⁶ For a definition of banks' business models, please refer to the study "The profitability of Austrian banks' domestic business from 1995 to 2016: driving forces, current challenges and future opportunities" in this Financial Stability Report (p. 52).

⁷ Defined as the ratio of risk provisions for NPLs to total gross NPLs.

⁸ Source: ECB consolidated banking data.

Chart 23

Development of the CET1 ratio and its components



Source: OeNB.

Note: As from Q4 2016, the CESEE subsidiaries of UniCredit Bank Austria AG are no longer included in these figures (gray highlight).

consolidated CET1 ratio rose to a record high of 15.1%, which is 190 basis points higher than a year ago; and its fully phased-in leverage ratio stood at 7.8%. This marked improvement, which strengthens the Austrian financial system's loss absorbing capacity and stability, is the result of a successful catching-up process to close a historical

capitalization gap, following up on repeated recommendations by the OeNB.

From the end of 2014 until mid-2017, the Austrian banking system saw its CET1 capital increase by nearly 3%, while its risk-weighted assets (RWAs) declined by 20% (see chart 23). The restructuring at UniCredit Bank Austria AG in late 2016 clearly affected these aggregated figures, but the overall trend remains. In the last two and a half years, Austrian banks have continuously strengthened their capital base, while their RWAs fell in 2015 and stabilized thereafter.

This report contains a study on the comparability of Basel risk weights in the EU banking sector, which concludes that “a good portion of [risk weight] variability can be explained by portfolio- and destination-specific risk indicators such as macroeconomic indicators and NPL ratios. [...] However, [the authors] find statistically significant and economically important differences with regard to the country where a bank is headquartered [supported by] evidence that implementation standards differ from jurisdiction to jurisdiction.”

Box 2

Results of the OeNB's 2017 stress tests

This box presents the main results of the OeNB's annual stress tests in 2017 and briefly discusses methodological improvements in the ARNIE stress testing framework.¹

Motivation

The OeNB conducts annual tests for all Austrian banks under its mandate for banking supervision and financial stability assessment. Being focused on less significant institutions (LSIs), the OeNB's top-down stress tests are a meaningful complement to the EU-wide semi-annual stress tests for significant institutions (SIs).² These stress tests not only support supervision but also provide a systemic perspective, which is why the OeNB makes an effort to continually enhance its micro-founded stress test framework for solvency and liquidity.

¹ The OeNB started running top-down stress tests for the Austrian banking system more than a decade ago, see Boss et al. (2004). For a discussion of the current software framework, please refer to Feldkircher et al. (2013).

² For further details, please refer to the EBA website www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing.

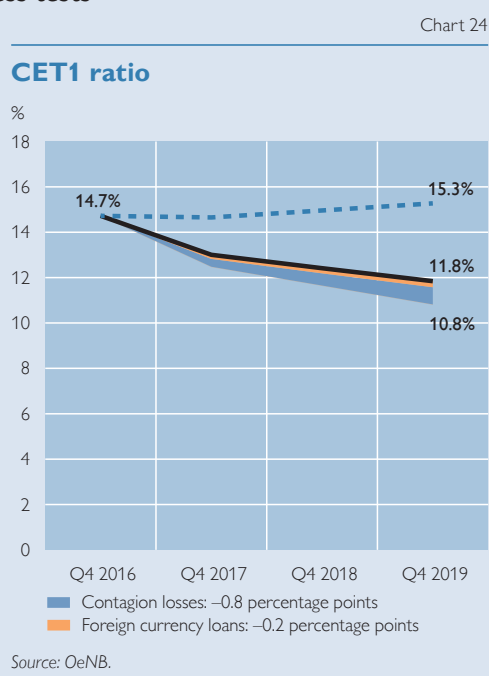
The OeNB's 2017 top-down solvency stress tests were designed to analyze two macro-economic scenarios: a baseline scenario (representing the current macroeconomic outlook) and an adverse scenario (assuming a severe downturn of the global economy accompanied by geopolitical threats and increased risk aversion across financial markets). Moreover, the tests addressed risks that are specific to the Austrian financial system, such as foreign currency loans, a large and interconnected banking sector and the exposures to the CESEE region. In the adverse scenario, Austrian GDP decreased by 6.3 percentage points relative to the baseline, and the GDPs of CEE, SEE and CIS countries decreased by 8.7, 10.5 and 12.5 percentage points, respectively, over a time horizon of three years.

The liquidity stress tests are based on five scenarios, including a macroeconomic scenario, scenarios with different layers of idiosyncratic stress and a combined scenario simulating the most severe run-downs.

Main results of solvency and liquidity stress tests

In the solvency stress tests, the aggregate Austrian banking sector started from a common equity tier 1 ratio (CET1R) of 14.7% at end-2016. This ratio improved to 15.3% in the baseline scenario by end-2019, while it decreased by 3.9 percentage points to a level of 11.8% in the adverse scenario. The impact of further stress factors was simulated with two sensitivity analyses: (i) additional losses from foreign currency lending led to a further decline of the CET1R by 20 basis points; (ii) an analysis of contagion effects revealed a further downward potential of 80 basis points.

As in previous years, the OeNB also conducted liquidity stress tests for a sample of banks based on a stressed maturity ladder of cash flows and liquidity buffers. On balance, i.e. across all currencies, the Austrian banking system was found to be sufficiently resilient against multiple stress scenarios for the liquidity and funding structure.



Low-interest rate environment puts pressure on banks' profitability

In 2017, the OeNB started to develop a new approach for projecting net interest income under stress. The module follows a micro-founded approach taking into account banks' individual balance sheet structures. For each modeled balance sheet item, an average effective interest rate is calculated based on economic considerations. The approach explicitly takes into account interest rate floors for assets and liabilities, asset repricing characteristics and future yield curve developments.

Stress test results show that even in the baseline scenario, i.e. under normal economic conditions, banks' net interest income suffers from the currently low interest rates. The main driver of this result are banks' long-term fixed rate assets (earning relatively high interest rates), which will mature over the stress testing horizon and will be replaced by lower rate assets. This leads to a decrease of operating profits within the next three years of 7%. A rise in interest rates, however, will not necessarily improve banks' profitability because higher credit risk costs are likely to at least partially outweigh increased net interest income.

Methodological improvements

Recent changes in the OeNB's top-down ARNIE stress testing framework are disclosed for improved transparency. Highlights since the last publicly available description – see Feldkircher et al. (2013) – include: (i) a new micro-founded approach based on changes of prices and volumes was developed to project banks' net interest income; (ii) bank and industry participations are now subject to a shock to the book value of at-equity ownership stakes in other entities; and (iii) liquidity stress tests now incorporate a large amount of recently available standardized liquidity risk reporting data.³

Conclusion

The 2017 OeNB stress tests confirm that – against the backdrop of the low interest rate environment, technological change and increased competition – Austrian banks need to make lasting improvements to their operating efficiency and further strengthen their capitalization.

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³ For the EBA ITS on reporting, please refer to <https://www.eba.europa.eu/regulation-and-policy/supervisory-reporting>.

Stable liquidity
situation of Austrian
banks

The liquidity coverage ratio (LCR) was introduced as a regulatory minimum requirement for all institutions at the individual and consolidated level in October 2015. It aims to ensure that institutions have sufficient amounts of highly liquid assets that will enable them to withstand conditions of a pre-defined funding stress for at least 30 days at all times. The LCR minimum requirement is defined as the ratio of high-quality liquid assets (HQLA) relative to stressed net outflows arising over a period of 30 days. Having amounted to 80% in 2017, this ratio will be fully phased in by 2018 to a minimum of 100%.

The weighted average LCR for all Austrian institutions has been stable and well above minimum requirements. As at August 2017, all Austrian institutions reported ratios above the regulatory minimum, with the weighted average

LCR amounting to 138% at the unconsolidated level. The composition of the HQLA has also largely been constant over time. As at August 2017, the buffer is concentrated in the highest category of eligible Level 1 assets with 93%, while the share of Level 1 covered bonds remains at 5%. Level 2a and Level 2b assets account for 1% each. Within the classification of Level 1 assets, government bonds and central bank asset reserves account for more than 80%.

Macroprudential supervision in Austria

One of the three pillars of the Austrian Sustainability Package⁹ adopted by the OeNB and the FMA in 2012 required Austria's three largest banks to monitor the stock and flow loan-to-local stable funding ratios (LLSFRs) of their foreign subsidiaries. With ownership of UniCredit Bank Austria's CESEE subsidiaries

The Austrian
Sustainability
Package improved
the funding balance
in CESEE

⁹ <https://www.oenb.at/en/Financial-Stability/Systemic-Risk-Analysis/Sustainability-of-Large-Austrian-Banks--Business-Models.html>

having been transferred to its Italian parent bank, this monitoring requirement now only applies to the subsidiaries of Erste Group Bank and Raiffeisen Bank International. As at mid-2017, all 23 monitored subsidiaries had a sustainable business model (compliant with the supervisory guidance). Year on year, the aggregated stock-LLSFR remained stable at around 75% and the majority of subsidiaries display a ratio below 80%, which is well below the early warning threshold set at 110%. An important side effect of the strengthened reliance on local funding is the substantial decrease in gross intra-group liquidity transfers from Austrian banks to CESEE credit institutions, which have halved since end-2011, coming to EUR 23 billion in mid-2017.¹⁰ Notwithstanding the overall improvement in the balance of Austrian CESEE subsidiaries' refinancing structure, the LLSFR pillar requires continued supervisory monitoring in order to avoid potential future boom-bust cycles in local lending.

The other two pillars of the Sustainability Package required the three parent banks to increase their capital base and to ensure that they had adequate recovery and resolution plans in place to face potential crisis situations. From the viewpoint of the Sustainability Package, the banks concerned – which all qualify as significant institutions under Europe's Single Supervisory Mechanism (SSM) – complied with these two requirements in the past. The related supervisory objectives have since been cast into new legal and institutional frameworks: Significant institutions' capitalization requirements are

now defined by the SSM's microprudential supervisory review and evaluation process (SREP), and the macroprudential capital buffers are set by the Austrian authorities.¹¹ Furthermore, the ongoing work on recovery and resolution plans is now governed by the European Bank Recovery and Resolution Directive under the aegis of the ECB and the European Single Resolution Board, respectively.

In sum, the Austrian Sustainability Package has successfully strengthened financial stability both in Austria and in the subsidiaries' host countries over the past five years and may therefore be considered a supervisory success. While the objectives relating to banks' capitalization and to recovery and resolution planning are now being pursued by other means, the funding situation of foreign subsidiaries requires continued supervisory monitoring along the lines of the Sustainability Package.

The OeNB's assessment of real estate-induced systemic risks is based on a comprehensive approach taking into account developments in real estate prices, the resilience of borrowers, the risk-bearing capacities of lenders, and the market structure and institutional factors influencing the real estate market in Austria.

Real estate-induced systemic risks remain subdued in Austria, largely due to the fact that Austrian households have low and decreasing indebtedness on an aggregate level, while mortgage borrowers feature income and wealth levels well above those of the median household. Property price growth has come down considerably, as described in the chapter on the Austrian corpo-

Systemic risks from the domestic real estate market remain subdued

¹⁰ Note: Bucking the general trend of decline, transfers to the Czech Republic skyrocketed over the past two years and now make up just over half of all transfers, although the relevant subsidiaries' refinancing position is typically strong.

¹¹ For further details regarding macroprudential capital buffers, please refer to www.fmsg.at/en.

Macprudential instruments to address systemic risks in the real estate market

rate and household sectors, and annual mortgage loan growth remained stable below 5% as at mid-2017.

Austrian banks' exposure to residential real estate, measured by loans to households collateralized by real estate in relation to their capitalization, is low (182% of consolidated CET1 capital) compared to other EU economies. The stock of mortgage loans remains of high quality as the proportion of non-performing real estate loans to domestic borrowers in total loans remains low (1.6% as at mid-2017).

With regard to new mortgage lending, the OeNB has, together with the Financial Market Stability Board (FMSB) and the Financial Market Authority (FMA), launched a sustainability initiative aimed at reducing the emergence of real estate-induced risks to financial stability. In this regard, the FMSB recommends that lenders, when

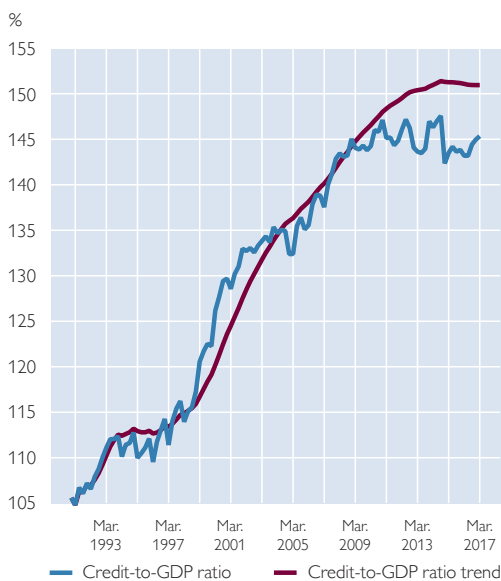
granting residential real estate loans, ensure that borrowers provide a minimum down payment and have sufficient buffers of disposable income.

In August 2017, paragraph 22b of the Austrian Banking Act entered into force, defining a set of macroprudential instruments¹² designed to contain systemic risks stemming from real estate financing. This legislation empowers the FMA to issue a regulation specifying upper limits to loan-to-value (LTV), debt-to-income (DTI) and debt-service-to-income (DSTI) ratios or mortgage loan maturities, subject to assessment by the OeNB and approval by the Austrian Ministry of Finance. Further, the FMA can specify minimum amortization requirements or rules regarding reciprocation on measures. The law is flexible in nature, allowing the FMA to differentiate measures according to type and amount of funding (e.g. de

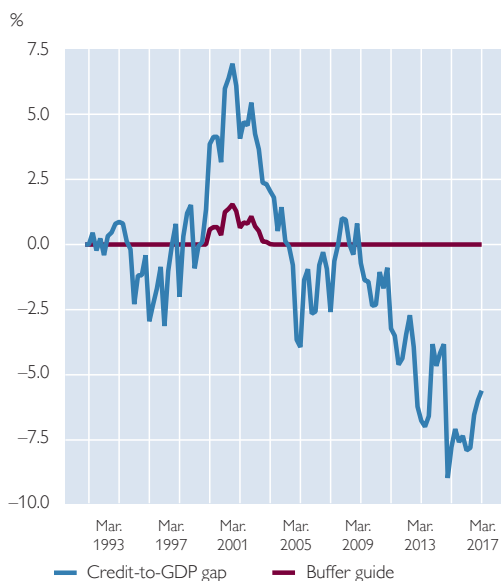
Chart 25

Credit-to-GDP

Ratio and trend



Gap and CCB buffer guide



Source: ECB, national central banks, Eurostat.

¹² Published in Austria's Federal Law Gazette on September 15, 2017: (original text in German) https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2017_I_136/BGBLA_2017_I_136.html. Opinion of the ECB in English: https://www.ecb.europa.eu/ecb/legal/pdf/en_con_2017_21_signed.pdf.

minimis quotas). Finally, as of July 2018, the FMSB can issue a recommendation to the FMA to activate macroprudential instruments when it detects systemic risk stemming from real estate financing.

Lenders have broadly adhered to sustainable lending standards so far, however. Nevertheless, some developments warrant heightened supervisory vigilance: The OeNB's mortgage lending survey indicates a recent spike in the share of new mortgage lending with relatively high LTV, DSTI and DTI ratios. These developments confirm the importance of the FMSB's recommendation on sustainable lending standards in real estate.

Given that the main indicator (credit-to-GDP gap) for all credit aggregates used remains negative (as in previous quarters), there are no signs of excessive credit growth in Austria. Therefore, the FMSB recommends that the FMA leave the countercyclical capital buffer rate at 0% of risk-weighted assets as at January 1, 2018.

Another tool, the systemic risk buffer (SRB), is necessary to mitigate long-term noncyclical systemic risks. It aims to increase the risk-bearing capacity of the Austrian banking system and, in a medium- and long-term perspective, to minimize the risks to the Austrian banking system. The SRB was activated in Austria in January 2016 for 12 identified institutions.¹³ The SRB's re-evaluation showed that the implementation of the SRB has been effective and that

risks have been reduced without any unintended consequences such as a reduction in bank lending. This relates above all to the decrease in structural systemic risks, as Austrian banks both improved their capitalization and downsized their foreign business.

Risk-mitigating factors notwithstanding, the structural systemic risk in the Austrian banking sector continues to be elevated. Key risks for the Austrian banking system emanate above all from the still substantial exposures to emerging markets in Europe and from banks' specific ownership structures. Based on these risk-enhancing characteristics, the OeNB identified two main risk channels for the Austrian banking system in 2015 (systemic vulnerability¹⁴ and systemic cluster risk¹⁵), which have since been confirmed.

Based on a comprehensive assessment, the OeNB finds that the SRB should be maintained yet reduced (compared with the original assessment in June 2015¹⁶) to a maximum of 2% in common equity tier 1 (CET1) of risk-weighted assets. The reduction is warranted because Austrian banks' foreign exposure to emerging markets has been scaled back considerably, the remaining exposure has been reallocated towards less risky countries, and the risk situation in those countries is characterized by positive, if heterogeneous developments. With regard to the calibration of the SRB for the two risk components, the SRB for addressing systemic vulnerability should be maintained at 1%

Countercyclical capital buffer stays at 0%

Better capitalization and downsizing of the foreign exposures

Systemic risk buffer has no negative consequences

¹³ <https://www.fmsg.at/en/publications/press-releases/2015/fifth-meeting.html>.

¹⁴ Systemic vulnerability arises due to increased vulnerability of one or more credit institutions resulting from disruptions in the financial system or parts thereof because of the interconnectedness of the credit institution(s) with other market participants or the financial system in general.

¹⁵ Systemic cluster risk results from substantial similar risk positions in the banking industry, which can lead to disruptions that may have serious negative effects on the financial system and the real economy.

¹⁶ In its fourth meeting, on June 1, 2015, the FMSB had originally decided to recommend activation of the systemic risk buffer up to a total of 3% to strengthen the Austrian banking sector. However, since SREP ratios were markedly higher than those on which the original recommendation was based, the recommendation was limited to up to 2% in the fifth meeting, on September 7, 2015.

and the SRB for addressing systemic cluster risk should be reduced from a maximum of 2% to 1%.

These systemic risks may manifest themselves both at the consolidated and the unconsolidated level. Moreover, within cross-border banking groups, capital allocation in crisis situations may not be flexible. Therefore, the FMSB recommends that the SRB should also be applied at the unconsolidated level for seven credit institutions.¹⁷ The overall SRB evaluation on the consolidated level will be completed by the end of the first half of 2018.

In line with the EBA's recommendation, the OeNB identified six "other systemically important institutions" (O-SII). Accordingly, the systemic importance of institutions was assessed using ten mandatory indicators referring to the four following criteria: size, importance (including substitutability/financial system infrastructure), complexity/cross-border activity and interconnectedness. The following table shows the identified institutions, their respective systemic importance in 2016 and in 2017 (measured by a score) and the resulting capital buffers.¹⁸

Report explaining the OeNB's role in banking supervision

Regarding microprudential supervision, the OeNB deems transparency to be a key factor of effective banking supervision, in particular within the context of the SSM, where many institutions are involved. Therefore, the OeNB recently published a report regarding its role as an integral part of banking supervision, focusing on the key aspects and results of its work.¹⁹

Foreign currency loan volumes continue to decline, but repayment risks remain

Stepped-up supervisory efforts aimed at curbing foreign currency lending have proven to be effective, as the outstanding volume of foreign currency loans (FCLs) continued its year-long downward trend in 2017. Over the last twelve months alone, FCLs to domestic nonfinancial borrowers declined by 14.1% on an exchange rate-adjusted basis. At the end of June 2017, these loans accounted for around EUR 27.3 billion, with the majority relating to households, and with the Swiss franc being the predominating currency. The share of FCLs in total loans to households dropped to 12.5% as at June 2017 (from 15.4% a year before).

Even though the volume of domestic FCLs has been declining steadily, they still entail potential redemption risks at maturity, especially since around three-quarters of these loans are bullet loans linked to repayment vehicles (RPVs, usually a life insurance policy). In this case, the borrower pays regular contributions into an RPV to make a

Identification of systemically important institutions

Total funding shortfall of repayment vehicles at EUR 6 billion

Table 1

Other systemically important Austrian institutions

Bank	2016 score	2017 score	Capital buffer
Erste Group Bank AG	1,856	2,231	2%
Raiffeisen Bank International AG	1,495	1,795	2%
UniCredit Bank Austria AG	2,056	1,223	2%
Raiffeisenlandesbank OÖ AG	412	466	1%
BAWAG P.S.K. AG	404	421	1%
RAIFFEISEN-Holding NÖ-Wien reg. Gen.m.b.H.	282	325	1%

Source: OeNB.

¹⁷ <https://www.fmsg.at/en/publications/warnings-and-recommendations/2017/recommendation-fmsg-4-2017.html>.

¹⁸ <https://www.fmsg.at/en/publications/press-releases/2017.html>.

¹⁹ The report is only available in German (https://www.oenb.at/dam/jcr:0397afa4-ea9b-436a-9ae0-13005d7e32f7/bankenaufsicht_sept_2017.pdf).

single bullet repayment at the end of the loan term. Thus, these borrowers are exposed to two main risks: first, the risk that the amount to be repaid at maturity increases as a result of foreign currency appreciation (exchange rate risk) and second, the risk that the RPV fails to reach the originally assumed performance, causing the amount saved to fall short of the entire loan repayment due at maturity (performance risk). Both risks may lead to a funding shortfall between the expected final value of the RPV and the amount outstanding at loan maturity. Monitoring the development of RPVs with a view to assessing the potential funding shortfalls, the OeNB in cooperation with the FMA, conducts a yearly survey among a representative sample of Austrian banks.²⁰ The results of this year's survey show that at the end of 2016, the estimated total shortfall stood at EUR 6.0 billion or 32% of the outstanding volume (see chart 26).²¹ This shortfall is primarily a result of the strong appreciation of the Swiss franc against the euro in the period during which these loans have been outstanding. As at mid-2017, Austrian banks and their borrowers still have some time to address the issue, as three-quarters of all RPV loans are loans with a remaining maturity of more than seven years. Especially against the background of the revised version of the FMA Minimum Standards,²² which are aimed at increasing transparency and strengthening risk awareness, the OeNB strongly recommends that banks and borrowers intensify their bilateral negotiations on measures that enable sustainable, tailor-made solutions and thereby mitigate risks stemming from these loans.

