



OESTERREICHISCHE NATIONALBANK  
EUROSYSTEM

# FINANCIAL STABILITY REPORT 35



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.

**Publisher and editor**

Oesterreichische Nationalbank  
Otto-Wagner-Platz 3, 1090 Vienna  
PO Box 61, 1011 Vienna, Austria  
[www.oenb.at](http://www.oenb.at)  
[oenb.info@oenb.at](mailto:oenb.info@oenb.at)  
Phone (+43-1) 40420-6666  
Fax (+43-1) 40420-046698

**Editorial board**

Philip Reading, Vanessa Redak, Doris Ritzberger-Grünwald, Martin Schürz

**Coordinator**

Andreas Greiner, Stefan Kavan

**Editing**

Dagmar Dichtl, Jennifer Gredler, Barbara Meinx, Susanne Steinacher

**Layout and typesetting**

Sylvia Dalcher, Melanie Schuhmacher, Michael Thüringer

**Design**

Information Management and Services Division

**Printing and production**

Oesterreichische Nationalbank, 1090 Vienna

DVR 0031577

ISSN 2309-7272 (online)

© Oesterreichische Nationalbank, 2018. All rights reserved.

May be reproduced for noncommercial, educational and scientific purposes provided that the source is acknowledged.

Printed in accordance with the Austrian Ecolabel guideline for printed matter.

Please collect used paper for recycling.

EU Ecolabel: AT/028/024



# Contents

Call for applications: Visiting Research Program	4
--------------------------------------------------	---

## Reports

Management summary	8
International macroeconomic environment: global and European economies see sustained upswing amid growing risks	11
Corporate and household sectors in Austria: improving risk indicators	20
Austrian financial intermediaries: strong profits, but banks need to further improve structural efficiency	33

## Special topics

Digitalization in financial services and household finance: fintech, financial literacy and financial stability <i>Helmut Elsinger, Pirmin Fessler, Judith Feyrer, Konrad Richter, Maria Silgoner, Andreas Timel</i>	50
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----

The Russian banking sector: between instability and recovery <i>Stephan Barisitz</i>	59
-----------------------------------------------------------------------------------------	----

One policy to rule them all? On the effectiveness of LTV, DTI and DSTI ratio limits as macroprudential policy tools <i>Nicolás Albacete, Pirmin Fessler, Peter Lindner</i>	67
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----

Annex of tables	85
-----------------	----

Editorial close: May 18, 2018

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

## 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 macro-economics, 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 2019 should be e-mailed to [eva.gehringer-wasserbauer@oenb.at](mailto:eva.gehringer-wasserbauer@oenb.at) by November 1, 2018.

Applicants will be notified of the jury's decision by mid-December. The following round of applications will close on May 1, 2019.

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 Macprudential Supervision Division, the European Affairs and International Financial Organizations Division, the Supervision Policy, Regulation and Strategy Division, the Off-Site Supervision Division – Less Significant Institutions, the Off-Site Supervision Division – Significant Institutions as well as the Office for Specific Bank Resolution Matters, with contributions from Andreas Breitenfellner, Robert Ferstl, Andreas Greiner, Manuel Gruber, Stefan Kavan, David Liebeg, Benjamin Neudorfer, Wolfgang Pointner, Elisa Reinhold, Bernhard Rottensteiner, Benedict Schimka, Josef Schreiner, Michael Sigmund, Eva Ubl, Klaus Vondra, Walter Waschiczek, Beat Weber and Tina Wittenberger.

# Management summary

## **International macroeconomic environment: global and European economies see sustained upswing amid growing risks**

The global upswing in economic activity continues to firm. Growth is projected to rise in emerging and developing markets as well as in advanced economies in both 2018 and 2019, despite some softening momentum in the first quarter of 2018 and growing risks amid geopolitical uncertainty. Financial market confidence, while remaining strong, has suffered from higher volatility in equity markets, reflecting trade tensions and less supportive monetary policy.

Central, Eastern and Southeastern Europe (CESEE) continues to experience one of the strongest economic expansions since 2008. Growth has been increasingly broad based amid vivid international demand, high capacity utilization, the inflow of EU funds, brightening sentiment, favorable financing conditions, high wage growth and tightening labor markets. The strong economic momentum notwithstanding, the increase in price pressures has remained limited, and inflation rates are well within targets in most countries. In Russia and Ukraine, growth is noticeably less brisk than in the rest of the region, albeit still positive. Firming credit growth and a further reduction in nonperforming assets have kept banking sector profitability broadly stable despite some decline in operating income.

## **Corporate and household sectors in Austria: improving risk indicators**

The Austrian economy recorded fast-paced growth in 2017, underpinned by both domestic and foreign demand. Strong investment demand increased the financing needs of nonfinancial corporations. While internal financing remained the most important source of funds and firms continued to have substantial liquidity at their disposal, Austrian nonfinancial corporations' recourse to external financing picked up in 2017.

A notable increase in equity funding notwithstanding, debt instruments provided the bulk of nonfinancial corporations' external financing in 2017 as lending by Austrian banks gained further momentum. In March 2018, its annual growth rate reached the highest value in nine years, even though Austrian banks continued their cautious lending policies. The expansion of bank lending to households also gained momentum in recent months. The main contribution to loan growth came from housing loans, not only because they are the most important loan category for households but also because of a slight acceleration of their expansion rate.

Historically low bank lending rates, reinforced by a high share of variable rate loans, continued to support the current debt-servicing capacity of the corporate and household sectors. The take-up of variable rate loans by both enterprises and households decreased further in the first months of 2018, but borrowers continue to be exposed to considerable interest rate risks. Foreign currency loans also remain a risk factor for vulnerable households, despite these loans' substantial decrease in past years due to supervisory measures. But given that the remaining volume of such loans is small, they do not represent a systemic risk for the Austrian financial system. Nonetheless, loans linked to repayment vehicles continue to warrant close monitoring.

Residential property prices in Austria continued to rise in 2017 and early 2018. Reflecting this pick-up in price growth, residential property prices in Austria continued to deviate from their fundamentally justified values, as the OeNB fundamental indicator implies.

### **Austrian financial intermediaries: strong profits, but banks need to further improve structural efficiency**

Almost a decade after the onset of the global financial crisis, the Austrian banking sector recorded its highest post-crisis profits in 2017, marking a recovery to pre-crisis levels amidst a highly supportive macroeconomic environment and historically low credit risk costs. Even though operating income was slightly higher and expenses fell year on year, the cost-income ratio remained elevated. Banks continued to benefit from their subsidiaries' activities in CESEE, where the net result after taxes was boosted by low provisioning levels.

Austrian banks' credit quality improved further, with nonfinancial corporations making up two-thirds of the remaining NPL portfolio. A positive trend was also observed at banks' subsidiaries in CESEE, where the situation remained highly heterogeneous across countries, however.

In this benign phase of the economic cycle, Austrian banks slightly increased their common equity tier 1 (CET1) capital ratio, but there is a clear loss in momentum compared to previous years, as profit-sharing demands from investors were successful and banks increased dividend payments. The CET1 ratio of Austrian significant institutions (SIs) fell further behind the average recorded for the Single Supervisory Mechanism (SSM) in 2017. The funding position of Austrian banks remained solid, and CESEE subsidiaries showed a strong reliance on local stable funding (as indicated by the Sustainability Package).