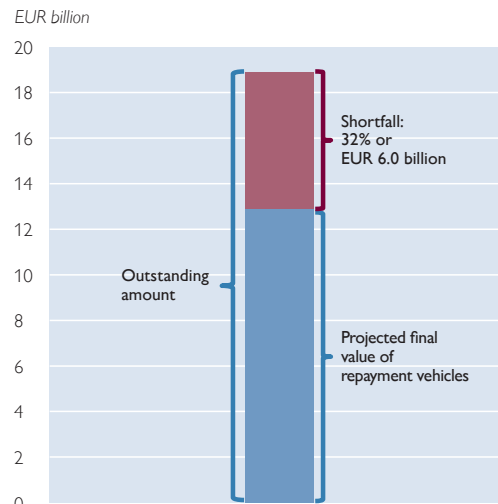
²⁰ The survey sample covers about 90% of outstanding domestic RPV loans.

²¹ Please note that due to future currency movements and the performance of RPVs, both are volatile figures.

²² A revised version of the "FMA's Minimum Standards for the Risk Management and Granting of Foreign Currency Loans and Loans with Repayment Vehicles" entered into force on June 1, 2017. For more details on the latest version see <https://www.fma.gv.at/download.php?d=2885>.

Chart 26

Shortfall of repayment vehicles (as of end-2016)¹

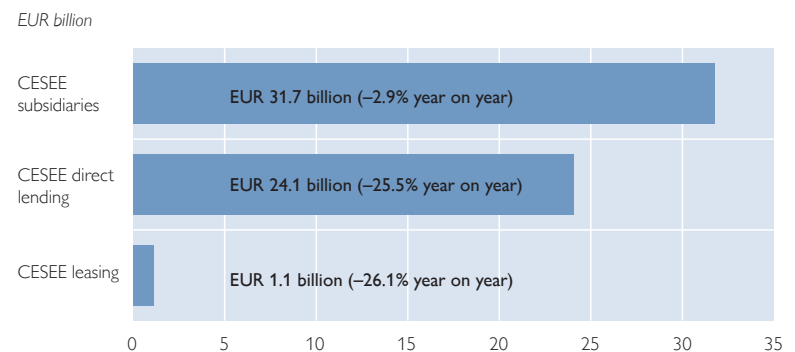


Source: OeNB.

¹ Most recent survey was conducted in spring 2017.

Chart 27

Foreign currency loans of Austrian banks to CESEE borrowers (growth rates from Q2 2016 to Q2 2017)



Source: OeNB.

Note: Growth rates are not adjusted for exchange rate effects.

In line with the ongoing downward trend of foreign currency lending in Austria, Austrian banks also continue to reduce their FCLs in CESEE. As at June 2017, their total FCL exposure including lending via banking subsidiaries, cross-border lending as well as leasing had decreased by 14.4% year on

Austrian banks
continue to reduce
their FCLs in CESEE

year to EUR 57 billion (see chart 27), with the main contributor to the decline being cross-border lending, which dropped by 25.5% to EUR 24 billion. Foreign currency lending via subsidiaries declined to EUR 32 billion (–2.9% year on year) and foreign currency leasing came down to EUR 1.1 billion.

In recent years, the currency composition of FCLs at subsidiaries has become more and more dominated by the euro, as three-quarters of all FCLs are euro-denominated (versus 56% at the end-2010), while the rest is denominated in Swiss franc (12%) and U.S. dollar (11%).

Box 3

Crisis management for less significant institutions (LSIs): objectives, a new framework and the role of the OeNB

Recent crisis experience at European LSIs has shown that there is a need to enhance the processes for LSI crisis management and related information exchanges between the Single Supervisory Mechanism (SSM) and the national competent authorities (NCAs) and, where appropriate, other stakeholders, e.g. the national resolution authorities (NRAs), the Single Resolution Board (SRB) or the European Commission. The SSM's efforts to improve this process will lead to closer cooperation and communication between the ECB and national authorities (including central banks) in crisis situations. In case a need should arise for SSM involvement, the ECB will be informed by the respective national direct supervisors before an LSI reaches a point of nonviability, prompting the ECB to assume a coordinating role when the LSI's situation becomes critical, in particular once the withdrawal of its authorization is on the horizon. However, not all financial adversity necessarily leads to cases of an LSI being in crisis. Against this backdrop, the following criteria have to be defined:

- a definition of an LSI in crisis (including the determination process and the elements to be taken into account);
 - the required collaboration and information exchange, including the supervisory history, the submission of information to the ECB and communication with other stakeholders.
- Accordingly, a common understanding for LSI crisis management has to be reached focusing on:
- NCAs' internal procedures for dealing with LSIs in crisis;
 - cooperation with the NRAs or the SRB for LSIs under the SRB's remit (also in relation to LSI common procedures);
 - cooperation with other relevant external stakeholders that are to be involved in LSI crisis management procedures;
 - communications with the public.

Apart from crisis management for LSIs, there are several other international activities aimed at further detailing and harmonizing aspects of crisis management. First, the European Banking Authority (EBA) has provided a recommendation regarding the coverage of material entities in group recovery plans, which encourages banks to combine relevant information for all material entities into a single integrated group recovery plan. Moreover, the EBA specified the level of detail at which material entities should be covered, based on the relevance of their critical functions. Second, there are intense discussions at the SSM and the EBA on the correct calibration of recovery indicators, in particular for capital and liquidity. While calibration will always depend on the specifics of an institution, general guidelines should help to ensure a harmonized approach throughout the banking sector.

These efforts to improve the planning and execution of crisis management undertaken at the European level enhance the European and Austrian authorities' readiness to act in case a bank were to face a crisis.

Low interest rates and new regulatory environment prompt other financial intermediaries to adjust portfolios

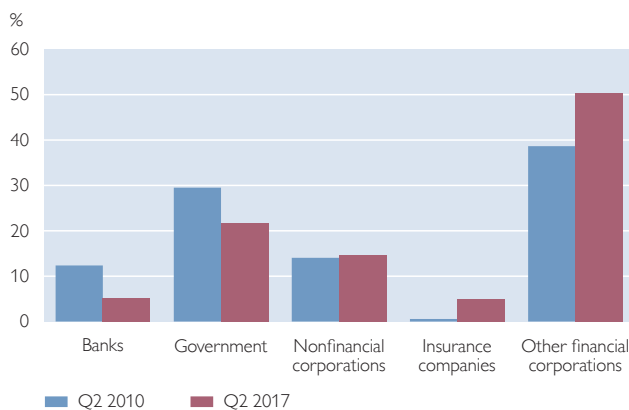
The low interest rate environment has resulted in a considerable change in the asset allocation decisions of insurance companies, pension funds and severance

funds. All three categories of institutional investors moved out of bank bonds in an abrupt shift into securities of nonfinancial corporations and other financial corporations. This can be interpreted as an indication of search-for-yield behavior, which is typically associated with higher risks.

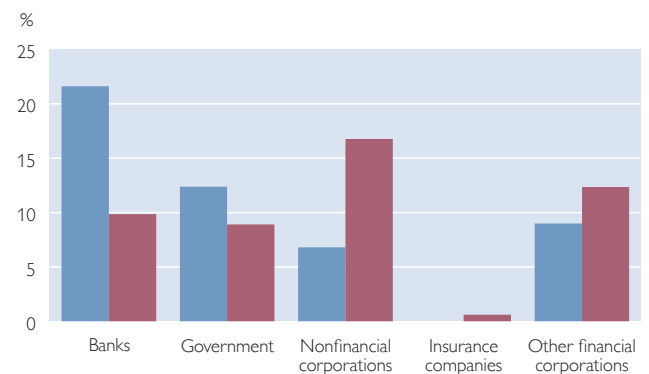
Chart 28

Considerable changes in the investment behavior of Austrian pensions funds and severance funds

Asset allocation of pension funds' investments in securities



Asset allocation of severance funds' investments in securities

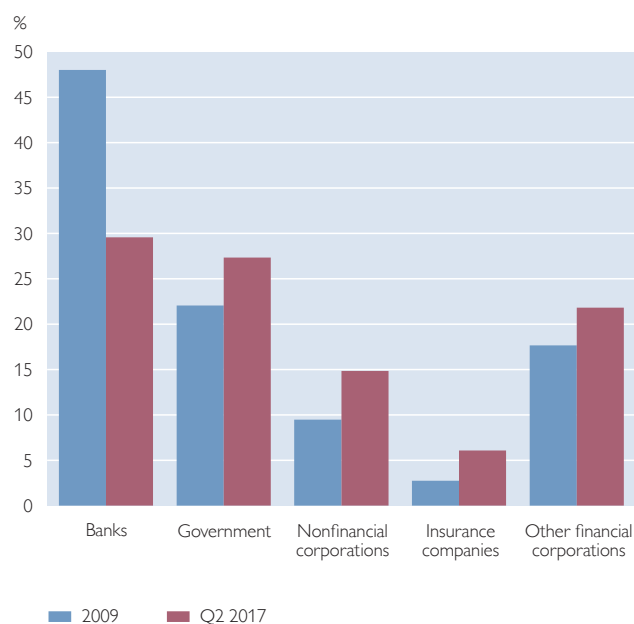


Source: OeNB.

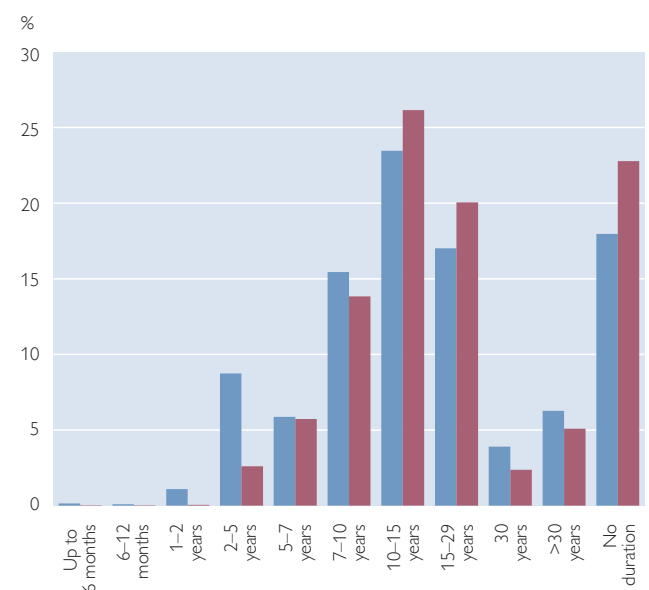
Chart 29

Considerable changes in the investment behavior of Austrian insurance companies

Asset allocation of insurers' investments in securities



Original maturity of insurers' investments in securities



Source: OeNB.

The Austrian insurance sector is adapting to the macroeconomic environment as well as to regulatory challenges such as Solvency II. The implementation of these new rules and the low interest rate environment are factors driving the investment behavior of insurance companies. From 2009 to mid-2017, they significantly reduced their aggregated exposure to financial sector securities (–11 percentage points), although no clear market trend across all insurance companies has been detected. This is due to the fact that the Austrian insurance market is very heterogeneous, with a small number of large insurance undertakings accounting for the majority of assets (e.g. the top 5 undertakings account for more than 70% of total assets). The companies for which search-for-yield behavior was observed shifted assets within fixed income portfolios towards higher-yielding securities (e.g. corporate bonds)

with lower credit quality and longer durations.

This is reflected in the charts above, which show aggregated numbers for the total market. There has also been a shift in asset duration, from short durations (2 to 5 years) towards the 10-to-15-year and 15-to-29-year duration bands, as the low-yield environment makes short-term securities particularly unattractive.

The new market conditions have been particularly significant for life insurance companies, with premiums having decreased by approximately 7% or more per annum as at mid-2017. This decrease was mainly driven by a fall in single premiums. The insurance sector continues to respond to this challenging environment by shifting its business mix toward products that are directly linked to market performance, whose investment risk is borne by policyholders.

Special topics

Profitability of Austrian banks' domestic business from 1995 to 2016: driving forces, current challenges and future opportunities

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This study analyzes how Austrian banks generated profits in their domestic business over the last two decades, i.e. from 1995 to 2016, while paying close attention to the heterogeneity in business models. We focus on the period after the global financial crisis (GFC) and the challenges it entails, in order to highlight the most important trends and their potential repercussions on the medium-term sustainability of banks' profits and consequently Austria's financial stability. We find that banks and their income grew strongly before the GFC at the expense of their margins, whereas this trend went into reverse after the crisis hit. Operating expenses increased steadily until recently, when cuts in staff-related expenses started to show effects. Higher credit risk costs were another consequence of the GFC, but the sector-wide ratio of nonperforming loans never surpassed 5%. All of these developments resulted in strong volatility in the return on (average) assets (ROA) after the onset of the GFC and – supported by historically low loan loss provisioning – a recent return to pre-crisis levels. Overall, smaller local banks generated above-average ROAs. Large banks underperformed, while large regional banks performed in line with the banking sector average. In the near future, improvements in operating profitability in a highly competitive market are likely to depend on banks' pricing power and their ability to use the currently calmer environment to address structural cost issues, to tap new sources of income whose pricing adequately reflects risks and to ready themselves for the digitalization of their business.

JEL classification: G01, G21

Keywords: banking, financial crisis, Austrian banks, bank profitability, net interest income, net interest margin, investment income, fees and commissions income, operating expenses, cost-income ratio, credit risk, nonperforming loans

The sustainable profitability of banks is an important building block in strengthening a financial system's stability, as it allows banks to fulfill their important role as financial intermediaries in the economy and to build up loss-absorbing capacity for future downturns. In this study, we analyze the unconsolidated profitability of Austrian banks based on their domestic business (which includes direct cross-border activities) from

1995 to 2016. This period includes both the global financial crisis (GFC)² and the current low interest rate environment. We place special emphasis on how different business models fared.³ The paper is structured as follows: in section 1, we start by characterizing banks' business models. Section 2 then analyzes operating income in detail, focusing in particular on interest and non-interest income. Section 3 is dedicated

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² We use the term GFC for the bank crisis that followed the collapse of the U.S. investment bank Lehman Brothers in September 2008.

³ Given our long time series of 22 years and the Austrian banking system's fragmentation, the bank sample is highly variable over time. Amounting to over 1,000 in 1995, the number of banks was still high in 2016 (at more than 600). It should also be noted that due to the lack of consolidation in unconsolidated figures, profits in decentralized sectors are subject to an upward bias. Together with the study undertaken by Kavan et al. (2016), which looked at Austrian banking subsidiaries in Central, Eastern and Southeastern Europe, this study complements the picture regarding the history of and the medium-term outlook for Austrian banks' profitability.

to operating expenses, while section 4 takes a close look at credit risk costs. Section 5 provides a final overview, where we use waterfall charts for revenues and expenses and compute returns on assets, before section 6 summarizes the findings of this study.

1 The characterization of distinct business models

In order to gain further insight when analyzing the profitability of Austrian banks' domestic business, we first assign each bank to one of seven business models, which we characterize as follows:⁴

- large banks that typically operate nationwide;
- large regional banks that typically operate in a single larger region or federal province (Bundesland);
- smaller local banks that typically operate in a single smaller region or town;
- private banks offering specialized services, typically to wealthier individuals (e.g. wealth management);
- building and loan associations (Bausparkassen) that focus on savings and mortgage products;
- special purpose banks that offer a highly heterogeneous set of services (e.g. asset management, investments, private pensions, car financing); and
- other joint stock banks.

These general business model characteristics translate into differences in terms of the banks' size and their profit generation. As of 2016, large banks and large regional banks together accounted for nearly two-thirds of all unconsolidated total assets of the Austrian banking sector (with nearly

one-third each). Smaller local banks represent by far the highest number of banks in Austria, but combined hold only around 15% of the sector's total assets. The other business models are less significant in Austria, as the respective banks hold only between 2% and 4% each of the Austrian banking sector's total assets. When we analyze the structure of each business model's profit and loss statement, the following differences become evident: while large regional banks typically reflect the average structure of the Austrian banking sector, large banks derive an above-average share of their income from investments and allocate a high share of their expenses to risk provisions. Both smaller local banks and building and loan associations are highly dependent on net interest income. However, the former stand out as having a higher share of personnel expenses, while the latter spend more on administration. Private banks tend to earn most of their income from fees and commissions and record an above-average share of personnel expenses. Special purpose banks are characterized by a high share of "other" income (mostly from leasing) and by a low share of net interest income.

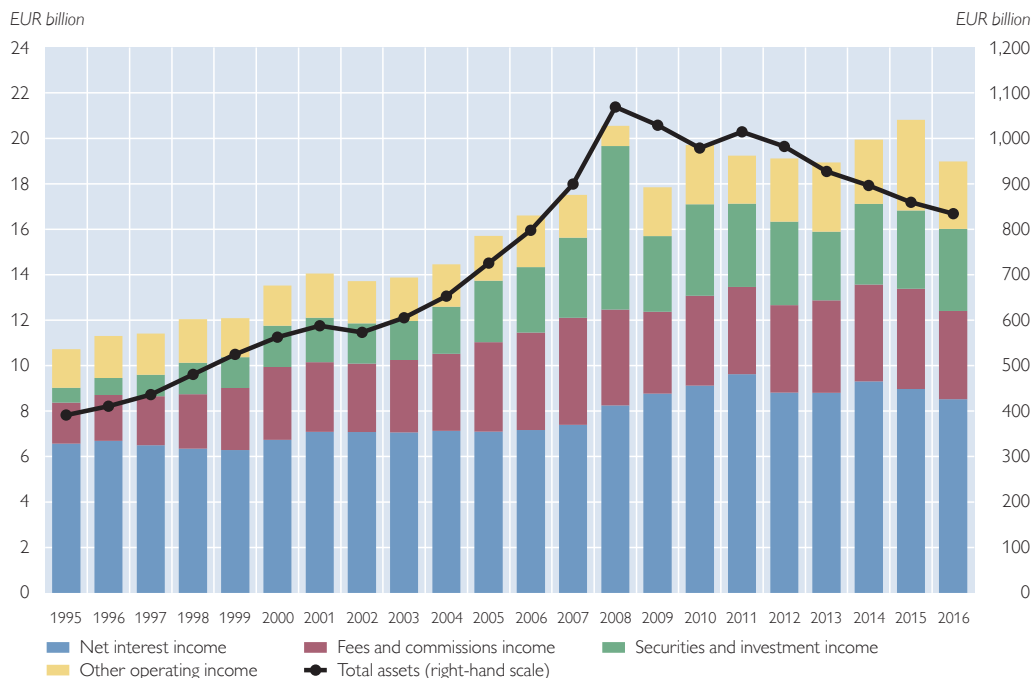
2 Operating income relies strongly on net interest income, while income from fees and commissions, securities and investments gained in importance

Before the GFC, the operating income of Austrian banks nearly doubled from 1995 to 2008, but its rise was not as strong as the balance sheet expansion (see chart 1), which points to a compression of the operating income

⁴ We did not analyze in detail Austrian credit institutions that are guarantee banks, bad banks, foreign branches located in Austria or banks that are otherwise not involved in standard banking operations.

Chart 1

Breakdown of Austrian banks' domestic operating income



Source: OeNB.

margin.⁵ During this benign phase of the financial cycle, net interest income was more or less flat (especially in the early 2000s), while fees and commissions income more than doubled, and income from securities and investments increased substantially (more than five-fold between 1995 and 2007, before doubling in 2008), as some banks and bank customers expanded their capital market activities.

After the onset of the GFC, several of these trends went into reverse. From end-2008 to end-2016, the volume of total assets dropped by one-fifth, while operating income declined by less than one-tenth. Net interest income improved in the immediate aftermath of the crisis before being negatively affected by the low interest rate environment. Securities and investment income remained close to its 2007 pre-crisis level. Fees and

commissions income barely recovered from the impact of the GFC, dropping by one-quarter between 2007 and 2009. The following subsections analyze these developments in more depth.

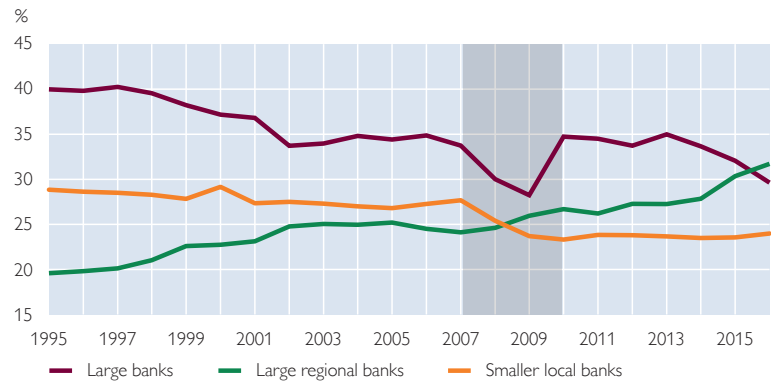
2.1 Net interest income is the most important domestic income source and was affected by distinct pre- and post-GFC price and volume effects

Net interest income (NII) is by far the most important source of domestic income for Austrian banks. However, the above-described developments caused the share of NII in operating income to drop from 61% to 40% between 1995 and 2008, before recovering only slightly thereafter (2016: 45%, as can be inferred from chart 1). This substantial relative decrease is attributable to clear endogenous trends in both

⁵ See Gruber, Kavan and Stockert (2017) for further details regarding an adapted DuPont analysis of banking profitability, including the concept of the operating income margin.

Chart 2

Business models' share in net interest income



Source: OeNB.

Note: The figures for 2008 and 2009 are influenced by the temporary reporting of a large investment bank (classified as a special purpose bank, not shown here).

pricing (i.e. total spread/margin) and volumes of interest-earning assets underlying the NII, as well as to the dynamic rise in non-interest income before the GFC. Subsections 2.2 and 2.3 will explain the latter, but we will first focus on the drivers of banks' NII.

As a starting point, it is worth noting that three types of banks have dominated the Austrian banking sector's unconsolidated NII, accounting for an aggregate share of more than 80% over the analyzed time span. Their relative importance varied over time, however. From 1995 to 2016, large and smaller local banks both saw their respective shares in total NII drop from 40% and 29% to 30% and 24%, while large regional banks rose to the top spot, as their share in total NII expanded from 20% to 32% (see chart 2). To analyze these shifts in more detail, we dissect the changes in the NII for these three business models "into a volume and a price effect, using the total spread (i.e. a margin/price) on interest-earning assets and interest-bearing liabilities (i.e. volumes) according to a formula proposed by the ECB. This formula defines the total spread as the combination of a spread – i.e. interest revenue per interest-earning asset (IEA) minus interest expense per interest-bearing liability (IBL) – and an endowment effect, which 'measures the gain from the fact that some part of IEA does not have an interest cost. [...] This calculation disregards the cost of equity capital.'"⁶

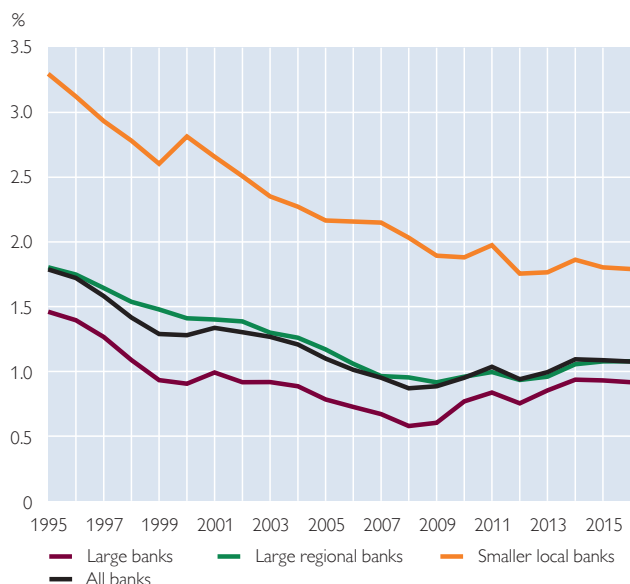
The left-hand panel of chart 3 highlights the pricing side: the total spread of Austrian banks' domestic business fell by half before the crisis, from 1.8% in 1995 to 0.9% in 2008, before recov-

ering slightly to 1.1% in 2016, when both the yield on IEAs (2.0%) and the cost of IBLs (0.8%) were at their historical lows due to the low interest rate environment. These challenging market trends affected business models to various degrees, however. On the one hand, smaller local banks witnessed a substantial fall in their total spread over the last two decades, and it still remains under pressure. After all, their business model typically relies on funding from deposits, whose rate is subject to a natural zero lower bound, while their interest income often depends on variable rate loans that are linked to currently low (or even negative) inter-bank offered rates, such as the EURIBOR.⁷ On the other hand, large banks' and large regional banks' total spread fell by slightly less than average before the GFC (albeit from a lower starting point) and managed to recover some of these losses in the years thereafter.

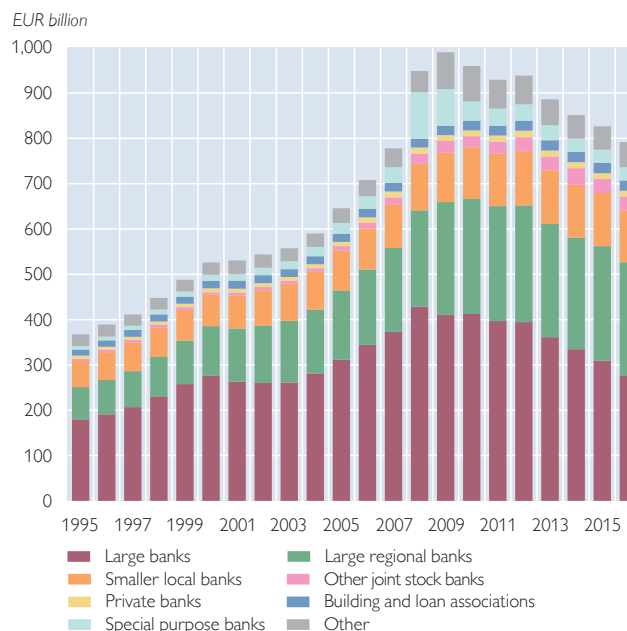
⁶ See Kavan et al. (2016, pp. 67–69) for an application of this methodology and ECB (2000, p. 27) for the underlying formula.

⁷ See Kerbl and Sigmund (2016), who offer more details on the impact of the negative interest rate environment. They also "find that small regional banks are hit hardest [by a negative interest rate environment]. These banks have a high share of deposits and are more sensitive to changes in the reference rates."

Austrian banks' total spread in their domestic business



Austrian banks' average interest-earning assets in their domestic business



Source: OeNB.

The right-hand panel of chart 3 shows the development of IEA volumes over time. They grew by more than 150% from 1995 to 2008 and declined by nearly one-fifth after the onset of the GFC.

With regard to the three most important types of Austrian bank business models, there are three main findings. First, large regional banks tripled their IEAs from 1995 to 2008. In contrast, large banks (+138%) and especially smaller local banks (+80%) expanded their IEA volumes more gradually and at a below-average pace. Second, after the onset of the GFC, large banks scaled back their IEAs by more than one-third from 2008 to 2016. Large regional banks and smaller local banks continued growing until 2012, before roughly stabilizing their volumes.

Third, and consequently, large banks that owned roughly half of all IEAs before the GFC witnessed a continuous decline of their share until 2016 (to slightly more than one-third of IEAs). At the same time, the large regional banks nearly caught up by raising their share from less than one-fifth in 1995 to nearly one-third in 2016.

Over the last two decades, shifts in the IEA mix appear to be linked to the spreads banks faced in different product segments.⁸ Throughout the period under review, the spread earned (before risk) on loans and advances was higher in the nonbank business than in the interbank business, given that, in the latter segment, competition is considered to be fiercer and credit risk to be lower. Before the GFC, however, the spread on nonbank business had declined, while the spread

⁸ This spread analysis is based on the difference between product-specific IEA yields (for loans and advances to banks or nonbanks) and the average cost of IBLs.

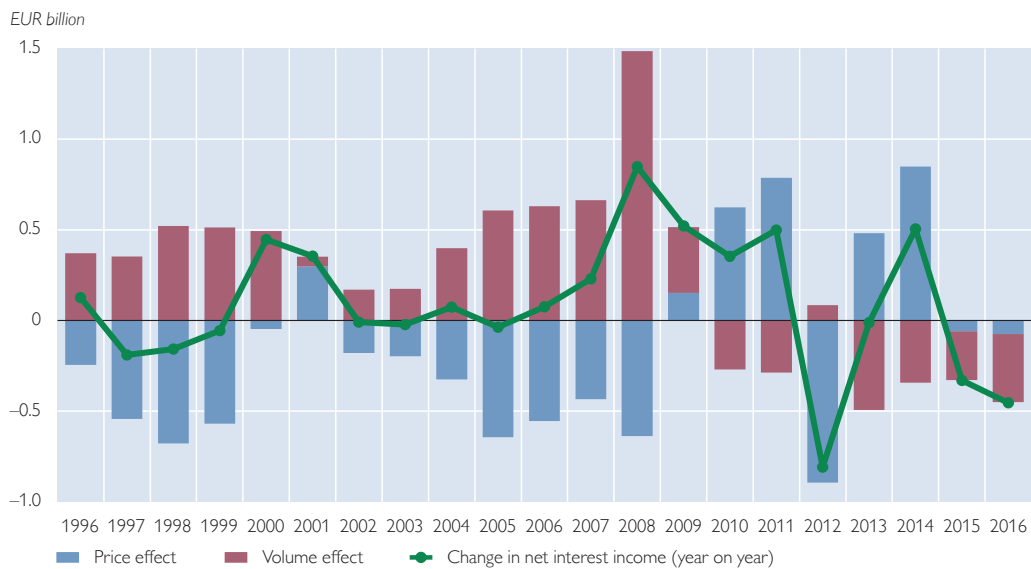
on interbank business had been rather stable. Therefore, it became relatively more attractive for banks in the pre-crisis years to increase their interbank assets to offset the prevailing pricing pressures, as they could expand more quickly, in higher volumes and at lower relative operating expenses (e.g. without a dense branch network). During these years, debt securities also gained in importance in Austrian banks' IEA portfolio.⁹ After the crisis, the picture changed, as the spread improved slightly in the nonbank business, but decreased in the interbank business. In this altered environment, banks cut back on their previous growth areas (i.e. activities in the interbank and debt securities markets) and refocused on

pricing, which had nonbank business regain importance.¹⁰

Combining the above-described pricing and volume effects, we conclude that NII was affected by clear pre- and post-GFC trends (see chart 4). In a highly competitive domestic market, the total spread was substantially compressed before 2008, which had a negative price effect on NII. At the same time, banks expanded their IEA volumes to stabilize and protect their main source of income. In the years following the onset of the GFC, the opposite was observed, as banks scaled back their aggregate IEA volumes, while focusing on earning higher total spreads to improve their NII (except for 2012¹¹). In the last two years under observation – 2015

Chart 4

Drivers of net interest income of Austrian banks in their domestic business



Source: OeNB.

⁹ Debt securities are also interest-earning assets, besides loans and advances.

¹⁰ See pp. 43–45 of this Financial Stability Report to learn more about growth in mortgage loans in Austria and the related financial stability considerations.

¹¹ In 2012, smaller local banks were particularly affected by the spread compression. The three-month EURIBOR strongly declined that year and smaller local banks barely profited from lower IBL costs (as their deposit rates were not directly linked to the EURIBOR). At the same time, the yield earned on their IEA declined markedly, as the interest rate of loans was typically linked to interbank offered rates.

and 2016 – this trend came to a halt given a small negative price effect that arose from the low interest rate environment. With the latter taking its toll, NII in domestic business declined. It is interesting to note the following: First, the sign of the (price/volume) effect was the same across all business models in most years.¹² Second, price effects were very significant for smaller local banks and the reduction of IEA volumes after 2008 was particularly striking with regard to large banks. And, third, large regional banks became the top NII earners, experiencing an average price effect and strong IEA volume growth (in particular before the GFC).

2.2 Net fees and commissions income reflects cyclical developments; expanding it proved difficult in recent years

Net fees and commissions income (NFCI) was the second most important source of income for Austrian banks in the period under review (see chart 1). However, with traditional retail banking prevailing, its role is subordinate to NII. NFCI typically accounted for less than one-quarter of total operating income between 1995 and 2016. As the left-hand panel of chart 5 shows, payments and the securities business are the two most important contributors to NFCI, accounting for around two-thirds. Over time, NFCI also displays clear procyclical trends that were largely caused by the securities business, which exhibited pronounced upswings in line with financial market developments (peaks in 2000 and 2007). Since the onset of the GFC, however, the share of NFCI in the total operating income of Austrian banks has been fairly stable, at around 20%.

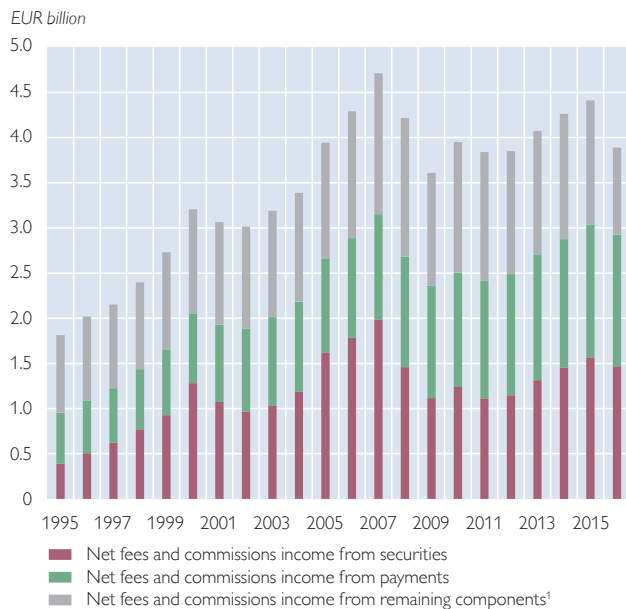
From a business model perspective and as highlighted in the right-hand panel of chart 5, smaller local banks continuously increased the share of NFCI in total operating income (to 23% in 2016). By contrast, in the case of large banks, this figure declined strongly after the GFC, even dropping below the level recorded in 1995 (2016: 15%). At a more granular level, the following trends are noteworthy over the last two decades:

- NFCI from the securities business – which is particularly important for private and special purpose banks – gained in significance across all business models (except for smaller local banks): its share in total operating income doubled from 4% in 1995 to 8% in 2016.
- Starting from a share of 5% in 1995, NFCI from payment services also became more significant, reaching nearly 8% of total operating income in 2016. It is interesting to note that this steady development was mainly driven by an increase at smaller local banks (from 5% in 1995 to 13% in 2016), whereas the large banks' share stagnated at around 6%.
- Credit-related fees hovered around 2% to 3% of total operating income of all Austrian banks, with noteworthy cyclical developments at large banks. Smaller local banks and large regional banks showed a steady increase.
- Other NFCI – e.g. from foreign exchange operations – lost in importance, as its share fell from its 2.7% peak in 2001 to 0.7% of total operating income in 2016. The introduction of euro banknotes and coins in 2002 acted as the main driver of this development.

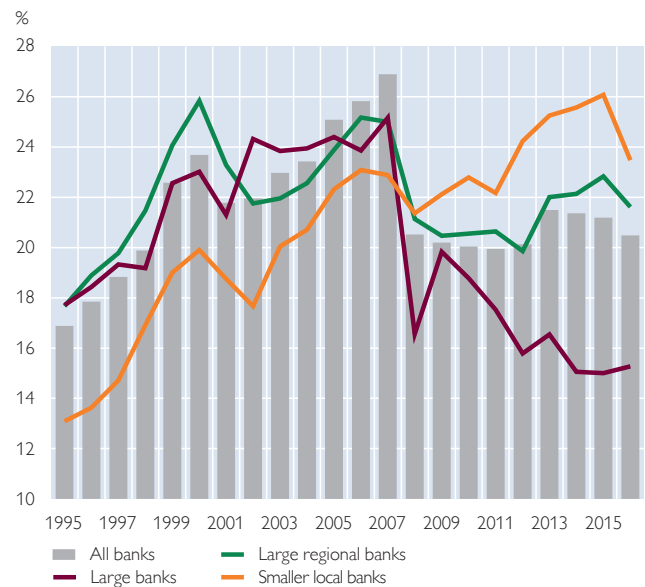
¹² An exception has been noted above regarding IEA growth discrepancies in the years after the onset of the GFC.

Chart 5

Components of net fees and commissions income



Share of net fees and commissions income in total operating income



Source: OeNB.

¹ Remaining components consist of credit operations, foreign exchange and precious metals operations and other service operations.

In the current low interest rate environment, banks have a vital interest in pushing up their NFCI, which is particularly true for retail-orientated banks that experience pressures on their net interest income (see chart 3). Achieving this objective is not easy, however, as success often depends on the prevailing financial cycle as well as on the nature of banking services and products. It seems that banks' efforts were generally more effective where fees and commissions were opaque and thus difficult to compare or nonnegotiable, or where it was unpractical for customers to switch banks often ("sticky business").¹³

2.3 Income from direct investments is significant, but its momentum ended with the onset of the GFC

With a share of 21% between 2004 and 2016, income from direct investments contributed significantly to Austrian banks' domestic operating income (see chart 6), but its weight declines in step with the banks' size. While this type of income is particularly important for large banks (36%), it stands at 19% for large regional banks and at a mere 10% for smaller local banks.¹⁴

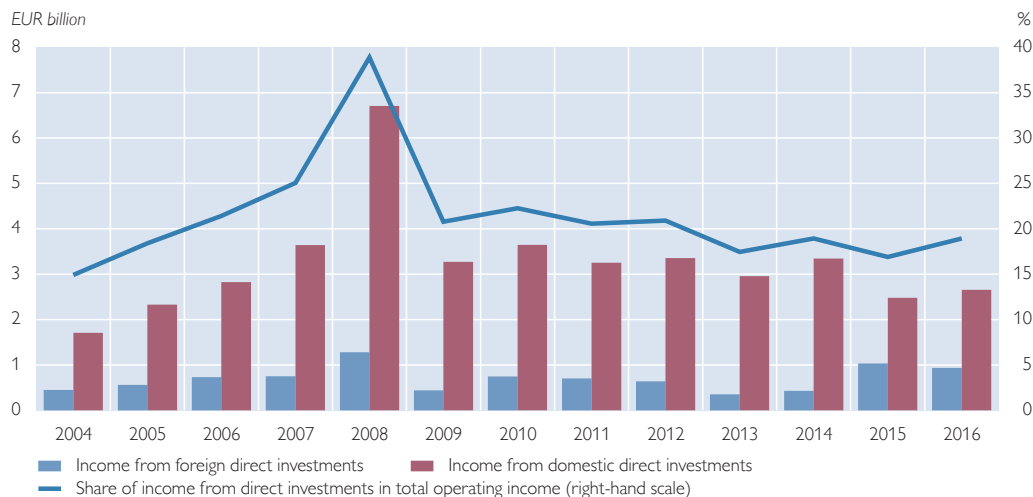
These varying percentages are also reflected in the cumulative income banks obtained from their direct investments from 2004 to 2016, which

¹³ Indications supporting this conclusion can be found in various bank customer surveys that conclude that "only 20% of the respondents know the exact costs of their current account, 35% know them approximately and 43% do not know them" (Austrian Federal Competition Authority, 2017, p. 27), while "[regarding the comprehensibility of banks' terms and conditions] only 43% said they understand everything. For 36% not everything is understandable or transparent. 10% do not understand the terms and conditions and 11% have never looked at them." (ING-DiBa, 2017, translated from German into English by the authors of this study).

¹⁴ Granular data on income from direct investments became available in 2004.

Chart 6

Total income from direct investments (foreign and domestic)



Source: OeNB.

added up to EUR 51 billion for the total banking sector, with EUR 33 billion earned by large banks, EUR 11 billion by large regional banks and EUR 4 billion by smaller local banks. Irrespective of the business model, the larger part of this income derives from domestic direct investments, in particular in nonbanks.

When we look at the developments of the last two decades, a procyclical trend emerges, as both the number and aggregate book values of Austrian banks' direct investments increased significantly before the GFC, but dropped substantially thereafter. From 2008 (peak) to end-2016, the number of direct investments contracted by 32% to over 3,000, with smaller local banks holding slightly more than half of them. This decrease in numbers corresponded to a 45% reduction in the total book value of all direct investments to EUR 43 billion (large banks: -58% to EUR 24 billion). While this reduction in direct investments streamlined the structure of the Austrian banking sector (including its governance), it also put an end to the momentum this

source of income had witnessed before the GFC.

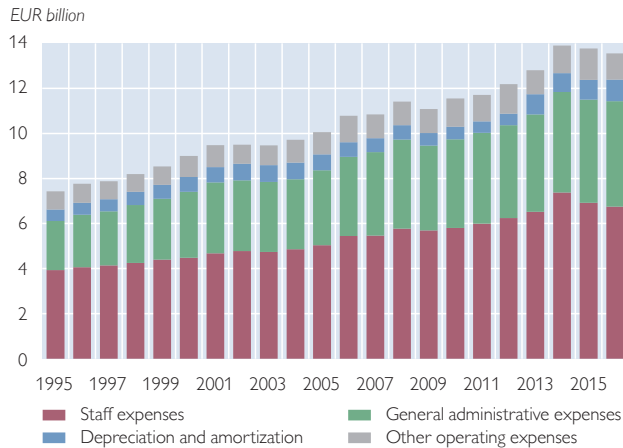
3 Operating expenses increased steadily until recently, when cuts in staff-related expenses started to show effects

Austrian banks' operating expenses increased steadily between 1995 and 2014, when they peaked at EUR 13.9 billion, as one-off costs triggered a strong increase in staff expenses. Since then, Austrian banks' cost-cutting efforts have been reflected in slightly decreasing operating expenses, which stood at EUR 13.6 billion in 2016 (see the left-hand panel of chart 7).

When analyzing Austrian banks' operating expenses over the last two decades, we note that their composition did not change much. Half of them are related to staff, while general administrative expenses account for 35%. The latter increased more markedly overall, recently driven by investments and costs related to information technology (e.g. IT system upgrades and overhauls). In contrast, staff expenses grew more slowly and recently started

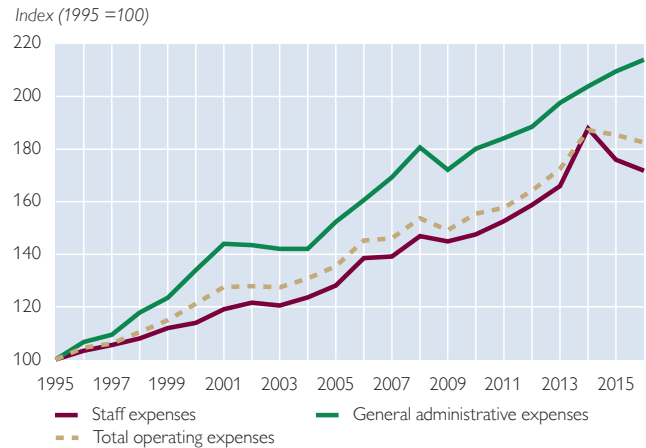
Chart 7

Composition of operating expenses



Source: OeNB.

Development of operating expenses



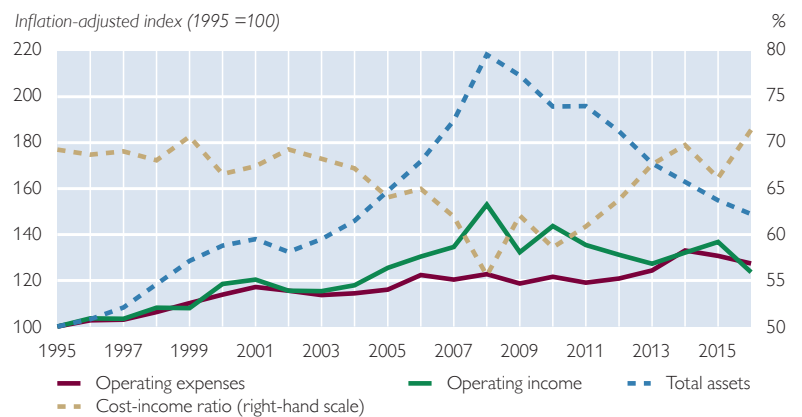
to exhibit a slight downward trend (see the right-hand panel of chart 7). Since the onset of the GFC, the number of full-time equivalents (FTEs) in banks in Austria has decreased by 10%, with the adjustment process gathering momentum since 2014, when outsourcing, automation and branch closures gained traction. By the end of 2016, the domestic Austrian banking system employed less than 62,000 FTEs, which is the lowest value since records began in 1998.¹⁵ Likewise, the number of branches in Austria has fallen steadily since 2013, down to 3,926 in 2016 (the lowest level since 1995).

Austrian banks' domestic operating income grew and shrank along with their size, albeit to a lesser extent (see the beginning of section 2 and chart 1). Chart 8 sheds additional light on banks' operational efficiency by adjusting for inflation and including operating expenses to deduce their cost-income ratio (CIR, a common indicator of operating efficiency). The first thing we observe is that real operating ex-

penses show little correlation with the banking sector's size throughout the recent financial cycle, as costs remained more or less flat on an inflation-adjusted basis from 2001 to 2012. This could be related to the fact that half of the operating expenses are considered to be rather fixed and linked to bank-exogenous inflationary trends (e.g. staff costs). Second – and resulting

Chart 8

Cost-income ratio in comparison to banks' total assets, operating expenses and income over time



Source: OeNB.