As to macroprudential policy in Austria, systemic risks in residential real estate lending continue to be limited, which is mainly due to the high risk-bearing capacity of lenders and borrowers. Yet, against the backdrop of record low interest rates and strong increases in property prices, the OeNB calls on banks to exercise caution with regard to real estate lending standards, especially since they show indications of unsustainability for a non-negligible share of newly granted loans.

Despite improved economic conditions, the persistently low yield environment remains a challenge for Austrian life insurance companies. The insurance sector has been adjusting to this environment as well as to regulatory changes by adapting its investment mix, both in terms of securities' issuers and duration. In payment services, challenges remain regarding the revised EU Payment Services Directive, as essential technical issues of the legislation are still unresolved.

### **Recommendations by the OeNB**

In the current phase of buoyant economic activity, Austrian banks should continue to address outstanding issues in order to foster the sustainability of their profits, improve their resilience and prospects, and ensure that they have enough room for maneuver for potential future downturns.

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

- Use the window of opportunity which the benign market environment provides to further improve structural efficiency. This will strengthen banks' profitability, allow investments in digitalization and help to further increase banks' risk-bearing capacity.
- Reinvigorate efforts to further improve capitalization, especially at significant institutions, as the current upturn may sow the seeds for the emergence of future credit risks.



- Apply sustainable lending standards in real estate lending, both in Austria and in CESEE.
- Continue efforts to resolve remaining nonperforming loans in CESEE.
- Maintain compliance with the FMA minimum standards regarding foreign currency and repayment vehicle loans and intensify bilateral negotiations with borrowers to find tailor-made solutions; and maintain compliance with the (recently) reviewed Sustainability Package.

# International macroeconomic environment: global and European economies see sustained upswing amid growing risks

## **Global economic growth withstands trade tensions, oil price rise, monetary tightening and market volatility**

The global economic upswing remains sustained and well synchronized despite the impact of trade tensions, with the forecast for worldwide GDP growth being revised upward to 3.9% in 2018. In the first quarter of the same year, however, a temporary dip occurred in several countries. Before, in 2017, the world economy had reported its fastest expansion since 2011 based on rising global investment and trade. Global financial conditions remained supportive, in line with still accommodative, albeit gradually tightening, monetary policies, and apart from recent equity market volatility and increases in bond yields. The announcements of intended U.S. import tariffs on certain goods as well as the rise in U.S. government bond yields led to a temporary increase in non-European emerging market bond spreads. Inflation dynamics continued to be moderate, despite rising oil prices.

The risks to the global activity outlook are broadly balanced in the short term, but skewed to the downside in the medium term, reflecting threatening trade protectionism, uncertainty about the speed of monetary policy normalization and geopolitical tensions.

In the United States economic activity is expected to grow above potential in 2018 amid sizeable procyclical fiscal expansion, notwithstanding a – probably temporary – retreat from earlier highs in the first quarter. Tax cuts on households' and corporates' income, which became effective at the beginning of this year, are likely to increase spending and investment. Whether this will translate into growth depends, among other things, on U.S. trade policies toward major trading partners. While the U.S.A. has already imposed punitive tariffs on Chinese imports, prompting retaliatory measures by the Chinese authorities, a similar trade conflict is looming with the European Union. Robust employment and wage growth is contributing to moderately increasing inflation. The Federal Reserve System has continued to tighten monetary policy by raising its key interest rate twice, in December 2017 and March 2018, and to normalize its balance sheet by no longer reinvesting all of the maturing assets it holds on its balance sheet.

In Japan economic activity contracted slightly in the first quarter of 2018 owing to weak investment and low real wage increases after a few relatively strong quarters that built on public investment and external demand. Japan's economy is expected to regain steam throughout the rest of the year before a planned sales tax hike is likely to dampen economic activity again. The Bank of Japan expects inflation to stay well below its target and therefore maintains its quantitative and qualitative monetary easing.

In China economic growth driven by investment, consumer spending and net exports exceeded the official target in 2017. Rapid growth continued in the first quarter of 2018 despite narrowing external surpluses – as growth is rebalancing toward internal sources – and a stronger exchange rate of the Chinese renminbi against the U.S. dollar. Growth is projected to soften only slightly in 2018 as tighter regulation of nonbank intermediation, which is aimed at reducing financial risks becomes effective. There is still policy space to respond to risks from trade tensions should they materialize. Lately, inflation has shown some volatility at still moderate levels.

Synchronized  
expansion in the  
U.S.A., Japan and  
China

In the United Kingdom growth continued its slowdown and is forecast to moderate further due to feeble private consumption growth. Investment is expected to remain weak because of persisting uncertainty, and net trade is expected to decline. Inflation decreased despite a tight labor market and the recent stabilization of the pound sterling. The Bank of England has maintained its bank rate marginally above zero and kept its stock of corporate and government bond purchases.

Notwithstanding some recent weakness, the Swiss economy displayed broad-based growth and very low inflation in 2017. Whether exports will continue their recovery depends on the Swiss franc, which, however, has recently shown some volatility, re-approaching the exchange rate of CHF 1.18 against the euro. The Swiss National Bank has maintained its expansionary monetary policy with negative key interest rates, while being prepared to intervene in foreign exchange markets.

### **Euro area recovery becomes stronger and more broadly based**

After its best performance for a decade in 2017 (2.4%), economic growth in the euro area cooled somewhat in the first quarter of 2018, mainly due to temporary factors. Nevertheless, the euro area's growth momentum continues to be solid and broadly based as employment creation supports private consumption, financial conditions and profits favor business investment, and foreign demand boosts exports even with some strengthening of the euro. The euro area fiscal stance is expected to contribute to the expansion in 2018 before turning neutral thereafter. In their latest projections, ECB staff forecast the same growth rate for 2018 as for the previous year, which is, however, expected to somewhat decelerate in the years ahead. Risks to the growth outlook are balanced between positive cyclical dynamics and negative global factors, including the threat of rising protectionism.

The output gap is considered to be positive and expected to widen over the projection horizon. Nevertheless, HICP inflation is seen to rise only in 2020, mostly driven by internal forces, reflecting further labor market recovery. So far, however, downward risks seem to have materialized despite higher-than-expected oil and food prices. Subdued underlying inflation (0.7% in April 2018) can be explained by moderate wage increases due to labor underutilization masked by buoyant employment creation. The ECB forecasts headline (HICP) inflation to even decline, from 1.5% in 2017 to 1.4% in the following two years, before rising again to reach 1.7% in 2020. Market- and survey-based long-term inflation expectations have remained broadly unchanged.

At its April 2018 meeting, the Governing Council of the ECB kept interest rates on its 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 will last until the end of September 2018, or beyond, if needed. In January 2018, the monthly pace of net asset purchases was reduced from EUR 60 billion to EUR 30 billion. Furthermore, maturing securities will be reinvested as long as deemed necessary. The APP has had an easing effect on credit terms and conditions. The annual growth rate for loans to the private sector remained on a path of moderate expansion. Bank lending rates have been close to their historical lows although credit standards eased further and loan demand increased.