¹⁵ See Ritzberger-Grünwald, Stiglbauer and Waschiczek (2016) for details regarding banking employment in Austria.

from the above-mentioned income and expense trends in relation to banks' growth, the CIR as measured in 2016 was virtually unchanged from its 1995 value. It had, however, gone down (i.e. improved) during banks' expansion phase before the GFC, and gone up (i.e. worsened) thereafter as banks' balance sheets were shrinking. Third, and consequently, the CIR increase after the onset of the GFC to slightly above 70% in 2016 was not primarily caused by rising real expenses but declining real operating income.

Finally, we take a look at the cost efficiency of the most important business models after the onset of the GFC. Smaller local banks display a CIR that is above the banking sector average. This is due to their costly distribution channel using small branches and their difficulty in generating economies of scale. Since they could not compensate for domestic weaknesses with foreign profits, they were forced to put a strong focus on cost-cutting initiatives that were supported by continued merger efforts to raise synergies. As a

result, they proved most successful in cutting operating expenses in absolute terms, which even fell below pre-crisis levels in recent years. This situation contrasts with large regional banks and large banks, which saw their CIR rise after 2008, while their operating expenses still remained above pre-crisis levels.

4 Credit risks materialized during the GFC, but as the NPL ratio approached pre-crisis levels again in 2016, provisioning came to a virtual standstill

Austrian banks' unconsolidated non-performing loan (NPL) ratio, which amounted to 3.0% in 2008, increased after the onset of the GFC, to peak at 4.7% in 2010.¹⁶ It then remained above 4%, before decreasing substantially to 3.5% in 2016, aided by an improved macroeconomic backdrop and balance sheet cleanups.

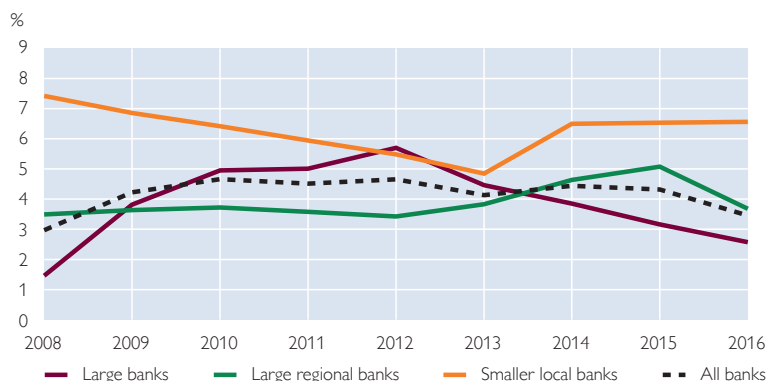
Looking at NPL ratios for various bank business models, we focus on developments evident for large banks, large regional banks and smaller local banks (see chart 9), as these banks account for more than 90% of the total volume of loans and NPLs to nonfinancial corporations and households.¹⁷

The NPL ratio of large banks increased significantly between 2008 and 2012, namely from 1.5% to an above-average 5.7%, but showed a continuous decline thereafter (2.6% in 2016).

Large regional banks exhibited a rather stable NPL ratio between 2008 and 2012, when it stood at a below-average 3.6%. Their NPL ratio peaked at 5.1% in 2015. Its significant reduction to 3.7% in 2016 was due, among other

Chart 9

NPL ratio of Austrian banks' domestic business



Source: OeNB.

¹⁶ The NPL ratio is defined as the volume of loans to nonfinancial corporations and households that are 90 days overdue and/or unlikely to be repaid in relation to total gross loans to nonfinancial corporations and households. Due to data limitations and changes in reporting standards, our analysis focuses on data from 2008 onward.

¹⁷ See box pp. 38–39 of this Financial Stability Report for a sectoral decomposition of the loan portfolio with a focus on NPLs.

factors, to a decline at some state mortgage banks (Landeshypothekenbanken), in particular in their corporate portfolios.

Smaller local banks post an above-average NPL ratio given their higher share of loans to households and small and medium-sized enterprises, which traditionally show higher default ratios. While the NPL ratio of these banks amounted to 7.4% in 2008, it decreased to 4.8% in 2013, as NPLs fell and the loan volume rose. However, when reporting standards changed in 2014, the ratio went up to 6.5% and remained stable thereafter.¹⁸

Of all loans to households and non-financial corporations, the latter dominate, with a share of 62% (end-2016), and show a consistently lower NPL ratio compared to the former. Between 2014 and 2016, amid a benign macro-economic environment, the NPL ratio declined for both types of loans (households: from 5.0% to 4.2%, and non-financial corporations: from 4.1% to 3.0%).¹⁹

How did these NPL ratios affect risk provisioning and, ultimately, Austrian banks' profitability? While absolute loan loss provisioning (LLP) was rather stable from 1995 to 2007, it increased considerably after the onset of the GFC, given the above-mentioned NPL dynamics. Equaling EUR 2 billion in 2007, LLP peaked at EUR 4.4 billion in 2009. This marked increase was to a considerable extent driven by risk provisions for direct cross-border loans.²⁰ Starting in 2012, but especially in 2016, LLP

went down sharply, to reach a historical low of a mere EUR 0.5 billion in 2016, which not only reflects the improved economic situation, but also supported the substantial profits Austrian banks made in that year. This development, which has yet to prove its sustainability, was observed for all business models, but was especially pronounced at large regional banks and smaller local banks.

We now combine the above-described NPL and LLP trends to analyze the relative level of credit risk coverage that Austrian banks have built up (while disregarding additional collateral). This shows that, following stepped-up provisioning after the onset of the GFC, the coverage ratio of Austrian banks increased from 46% in 2008 to 62% in 2014 and dropped again to 49% in 2016, as LLP came to a virtual standstill.²¹ A highly heterogeneous picture emerged: while the coverage ratio of large regional banks (46%) and especially of smaller local banks (41%) remained below the sector-wide ratio of 49%, large banks managed to raise their ratio to 65% after sustained efforts.

Regarding the impact of LLP on banks' profitability, LLP consumed an average 44% of operating profits between 1995 and 2007. Induced by the GFC, this level surged to 65% in 2009, due to falling profits and increasing LLP. In 2016, however, risk provisioning reached its historical trough, when it amounted to only 9% of operating profits. The heterogeneity between

¹⁸ The change in reporting standards (caused by the Basel III framework) resulted in a smaller sample and the exclusion of direct lending.

¹⁹ Distinguishing between loans and NPLs to households and to nonfinancial corporations has only been possible since 2014.

²⁰ As of end-2016, direct cross-border loans amounted to around one-quarter of total outstanding loans (in unconsolidated terms).

²¹ The coverage ratio is calculated by dividing the loan loss provisions on NPLs by the total volume of gross NPLs. The data were sourced from the Central Credit Register, which only includes loans with volumes above EUR 350,000. Our figures may therefore not be comparable to coverage ratios calculated from other sources.

business models was again substantial. While large banks' LLP used up 19% of their operating profits, this ratio stood at a marginal 0.3% for large regional banks and at -0.2% for smaller local banks on account of net releases of loan loss provisions.

As far as the remaining profit and loss items are concerned, three, primarily cost-related, factors must still be noted: the bank levy, income taxes and the extraordinary profit or loss. First, the bank levy (Stabilitätsabgabe²²) was mainly borne by the large and large regional banks and amounted to an annual EUR 625 million between 2011 and 2015. In 2016, banks had to make a one-off payment of EUR 1 billion, but will now face a significantly reduced annual levy of approximately EUR 100 million. Second, income taxes, which averaged less than EUR 400 million

per year from 1995 to 2016, were largely paid by large regional and smaller local banks after the bank levy had been introduced. Third, the extraordinary net result – frequently a small loss – has typically played a minor role in Austrian banks' profits, except in 2006, 2009 and 2014, when its impact was substantial, exceeding EUR 1 billion, due to one-off effects at individual large banks.²³

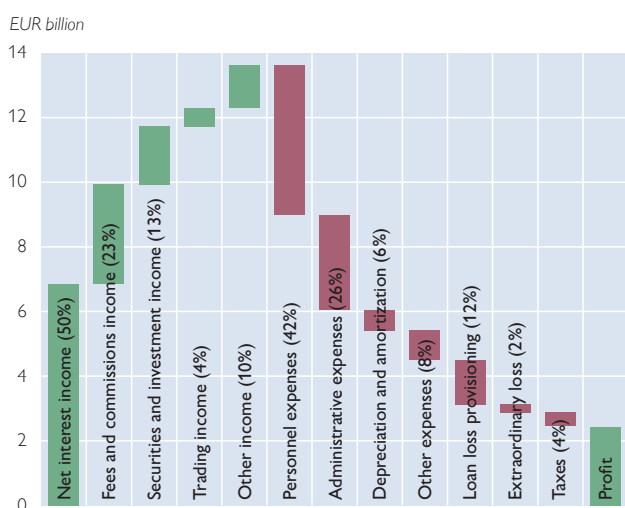
5 Final overview: increased provisioning weighed on profits after the GFC

In order to provide an overview of all aforementioned income and cost components that define banks' profitability, we create waterfall charts for revenues covering the periods before and after the GFC (1995–2007 and 2008–2016; see chart 10). The most noticeable

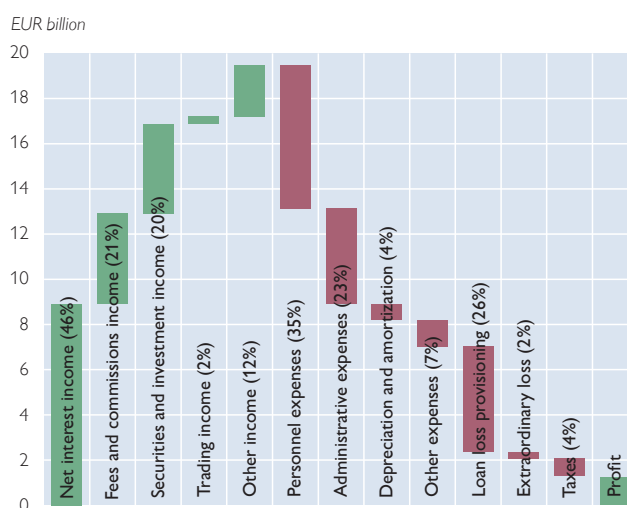
Chart 10

Accumulated profit and loss account of all Austrian banks (1995–2016, annualized)

1995–2007 (annualized)



2008–2016 (annualized)



Source: OeNB.

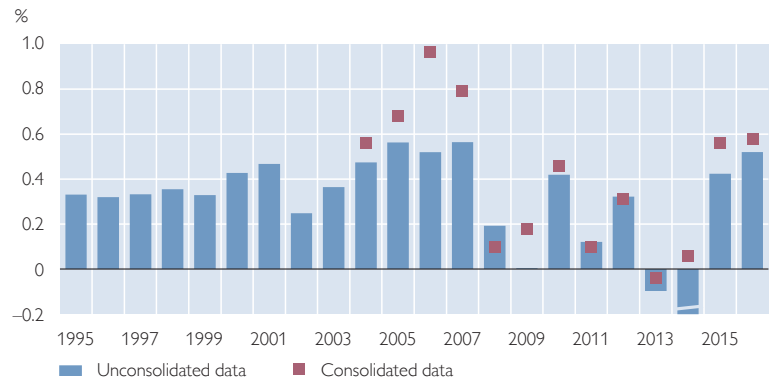
Note: Percentages indicate shares in total income or total expenses/costs.

²² Pursuant to the Stability Levy Act (Stabilitätsabgabegesetz – StabAbgG), which is available (in German) at www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007050.

²³ The net extraordinary result was -EUR 2.3 billion in 2006, EUR 2.2 billion in 2009 and -EUR 5.5 billion in 2014. For further details on some of these major profit and loss items, see www.bankaustria.at/files/BA-CA_AG_Bericht_2006_EN.pdf (2006), www.bankaustria.at/files/Jahresfinanzbericht_de.pdf (2009) and www.erstegroup.com/content/dam/at/eh/www_erstegroup_com/en/Investor%20Relations/2014/Reports/AR2014_unconsolidated_en.pdf (2014).

Chart 11

Return on average assets of the Austrian banking sector



Source: OeNB.

difference between these two periods is that credit risk provisioning increased substantially after the onset of the GFC, as risks that had built up before the GFC materialized and caused the share of annual credit risk costs in total costs to more than double. Consequently, annualized profits decreased significantly. Even so, not all business models were affected to the same extent. While large banks and other joint stock banks faced above-average increases in risk provisioning, smaller local banks and private banks even reduced their share of risk provisioning in total costs.

To translate absolute profits into even more meaningful relative profitability figures, we now turn to the return on (average) assets (ROA): Austrian banks generated an unconsolidated ROA of 0.3% per annum over the entire analyzed period (1995–2016, see chart 11).²⁴ Three findings are remarkable here. First, regarding the time dimension, the ROA stood at 0.4% in the years before the GFC, dropping to a mere 0.1% after 2008. Second, the different business models have not been equally profitable over the past 22 years. While smaller local banks, private banks and special purpose banks generated above-average ROAs in the majority of years, large banks and building and loan associations underperformed. Other joint stock banks and large regional banks displayed ROAs close to the average, which underlines the latter's representativeness for the Austrian banking sector as a whole. Third, unconsolidated ROAs were below consolidated ROAs in most years,

which implies that foreign activities via subsidiaries were more profitable than domestic activities (including direct cross-border activities).²⁵

6 Summary of findings

The sustainable profitability of banks is an important building block in strengthening a financial system's stability, as it allows banks to fulfill their important role as financial intermediaries in the economy and to build up loss-absorbing capacity for future downturns. During the two decades from 1995 to 2016, the GFC proved to be a major turning point for Austrian banks' domestic profitability (including from direct cross-border activities), as its repercussions negatively affected operating incomes and credit risk provisioning. While this temporal dimension is omnipresent in this study, we also pay close attention to the heterogeneity between various business models, focusing in particular on the three business models that dominate the Austrian

²⁴ Although comparable ROA data from other EU countries are scarce on an unconsolidated basis, Austrian banks' domestic net interest margins have typically been below the EU average, while their credit quality was less affected by the GFC (especially when compared to countries in the European periphery).

²⁵ In the years after the onset of the GFC – i.e. from 2009 to 2016 –, Austrian banks' subconsolidated profits from their CESEE subsidiaries amounted to around three-quarters of their total consolidated profits, while this share was close to half in 2016.

banking sector: large banks, large regional banks and smaller local banks.

Overall, we find that banks and their income grew strongly before the GFC at the expense of their margins, whereas this trend went into reverse after the crisis hit. Smaller local banks, which are particularly dependent on net interest income, experienced continuous and barely abating pressure on their net interest margin, while large banks, which managed a turnaround in their pricing after the onset of the GFC, considerably reduced their interest-earning assets. Other sources of income gained importance over the last two decades, but proved difficult to expand. On the one hand, net fees and commissions income became more important for smaller local banks (especially from payment services), while the opposite is true for large banks. On the other hand, income from direct investments, which is significant for larger banks, saw its momentum fade with the onset of the GFC.

On the cost front, operating expenses increased steadily until recently – with investments in information technology gaining importance – but cuts in staff-related expenses are now starting to show effects. It is noteworthy that Austrian banks' high post-crisis cost-income ratio is mainly driven, on an inflation-adjusted basis, by the decline in real operating income. Smaller local banks stand out in this respect as they are less cost efficient due to their difficulty in generating economies of scale. They consequently had a strong incentive for cutting their cost base (including via intra-sectoral mergers).

In addition to the above-mentioned income decline, higher credit risk costs were another consequence of the GFC, as risks that had previously built up in an expansionary (and margin-diluting)

phase materialized; but it must be emphasized that the Austrian banking sector's NPL ratio never surpassed 5%. Its decline in 2016 to 3.5% caused loan loss provisioning to come to a virtual standstill, which supported the substantial profits Austrian banks made in that year. However, this development, which was especially pronounced at large regional banks and smaller local banks, has yet to prove its sustainability. Regarding the remaining items on banks' profit and loss statement, the bank levy, which was a noteworthy cost item in the last few years, will be significantly reduced going forward, and the extraordinary result has typically played a minor role (except in 2006, 2009 and 2014).

All of these developments resulted in strong volatility in the domestic ROA after the onset of the GFC and – supported by historically low loan loss provisioning – a recent uptick to pre-crisis levels. Over the entire analyzed period, the different business models performed heterogeneously. While smaller local banks generated above-average ROAs in the majority of years and large banks underperformed, large regional banks generated average ROAs, which underlines their representativeness for the Austrian banking sector.

Looking forward, net interest income is likely to remain the backbone of Austrian banks' domestic income, as banks' business models have proven rather resilient to change. In a still highly competitive market, improving operating profitability is therefore likely to depend on banks' pricing power – both in terms of margins and fees – and their ability to make structural adaptations, which include raising investments in digitalization, and reducing staff expenses and streamlining branch networks. In a benign macro-

economic environment, low provisioning levels are a welcome and supportive trend from a profitability point of view, but they have yet to prove their sustainability over the medium term.

Our conclusion is that Austrian banks were significantly affected by the GFC in their domestic business, but

overall they weathered this cyclical storm well. Now, in a calmer macrofinancial environment, they should continue to proactively address their structural cost issues, to tap new sources of income whose pricing adequately reflects risks and to ready themselves for the digitalization of their business.

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Comparability of Basel risk weights in the EU banking sector

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Our aim is to quantify the variability across EU countries evident in the risk weights (RW) applied by banks to their exposures. To this end, we use a publicly available panel dataset which provides granular portfolio-by-portfolio data for major EU banks and covers six periods between 2013 and 2016. In line with the Basel regulatory capital framework, RW should adequately mirror the risk of the obligations. One meaningful indicator of the underlying risk is the share of nonperforming loans (NPLs) in a given portfolio. We show that a good portion of RW variability can be explained by portfolio- and destination-specific risk indicators such as macroeconomic indicators and NPL ratios. In our analysis, we find that it is not statistically significant that large banks are better able to push down RW (after controlling for underlying credit risks). It is of marginal statistical significance that banks with low common equity tier 1 (CET1) ratios employ RW that are lower than would be expected from the underlying credit risk. We observe, however, statistically significant and economically important differences with regard to the country where a bank is headquartered. The paper sets forth evidence that implementation standards differ from jurisdiction to jurisdiction, thus motivating initiatives by the EBA and the ECB to strengthen harmonization.

JEL classification: G21, G28, E61, G38

Keywords: bank capital, regulation, risk weights, Basel regulatory capital frameworks

The prime rationale for Basel II was to strengthen the regulatory capital framework by ensuring that banks' capital allocation is more risk sensitive. Basel II hence permitted banks to use internal risk models to quantify their capital requirements for credit risk (the so-called internal ratings-based (IRB) approach) instead of the risk weight table under Basel I. Banks had already begun to employ such risk models in their own management and were now allowed, upon supervisory approval, to use them to calculate their capital requirements. As an alternative, Basel II allowed banks to employ a simpler standardized approach for calculating the risk inherent in their exposures.

The objective of model-based capital requirements was to obtain higher risk sensitivity and thus increase the efficiency of credit allocation. However, this objec-

tive had to be weighed against banks' incentives to use "artificially low" internal estimates. Naturally, supervisors have to prevent the latter from happening. Another concern was whether differences in banks' and supervisory standards regarding the implementation of models would make the outcomes comparable across jurisdictions.

Several studies examining whether supervisors were able to prevent banks from embellishing capital ratios found concerning discrepancies in risk weights across banks and jurisdictions.² Therefore, international bodies like the Basel Committee on Banking Supervision (BCBS) and the European Banking Authority (EBA) responded by strengthening their focus on the topic. A number of studies also showed that many banks that rely on internal models for calculating regulatory capital overstate their

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² For example, Behn et al. (2016) provide an overview of the literature on risk weight heterogeneity, and the BCBS (2013) summarizes the BIS RCAP analyses.

capital ratios by reducing the risk weights (RW) (Vallascas and Hagendorff, 2013; Mariathan and Merrouche, 2014; Behn et al., 2016; Bruno et al., 2016). Such practices would have grave consequences for banking regulation, which largely relies on capital requirements. For this reason, some researchers (e.g. Haldane, 2012) argue that banking regulation should become less complex, a view that has attracted growing support recently (BCBS, 2016b). With the transition to IFRS 9, internal credit risk models will also be used to determine credit risk provisions. Against this backdrop, the comparability of banks' internal model outcomes will be even more relevant.

We set out to investigate the main determinants of RW heterogeneity, focusing on the question to which extent cross-country differences in risk weights³ can be explained by bank-specific factors. According to the Basel regulatory framework, what we would like to dub “*intended* risk weight heterogeneity” is due to differences in actual underlying risks. By contrast, “*unintended* risk weight heterogeneity” arises when banks' and supervisory standards are implemented differently from jurisdiction to jurisdiction and also when artificially low internal estimates come into play.

We use an extensive, granular dataset on major European banks from the EBA transparency exercises. This dataset is very rich in dimensionality (banks, asset classes, IRB vs. standardized approach, destination country of exposures and time breakdown). This allows us to study risk weights on a very granular level (e.g. the RW applied by ING Bank to Turkey under the IRB approach in the corporate portfolio was around 34% in 2015, which compares with BNP Paribas' RW of 49%). Importantly,

this public dataset also features the NPL ratio for the same portfolio breakdown, thus providing a clear view on the riskiness of obligations.

The results of the paper are aimed at supporting policy discussions held by regulatory authorities, which are currently addressing the complexity and excessive unwarranted variability in the internal models banks use to assess their credit risk. In this context, the paper is meant to shed light on the main determinants of EU banks' risk weights.

Our paper is structured as follows: section 1 and 2 review the literature and the regulatory undertakings aimed at reducing RW heterogeneity. Section 3 then offers an overview of the data used. In section 4, we follow a stepwise procedure, starting with few explanatory variables related to the underlying credit risk to explain RW in a panel econometric approach. First we focus on “*intended* risk weight heterogeneity,” and then we analyze whether there is also evidence for “*unintended* risk weight heterogeneity.” In section 5, we apply the findings of section 4 and construct hypothetical common equity tier 1 (CET1) ratios for selected banks under the assumption that the banks operate from a different country, while leaving all portfolio characteristics unchanged. Section 6 concludes.