ECB holds firm to accommodative monetary policy stance

Since November 2017 the yields of German ten-year government bonds have further increased by some 27 basis points to 0.64% (in mid-May). The spreads of Greek, Portuguese and Spanish bonds to German benchmark yields have substantially narrowed, indicating improved confidence of financial markets toward the euro area. Less pronounced declines have been observed with regard to the spreads of Italian and French bonds. After the period of observation, however, that market confidence turned out to be fragile as risk premiums of Italian and Spanish bonds surged temporarily due to political instability. Meanwhile the spreads between 10-year U.S. Treasuries and German Bunds have come close to their 30-year high. During the same period, the exchange rate of the euro in nominal terms appreciated by some 2.3% to roughly USD 1.19 per EUR, while losing 1.4% against the Japanese yen. In general, volatility in foreign exchange markets remained subdued. In contrast, international stock exchanges went through turbulences in February and March 2018. By mid-May the representative stock index DJ Euro Stoxx had gained almost 2% since the beginning of the year – benefiting from falling long-term yields –, while the Dow Jones Industrial Index and the FTSE 100 had hardly improved at all, albeit being close to all-time highs. Brent crude oil prices rose by more than 17% in the course of the first four-and-a-half months of 2018 to above USD 78 per barrel – amid growing demand and intensifying geopolitical tensions.

### CESEE: fastest economic expansion in years amid broadly sound banking sector developments

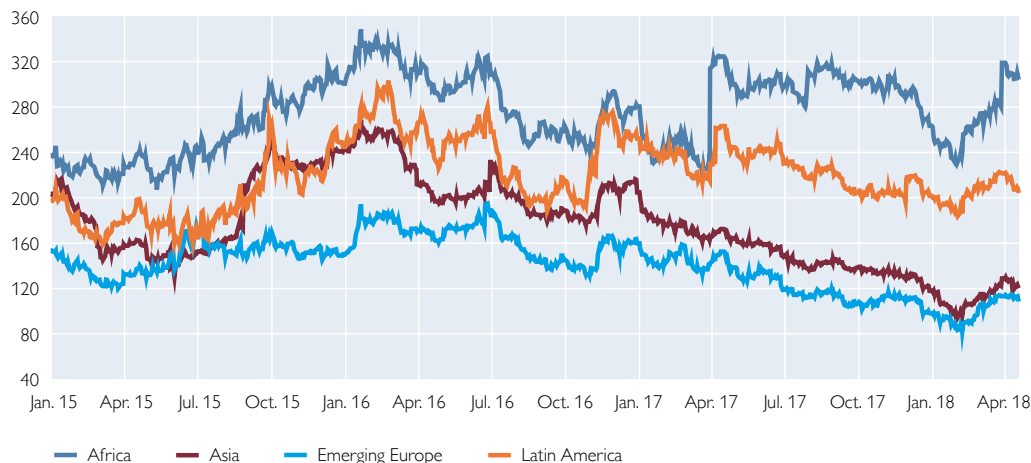
The synchronized upswing of the big engines of the global economy – the U.S.A, China and the euro area – provided a favorable external environment for the CESEE region. Based on rising global investment and trade, the world economy reported its fastest expansion in 2017 since 2011. Within the euro area, growth was again vivid in Germany, the central anchor for many of the CESEE economies. Via their integration into global value chains, CESEE countries benefited not only

International environment remains supportive for CESEE region

Chart 1.1

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

Euro EMBIG spread in basis points



Source: Macrobond.

Note: EMBIG = Emerging Markets Bond Index Global.

directly from strong international demand for final goods but also from increasing demand for intermediate goods.

International financial conditions remained broadly supportive as well, despite the turbulences occurring in February and March 2018 following the announcement of U.S. import tariffs on certain goods. These events led to a temporary increase in emerging market bond spreads. However, spreads of euro-denominated sovereign bonds for European emerging markets remained at multi-annual lows, and notably below those for other emerging market regions.

Growth reaches highest level in years

Against this background, economic conditions in CESEE remained favorable in the second half of 2017, and the region experienced one of the strongest economic upswings since 2008. This was especially true for the CESEE EU Member States, where the economic momentum was strong and broadly based, leading to an average growth rate of 4.7% in 2017. Positive contributions from private consumption were increasingly supplemented by strengthening investments. Domestic demand stayed strong given dynamic private consumption growth based on good sentiment, higher wages, private sector deleveraging and tightening labor markets. Firms are approaching the limits of their production capacity and were increasingly prepared to spend on extending their capital formation given favorable financing conditions. Public investment and construction continued to be supported by inflows of EU funds.

Outside the EU, extraordinarily high growth rates were reported for Turkey, reflecting a combination of government stimulus and exceptionally strong external demand. Growth was less swift in Russia and Ukraine. Russia continued its recovery from recession. At 1.5% in 2017, economic dynamics remained moderate by regional standards, however, reflecting structural weaknesses and a low growth potential. Ukraine reported a growth rate of 2.5% in 2017 as private consumption and fixed investment continued to recover from a low base.

The generally favorable picture was blurred mainly by political risks that might affect the region's economies in the short to medium term. Several events are keeping relations tense between Russia and the West. The most recent U.S. sanctions against Russia (comprising extensive transaction bans on 24 Russian businessmen and 15 companies), for example, have already had a strong impact on the Russian ruble, temporarily pushing down its external value by about 10%. Furthermore, an escalating trade conflict between the U.S. and the EU would disproportionately affect the highly open CESEE region. Ongoing disputes with the European Commission and European partners could impact the CESEE EU Member States' standing in the upcoming negotiations for the 2021–2027 EU budget. Those negotiations will be dominated by Brexit, and the size and composition of the EU budget will possibly be altered. Moreover, EU funds could be made conditional on adherence to the rule of law and common European values. Finally, employment growth, record low unemployment and emigration to Western Europe laid bare labor shortages especially in Central European economies, which could start weighing on economic growth. The missing workforce has already become a major issue for companies across the region and surveys find companies struggling to find workers as labor shortages expand from manufacturing to labor-intensive sectors such as construction and services.

Inflationary pressure moderate in most CESEE EU Member States

Strong economic growth, tightening labor markets, swiftly rising wages and generally strong domestic economic momentum in the CESEE EU Member States

were not reflected in rising inflationary pressure in the review period. After a trough in mid-2016, inflation accelerated slowly in late 2016 and early 2017. In the second half of 2017, however, inflation stabilized at around 2% throughout most of the CESEE region. In fact, price pressures moderated in several countries in early 2018.

A notable increase in inflation was reported for Romania only, where strong demand pressure, higher administered prices and a base effect after adjustments to indirect taxes in 2017 lifted price growth to 4% in March 2018. Accordingly, the Romanian central bank (NBR) increased its policy rate from 1.75% to 2.25% in January and February 2018, after having repeatedly adjusted the rates on its deposit and lending facility in late 2017 and early 2018. The NBR expects inflation to pick up further in the short term before returning to the upper bound of the variation band around its inflation target toward the end of this year.

Despite some moderation in inflation, the Czech central bank (CNB) continued its rate hikes that had started in August 2017 by lifting its policy rate to 0.75% in November 2017 and February 2018. The CNB projects inflation to be above target for the rest of 2018 and to return to target at the beginning of 2019.

The Hungarian central bank (MNB) expects inflation to remain below its target at least until mid-2019. Against this background, the MNB continued to further selectively loosen its monetary policy by reducing the cap on its three-month deposit facility, by extending its foreign currency swap facility in order to boost forint liquidity in the system and by introducing two new tools to its monetary policy tool kit (interest rate swaps to banks and regular purchases of mortgage bonds with at least three-year maturity).