1 Literature on risk weights

Recently, a large and growing body of literature has been exploring topics related to unwarranted RW heterogeneity. On the downside, such cross-country studies often “only” examine banks' risk densities (i.e. the ratio of risk-weighted assets to total assets) at the bank and not at the portfolio level, which is due to the lack of granular data on banks' asset compositions. Vallascas and

³ Calculated by means of internal models, risk weights determine banks' minimum capital requirements for credit risk.

Hagendorff (2013), for example, investigate whether capital requirements accurately reflect portfolio risk by using a cross-country sample of almost 250 listed international banks that covers the period between 2000 and 2010. They conclude that risk-weighted assets based on internal ratings are ill calibrated to, and thus underreport, bank portfolio risk. Beltratti and Paladino (2016) consider a panel dataset of 548 large international banks from 45 countries and use risk densities to test the hypothesis whether banks with higher cost of equity are more aggressive in reducing risk weights. They reject this hypothesis and find that European banks located in peripheral countries did not employ risk-weighted asset (RWA)⁴ saving as much as European banks in core countries, where a higher degree of RWA saving was associated with raising more equity during the European sovereign debt crisis. Similarly, by examining a panel of 115 banks from 21 OECD countries, Mariathasan and Merrouche (2014) find that risk densities decline significantly once banks are authorized to apply the internal ratings-based approach to calculate their solvency ratios. To be precise, according to their research, declines in risk weights are more pronounced among weakly capitalized banks. This finding, which is consistent with assumptions about RW manipulation given a weak legal framework for supervision, also applies to countries where supervisors oversee many IRB banks. Using a sample of around 40 banks from the U.S.A., Canada and Europe, Begley et al. (2017) conclude that banks significantly underreport the risk in their trading book when they have lower equity capital. Bruno et al. (2016) explore the drivers of

risk-weighted assets among European banks by assessing RW discrepancies of the 50 largest European banking groups between 2008 and 2014. They find that risk weight heterogeneity is explained by the intensity of internal ratings, by bank size, business models and asset mix. In addition, they observe that banks that use IRB approaches more extensively shifted their “riskier” corporate loans to “safer” government bonds from 2008 to 2014.

Besides these cross-country studies, other papers analyze banks’ risk modelling within a single country. For example, Behn et al. (2016) investigate a loan-level dataset relating to German banks that use the model-based approach. They show that, first, banks using the IRB approach systematically underpredict actual default rates. Moreover, loss rates are higher for loans under the IRB approach compared with loans under the standardized approach, while RW are significantly lower under the former approach. The most interesting finding is, however, that loans under the IRB approach carried higher interest rates, which suggests that banks were aware of the higher risk associated with these loans. By contrast, Fraisse et al. (2015), who conduct similar research on French banks, report no similar RW manipulations for corporate loans when internal models are used. Along the same lines, Barakova and Palvia (2014) examine U.S. banks and find that IRB RW are determined mostly by portfolio risk, while Plosser and Santos (2014) provide evidence that low-capital U.S. banks try to improve their regulatory ratios.

In June 2017, the IMF published a working paper (Turk-Ariss, 2017) on the heterogeneity of bank risk weights by using the results from the 2015 EBA

⁴ Risk-weighted assets (RWA) are risk weights multiplied by the respective exposure amounts, i.e. amounts given in euro; risk weights per se are measured in percent.

transparency exercise⁵. Turk-Ariss (2017) finds that corporate RW are influenced by the riskiness of an average representative firm, but not by market averages of firms' probability of default. In addition, she carries out a counterfactual analysis, in which she assigns the same RW to banks operating in a specific country. The counterfactual analysis shows that some banks would experience a significant decline in their capital ratios but still fulfill the minimum capital requirements.

2 Regulatory review of risk weights

In response to the growing literature on RW heterogeneity, regulatory reviews addressed this issue, e.g. the Regulatory Consistency Assessment Programme (RCAP) exercise of the Basel Committee on Banking Supervision, the EBA's review of consistency of risk-weighted assets exercise and the ECB's Targeted Review of Internal Models (TRIM) exercise.

At the beginning of 2016, the BCBS (2016a) consequently proposed changes to the IRB approaches, especially to use model-parameter floors as a key element of the BCBS regulatory reform programs to be finalized by end-2016. The proposed measures aim (1) to reduce the complexity of the regulatory framework and to improve comparability; and (2) to address excessive variability in the capital requirements for credit risk by ensuring a minimum level of conservatism for IRB portfolios. The floor is meant to limit IRB model measurement errors. Moreover, the RCAP exercise resulted in the removal of the option to use advanced IRB approaches for low-default portfolios.

One year later, the ECB (2017) launched on-site inspections in connection with its Targeted Review of Internal Models with a view to (1) improving consistency among banks' IRB methodologies and (2) reducing unwarranted (non-risk-based) variability in RW related to internal models. In a nutshell, the TRIM exercise is meant to ensure that banks' internal models yield adequate capital requirements. Covering all significant institutions with approved Pillar 1 internal models, TRIM includes on-site missions at 68 banks within 15 countries, to be completed by the beginning of 2019. This review covers at least 60% of IRB exposure at default (EAD) for credit risk (equaling some EUR 7 trillion).

In addition, as part of its review of consistency of risk-weighted assets, the EBA (2017a) published a report presenting the results of the supervisory benchmarking exercise for residential mortgages, SME retail, SME corporate and corporate–other portfolios covering 114 institutions in 17 EU countries. According to this report, the country of the reporting bank and the respective countries of the counterparties are important drivers of RW variability. This confirms that RW variability may be due not only to the underlying risk but also to bank and supervisory practices. However, the report also states that on average the estimated values for the probability of default (PDs) and the expected loss given default (LGDs) are higher than the observed default rates and loss rates. In other words, it suggests that banks are in general conservative.

In addition to these supervisory reviews, macroprudential supervision took action to establish RW floors in Belgium, Croatia, Finland, Ireland,

⁵ Our paper is also based on the EBA's transparency exercises, but our time coverage is broader as we include 2012-12, 2013-06, 2014-12, 2015-06, 2015-12 and 2016-06. This allows us to employ panel econometrics and differentiate between time-varying and time-constant effects.

Luxembourg, Norway, Poland, Romania, Slovenia, Sweden and the United Kingdom. These RW floors apply either on a bank average basis or on an individual loan basis – typically for the asset class of retail mortgages (see ESRB, 2017, for an overview of macroprudential measures).

Both the large and growing body of literature and supervisory as well as macroprudential action attest to the importance of the IRB RW topic.

3 Dataset – EBA transparency exercises

Our analysis is based on the datasets from the EBA transparency exercises. By carrying out these disclosure exercises, the EBA aims to foster market discipline in the Single Market and enhance transparency in the EU banking sector.⁶ The three exercises completed to date comprise bank-specific data for six reference dates⁷: representing around 70% of total EU banking assets (European Banking Authority, 2015), the sample consists of over 130 banks, at the highest level of consolidation, from 24 countries in the EU and the European Economic Area (EEA).⁸ A considerable advantage of the dataset is its granularity – exposures and RW are broken down by banks, asset classes, the largest countries of counterparty, default status and calculation method (IRB vs. standardized approach) as well as time. This granularity allows us to compare bank-by-bank RW determined by a number of factors.

Given that the data were also partly used in EBA stress tests, both the banks' own and supervisory quality control ensures a high standard of data quality. Needless to say, errors might occur in a dataset that large. To ensure that outliers do not affect our estimates, we exclude observations where RW exceed 370% or where the exposure (of a particular bank to a particular destination in a particular asset class and period) is missing or below EUR 5 million. In general, we consider the data quality to be high.

4 Step-by-step exploration of heterogeneity of risk weights in Europe

4.1 RW comparison based on the standardized and the IRB approach

The first important determinant of the level of RW that we consider is whether the calculation is based on the standardized approach (StA) or the IRB approach. Chart 1.1 below shows kernel density estimates for RW⁹ for retail and corporate clients as calculated under the StA or the IRB approach. Chart 1.2 presents a breakdown by the country of the consolidating entity (i.e. the country where a bank is headquartered; in the following referred to as “HQ country”). While StA RW are concentrated around 35%, 75% and 100%, IRB RW populate a broad range of values, all as *intended* by regulation. We infer that IRB RW are substantially lower than StA RW. Moreover, in some countries there is

⁶ The EBA also conducts a benchmarking exercise on a regular basis (EBA, 2017a), which yields more in-depth data. These data are available in full only to the EBA, however.

⁷ December 31, 2012; June 30, 2013; December 31, 2014; June 30, 2015; December 31, 2015, and June 30, 2016.

⁸ The number of banks in the sample increased from 64 in the 2013 exercise to 131 in the 2016 exercise (see <http://www.eba.europa.eu/risk-analysis-and-data/eu-wide-transparency-exercise/2016/results> for more details).

⁹ We calculate RW as the ratio between “risk exposure amount” and “exposure values” by focusing on non-defaulted exposures as defined by the EBA. For IRB portfolios, the dataset provides the amount of defaulted loans only for the “original exposure,” i.e. the exposure before substitution effects. We therefore reduce the exposure after substitution effects (“exposure value”) by the share of defaulted loans in the original exposure.

no or hardly any overlap between both distributions. StA RW exhibit a very similar distribution, but IRB RW vary substantially from country to country. For example, Ireland has the highest median RW with a relatively high variation as reflected by the long box

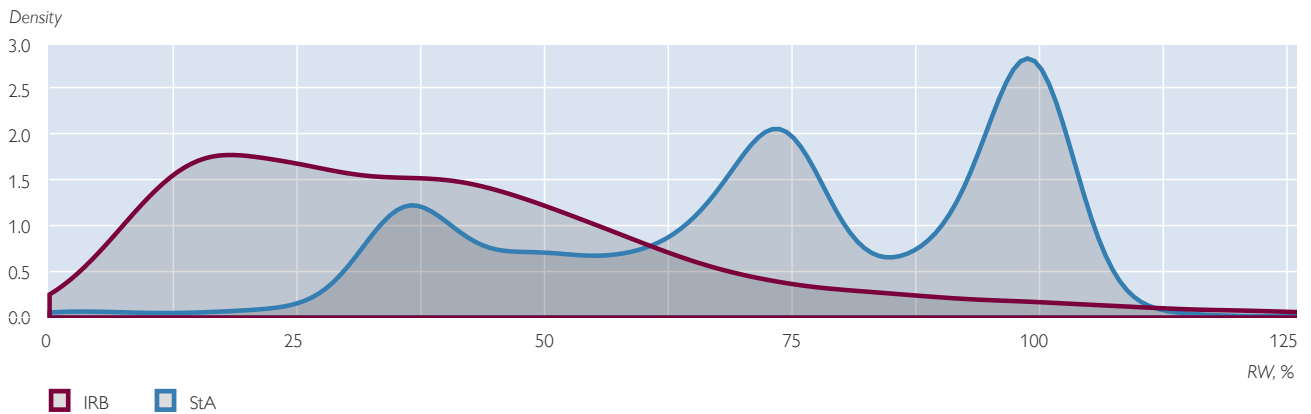
plots, while Denmark and Luxembourg have the lowest median IRB RW.

However, several caveats apply to this comparison of StA RW and IRB RW, which makes a more detailed comparison difficult. For one thing, under the IRB approach, banks calculate ex-

Chart 1.1

Comparison: risk weights IRB vs. StA

Density function of RW for corporate and retail exposures

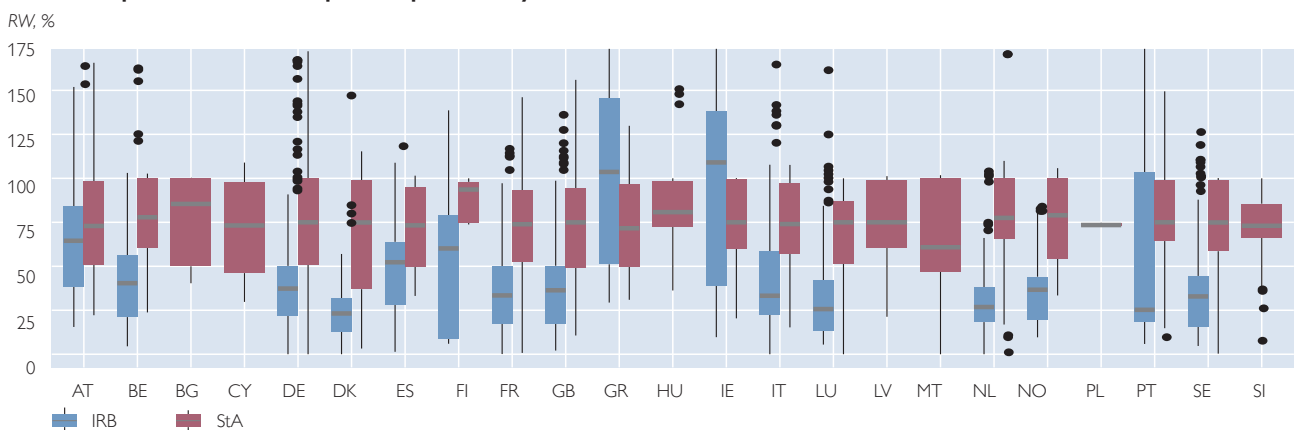


Source: EBA transparency exercises, authors' calculations.

Chart 1.2

Comparison: risk weights IRB vs. StA

RW for corporate and retail exposures per country



Country	AT	BE	BG	CY	DE	DK	ES	FI	FR	GB	GR	HU	IE	IT	LU	LV	MT	NL	NO	PL	PT	SE	SI
StA	519	180	12	115	967	135	328	13	739	522	172	127	92	359	120	25	91	343	114	4	294	349	109
IRB	249	247	0	0	959	148	178	39	520	375	25	0	102	235	150	0	0	329	96	0	103	354	0

Source: EBA transparency exercises, authors' calculations.

Note: In countries with a wider box plot, banks calculate RW only under the StA.

pected loss and deduct any excess of this amount over provisions from capital. In addition, the definition of asset classes differs,¹⁰ which likewise makes a more detailed comparison problematic. Given the absence of heterogeneity in StA RW and the above-mentioned lack of their comparability with IRB RW, we decided to focus on IRB RW only. An important takeaway is that, everything else equal, a bank with a higher share of IRB exposures will tend to have substantially reduced RWA. The extent to which a bank uses the IRB approach or StA is therefore crucial to the RW level, but that is beyond the scope of this paper.

In what follows, we limit our sample to IRB RW for the asset classes “corporates,” “institutions” and “retail,” and we split the latter into “retail – other retail,” “retail – qualifying revolving” and “retail – secured by real estate property” to account for the different characteristics in these classes. This leaves us with around 13,900 observations.

4.2 IRB approach: asset classes

To test the importance of asset classes and other determinants of RW (introduced below), we employ a weighted¹¹ random-effects panel model:

$$y_{i,j,k,t} = \alpha + \beta' X_{i,j,k,t} + u_{i,j,k} + e_{i,j,k,t} \quad (1)$$

where $y_{i,j,k,t}$ denotes the dependent variables (IRB RW) of bank i , to destination country j , in asset class k at time t , $X_{i,j,k,t}$ the explanatory variables, $u_{i,j,k}$ the random effects and $e_{i,j,k,t}$ the idiosyncratic error

term. α represents the global intercept and β' the regression coefficients of the explanatory variables. Note that our cross-section is not banks, but a combination of banks, destination and asset class.¹²

A second important factor for the RW level is the asset class, i.e. whether the counterparty is a retail client or a financial institution. Reflecting different risk levels associated with these counterparties, this factor is part of what we described in the introduction as “*intended risk weight heterogeneity*.”

In a simple model, this factor alone – asset class – explains already 46% of the variability in IRB RW.

4.3 Bank-specific, portfolio-specific and destination-specific factors

IRB RW are *intended* to be sensitive to the risk of the obligations. Apart from the asset class, we add a range of bank-specific, portfolio-specific and destination-specific factors to capture these effects. If RW solely reflect the risk of the obligations, these factors put together will explain a high share of the variability in RW.

Table A3 in the annex lists the variables that we take into account. The risk of the obligations is determined by the PDs and the LGDs. The risk factors introduced below typically address both the PDs and LGDs simultaneously.

As *destination-specific factors* we use common macroeconomic control variables like GDP growth, unemployment and GDP per capita. These factors account, for instance, for how severe the financial crisis hit the destination

¹⁰ This is why we keep the comparison between StA and IRB simple by confining it to the broad categories of corporate and retail customers – and even here, differences in the definitions exist.

¹¹ We weight the observations by the exposure amount.

¹² The choice of random effects over fixed effects follows automatically from our research question: assuming that RW are determined by the underlying credit risk (an assumption we are evaluating), fixed effects should not be relevant. In what follows, we will introduce dummy effects for destination, time and headquarters, but not for the full set of the cross section (bank, destination, asset class).

country and whether the latter is an advanced, an emerging or a developing economy. To account for nonlinear effects on default rates as observed in recessions, we also add GDP growth squared (where we maintain the sign). Higher economic growth is associated with fewer defaults, and so are high economic standards and low unemployment. Moreover, in times of economic expansion, it is easier for banks to sell collateral following a borrower's default, which helps limit the LGD.

As *bank-specific and portfolio-specific factors* we add a dummy variable (“foreign dummy”) equal to one if the destination country differs from the bank's HQ. This variable reflects lending to a foreign country, where lending might be more conservative and RW therefore lower. To control for a bank's expertise in lending, we introduce the variable “market relevance.” It measures the share of the given portfolio (bank i , destination j , asset class k , time t) in the total credit risk exposure of that bank. A bank concentrating on one particular market and asset class is set to have a high level of expertise in that business area, which is why we expect RW to be lower compared with other areas where lower exposures are likely to go hand in hand with less expertise and higher RW. What is more, the dataset stemming from the EBA transparency exercises allows us to extract the nonperforming loan ratio (NPL ratio) at the same level of granularity (bank–destination–asset class and time level) as an additional control variable. In other words, we can control for the riskiness of banks' individual portfolios. The NPL ratio of

a given portfolio captures the share of defaulted exposures,¹³ thereby providing a meaningful indicator of an obligor's riskiness.

As banks often pool customers from different countries, we also construct an NPL ratio on a (bank, time and) asset class basis, while disregarding the destination country, as an additional factor. A high NPL ratio signifies both a higher default rate and higher losses because collateral cannot be enforced or has substantially lost value. To the best of our knowledge, we are the first to exploit this feature of granular asset quality.

Taken together, the risk factors discussed above represent a sound set of factors regarding PDs and a decent one regarding LGD. The lack of data on portfolio-level collateral values constitutes a blind spot in an otherwise very comprehensive and granular set of risk factors.

Table 1 presents the estimation results. The first column includes only macroeconomic variables to explain IRB RW. The model output shows that these factors, together with the asset class, explain around 46% of the variability. As expected, both positive GDP growth and higher absolute economic standards (expressed by GDP per capita) reduce IRB RW. When we control for these factors, the level of unemployment no longer has explanatory power. Once we add portfolio- and bank-specific variables (column 2 of table 1), we improve the explanatory power of the model to around 54%. In line with our expectations, higher NPL ratios (both at the single portfolio level and at the asset class level) increase IRB RW,¹⁴

¹³ Strictly, we have the ratio of defaulted loans. In this paper, “nonperforming” and “defaulted” are used synonymously. There is a slight difference between NPLs and defaulted loans. What we call NPL ratio here is in fact the share of defaulted loans (as included in our dataset).

¹⁴ The NPL ratio is a good indicator of the riskiness of the portfolio. Note that the RW are calculated only for the performing portfolio.

while higher market relevance, used as a proxy for greater expertise, lowers RW.

It is evident from the macroeconomic variables and the coefficients on the NPL ratio that banks will be faced with higher RW during a crisis.¹⁵

4.4 Adding destination-specific and time-specific hidden effects

Even though the destination-specific and portfolio-specific risk factors considered so far already explain a fair share of RW variability, a substantial

Table 1

Panel estimation results: coefficients and robust standard errors

Variables	Macro	Add risk	Add hidden	Add HQ
Intercept	75.6***	78.1***	77***	81.5***
Unemployment	-0.3	-1.5***	-2.4**	-2.5**
GDP per capita – PPP	-0.5***	-0.4***	-0.4	-0.4
Recent GDP growth	-1.2*	-0.4	0	0
Recent GDP growth squared	0	-0.1	-0.2*	-0.2*
Asset class: institutions	-34***	-30.3***	-29.5***	-28.7***
Asset class: retail – other retail	-20.9***	-24.9***	-23.1***	-23.6***
Asset class: retail – qualifying revolving	-20***	-22.8***	-22.9***	-24***
Asset class: retail – secured by real estate property	-34.6***	-27.7***	-27.8***	-28.5***
NPL ratio		1.1**	1.1**	1.1**
Total NPL ratio per asset class		0.2	0.2	0.2
Foreign dummy		-3.7	-6.7***	-4.2*
Market relevance		-86.9***	-77.5***	-73.5***
Market relevance squared		103.5***	96.3***	90.2***
June 2013			0.2	0.2
December 2014			-2.4*	-2.5*
June 2015			-1.1	-1.1
December 2015			-1.4	-1.4
June 2016			-1.5	-1.4
HQ in:				
BE				-11.6**
DE				-9.4**
DK				-19.7***
ES				-0.1
FI				-4.8
FR				-7.4*
GB				4.2
GR				-2.6
IE				5.8
IT				-15.5***
LU				-1.3
NL				-9.2*
NO				-9.3
PT				2.8
SE				-17.2***
R ²	46	54	56	57
Number of observations	7,593	7,593	7,593	7,593
Destination fixed effects	No	No	Yes	Yes

Source: Authors' calculations.

Note: Codes denoting statistical significance: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$.

We use HC-robust standard errors.

Reference categories: (1) asset class: corporates, (2) time: December 2012, (3) HQ: in AT.

The dependent variable IRB RW is given in percentage points.

¹⁵ This cyclicality of RW is discussed e.g. in Kerbl and Sigmund (2009).

part has yet to be accounted for. One possible explanation may be that there are risk factors specific to the destination country that are not captured by economic growth or other common macro variables but are hidden (at least from our dataset). Besides, RW variability may arise from differences in the portfolio composition. Also, there might be effects across all exposures over time. To account for these, we add a dummy variable for each destination country and time point, which captures all remaining effects common to a destination or a time point. For the results of this regression, see the “Add hidden” column of table 1 and table A5 in the annex.

Indeed, we find that some destination countries (e.g. the Baltics and Slovakia) exhibit higher RW than expected from the macroeconomic and portfolio-specific variables that we control for, while other countries show lower-than-expected RW (e.g. Japan, Ukraine and New Zealand).¹⁶ We conclude that there are country-specific factors common to (a large share of) exposures to these countries that reduce the risk and thereby RW. Once we control for destination- and time-specific effects, some macroeconomic indicators lose their statistical significance, which reflects the usual crowding out of these factors by the more granular fixed effects.

4.5 Adding HQ-specific hidden effects

Having included a comprehensive set of control variables to capture the risk inherent in obligations (“intended risk weight heterogeneity”), we can now answer the question whether different implementation standards (“unintended risk weight heterogeneity”) also play a role. For this purpose, we add dummies depending on the HQ of the bank granting the loan. In an ideal world with equal implementation standards, these HQ fixed effects would not matter, i.e. they would be statistically zero.

The results are displayed in the rightmost column (“Add HQ”) of table 1. While the explained variance (R^2) rises only marginally (from 56% to 57%), the HQ effects are important:¹⁷ for most countries we find no significant HQ effects¹⁸, but for some countries¹⁹, there are statistically significant and economically important effects, which is in line with Turk-Ariss (2017) and the EBA (2017a).

The effects are large in Denmark, Sweden and Italy, with low RW due to the HQ of the bank being in these countries, whereas the opposite is true for Ireland, the United Kingdom and Portugal, even though the effects are not statistically significant in the latter countries. As a case in point, the expected IRB RW of a bank headquartered in Italy is 15.5 percentage points lower than the IRB RW of an Austrian

¹⁶ Looking at the list of destination coefficients (see table A5 in the annex), it is not clear which macroeconomic variables are missing. Many – but not all – Eastern European and less developed countries have higher RW.

¹⁷ The probability that all HQ effects are equal to zero can be rejected at any probability level (F -statistic: 228.5 on 16 and 7670 degrees of freedom). The R^2 of using solely HQ effects and no other regressors would be 32%. Chart A2 in the annex provides further evidence in favor of this conclusion.

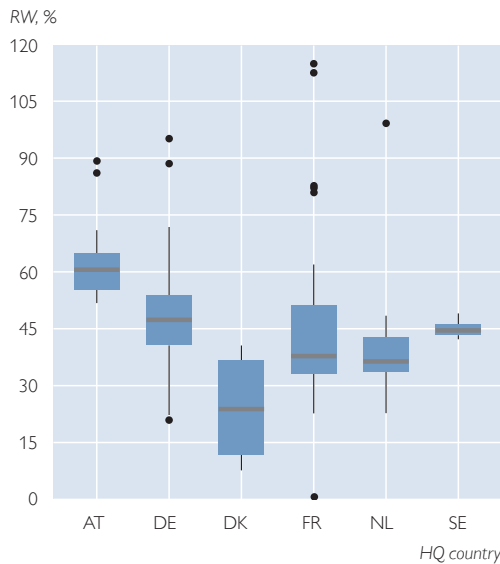
¹⁸ Note that the sheer number of significant effects depends on the reference category (in this case AT). If we chose the most extreme reference category (the one with the highest effect, IE), the number of significant ($p < 0.05$) HQ effects would remain at seven. Also, note that we use HC-robust standard errors.

¹⁹ Some of these identified countries have already taken macroprudential measures targeting banks’ RW (see <http://www.eba.europa.eu/risk-analysis-and-data/eu-wide-transparency-exercise/2017> for an overview).

Chart 2

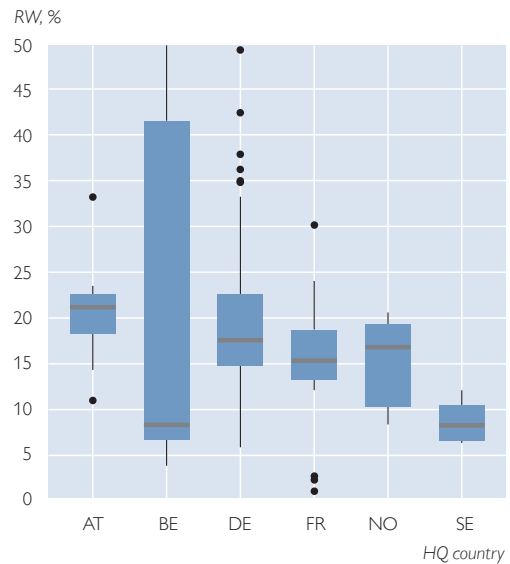
Comparison of IRB RW by HQ country

IRB RW for corporate exposures to DE



Country	AT	DE	DK	FR	NL	SE
No. of obs.	14	78	6	34	16	10
NPL ratio, %	2.53	4.58	0.33	1.79	3.4	1.3

IRB RW for retail exposures to DE



Country	AT	BE	DE	FR	NO	SE
No. of obs.	10	7	50	16	6	6
NPL ratio, %	7.13	6.46	1.19	6.21	0	0.46

Source: EBA transparency exercises, authors' calculations.

bank with the same destination, asset class and macroeconomic environment. These economically important effects would change the CET1 ratio by several percentage points – depending on the share of IRB capital requirements in total minimum capital requirements.

To better illustrate this heterogeneity between HQ countries, chart 2 depicts RW pertaining to the same asset class and the same destination (Germany) of all banks headquartered in selected countries²⁰. We see that in some cases RW variability is more pronounced between countries than within one country. In other cases, the medians of the distribution still differ widely. While chart 2 illustrates the heterogeneity across HQ countries, the results of the regression (see table 1) are sharper as the

regression allows us to identify HQ effects also after controlling for portfolio-specific NPL ratios.

Here, the question arises whether HQ effects might be driven by different country-specific collateral policies. While this may not be completely ruled out, two facts contest this hypothesis: First, NPL ratios indirectly also provide evidence on collateral, with a highly collateralized portfolio unlikely to remain nonperforming for long. Second, the HQ effects also hold within exposure classes (especially for retail secured by real estate) that exhibit homogeneous collateral requirements within one destination.

Another question is whether the large HQ effects may be in part explained by differences between the

²⁰ Germany was chosen as a destination because a large number of banks from different HQ countries actively grant loans to Germany, which enables us to draw this comparison. The HQ countries were chosen based on their HQ regression dummy coefficient.

advanced and the foundation IRB approach. Under the advanced IRB approach, banks estimate PDs and LGDs, whereas, under the foundation IRB approach, only PDs are estimated, which usually results in higher RW on balance. There are, indeed, cross-country differences in the use of the advanced vs. the foundation IRB approach. The different degrees of advanced IRB usage across countries, however, mainly mirror different degrees of supervisory standards concerning the approval of advanced IRB models, thus falling into the “*unintended risk weight heterogeneity*” category. Against this background, the BCBS (2016a) sees a greater need for reform in the use of advanced IRB models.

Another question is whether data quality issues or data shortages might bias our results. Even in supervisory exercises that collect data dedicated to RW variability, data quality issues are mentioned as a key caveat in the respective findings (European Banking Authority, 2017a, 2017b). As discussed in section 3, the quality controls implemented by banks and supervisors with a view to the data being used in EU-wide stress tests ensure a high data quality standard. The identification of HQ effects separated from (hidden) destination-specific effects depends on cross-border exposures. In general, at 6,362 data points²¹, our dataset provides a sufficiently high number of these, which allows us to obtain statistically significant regression coefficients (see table 1). At the same time, such data points may be reported only by a few banks in a given country. For Denmark, for instance, there is only one bank (Danske Bank) with notable cross-border exposures, and

only banks from Norway, Ireland and Sweden have cross-border exposures vis-à-vis Denmark. This should be borne in mind when interpreting the regression results. While we need to rely on the given data, we can check the robustness of our results regarding our statistical approach and choices therein.²²

We perform a number of robustness checks to validate our findings of HQ effects.²³ First, we analyze whether using a pooled OLS estimation would make a difference. Second, we analyze whether dropping destination fixed effects (but maintaining HQ effects) would change the picture. Third, we introduce another variable – rule of law (RoL) – as an indicator of the degree of collateral enforcement. We did not use RoL earlier because of data gaps. To close these gaps to a minimal degree, we assume that Switzerland has the same rule of law as Norway, Slovakia the same as the Czech Republic, Ireland the same as the United Kingdom, and that there are no substantial changes from one year to the next, so if a particular year is missing, we fill this with the adjunct year. Forth, we rerun our estimation without weighting the regression function by the exposure amount. Fifth, we cluster standard errors at the HQ level in order to account for possible correlation in the error terms. Sixth, we use a more detailed breakdown of asset classes (e.g. corporate exposures broken down into SME and non-SME) as previously employed. None of these changes leads to important changes in the HQ effects (for the results, see table A5 in the annex). Also, further regressions conducted in section 4.6 do not change these findings, either.

²¹ These 6,362 data points include only the asset classes studied here, i.e. institutions, corporate and retail.

²² We also checked whether excluding any particular bank in any particular period would change our conclusions, but this was not the case.

²³ The results of the robustness checks are shown in table A5 in the annex.

4.6 Evidence for other “unintended risk weight heterogeneity”

In addition to different implementation standards, we look at other forms of “unintended risk weight heterogeneity.” First, banks with a lower CET1 ratio (e.g. due to an idiosyncratic risk shock) have a greater incentive to push for low RW to artificially increase their CET1 ratio and thereby avoid regulatory and market sanctions. To test this hypothesis, we conduct a two-stage least squares (2SLS) estimation by using the “leverage ratio”²⁴ as an instrument variable (IV) for the CET1 ratio. In light of the model output, we do not reject our hypothesis that banks with a low CET1 ratio push for low RW, which results in artificial increases of their CET1 ratios. However, this effect is only marginally significant ($p < 0.1$). These results (as well as the robustness checks) are shown in table A5 in the annex.

Second, we also test whether large banks are better able to outmaneuver supervisors by increasing the complexity of their models. Large banks tend to have lower RW, but this general observation does not control for asset class composition and other risk indicators discussed above. In our context, we can control for these factors. We add total credit exposure of each bank and/or its log to the regression. We find no statistically significant effect supporting this hypothesis.

5 The effects of changing HQ countries on banks’ capital ratios

In this section, we quantify the model results (section 4.5) by assessing how capital ratios – the ratios between capital and risk-weighted assets²⁵ – would change if we only changed the country where banks are headquartered but kept everything else equal.²⁶ For this hypothetical prediction exercise, we select the largest banks from every country according to their total credit exposure (both in IRB and StA) and use the estimation results obtained in column “Add HQ” in table 1 to calculate the hypothetical capital ratios. Clearly, these calculations are hypothetical in several respects and should be understood only alongside these caveats: for one thing, we use the point estimates irrespective of statistical significance (e.g. there is also an effect AT vs. IE). For another, we assume that the prediction error is additive and independent of HQ effects. Additionally, total IRB RWA are de facto floored by either 80% of Basel I RWA or standardized-approach RWA. As only banks can calculate these floors, we must ignore this effect and quantify the variability of model-based RW only, i.e. without considering that in some cases floors might kick in.²⁷ In short, these calculations are meant to illustrate the magnitude of the regression coefficients. The estimates should definitely be taken with a grain of salt:

²⁴ As “leverage ratio” we use the ratio of tier 1 capital over total credit exposures.

²⁵ Risk-weighted assets are calculated by multiplying the exposure by the RW. Thus, an increase in RW leads to a decrease in the capital ratio.

²⁶ In this hypothetical scenario, we keep the following elements unchanged: CET1 capital, risk exposure amount for operational risk, for market risk, for credit valuation adjustment and for other risk exposure amounts as well as for credit risk in the StA and for IRB credit risk in the asset class central banks and central governments, equity, securitization, and other non-credit-obligation assets. Moreover, the destination of the counterparties, the NPL ratios in each portfolio and all other predictors remain unchanged. The only thing we adjust is the HQ country.

²⁷ These floors are complicated: whether a bank has to compare its IRB RWA with 80% of Basel I RWA or of standardized-approach RWA is not clear from our dataset. In 2013 (the only year for which data are available), the floor was relevant for only two of the banks represented in table 2: OP-Pohjola Group and Banque et Caisse d’Epargne de l’Etat, Luxembourg.

Table 2

Hypothetical CET1 ratios for the selected largest banks per HQ country

Bank name	AT	BE	DE	DK	ES	FI	FR	GB	IE	IT	LU	NL	NO	PT	SE
	%														
Erste Group Bank AG	13.3	15.6	15.1	17.5	13.3	14.2	14.7	12.6	12.3	16.5	13.5	15.1	15.1	12.8	16.9
KBC Group NV	13.6	16.7	16.0	19.3	13.6	14.7	15.4	12.7	12.4	18.0	13.9	15.9	15.9	13.0	18.6
Deutsche Bank AG	10.9	12.5	12.2	13.9	10.9	11.5	11.9	10.5	10.3	13.2	11.1	12.2	12.2	10.6	13.5
Danske Bank	10.8	13.3	12.7	15.8	10.8	11.7	12.3	10.1	9.9	14.4	11.0	12.7	12.7	10.3	15.0
Banco Santander SA	12.3	13.7	13.5	14.5	12.3	12.9	13.2	11.9	11.7	14.1	12.5	13.5	13.5	12.0	14.3
OP-Pohjola Group	21.1	27.7	26.6	30.9	21.1	23.6	25.2	19.3	18.7	29.2	21.7	26.5	26.5	19.9	29.9
BNP Paribas SA	10.5	11.7	11.5	12.6	10.5	11.0	11.3	10.1	10.0	12.2	10.6	11.4	11.5	10.3	12.4
HSBC Holdings Plc	12.2	13.5	13.2	14.4	12.2	12.7	13.0	11.7	11.6	13.9	12.3	13.2	13.2	11.9	14.1
Bank of Ireland	14.1	17.2	16.7	18.2	14.1	15.3	16.1	13.2	12.8	17.7	14.4	16.6	16.6	13.5	17.9
UniCredit SpA	9.1	10.1	9.9	11.0	9.1	9.5	9.8	8.8	8.7	10.5	9.2	9.9	9.9	8.9	10.7
Banque et Caisse d'Épargne de l'État	17.0	20.9	20.3	23.0	17.0	18.8	19.8	15.6	15.1	22.0	17.4	20.3	20.3	16.0	22.4
ING Groep N.V.	11.3	13.7	13.2	15.9	11.4	12.2	12.8	10.7	10.4	14.7	11.6	13.2	13.2	10.9	15.2
DNB ASA	12.8	15.0	14.5	17.1	12.8	13.6	14.1	12.2	11.9	15.9	13.0	14.5	14.5	12.4	16.4
Banco Comercial Português SA	12.7	14.7	14.2	16.5	12.7	13.4	13.9	12.1	11.9	15.5	12.9	14.2	14.2	12.3	15.9
Nordea Bank Group	11.7	14.7	14.0	17.9	11.7	12.7	13.4	10.9	10.6	16.1	11.9	13.9	14.0	11.1	16.8

Source: Authors' calculations.

Note: The figures in the main diagonal reflect the actual capital ratios, whereas the off-diagonal figures are hypothetical ratios.

parameter uncertainty alone causes these CET1 ratios to fluctuate on average ± 85 basis points in a 25%–75% confidence band.

Table 2 shows the hypothetical capital ratios for the largest banks in all countries, with the main diagonal representing the actual capital ratios as at June 2016 and the caveats mentioned above. The off-diagonal elements, which often deviate from the actual ratios, are driven by two factors: (1) the HQ dummy coefficients, and (2) the share of a bank's IRB risk exposure amount in its total minimum capital requirements. While the first factor determines the size of the change to a single RW, the second determines the degree to which a bank's minimum capital requirements are affected. The effects are economically large.

We additionally validate this finding by training a random-forest and a boosted regression tree to our data (see the annex for a description). We then use these models for prediction. Table A1

and A2 in the annex show that capital ratios obtained from the decision trees differ from those obtained from the panel regression (table 2). These differences illustrate that model uncertainty is evident (in addition to parameter uncertainty), again cautioning against taking the figures at face value. The most notable differences are observed for Ireland in the boosted regression tree, where the predicted RW are highest compared with the other models. On the other hand, many predictions are similar to the predictions derived from the random effects model in table 2. For example, Erste Bank's predicted CET1 ratio in the Netherlands would be 15.1% according to the random effects panel model, 15.2% under the random tree method and 14.4% when the boosted regression tree is used.

As there are several cases where the three approaches deviate from each other by more than one percentage point, a narrow interpretation of the results at the bank level is not really meaningful.

In some cases, the identification of HQ effects might be mainly based on banks not listed in table 2²⁸. We conclude that, while HQ-specific effects are important, their exact size is subject to model uncertainty.

6 Summary and conclusions

We analyze RW variability in the EU banking sector, using a granular dataset and a panel model approach. Our focus is on the question whether RW can be approximated by observable risk indicators (“*intended* risk weight heterogeneity”) or whether there is evidence for “*unintended* risk weight heterogeneity.” The latter would reflect differences in banks’ and supervisory implementation standards and in banks’ propensity to use artificially low internal estimates across jurisdictions.

In a stepwise procedure, we show that a good portion of RW variability can be explained by portfolio- and destination-specific risk indicators such as macroeconomic indicators and NPL ratios. Such variability is in line with regulators’ intentions.

We then also study *unintended* variability (“*unintended* risk weight heterogeneity”) by analyzing the effects on RW of (1) bank size, (2) bank capitalization, (3) the headquarters country reflecting supervisory practice and implementation standards.

We find that, first, it is not statistically significant that large banks are better able to push RW down (after controlling for the underlying credit risks). Second, it is of marginal statistical significance that banks with low CET1 ratios employ RW that are lower than would be expected from the underlying credit risk.

Third, there are statistically significant and economically important differences relating to the country where the bank is headquartered. This provides evidence that standards are implemented differently from jurisdiction to jurisdiction, a finding that is robust to a range of alternative specifications including tree-based methods.

We conclude that recent efforts by supervisors to lower RW variability are important for market participants, most notably the EBA benchmarking exercise and the ECB’s TRIM exercise. With a view to ensuring a level playing field, the measures focusing specifically on the euro area should be extended to encompass also non-euro area countries in order to reduce unwarranted RW variability. Many of the countries with large (negative) HQ effects, i.e. low RW after controlling for risk, have already implemented macroprudential measures that specifically address the issue of low RW. As a case in point, Sweden’s financial supervisory authority requires banks to hold systemic risk buffers, to maintain minimum RW and to comply with high capital charges under Pillar 2. In addition, our results support regulatory floors for model outputs as also envisaged under Basel IV and efforts by supervisors to harmonize banks’ Pillar III requirements.

Our findings also help inform the ongoing policy debate about the complexity of regulation. Complex rules require a (potentially too) great effort from supervisors to enforce standards consistently and monitor those subject to the rules. It would only be fair that the costs of these efforts were borne by those calling for such complex rules.

²⁸ By selecting the largest banks in each country, we addressed this caveat to the extent possible.

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Annex

A further method we employ to validate our regression findings is to estimate tree-based regressions explaining RW by the same set of predictors. Specifically, we employ random forests and boosting, flexible and powerful machine learning techniques. A regression tree segments the predictor space into a set of non-overlapping regions in a procedure that minimizes the residual sum of squares at each step. Random forests and boosting both train an ensemble of regression trees that are combined for the final model.²⁹

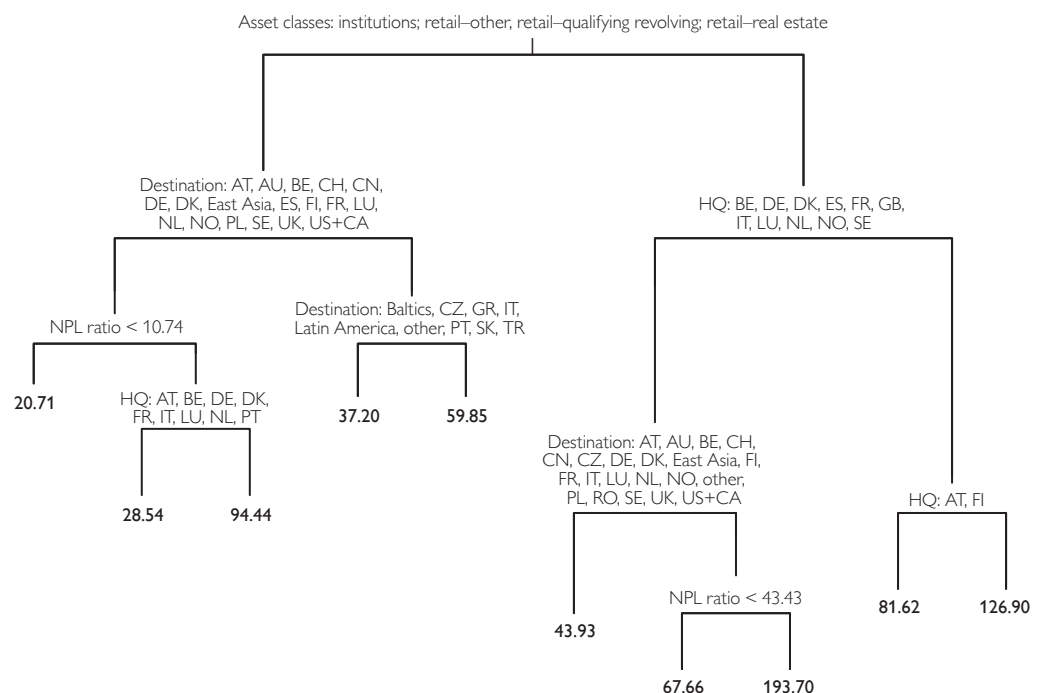
In chart A1, we present one example regression tree for the IRB RW

based on the variables used in section 4.5.³⁰ At every given internal node, both a left and a right branch emanate. For any new observation, follow the tree and go left at each node when the condition is fulfilled and right otherwise.

Even though random forests and boosting differ in the statistical approach from our random panel model employed earlier, the predictions of the model are highly comparable. We also find that – against the intention that only the risk of the obligations drives RW – the location of the headquarters is an important variable in explaining RW (see section 4.5).

Chart A1

Example of a decision tree



Source: Authors' calculations.

Note: If the condition is true, go left down the branch at every split.

²⁹ Hastie et al. (2009) provide a useful introduction to these methods in chapters 9, 10 and 15.

³⁰ This method requires us to aggregate destination countries into buckets. The “Baltics” aggregate comprises Estonia, Latvia and Lithuania, while “Latin America” consists of Venezuela, Colombia, Peru, Chile, Brazil and Mexico. Another bucket we construct is “East Asia,” which is made up of Japan, Korea, Singapore and Hong Kong. In addition, we treat Canadian exposures and U.S. exposures together. African and island countries are aggregated as “other” countries. This still leaves us with 32 different destination countries.

Also, to provide for additional robustness checks under section 5, we construct hypothetical CET1 ratios for the largest bank in each HQ country according to the random forest method (table A1) and the boosting method (table A2).