In the non-EU CESEE countries, inflation accelerated in Turkey and Ukraine. A large depreciation of the Turkish lira and a positive output gap pushed price growth in Turkey to above 10% throughout the review period, thus well above the year-end inflation target of 5%. The Turkish central bank (CBRT) kept its policy rate at 8%. However, it lifted the rate on its late liquidity window in two steps (in December 2017 and April 2018) from 12.25% to 13.5%, thus increasing the effective cost of bank funding. In addition, with the aim of curbing depreciation pressures, the CBRT introduced several instruments aimed at providing foreign exchange liquidity to the banking and corporate sector as of January 2017.

In Ukraine, rising production costs and global oil prices, a weak harvest and utility tariff hikes pushed up annual CPI inflation to 16.4% in September 2017, which prompted the central bank of Ukraine (NBU) to interrupt and partly reverse its series of key policy rate cuts over the last one-and-a-half years. Therefore, the NBU sharply increased the key rate in four steps (in October and December 2017, in January and March 2018) by a cumulative 450 basis points to 17%. Inflation still stood at 14.0% at end-February 2018 (despite a marked slowdown of the Ukrainian hryvnia's nominal depreciation in 2017), which is substantially above the NBU's target of 6%  $\pm$  2 percentage points for end-2018. The monetary authority expects inflation to slow down and return to target in mid-2019.

In Russia, the sluggish economic recovery and the oil price-related appreciation of the Russian ruble (by 13% against the euro in 2017) drove inflation down to 2.2% in February 2018. This is a historically low level and notably below the inflation target of the Russian central bank (CBR). Accordingly, the CBR continued to cautiously cut its key policy rate in the six months to end-March 2018 by a cumulative 125 basis points to 7.25%.

Strong price  
increases in Turkey  
and Ukraine



**Solid credit expansion amid strong demand and some easing in supply conditions**

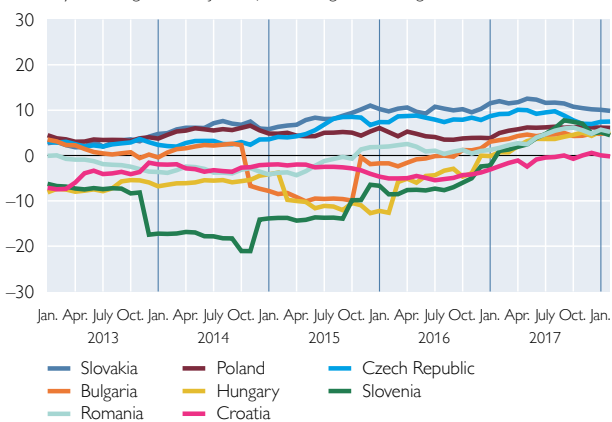
Growth of domestic credit to the private sector (nominal lending to the nonbank private sector adjusted for exchange rate changes) was solid in the review period. Most CESEE EU Member States reported credit growth rates of around 5% year on year, reflecting favorable general economic conditions in an environment of low interest rates, heightened competition among banks and monetary accommodation in the euro area. Furthermore, rising real estate prices went hand in hand with a substantial increase in housing loans. House prices rose by some 7% year on year in the second half of 2017 on average, showing especially strong increases in the Czech Republic (above 10%).

Lending surveys indicate continued strength in demand for credit. 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 eased for the first time in two years. Across the customer spectrum, credit standards eased especially on SME lending and consumer credit, while they tightened on mortgages. However, the gap between credit demand and credit supply that had been perceived for several quarters still persists. This suggests that most new credit may be considered to be of a better quality on average than in previous credit cycles.

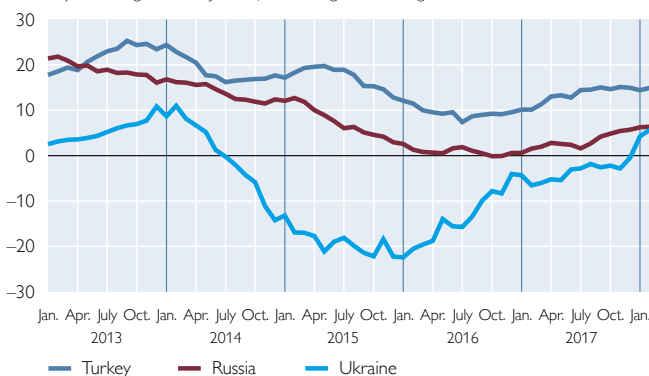
Chart 1.2

**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.

**Czech Republic and Slovakia further raise countercyclical capital buffer**

In the Czech Republic and Slovakia, credit growth declined somewhat from its peaks in mid-2017 but continued to stand at the highest level among all CESEE EU Member States. In Slovakia, especially growth of credit to households remained above a notable 10% throughout the review period. Both countries introduced countercyclical capital buffers of 0.5% of total risk exposures in 2017. The Czech Republic announced that it would raise buffers further to 1% and 1.25% in July 2018 and January 2019, respectively. Slovakia will increase its countercyclical capital buffer to 1% by August 2018. Furthermore, both countries introduced measures to put a brake on the expansion of housing loans. The Slovak central bank (NBS) decreed that new borrowers have to be assessed for their ability to repay a loan in the event of an increase in interest rates and is considering further

measures to contain household credit growth. The CNB introduced loan-to-value ratios for housing loans as an additional macroprudential measure.

Outside the EU, credit growth was swiftest in Turkey, where accommodative macroprudential policies and loans backed by Turkey's Credit Guarantee Fund kept credit growth at around 15%. Improving dynamics on the credit market were observed in Ukraine, where credit growth increased from negative levels throughout most of 2017 to above 5% in February 2018 as consumer lending rose sharply and corporate lending started to recover.

Some acceleration in credit dynamics was also reported for Russia, despite some trouble in the country's banking sector. In the second half of 2017, the CBR nationalized three medium-sized privately owned credit institutions – Otkrytie, B&N and Promsvyazbank. All three players (together accounting for about 7% to 8% of banking assets) had expanded aggressively in recent years, suffered from bad loans and become subject to bank runs. Their nationalization has lifted the share of state-owned banks to around 70% of total sector assets and delayed the overall improvement of credit quality, profitability and capital adequacy in the Russian banking sector. The ongoing consolidation in Russia and two other larger one-off transactions in Poland (UniCredit) and in Ukraine (Privatbank) have boosted both, local and state ownership in CESEE banking sectors during the past years. Today, the share of foreign ownership in the CESEE EU Member States is some 10 percentage points below its level of 2008.

Recovery of credit growth in Russia despite trouble in the banking sector

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 further. Nonperforming loans (NPLs) decreased in all CESEE EU Member States when compared to a year earlier. In several countries, NPL ratios reached their lowest levels since 2009. This positive momentum was attributable to favorable lending developments as well as to the strong general economic momentum. Furthermore, 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 – also positively impacted the stock of nonperforming assets.

NPLs continue their downward trend

While NPLs in Russia and Turkey remained virtually unchanged, bad assets shot up in Ukraine. This can be explained by a change in the methodology for collecting NPLs. The new framework captures loans that are more than 90 days past due as well as loans with a low probability of repayment. Intra-annual trends are more promising, though: The share of NPLs in total loans declined from a record level of 57.7% at mid-2017 to 54.5% at the end of the year against the background of a gradual increase in new lending. However, the NBU found a high probability that most of the current stock of NPLs will not be serviced properly again and prompted banks to step up their efforts to clean up balance sheets by selling or writing off NPLs.

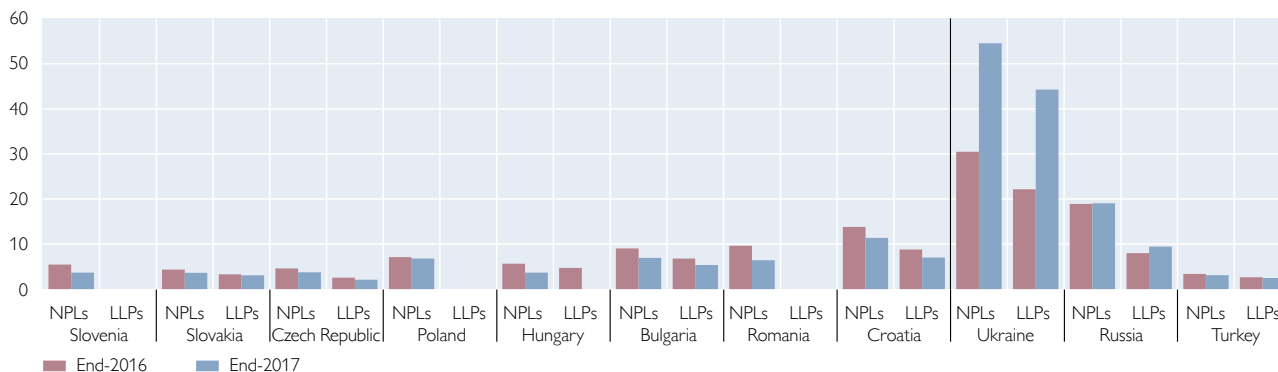
The reduction of NPL ratios in many CESEE countries was accompanied by a further decrease in foreign currency-denominated credit. This is especially true for households in the Czech Republic, Hungary, Russia and Slovakia, whose share of foreign currency-denominated credit in total credit is already close to zero. In the other countries, the average share declined by around 3 percentage points to a level of 27% since mid-2017.



Chart 1.3

### 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.

Credit fully funded by local deposits in most countries

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 end-2017. However, it has to be noted that this trend has come to a halt in Slovakia, where the gap widened in the review period (from  $-0.8\%$  of GDP at the end of 2016 to  $1.5\%$  of GDP at the end of 2017) against the background of strongly expanding claims amid a broadly stable depository base.

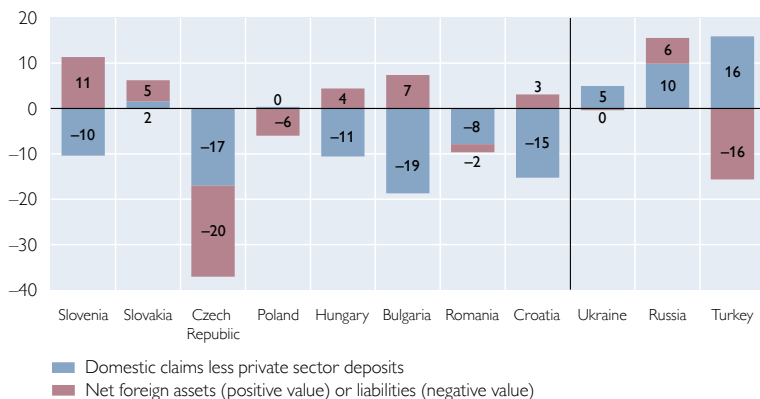
Profitability largely unchanged

Compared to the CESEE EU Member States, Russia, Turkey and Ukraine exhibited positive and large funding gaps of between  $5\%$  and  $16\%$  of GDP. While the gap narrowed in Ukraine (by  $4.6\%$  of GDP within a year) against the backdrop of negative credit growth especially in the first half of 2017, it widened somewhat in Turkey as deposits trended down.

Chart 1.4

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

% of GDP at end-2017



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

The banking sectors of four of the eleven CESEE countries under observation reported net external liabilities by the end of 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 Czech koruna against the euro in the first quarter of 2017. In Turkey, external liabilities remained broadly unchanged compared to a year earlier but stayed at a high level.

Average banking sector profitability in the CESEE EU Member States stood at  $1.1\%$  (return on assets; ROA) in 2017,

which is broadly comparable to the figures of the previous year (2016: 1.2%). Throughout the region, both operating income and operating expenses declined moderately. Provisioning needs also trended lower in most countries against the backdrop of improving asset quality. The latter translated into a notable increase in profits in Hungary and a more moderate increase in Romania and Slovenia. Bulgaria, the Czech Republic and Slovakia reported some decline in profits. A stronger decrease in the ROA, however, was only reported for Croatia against the backdrop of the banking sector's provisioning for its exposure to Agrokor, the country's ailing retailer.

The Ukrainian banking sector recovered from its record losses in 2016 after the nationalization of Privatbank in December of that year. In fact, operating profits increased thanks to lower funding costs and higher commission income. Provisioning also decreased substantially. However, provisioning for the whole year remained at a level high enough to drive aggregate banking sector profitability into the reds. In Turkey, the profitability of the banking sector reached one of the highest levels in the past four years, mainly due to strong net interest income, improvements in asset quality and a relative decrease in noninterest expenses.

Chart 1.5

### CESEE banking sector: profitability



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.

Capital adequacy ratios (CARs) remained high and increased further in several CESEE EU Member States. At the end of 2017, CARs ranged between 18.6% in Slovakia and 23.2% in Croatia. In the other countries of the region, capitalization was markedly lower (between 12.1% in Russia and 16.5% in Turkey). However, it improved in Turkey (on the back of profitability growth and subordinated debt acquisitions) and in Ukraine (on the back of the capitalization of state-owned banks).

Most CESEE banking sectors remain well capitalized

# Corporate and household sectors in Austria: improving risk indicators<sup>1</sup>

## Nonfinancial corporations' financing volumes on the rise

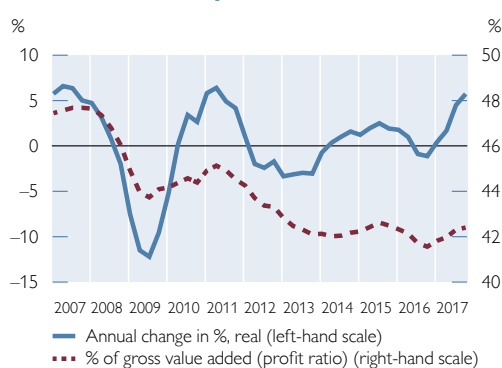
### Strong growth and low debt financing costs support Austrian firms' profits

Robust investment demand

Coupled with strong export growth, strong domestic economic activity resulted in real GDP growth of 3% in 2017 (trend-cycle adjusted) in Austria, signaling a boom phase. Domestic demand was mainly driven by strong investment demand; investment in plant and equipment has seen an exceptionally long phase of expansion, although motives for investment have increasingly shifted from replacing equipment to expanding capacity.

Increasing corporate profitability

Chart 2.1  
**Gross operating surplus of Austrian nonfinancial corporations<sup>1</sup>**

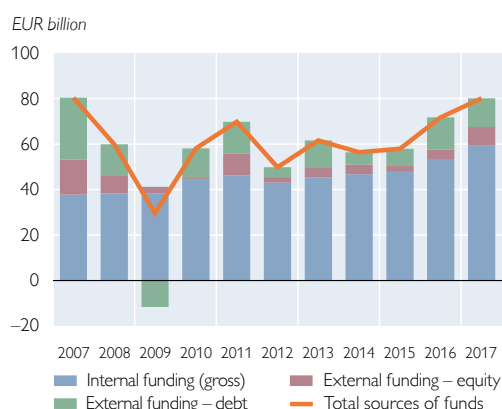


Source: Statistics Austria.