Table A1

Hypothetical CET1 ratios for the selected largest banks per HQ country according to the random forest method

Bank name	AT	BE	DE	DK	ES	FI	FR	GB	IE	IT	LU	NL	NO	PT	SE
	%														
Erste Group Bank AG	13.3	14.6	14.2	15.4	13.7	13.1	14.5	14.0	12.1	15.2	14.4	15.2	14.4	12.4	14.7
KBC Group NV	12.7	16.7	14.9	15.7	14.0	13.4	14.9	14.2	11.8	15.5	15.1	15.9	15.0	12.1	15.9
Deutsche Bank AG	10.0	11.4	12.2	12.3	10.3	9.8	11.6	11.3	9.1	11.9	11.4	12.0	11.5	9.3	12.1
Danske Bank	11.4	14.3	15.6	15.8	12.1	11.3	15.3	13.7	10.2	15.1	14.9	15.2	14.2	10.5	15.7
Banco Santander SA	12.1	12.8	12.8	12.9	12.3	12.1	13.1	12.6	11.2	12.9	13.2	13.0	12.8	11.3	13.0
OP-Pohjola Group	21.5	27.8	27.9	28.1	23.0	23.6	27.2	25.3	20.0	26.9	26.6	27.4	25.4	20.3	30.8
BNP Paribas SA	9.9	11.2	11.2	11.7	10.3	9.6	11.3	10.7	9.0	11.4	11.3	11.6	11.0	9.2	11.4
HSBC Holdings Plc	11.2	12.4	13.0	13.2	11.4	11.1	13.0	11.7	10.3	12.8	12.9	12.9	12.2	10.6	13.1
Bank of Ireland	12.7	14.9	13.2	14.8	14.7	14.1	15.1	11.8	12.8	14.7	15.6	14.7	14.8	12.8	14.6
UniCredit SpA	8.5	9.8	9.6	10.1	9.5	8.7	9.7	8.8	7.4	10.5	10.1	10.2	9.9	8.0	9.8
Banque et Caisse d'Épargne de l'État	16.2	19.7	19.9	21.2	17.7	15.2	18.7	18.6	14.9	19.3	17.4	20.8	18.4	14.9	20.6
ING Groep N.V.	11.4	13.1	13.0	13.4	11.9	11.3	12.7	12.6	10.3	12.9	12.7	13.2	12.5	10.5	13.4
DNB ASA	12.8	15.7	15.2	15.4	13.4	13.2	15.3	14.8	11.6	15.0	14.9	15.6	14.5	11.9	16.3
Banco Comercial Português SA	11.7	13.0	11.7	12.8	12.7	12.6	13.0	11.1	11.0	13.1	13.4	13.3	12.9	12.3	12.6
Nordea Bank Group	12.0	15.0	15.5	16.1	12.5	12.3	15.7	13.9	10.6	15.2	15.6	15.5	14.4	11.0	16.8

Source: Authors' calculations.

Note: The figures in the main diagonal reflect the actual capital ratios, whereas the off-diagonal figures are hypothetical ratios.

Table A2

Hypothetical CET1 ratios for the selected largest banks per HQ country according to the boosting method

Bank name	AT	BE	DE	DK	ES	FI	FR	GB	IE	IT	LU	NL	NO	PT	SE
	%														
Erste Group Bank AG	13.3	14.9	14.3	16.0	12.8	10.7	15.2	12.2	9.8	16.0	15.5	14.4	13.8	11.0	14.6
KBC Group NV	13.6	16.7	15.3	17.6	13.6	10.7	16.4	12.8	10.2	17.2	18.0	16.1	14.5	11.7	15.4
Deutsche Bank AG	10.9	11.7	12.2	13.3	11.0	9.9	12.4	11.0	8.8	13.2	12.7	12.2	12.0	9.5	12.4
Danske Bank	11.4	13.2	13.4	15.8	11.7	9.6	14.4	11.6	8.2	14.9	14.5	13.6	14.1	9.1	14.5
Banco Santander SA	12.6	13.0	13.2	14.0	12.3	11.3	13.7	12.0	10.4	14.0	14.2	13.6	13.0	12.0	13.4
OP-Pohjola Group	24.2	30.6	26.7	39.4	24.5	23.6	30.3	23.6	16.4	34.5	34.9	27.7	27.8	19.2	31.1
BNP Paribas SA	10.1	11.0	11.2	11.8	10.3	9.1	11.3	10.1	8.5	11.8	11.6	11.3	11.0	9.2	11.2
HSBC Holdings Plc	11.6	12.2	12.6	13.3	11.5	10.5	12.9	11.7	9.6	13.1	13.0	12.7	12.4	10.3	12.7
Bank of Ireland	14.9	17.7	15.2	19.7	13.9	10.8	17.6	11.4	12.8	17.9	21.9	17.8	14.2	14.9	15.3
UniCredit SpA	8.7	9.8	9.6	10.2	9.0	7.6	9.8	8.2	7.2	10.5	10.5	10.0	9.4	8.1	9.6
Banque et Caisse d'Épargne de l'État	15.9	17.9	18.7	20.3	15.2	12.3	18.8	16.0	12.7	19.3	17.4	16.6	17.5	13.2	18.2
ING Groep N.V.	11.7	12.8	13.1	14.6	11.7	10.5	13.6	11.8	9.3	14.1	13.9	13.2	12.8	10.6	13.3
DNB ASA	12.9	14.6	13.9	16.0	12.8	10.6	15.0	12.6	9.7	15.4	14.6	13.9	14.5	10.5	15.4
Banco Comercial Português SA	11.6	15.3	10.8	11.9	12.5	7.9	13.3	9.2	8.2	13.6	12.7	12.8	10.3	12.3	11.1
Nordea Bank Group	13.2	15.5	15.3	18.6	13.3	11.3	16.6	12.9	9.3	17.6	17.2	15.5	15.8	10.6	16.8

Source: Authors' calculations.

Note: The figures in the main diagonal reflect the actual capital ratios, whereas the off-diagonal figures are hypothetical ratios.

Table A3

Description of variables

Variable name	Description	Expected sign	Source
Dependent variable			
Average risk weights for corporate, retail or institution exposures	Ratio between IRB RWA and exposure values (IRB-RW) for corporate, retail (split into retail qualifying revolving, retail secured by real estate property, retail other), or institution exposures ¹	n.a.	EBA transparency exercises, authors' calculations
Destination-specific variables (macroeconomic control variables)			
Recent GDP growth	Average GDP growth rate of past 3 years	–	World Bank
Recent GDP growth squared	Average GDP growth rate of past 3 years squared, where the sign is maintained	–	World Bank
Unemployment	Unemployment rates averaged over past 3 years	+	World Bank
GDP per capita – PPP	Average GDP per capita in terms of PPP in current USD million of past 3 years	–	World Bank
Bank- and portfolio-specific control variables			
NPL ratio	Nonperforming loans over total loans at the portfolio level (bank, destination, asset class)	+	EBA transparency exercises, authors' calculations
Total NPL ratio per asset class	Total NPL ratio per asset class (at the bank and asset-class level only)	+	EBA transparency exercises, authors' calculations
Foreign dummy	Dummy which takes the value 1 if the exposure is cross-border	–	EBA transparency exercise
Market relevance	Share of exposure in total exposure	–	EBA transparency exercises, authors' calculations
Market relevance squared	Share of exposure in total exposure squared	+	EBA transparency exercises, authors' calculations
Total exposure	Total IRB and StA exposure per bank	–	EBA transparency exercises, authors' calculations
CET1 ratio	Common equity tier 1 ratio	–	EBA transparency exercises, authors' calculations
"Leverage ratio"	Share of tier 1 capital in total credit exposure	–	EBA transparency exercises, authors' calculations
Rule of law (RoL)	Overall score of rule of law	–	World Justice Project – rule of law index

Source: Authors' compilation.

Note: Theoretical considerations suggest that the impact of a variable on the risk weight is either positive (+) or negative (–).

¹ To prevent outliers from distorting our estimations, we only consider risk weights smaller than 370% and total exposures greater than EUR 5 million.

Table A4

Summary statistics – descriptive statistics

Variable name	Minimum	1 st quartile	Median	Mean	3 rd quartile	Maximum	NAs	Standard deviation
Risk weights, %	0	15.32	27.11	35.11	46.55	322.2	0	29.00
Recent GDP growth, %	–6.80	0.36	1.06	1.06	1.91	9.86	77	1.54
Recent GDP growth squared	–46.3	0.13	1.13	2.77	3.63	97.17	77	7.66
Unemployment, %	1.12	2.81	3.59	4.26	4.83	13.14	86	2.38
GDP per capita – PPP, thousands	1.01	37.48	43.56	45.57	49.59	102.1	81	16.59
NPL ratio, %	0	0	0.77	3.73	3.69	100	0	8.35
Total NPL ratio per asset class, %	0	0.40	1.96	3.63	4.44	69.58	0	5.59
Total exposure, 100 billion	0.05	1.56	3.13	5.24	8.68	21.29	0	4.76
Market relevance, %	0	0	0.01	0.03	0.02	0.77	0	0.06
Market relevance squared	0	0	0	0.01	0	0.59	0	0.03
CET1 ratio, %	5.51	11.42	13.01	13.54	15	28.57	0	3.14
"Leverage ratio," %	1.75	4.92	5.50	5.57	6.26	13.45	0	1.12
Rule of law index	0.31	0.72	0.78	0.76	0.81	0.89	220	0.09

Source: Authors' calculations.

Table A5

Panel estimation results: other “unintended risk weight heterogeneity” and robustness checks

Variable	2SLS: CET1 IV leverage	Add size	Add RoL	Pooled	Un- weighted	Add nonlinear NPL	Add asset classes	Clustered SE
Intercept	389.1**	392.1**	85.8***	215.3***	77.6*	366.4**	53.1***	392.2***
NPL ratio	1.1**	1.1**	1.1**	1.6***	0.2*	1.1*	0.7***	1.1.
NPL ratio – nonlinear					0	0		
Total NPL ratio per asset class	0.2	0.2	0.2	-0.3	0.5***	-0.3	-0.2	0.2
Total NPL ratio per asset class – nonlinear					0.1**	0.1**		
Unemployment	-2.4**	-2.5**	-2.7**	-3*	-1*	-2.8**	-0.3	-2.5
GDP per capita – PPP	-0.4.	-0.4.	-0.4.	-0.3	-0.3	-0.5*	0.1	-0.4
Recent GDP growth	0.1	0	0	-0.2	-3.3***	0	0.1	0
Recent GDP growth squared	-0.2*	-0.2*	-0.2*	-0.2	0.2*	-0.2*	-0.3**	-0.2
Asset class: institutions	-28.7***	-28.7***	-28.5***	-26.7***	-26.7***	-21.6***	-27.3***	-28.7***
Asset class: retail – other retail	-23.5***	-23.6***	-23.4***	-22.5***	-24.6***	-23.8***		-23.6*
Asset class: retail – qualifying revolving	-24***	-24.1***	-23.8***	-22.9***	-32.5***	-21.8***	-20.1***	-24.0*
Asset class: retail – secured by real estate property	-28.6***	-28.5***	-28.6***	-29.9***	-33.8***	-27.6***		-28.5***
Asset class: corporates – SME							4.1	
Asset class: corporates – specialized lending							10.5***	
Asset class: retail – other retail – non-SME							-16***	
Asset class: retail – other retail – SME							-18.6***	
Asset class: retail – secured by real estate property – non-SME							-25.8***	
Asset class: retail – secured by real estate property – SME							-23.1***	
Foreign dummy	-4.2*	-4.3*	-4*	-2.3**	-4.9***	-3.9*	-2.9*	-4.2.
Market relevance	-72***	-74.7***	-70.8***	-47.3***	-132.9***	-67.6***	-55.6***	-73.5*
Market relevance squared	87.9***	91.1***	87.1***	57.4***	188.3***	82.6***	63.9***	90.2
CET1 ratio (IV for “leverage ratio”)	0.3.							
Total exposure		-0.1						
Rule of law			-22.2.					
June 2013	0.1	0.2	0.2	0.1	3.1***	0.2	-0.1	0.2
December 2014	-2.5*	-2.4*	-2.6*	-3.4.	-0.1	-1.8.	-3.5**	-2.5
June 2015	-1.2	-1.1	-1.2	-2.1	1.2.	-0.3	-3.6**	-1.1
December 2015	-1.4	-1.3	-1.4	-2.3	1	-0.5	-3.9**	-1.4
June 2016	-1.6	-1.4	-1.3	-2.4	1.9*	-0.6	-3.7**	-1.4
HQ in:								
BE	-11.4**	-11.6**	-13.4***	-12.7***	-4.3	-11.8**	-12.3***	-11.6*
DE	-8.9**	-9.3**	-10.9**	-9.7***	-7.3**	-8.5*	-7.8**	-9.4.
DK	-19.5***	-19.6***	-21.2***	-17.4***	-13***	-16.6**	-14.3***	-19.7*
ES	0.3	0.4	-1.6	-0.2	0.5	0.1	3.9	-0.1
FI	-4.6	-4.8	-6.3	-1	5.7	-1.6	-1.5	-4.8
FR	-6.9*	-6.9*	-8.9**	-8.5***	-7.8**	-7.3*	-7.4**	-7.4.
GB	4.6	4.7	2.6	2.9	5.	5.6	7.1*	4.15
GR	-1.5	-2.6	-2	24.5	13.3	-1	17.8	-2.6
IE	4.9	5.9	4	2.8	17.7**	5.8	12.6.	5.8
IT	-15***	-15.2***	-17.1***	-13.7***	-9.6**	-16.3***	-12.9***	-15.5*
LU	-0.7	-1.3	-2.7	-0.3	-10.5**	0.6	2	-1.3
NL	-8.7*	-8.9*	-10.7**	-9.7***	-6.1*	-8.6*	-7.9**	-9.2*
NO	-8.8.	-9.2.	-10.8*	-8.2**	-6.9*	-5.6	-5.2	-9.3
PT	3.2	2.8	1	0.8	7.2	2.4	10.3.	2.8
SE	-16.9***	-17.2***	-18.7***	-15.8***	-9.4**	-13.4**	-14.4***	-17.2*
R ²	58	57	58	65	48	59	59	57
Number of observations	7,509	7,593	7,463	7,593	7,593	7,593	11,328	7,593
Destination fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: authors' calculations.

Note: Codes denoting statistical significance: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$. We use HC-robust standard errors except in the rightmost column, where we use clustered standard errors at the HQ level. Reference categories: (1) asset class: corporates, (2) time: December 2012, 3) HQ: in AT. The dependent variable IRB-RW is given in percentage points. 2SLS stands for “two-stage least squares” and SE for “standard error.”

Table A6

Coefficients for destination in “Add hidden” and “Add HQ” regressions

	Add hidden	Add HQ
Angola	325.6*	310.7*
Australia	-9.4*	-8.7*
Barbados	28.8**	22.1*
Belgium	-2	1.7
Brazil	9.8	3.4
Bulgaria	20.2*	13.5.
Canada	7.6	-2.9
Chile	-8.1	-15.2.
China	14.6	4.4
Colombia	8.7	1.5
Croatia	24.9.	19.4
Czech Republic	10.6*	10.5*
Denmark	-3.3	10.5*
Estonia	10.4	21.2*
Finland	5.9	12
France	2.8	4.9
Germany	1.3	5.2
Greece	8.1	5.4
Hong Kong	7.3	-3.5
Hungary	32.2*	29.9*
India	5.5	7.8
Ireland	22.3	14.1
Italy	-0.8	7.2
Japan	-15.5**	-15.7**
South Korea	13.4	14.2
Latvia	34.5**	45.4***
Lithuania	20.9*	31.8**
Luxembourg	17.9	17.8
Mexico	19.8.	12.7
Mozambique	-51	-60.3.
Netherlands	1.7	5.6
New Zealand	-22.5***	-20.5***
Norway	7.3	14.9*
Peru	33.4	25.9
Poland	9.3	10.1
Portugal	15	7.7
Romania	23.8*	17.3
Russia	12.2	13.7.
Saudi Arabia	-8.5	-19.7
Singapore	16.5	7
Slovakia	17.4*	16*
Slovenia	63.2***	56.3***
South Africa	26.3*	16.1
Spain	20.7*	17.4*
Sweden	-5	7.5
Switzerland	-7.9	-8.7
Turkey	18.5.	21.8*
Ukraine	-147***	-150.5***
United Kingdom	2.4	-4.4
United States	11.5*	8.4
Venezuela	2.7	-4.7

Source: Authors' calculations.

Note: Codes denoting statistical significance:

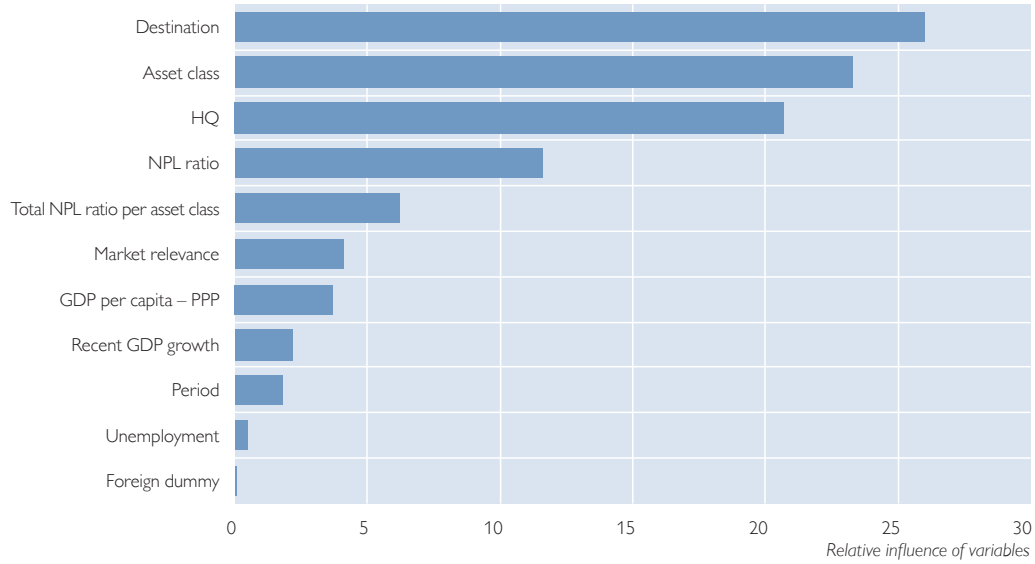
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$.

Table A5 presents the results of section 4.6 (“other unintended risk weight heterogeneity”) in the first two columns (“2SLS: CET1 IV leverage,” “Add size”). The other columns present robustness checks described in section 4.5. The column entitled “Add NPL nonlinear” adds PD indicators where the NPL ratios are transformed according to the risk weight formulae in Article 153 CRR (with LGD=0.45 and M=2.5).

Chart A2

Relative influence of variables according to the boosting method

Variables



Source: EBA transparency exercises, authors' calculations.

Annex of tables

Annex of tables

International financial market indicators	Table
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Cutoff date for data: November 23, 2017

Conventions used in the tables:

× = No data can be indicated for technical reasons

.. = Data not available at the reporting date

Revisions of data published in earlier volumes are not indicated.

Discrepancies may arise from rounding.

Please note that in the MS Excel file, thousand and decimal separators will be displayed according to users' country settings.

International financial market indicators

Table A1

Short-term interest rates¹

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>Three-month rates, period average, %</i>								
Euro area	1.39	0.57	0.22	0.21	-0.02	-0.26	-0.22	-0.33
U.S.A.	0.34	0.43	0.27	0.23	0.32	0.74	0.63	1.14
Japan	0.34	0.33	0.24	0.21	0.17	0.08	0.10	0.06
United Kingdom	0.87	0.83	0.51	0.54	0.57	0.50	0.59	0.33
Switzerland	0.12	0.07	0.02	0.01	-0.75	-0.75	-0.75	-0.73
Czech Republic	1.19	1.00	0.46	0.36	0.31	0.29	0.29	0.29
Hungary	6.19	6.98	4.31	2.41	1.61	0.99	1.21	0.21
Poland	4.54	4.91	3.02	2.52	1.75	1.70	1.68	1.73

Source: Bloomberg, Eurostat, Macrobond.

¹ Average rate at which a prime bank is willing to lend funds to another prime bank for three months.

Table A2

Long-term interest rates¹

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>Ten-year rates, period average, %</i>								
Euro area	4.31	3.05	3.01	2.28	1.27	0.93	0.98	1.29
U.S.A.	2.89	1.81	2.25	2.60	2.13	1.82	1.94	2.40
Japan	1.13	0.86	0.71	0.57	0.36	-0.04	0.04	0.05
United Kingdom	2.87	1.74	2.03	2.14	1.79	1.22	1.45	1.13
Switzerland	1.47	0.67	0.88	0.80	-0.02	-0.36	-0.28	-0.10
Austria	3.32	2.37	2.01	1.49	0.75	0.38	0.47	0.57
Czech Republic	3.71	2.78	2.11	1.58	0.58	0.43	0.46	0.74
Hungary	7.64	7.89	5.92	4.81	3.43	3.14	3.26	3.30
Poland	5.96	5.00	4.03	3.52	2.70	3.04	3.00	3.52

Source: ECB, Eurostat, Macrobond.

¹ Yields of long-term government bonds.

Table A3

Stock indices

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>Annual change in %, period average</i>								
Euro area: EURO STOXX	-3.60	-6.36	17.53	13.07	11.76	-9.67	-12.47	16.48
U.S.A.: S&P 500	11.20	8.81	19.17	17.49	6.71	1.63	-3.28	17.25
Japan: Nikkei 225	-5.81	-3.43	49.20	13.84	24.21	-11.92	-13.26	16.69
United Kingdom: FTSE100	3.90	1.09	12.69	3.23	-1.38	-1.74	-11.02	20.17
Switzerland: SMI	-6.96	4.88	24.14	9.28	4.23	-10.12	-11.19	8.73
Austria: ATX	-3.69	-14.79	16.94	-2.36	1.28	-5.42	-10.54	31.43
Czech Republic: PX 50	-5.11	-14.56	2.53	1.62	0.81	-11.49	-12.42	10.52
Hungary: BUX	-8.67	-12.01	3.26	-3.89	17.28	28.94	27.78	31.84
Poland: WIG	4.36	-6.65	16.05	8.07	-0.31	-9.83	-14.83	27.70

Source: Macrobond.

Table A4

Corporate bond spreads¹

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>Percentage points, period average</i>								
Euro area								
AA	2.13	1.67	0.89	0.59	0.72	0.80	0.87	0.84
BBB	3.98	3.75	2.25	1.71	1.89	2.11	2.29	1.88
U.S.A.								
AA	1.68	1.50	1.12	0.88	1.04	0.93	1.01	0.78
BBB	2.34	2.59	2.17	1.76	2.13	2.21	2.49	1.63

Source: Macrobond.