<sup>1</sup> Four-quarter moving sums.

Buoyant economic growth supported the earnings-generating capacity of Austrian nonfinancial corporations. According to the sectoral accounts, the gross operating surplus<sup>2</sup> of Austrian nonfinancial corporations rebounded in 2017, posting a year-on-year increase of 5.7% in real terms in the fourth quarter of the year (based on four-quarter moving sums; see chart 2.1). In nominal terms, gross operating surplus rose by 7.3%. Yet, by historical standards corporate profitability remained muted, even if its downward trend – as measured by gross operating surplus divided by gross value added – eventually began to reverse. In the fourth quarter of 2017, the gross profit ratio amounted to 42.4%, up 0.8 percentage points from the post-crisis low registered in the third quarter of 2016. However, as the gross operating surplus does not include interest received or paid, it does not take into account that the low interest rate environment reduced the net interest burden of indebted nonfinancial corporations and thus supported the non-operational part of corporate income. Overall, increased earnings not only alleviated debt servicing, but augmented the corporate sector's internal financing potential.

Chart 2.2  
**Sources of funds for Austrian nonfinancial corporations**



Source: OeNB, Statistics Austria.

Note: 2017 data are preliminary.

<sup>1</sup> 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.

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

### **Austrian nonfinancial corporations' need for financing increased**

The ongoing recovery in corporate investment raised the financing needs of Austrian nonfinancial corporations. Internal financing (measured as the sum of changes in net worth and depreciation) remained the most important source of funds for nonfinancial corporations (see chart 2.2). In 2017, it increased by 11.7% year on year to reach EUR 59.3 billion. At the same time, nonfinancial corporations' recourse to external financing picked up briskly and, at EUR 20.8 billion, registered a similar rate of annual growth of 11.4%.

Internal financing remains most important source of funds

As a sum of internal and external financing, nonfinancial corporations' total financing continued to expand in 2017 and was up 11.7% against the value registered in 2016. Thus, in nominal terms, financing volumes returned to pre-crisis levels. At 74%, the share of internal financing in total financing remained above the values seen before the crisis, corroborating its significant role in corporate financing. Including equity-based external financing, the overall structure of corporate financing was again marked by a significant weight of own funds (internal financing and equity), which accounted for 84% of financing in 2017. In sum, the recent expansion of financing volumes implies that Austrian nonfinancial corporations had sufficient means to fund their investments during the current cyclical upswing. This is also reflected by the fact that corporate sector net lending was positive in both 2016 and 2017, indicating a persistent surplus of funding over gross fixed investment.

As to the structure of nonfinancial corporations' external financing in 2017, roughly 40% came in the form of equity financing, which is clearly above the corresponding figures of 2016 and 2015, when this share was about one-quarter. In absolute terms, equity financing rose by 80% year on year to EUR 8.2 billion. The majority of equity financing was unquoted equity whereas listed shares played only a comparatively small role, amounting to EUR 1.3 billion. In 2017, there had been two new listings of Austrian nonfinancial corporations on the Vienna stock exchange and one in Zurich. In 2018 so far, there has been no new listing.

Equity financing on the rise

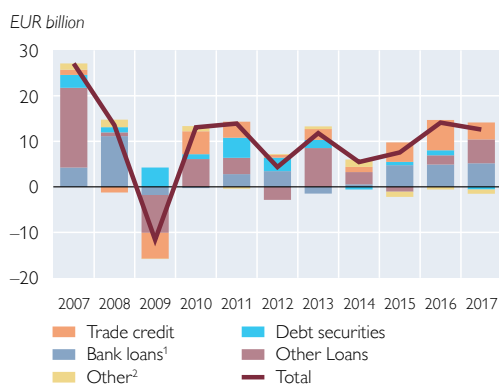
### **Debt financing goes down slightly**

Yet, in spite of the increasing recourse to equity, debt instruments again provided the bulk of nonfinancial corporations' external financing in 2017, even if, at EUR 12.6 billion, its volume fell short of the 2016 figure by about 10%. In the light of low interest rates, debt financing continued to be very attractive. For the first time in five years, the domestic financial sector regained its role as the Austrian corporate sector's primary source of debt financing, providing 46% of net debt flows to nonfinancial corporations. Almost all these flows came from monetary financial institutions (MFIs). About 42% of debt financing stemmed from other nonfinancial corporations. For one, this financing took the form of loans from other enterprises, which largely reflect transactions within corporate groups. Moreover, trade credit – including cross-border trade credit – still played a prominent role in corporate debt financing, even though it fell by some 40% compared to 2016 volumes. Although this form of finance is comparatively more expensive in a low interest rate environment, one reason for the strong recourse to trade credit might be that trade credit constitutes a major part of firms' working capital and is therefore particularly relevant in a cyclical upswing. Foreign funding, which had afforded half the debt financing of nonfinancial corporations in 2016 and 2015, only played a minor role in corporate financing in 2017.

Financial sector as primary source of debt financing

Buoyant growth of bank loans

Chart 2.3  
Debt financing of Austrian nonfinancial corporations



Source: OeNB.

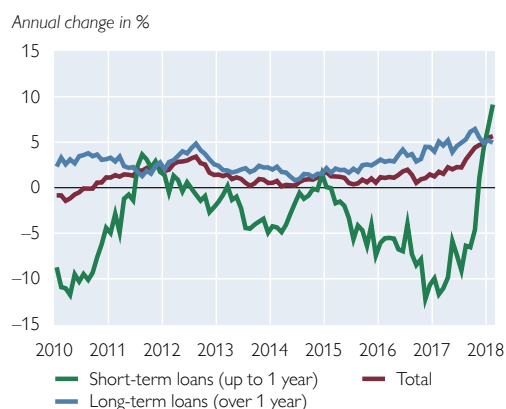
<sup>1</sup> Loans by domestic and foreign banks.

<sup>2</sup> Pension entitlements and other accounts payable.

Note: 2017 data are preliminary.

Chart 2.4

MFI loans to nonfinancial corporations



Source: OeNB.

Banks' lending policies remain cautious

tious lending policies in 2017 and the first quarter of 2018, according to the euro area bank lending survey (BLS), notwithstanding a slight easing of their credit standards for loans to enterprises in the second and fourth quarters of 2017. Given the prolonged period of tightening from 2010 to 2015, credit standards are probably still rather tight overall. Among the factors affecting banks' stance toward lending to firms, pressure from competition, especially from other banks, was most often cited as having caused banks to ease their internal guidelines or loan approval criteria. Risk perception, especially banks' assessment of their borrowers' creditworthiness, also contributed somewhat to the easing of credit standards, re-

Looking at maturities, short-term (with maturities up to one year) and long-term financing contributed in roughly equal measure to net corporate debt flows.

Loans by (domestic and foreign) banks accounted for 41% of debt financing in 2017. Whereas loans from foreign banks, which had exhibited buoyant growth in 2016 and 2015, decreased in 2017, lending by Austrian banks to domestic nonfinancial corporations gained further momentum in 2017 and early 2018.<sup>3</sup> In February 2018, its annual growth rate (adjusted for securitization as well as for reclassifications, valuation changes and exchange rate effects) reached 5.7% in nominal terms, the highest value in more than nine years (see chart 2.4). While loans across all maturities showed lively growth, the strongest contribution to this upturn came from loans with longer maturities (more than five years), which are most relevant for business fixed investment. Apart from the low interest rate environment, the greater importance of long-term loan contracts can most likely be attributed to both the economic upswing and expectations of rising interest rates in the future.

Loan growth picked up even though Austrian banks continued their cau-

<sup>3</sup> At the cutoff date, financial accounts data were available up to the fourth 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.

flecting the cyclical upswing of the Austrian economy, whereas reduced risk tolerance contributed to a slightly more cautious stance.

At the same time, corporate loan demand continued its recovery that had begun two years ago. From the second quarter of 2016 onward, the banks surveyed in the BLS reported a continuous pickup in corporate loan demand. Reflecting the current cyclical situation, in recent quarters banks named funding requirements for fixed investment as a major driver of increasing loan demand. Inventories and working capital, merger and acquisition activities as well as debt restructuring and renegotiations were other factors behind this rise, while internal financing continued to dampen loan demand.

Historically low bank lending rates continued to support lending to the corporate sector. Not only did the Eurosystem preserve a high degree of monetary policy accommodation, but the translation of lower bank funding costs into reduced lending rates was likely to be supported by higher capital ratios and improved ratings of the Austrian banking sector. As a result, interest rates on new loans to nonfinancial corporations decreased by a further 26 basis points during 2017 and the first two months of 2018 (see chart 2.5). During this period, the spread between interest rates on loans of smaller amounts and those 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 37 basis points and thus was another 2 basis points lower than in 2016.

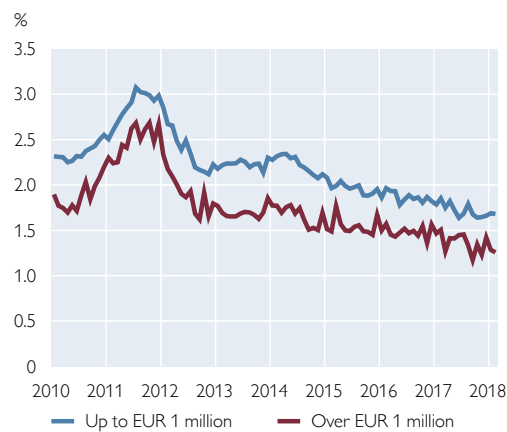
The results of the BLS show how banks differentiated interest margins by credit risk. According to the survey, the margins for average loans have been eased (i.e. lowered) in most of 2017 and in 2018 so far. As to the factors behind this easing, respondent banks mainly named the competitive situation in the Austrian banking market.<sup>4</sup> In contrast, the margins on riskier loans were largely left unchanged during the last few quarters, pointing to a differentiated risk assessment by banks. Collateral requirements and other terms and conditions (such as noninterest charges, loan covenants, loan maturity and loan size) remained broadly unchanged during the same period.

On top of increasing outstanding loan volumes, firms continued to have substantial liquidity at their disposal. On the one hand, the total amount of undrawn credit lines<sup>5</sup> available to enterprises rose further in 2017, and fell only slightly in early 2018, implying a significant increase in unutilized liquidity on which enterprises can draw if necessary (see chart 2.6). On the other hand, firms'

Loan demand goes up

Bank interest rates decline further

Chart 2.5  
Interest rates for floating rate MFI loans



Source: OeNB.

<sup>4</sup> On the structure of the Austrian banking market, see table A10 in the annex and p. 33f of the OeNB's Financial Stability Report 34.

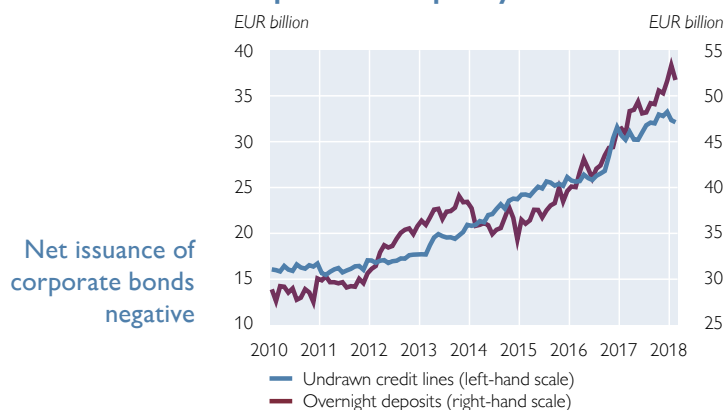
<sup>5</sup> According to the OeNB's statistics on new lending business.

Abundant liquidity buffers



Chart 2.6

### Indicators of Austrian nonfinancial corporations' liquidity



Source: OeNB.

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

transferable deposits continued to rise briskly (+12.8% year on year in February 2018). Apart from the low opportunity cost of holding liquid assets and the small yield difference relative to longer-term deposits, these strong inflows into transferable deposits are also likely to mirror nonfinancial corporations' improved earnings.

Debt securities' net contribution to corporate financing was negative in 2017. According to financial accounts data, corporate bond issuance decreased by EUR 1.7 billion, low corporate bond yields notwithstanding. Yet, despite this decline, bonds play a relatively important role in Austrian corporate finance, even if this form of funding is available

only to a limited number of mainly larger companies. By the end of 2017, the outstanding amount of long-term bonds issued by the corporate sector amounted to 10.8% of GDP. Risk aspects of corporate bonds compare favorably with those of bank loans. Both the share of floating rate issues, amounting to 14.1% in February 2018, and the foreign currency share, amounting to 1.3% of the outstanding volume of corporate bonds, were considerably below the respective values for bank loans.

Box 1

#### Alternative forms of finance for SMEs in Austria

Access to funding for SMEs in Austria has been rated suboptimal by some market participants, especially with respect to equity finance. In December 2014, these market participants, namely the Austrian Federal Economic Chamber (Professional Association of Financial Service Providers), the AustrianStartups platform, the Senate of Economy, the Austrian Angel Investors Association (aaia) and the Austrian Private Equity and Venture Capital Organisation (AVCO), published a common position paper containing proposals how to improve the legal framework for alternative SME financing in Austria. This box presents these proposals and contrasts them with corresponding policies implemented since they were published.

First, the position paper proposed a tax exemption for investments in young Austrian SMEs of up to EUR 100,000. Such general tax exemptions face a rather high risk of windfall gains, but the Austrian government deemed more equity investment in young SMEs beneficial and thus introduced a risk capital premium, i.e. a subsidy of 20% (up to a maximum of EUR 50,000) for investments in SMEs' equity or subordinated liabilities, in 2017.

Second, the paper proposed changes in the regulatory framework for retail investment in SMEs ("crowd investing"), especially an increase in the limit that would require firms to publish a prospectus if they wanted to raise capital. Preparing a fully-fledged prospectus was considered too expensive for SMEs and, hence, a significant barrier to funding. In this context, the new Alternative Financing Law (Alternatives Finanzierungsgesetz – AltFG), enacted in September 2015, reduced the informational requirements for a prospectus if the capital issue aimed at raising less than EUR 1.5 million. As crowd investing bears a significant loss risk, the investment of retail investors was limited at 200% of their monthly net income or 10% of their net financial assets.

Third, the paper suggested tax incentives for business angel investors. As the proposed tax exemption model was associated with a high risk of windfall gains, the government opted to raise the funding of the present business angels fund by EUR 5 million. The *aws Business Angels Fonds Austria* is managed by *Austria Wirtschaftsservice Gesellschaft mbH (aws)* and leverages business angel investments in Austrian SMEs by up to 100%; its volume totals EUR 32.5 million.