¹ Spreads of seven- to ten-year corporate bonds against ten-year government bonds (euro area: German government bonds).

Financial indicators of the Austrian corporate and household sectors

Table A5

Financial investment of households¹

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>EUR billion, four-quarter moving sum</i>								
Currency	1.1	0.6	1.2	0.9	0.7	0.6	0.6	0.5
Deposits	4.6	3.8	1.9	3.2	6.5	11.1	8.8	12.1
Debt securities ²	1.8	0.2	-1.8	-4.2	-3.5	-2.7	-2.2	-2.9
Shares and other equity ³	0.8	1.1	-0.1	1.5	-0.3	1.2	1.6	-0.1
Mutual fund shares	-1.4	0.9	2.7	3.5	4.1	3.1	2.9	3.8
Insurance technical reserves	2.9	3.7	3.4	3.3	1.6	1.1	1.1	0.2
Other accounts receivable	0.2	0.0	0.0	1.7	1.1		0.1	0.1
Total financial investment	10.0	10.3	7.3	9.9	10.2	13.4	12.9	13.7

Source: OeNB (financial accounts).

¹ Including nonprofit institutions serving households.

² Including financial derivatives.

³ Other than mutual fund shares.

Table A6

Household¹ income and savings

	2009	2010	2011	2012	2013	2014	2015	2016
<i>EUR billion, four-quarter moving sum</i>								
Net disposable income	172.4	173.8	178.3	185.4	185.6	189.7	193.2	200.9
Savings	19.8	16.8	14.2	16.6	13.3	13.0	13.4	16.0
Saving ratio in % ²	11.4	9.6	7.9	8.9	7.1	6.8	6.9	7.9

Source: Statistics Austria (national accounts broken down by sectors).

¹ Including nonprofit institutions serving households.

² Saving ratio = savings / (disposable income + increase in accrued occupational pension benefits).

Table A7

Financing of nonfinancial corporations

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>EUR billion, four-quarter moving sum</i>								
Debt securities ¹	4.2	2.8	1.7	-0.7	0.0	0.7	1.9	-1.1
Loans	6.4	0.6	7.0	3.2	3.7	6.9	8.8	15.6
Shares and other equity	9.7	2.4	4.4	4.2	2.6	4.3	-0.1	3.9
Other accounts payable	3.3	0.9	3.1	2.9	3.8	6.5	6.1	3.7
Total external financing	23.6	6.7	16.2	9.6	10.1	18.4	16.7	22.1

Source: OeNB (financial accounts).

¹ Including financial derivatives.

Table A8

Insolvency indicators

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
Default liabilities (EUR million)	2,775	3,206	6,255	2,899	2,430	2,867	1,800	668
Defaults (number)	3,260	3,505	3,266	3,275	3,115	3,163	1,625	1,531

Source: Kreditschutzverband von 1870.

Note: Default liabilities for 2013 include one large insolvency.

Table A9

Housing market indicators

	2009	2010	2011	2012	2013	2014	2015	2016
Residential property price index	2000=100							
Vienna	133.5	143.9	156.1	180.7	196.3	204.6	209.2	217.2
Austria	119.8	127.3	132.7	149.1	156.0	161.4	168.1	180.4
Austria excluding Vienna	114.8	121.1	124.0	137.4	141.1	145.4	152.9	166.7
Rent prices¹	2000=100							
Vienna: apartments	116.3	117.7	121.0	126.3	129.5	134.9	140.4	149.9
Austria excluding Vienna: apartments	144.7	145.9	148.2	144.1	162.5	158.9	158.3	163.0
Austria excluding Vienna: single-family houses	101.5	101.7	97.1	94.6	95.5	97.4	94.2	95.0
Rents of apartments excluding utilities, according to CPI	96.7	100.0	103.3	107.8	111.2	115.6	120.7	124.4
OeNB fundamentals indicator for residential property prices²								
Vienna	-6.6	-2.6	3.4	12.0	15.9	16.8	16.9	18.8
Austria	-12.7	-8.9	-5.6	-0.2	-1.3	-1.4	0.3	5.0

Source: OeNB, Vienna University of Technology (TU Wien).

¹ Free and regulated rents.

² Deviation from fundamental price in %.

Austrian financial intermediaries¹

Table A10

Total assets

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
	<i>End of period, EUR million</i>							
Total assets on an unconsolidated basis	1,014,278	982,114	927,155	896,424	859,165	832,267	850,643	842,375
of which: total domestic assets	693,394	678,500	645,275	611,540	605,267	603,541	597,624	605,534
Total assets on a consolidated basis	1,166,313	1,163,595	1,089,713	1,078,155	1,056,705	946,342	1,061,760	962,044
Total assets of CESEE subsidiaries ^{1,2}	270,045	276,352	264,998	285,675	295,557	184,966	296,735	197,725
Leverage ratio (consolidated, %) ³	5.8	6.1	6.5	6.1	6.3	7.6	6.5	7.8

Source: OeNB.

¹ Including Yapı ve Kredi Bankası (not fully consolidated by parent bank UniCredit Bank Austria AG) since 2014.² The transfer in ownership of UniCredit Bank Austria's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as of end-2016.³ Definition up to 2013: tier 1 capital after deductions in % of total assets. Definition as of 2014 according to Basel III.

Table A11

Sectoral distribution of domestic loans

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
	<i>End of period, EUR million</i>							
	All currencies combined							
Banks	184,789	169,364	147,537	133,342	127,037	122,204	116,450	122,264
Nonbanks	329,912	330,385	326,820	328,324	333,970	338,322	335,793	338,058
of which: nonfinancial corporations	138,840	140,384	140,329	136,606	137,235	136,963	137,156	138,134
households ¹	138,353	139,056	139,052	140,946	146,432	153,501	147,971	153,451
general government	28,976	27,972	25,970	28,102	28,076	27,630	28,517	27,592
other financial intermediaries	23,586	22,806	21,244	22,578	22,127	19,987	22,033	18,689
	Foreign currency							
Banks	25,288	19,422	16,013	15,181	12,963	12,144	12,138	10,438
Nonbanks	57,231	47,652	40,108	36,288	33,950	30,089	32,204	27,338
of which: nonfinancial corporations	12,111	9,156	6,985	6,379	5,293	4,296	4,662	4,181
households ¹	38,716	32,905	28,385	25,374	24,423	21,224	22,785	19,185
general government	3,267	2,827	2,478	2,777	2,858	2,623	2,766	2,129
other financial intermediaries	3,133	2,761	2,257	1,759	1,374	1,945	1,991	1,815

Source: OeNB.

¹ Including nonprofit institutions serving households.

Note: Figures are based on monetary statistics.

¹ Since 2007, the International Monetary Fund (IMF) has published Financial Soundness Indicators (FSIs) for Austria (see also www.imf.org). In contrast to some FSIs that take only domestically-owned banks into account, the OeNB's Financial Stability Report takes into account all banks operating in Austria. For this reason, some of the figures presented here may deviate from the figures published by the IMF.

Table A12

Loan quality

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, % of claims on nonbanks</i>								
Specific loan loss provisions for loans to nonbanks (unconsolidated)	3.2	3.4	3.5	3.3	3.0	2.3	2.7	2.2
Specific loan loss provisions for loans to nonbanks (consolidated)	4.3	4.6	4.8	4.5	4.2	3.2	3.5	2.8
Specific loan loss provisions for loans to nonbanks (Austrian banks' subsidiaries in CESEE)	7.3	7.6	8.0	7.3	7.0	6.1	6.7	5.2
Nonperforming loan ratio (unconsolidated) ¹	4.5	4.7	4.1	4.4	4.3	3.5	4.0	3.3
Nonperforming loan ratio (consolidated) ¹	8.3	8.7	8.6	7	6.6	4.9	5.6	4.6
Nonperforming loan ratio (Austrian banks' subsidiaries in CESEE) ²	14.2	13.9	14.0	11.8	11.5	8.6	9.9	7.5

Source: OeNB.

¹ Ratio for loans to corporates and households (introduced in Financial Stability Report 24 to better indicate the loan quality in retail business; not comparable with former ratios).² The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as of end-2016.

Table A13

Exposure to CESEE

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Total exposure according to BIS ¹	216,086	209,818	201,768	184,768	186,397	193,273	187,553	209,900
Total indirect lending to nonbanks ^{2,3}	171,311	171,117	161,439	177,389	176,728	108,738	106,405	114,093
Total direct lending ⁴	52,010	51,539	52,926	43,144	40,866	32,976	39,677	30,909
Foreign currency loans of Austrian banks' subsidiaries in CESEE ³	88,282	85,382	79,047	76,736	69,317	32,576	32,733	31,749

Source: OeNB.

¹ As of mid-2017, comparability of data with earlier figures is limited due to several methodological adjustments in data collection.² Lending (net lending after risk provisions) to nonbanks by all fully consolidated bank subsidiaries in CESEE.³ The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as of end-2016.⁴ Cross-border lending to nonbanks and nonfinancial institutions in CESEE according to monetary statistics.

Table A14

Profitability on an unconsolidated basis

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Operating income	19,227	19,115	18,967	19,943	20,813	18,984	9,936	10,013
of which: net interest income	9,622	8,813	8,814	9,306	8,975	8,522	4,333	4,075
securities and investment earnings	3,662	3,670	3,018	3,550	3,443	3,608	2,019	2,190
fee and commission income	3,835	3,848	4,073	4,260	4,410	3,887	2,121	2,214
trading income	325	631	495	368	516	322	97	167
other operating income	1,784	2,153	2,567	2,458	3,469	2,644	1,366	1,367
Operating expenses	11,714	12,193	12,835	13,906	13,770	13,55	7,048	6,203
of which: staff costs	5,998	6,243	6,507	7,384	6,918	6,752	3,660	2,991
other administrative expenses	4,028	4,124	4,301	4,459	4,582	4,683	2,359	2,279
other operating expenses	1,688	1,827	2,027	2,063	2,270	2,118	1,030	934
Operating profit/loss	7,513	6,922	6,132	6,037	7,043	5,477	2,887	3,810
Net profit after taxes	1,211	3,214	-935	-6,692	3,720	4,467	3,217	4,483
	%							
Return on average assets ¹	0.1	0.3	-0.1	-0.7	0.4	0.5	0.4	0.5
Return on average equity (tier 1 capital) ¹	1.6	4.31	-1.2	-9.9	5.9	7.0	4.9	7.3
Interest income to gross income	50.0	46.1	46.5	46.7	43.1	44.9	43.6	40.7
Cost-to-income ratio	60.9	63.79	67.7	69.7	66.2	71.4	70.9	62.0

Source: OeNB.

¹ End-of-period result after tax in % of average total assets and average tier 1 capital, respectively.

Table A15

Profitability of Austrian banks' subsidiaries^{1, 2} in CESEE

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Operating income	13,070	12,685	12,544	12,159	12,261	7,752	3,974	3,922
of which: net interest income	9,290	8,780	8,414	9,068	8,431	5,135	2,575	2,616
securities and investment earnings	67	66	63	27	49	57	41	64
fee and commission income	3,084	2,992	3,164	3,477	3,358	2,184	1,069	1,131
trading income	521	739	736	-251	642	681	548	200
other operating income ³	-141	-321	-374	-831	-528	-344	-219	-152
Operating expenses ³	6,325	6,363	6,253	6,413	6,264	4,084	2,016	2,078
of which: staff costs	2,972	2,992	2,922	2,978	2,896	1,956	959	1,002
Operating profit/loss	6,744	6,321	6,291	5,746	5,998	3,668	1,958	1,844
Net profit after taxes	1,876	1,999	2,201	672	2,050	2,354	2,162	1,527
Return on average assets ⁴	0.7	0.7	0.8	0.2	0.7	1.3	1.6	1.6
Return on average equity (tier 1 capital) ⁴	7.2	8.2	8.4	9.9	9.5	14.3	16.5	17.5
Interest income to gross income	71	69	67	75	69	66	65	67
Cost-to-income ratio ³	48	50	50	53	51	53	51	53

Source: OeNB.

¹ Pro rata data of Yapi ve Kredi Bankasi, a joint venture of UniCredit Bank Austria AG in Turkey, are included for the period from the first quarter of 2014 until end-2015.² The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as of end-2016.³ Since end-2014, other operating income and other operating expenses have been netted under other operating income.⁴ End-of-period result expected for the full year after tax as a percentage of average total assets and average total tier 1 capital, respectively.

Table A16

Profitability on a consolidated basis¹

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Operating income	37,207	37,673	35,271	28,717	28,064	22,640	11,228	11,668
of which: net interest income	20,426	19,259	18,598	19,345	18,336	14,710	7,239	7,259
net fee-based income	7,592	7,260	7,590	7,741	7,730	6,566	3,247	3,428
net profit/loss on financial operations	845	1,137	670	426	-50	106	127	44
other operating income ²	8,344	10,016	8,413	1,205	2,048	1,258	615	937
Operating expenses	26,839	25,582	27,318	19,833	17,612	16,690	8,088	7,656
of which: staff costs	10,279	10,391	10,378	9,543	8,959	8,775	4,367	4,167
other administrative expenses	6,316	6,410	6,628	6,569	6,830	5,823	2,898	2,872
Operating profit/loss	10,369	12,090	7,953	8,884	10,452	5,723	3,141	4,012
Net profit after taxes	711	2,966	-1,035	685	5,244	4,979	2,892	3,358
%								
Return on average assets ³	0.1	0.3	-0.0	0.0	0.6	0.6	0.6	0.8
Return on average equity (tier 1 capital) ³	1.7	5.1	-0.7	0.7	8.8	8.3	8.3	10.8
Interest income to gross income	54.9	51.1	52.7	67.4	65.3	65.0	64.5	62.2
Cost-to-income ratio	66.4	61.7	73.0	69.1	62.8	73.7	72.0	65.6

Source: OeNB.

¹ The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as of end-2016.² Since end-2014, other operating income and other operating expenses have been netted under other operating income.³ End-of-period result for the full year after tax but before minority interests as a percentage of average total assets and average tier 1 capital, respectively.

Table A17

Solvency

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Own funds	88,071	88,204	88,994	87,584	87,793	80,699	88,942	83,001
Total risk exposure	649,613	621,925	578,425	562,790	537,447	442,870	539,321	448,304
<i>End of period, eligible capital and tier 1 capital, respectively, as a percentage of risk-weighted assets</i>								
Consolidated total capital adequacy ratio	13.6	14.2	15.4	15.6	16.3	18.2	16.5	18.5
Consolidated tier 1 capital ratio	10.3	11.0	11.9	11.8	12.9	14.9	13.3	15.3
Consolidated core tier 1 capital ratio (common equity tier 1 as from 2014)	9.8	10.7	11.6	11.7	12.8	14.8	13.2	15.1

Source: OeNB.

Note: Since 2014, figures have been calculated according to CRD IV requirements; therefore, comparability with previous figures is limited.

Table A18

Market indicators of selected Austrian financial instruments

	2010	2011	2012	2013	2014	2015	2016	Oct. 2017
Share prices	<i>% of end-2010 prices, end of period</i>							
Erste Group Bank	100	39	68	72	55	83	81	111
Raiffeisen Bank International	100	49	77	62	32	35	44	76
EURO STOXX Banks	100	62	70	88	84	79	73	84
Uniq	100	64	67	63	53	51	49	60
Vienna Insurance Group	100	79	104	93	95	65	55	65
EURO STOXX Insurance	100	82	109	146	151	175	165	187
Relative valuation: share price-to-book value ratio	<i>%, end of period</i>							
Erste Group Bank	0.92	0.40	0.67	0.88	0.76	1.02	0.92	1.20
Raiffeisen Bank International	0.85	0.40	0.60	0.51	0.48	0.50	0.59	1.01
EURO STOXX Banks	0.67	0.49	0.58	0.81	0.77	0.74	0.71	0.86
Uniq	1.64	1.53	1.05	1.03	0.78	0.74	0.69	0.91
Vienna Insurance Group	1.07	0.95	1.07	1.02	0.98	0.79	0.62	0.73
EURO STOXX Insurance	0.79	0.65	0.75	1.07	0.93	1.02	0.89	1.09

Source: Bloomberg.

Table A19

Key indicators of Austrian insurance companies

	2011	2012	2013	2014	2015	2016	H1 16	H1 17 ²
Business and profitability	<i>End of period, EUR million</i>							
Premiums	16,537	16,341	16,608	17,077	17,342	16,920	9,220	9,227
Expenses for claims and insurance benefits	12,826	12,973	13,150	14,157	15,514	14,751	7,767	7,225
Underwriting results	295	455	592	477	475	560	422	327
Profit from investments	2,964	3,391	3,354	3,211	3,216	3,051	1,725	1,609
Profit from ordinary activities	1,162	1,395	1,524	1,421	1,354	1,414	954	934
Acquisition and administrative expenses	3,541	3,499	3,528	3,573	3,697	3,818	1,934	1,924
Total assets	105,945	108,374	110,391	113,662	114,495	114,707	115,024	140,288
Investments								
Total investments	99,776	103,272	105,496	107,442	107,933	108,897	108,398	109,887
of which: debt securities	37,813	37,614	39,560	41,667	41,517	43,241	42,803	43,564
stocks and other equity securities ¹	12,363	12,505	12,464	12,619	12,522	12,534	12,415	12,704
real estate	5,236	5,371	5,689	5,858	5,912	6,022	5,866	6,038
Investments for unit-linked and index-linked life insurance	15,870	18,330	19,127	20,179	19,776	20,142	19,413	20,241
Claims on domestic banks	16,405	16,872	16,687	15,800	15,492	13,793	15,059	x
Reinsurance receivables	1,733	1,933	824	918	971	1,027	1,116	1,237
	%							
Risk capacity (median solvency capital requirement)	332	350	368	380	375	x	x	241

Source: FMA, OeNB.

¹ Contains shares, share certificates (listed and not listed) and all equity instruments held by mutual funds.² A new reporting system based on Solvency II was introduced in 2017; therefore, some indicators cannot be compared with historical values.

Table A20

Assets held by Austrian mutual funds

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Domestic securities	50,046	50,963	49,757	52,116	52,970	54,382	52,817	54,467
of which: debt securities	16,683	17,527	16,203	15,467	13,609	13,278	13,653	12,525
stocks and other equity securities	2,991	3,637	3,610	3,345	3,530	4,283	3,266	4,377
Foreign securities	87,458	96,854	99,647	110,397	114,833	12,033	115,537	123,615
of which: debt securities	58,695	63,661	62,972	69,642	70,326	69,911	71,519	70,004
stocks and other equity securities	12,097	14,208	16,278	17,910	18,521	20,145	17,206	20,742
Net asset value	137,504	147,817	149,404	162,513	167,802	174,712	168,354	178,071
of which: retail funds	78,299	84,158	83,238	89,163	91,626	94,113	91,884	95,607
institutional funds	59,205	63,659	66,167	73,350	76,177	80,599	76,470	82,465
Consolidated net asset value	116,747	126,831	128,444	138,642	143,249	148,682	143,294	151,762

Source: OeNB.

Table A21

Structure and profitability of Austrian fund management companies

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Total assets	661	644	670	725	745	691	679	644
Operating profit	125	111	131	158	184	157	73	81
Net commissions and fees earned	284	283	310	368	411	402	197	212
Administrative expenses ¹	195	205	219	246	266	284	135	139
Number of fund management companies	29	29	29	29	29	29	29	29
Number of reported funds	2,171	2,168	2,161	2,118	2,077	2,029	2,051	2,040

Source: OeNB.

¹ Administrative expenses are calculated as the sum of staff and material expenses.

Table A22

Assets held by Austrian pension funds

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Total assets	14,798	16,335	17,385	19,011	19,646	20,839	19,848	21,645
of which: direct investment	1,139	1,139	1,640	1,065	990	835	929	827
mutual funds	13,626	15,278	15,745	17,946	18,656	20,004	18,918	20,818
foreign currency (without derivatives)	x	5,714	5,964	7,578	7,279	9,169	8,333	9,754
stocks	x	4,805	5,472	6,250	6,200	6,972	5,890	7,357
debt	x	8,464	7,650	9,163	9,552	9,521	10,202	9,625
real estate	x	567	583	576	690	754	702	774
cash and deposits	1,624	1,488	2,033	1,598	1,850	1,863	1,508	1,827

Source: OeNB, FMA.

Table A23

Assets held by Austrian severance funds

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>End of period, EUR million</i>								
Total direct investment	1,393	1,442	1,528	1,415	1,565	1,682	1,612	1,682
of which: euro-denominated	1,363	1,415	1,507	1,299	1,502	1,647	1,550	1,647
foreign currency-denominated	30	27	21	x	63	35	61	35
accrued income claims from direct investment	19	22	21	15	14	15	14	15
Total indirect investment	2,891	3,834	4,701	5,912	6,741	7,745	7,181	7,745
of which: total of euro-denominated investment in mutual fund shares	2,741	3,540	4,220	5,190	5,790	6,743	6,289	6,743
total of foreign currency-denominated investment in mutual fund shares	151	294	481	722	951	1,002	892	1,002
Total assets assigned to investment groups	4,284	5,254	6,218	7,306	8,294	9,412	8,770	9,412

Source: OeNB.

Note: Due to special balance sheet operations, total assets assigned to investment groups deviate from the sum of total indirect investments.

Table A24

Transactions and system disturbances in payment and securities settlement systems

	2011	2012	2013	2014	2015	2016	H1 16	H1 17
<i>Number of transactions in million, value of transactions in EUR billion</i>								
HOAM.AT								
Number	1	1	1	1	1	1	1	1
Value	7,667	9,974	5,906	7,438	6,381	4,316	2,262	2,050
System disturbances	1	1	3	0	1	4	2	0
Securities settlement systems								
Number	2	2	2	2	2	2	1	1
Value	439	418	369	377	315	335	165	231 ¹
System disturbances	0	1	5	2	3	3	1	0
Card payment systems								
Number	591	633	673	856 ²	901	963	379	427
Value	45	48	72	91 ²	97	101	25	27
System disturbances	4	4	2	0	2	4	2	0
Participation in international payment systems								
Number	36	41	53	113	144	166	80	80
Value	1,306	1,820	1,643	2,463	2,420	3,029	1,410	1,565
System disturbances	0	0	0	0	0	0	0	0

Source: OeNB.

¹ Significant rise in reported values since T2S migration in February 2017.² In mid-2014, significant changes were implemented in the reporting of card payment data. On-us ATM transactions have been included since then.