Fourth, the position paper argued that the efficiency of public investments in SMEs could be raised by pursuing fund-of-funds investment strategies. A fund-of-funds strategy would allow a public fund to invest in private investment funds; the position paper claims these private funds exhibit a higher propensity to invest and better performance. Although some private funds might indeed exhibit higher returns than public funds, this statement cannot be generalized to apply to all existing private investment funds. Additionally, public funds often serve more objectives than simply maximizing the rate of return. Nevertheless, the *aws Venture Capital Initiative* follows exactly this strategy in supporting seed funding for start-ups that rely heavily on R&D or new technologies.

Fifth, the paper criticized the legally binding minimum investment for retail investors in alternative investment funds (AIFs). The current legislation requires retail clients of AIFs to invest a minimum of EUR 100,000 to prevent less liquid private investors from taking on too much risk. According to the position paper, this minimum threshold was too high to mobilize much retail capital for AIFs and prevented retail clients from choosing risk-efficient portfolios. Although the question whether retail investors need access to AIFs to optimally pool their financial risks remains debatable, legislation was introduced in mid-2017 to lower the minimum.

Sixth, the paper called for reactivating a former investment vehicle for SMEs, the so-called *Mittelstandsfinanzierungsgesellschaft (MIFIG)*. MIFIGs are funds providing finance to and taking minority holdings in medium-sized enterprises, carrying tax incentives for investors to boost equity funding. The new MIFIG act (MIFIGG 2017) was introduced in mid-2017. It allows MIFIGs to invest up to EUR 15 million into a single SME and caps the tax incentives at EUR 15,000 per investor. Both the MIFIG act and the lower limit for retail investments in AIFs were codified in the same legal act and are still<sup>1</sup> pending for notification by the European Commission.

Many of the policy measures that addressed the proposals made in the position paper were enacted under the government's "start-up package" passed in July 2016. In 2017, when reviewing these reforms to improve access to finance for Austrian SMEs, the European Commission<sup>2</sup> assessed that "progress in this area can be considered substantial."

<sup>1</sup> Cutoff date: April 2018.

<sup>2</sup> See 2017 SBA Fact Sheet Austria at <https://ec.europa.eu/docsroom/documents/26562>.

### Corporate sector debt servicing capacity improved

The debt sustainability of Austrian nonfinancial corporations improved in 2017 due to enhanced profitability. In the course of the year, the corporate sector's debt-to-income ratio decreased considerably, by almost 20 percentage points, to reach 388% at the latest reading (see upper left-hand panel of chart 2.7). At 2.1%, the growth of corporate sector financial debt (measured in terms of total loans raised and bonds issued)<sup>6</sup> remained well below the expansion rate of the gross operating surplus. Likewise, the debt-to-equity ratio fell by 6.4 percentage points to 89.0% in 2017. The debt-to-equity ratio is higher in Austria than in the euro area, reflecting the lower equity ratio.

<sup>6</sup> This measure follows Eurostat's and the European Commission's debt measures for the macroeconomic imbalance procedure (MIP) surveillance mechanism. Pension scheme liabilities, which are not very significant in Austria, and other accounts payable, including trade credit and other items due to be paid, mostly on a short-term basis, are not included. These items essentially constitute operational debt, i.e. liabilities that a firm incurs through its primary activities.



### Share of variable rate loans continues to decline

The low interest rate environment, together with the economic recovery, continued to support firms' current debt-servicing capacity. Lower interest rates can reduce the interest service burden on both variable rate loans and new debt. In 2017, the ratio of interest payments for (domestic) bank loans to gross operating surplus continued to decline slightly, reaching 2.9% in the final quarter of last year. This reduction reflected the still high share of 83% of variable rate loans in new loans, despite a reduction by 13 percentage points between mid-2014 and the fourth quarter of 2017. While Austrian companies have therefore recorded lower interest expenses, they still face a high exposure to interest rate risk. A rebound of interest rates could become a burden, in particular for highly indebted companies, especially if it were not accompanied by a commensurate improvement in macro-economic conditions.

The Austrian corporate sector's exposure to foreign exchange risk decreased slightly further, amounting to 2.4% in the fourth quarter of 2017.

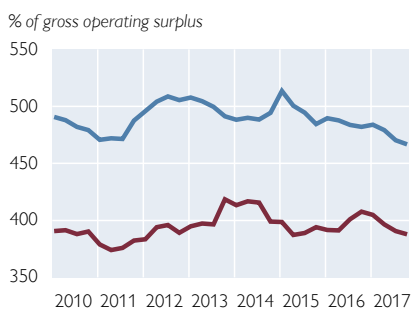
### Insolvency ratio diminishes further

The declining trend in insolvencies observed in the past few years remained on course as the insolvency ratio (i.e. the number of corporate insolvencies in relation to the number of existing companies) came down further in 2017. This downtrend may be attributed to moderate debt financing in the past few years as well as the low interest rate level, which makes debt servicing easier even for highly indebted companies. In part, it might also be connected to the fact that insolvencies usually lag cyclical movements.

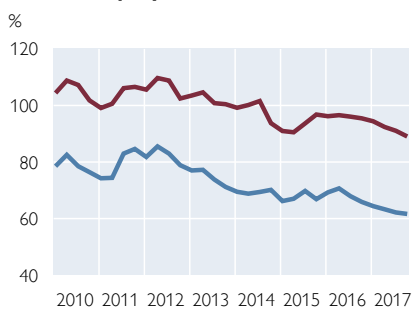
Chart 2.7

## Risk indicators for Austrian nonfinancial corporations

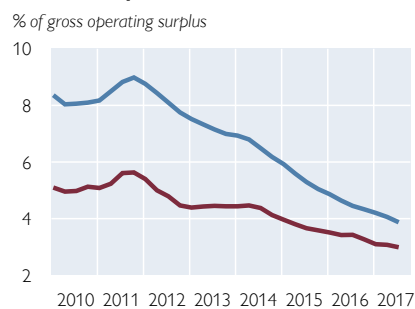
### Debt



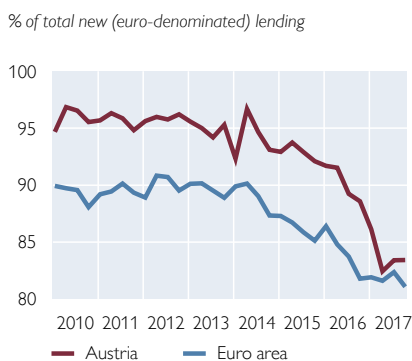
### Debt-to-equity ratio



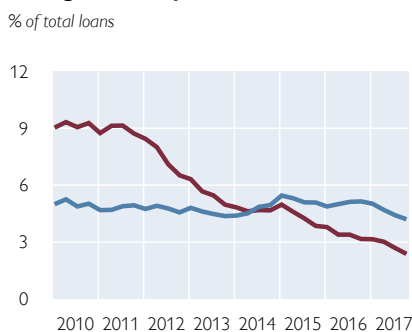
### Interest expenses<sup>1</sup>



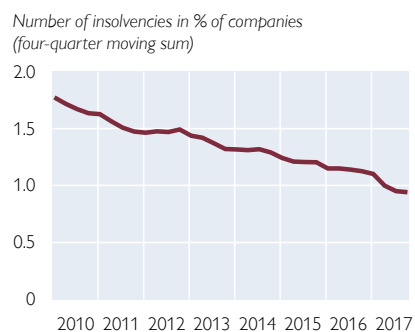
### Variable rate loans



### Foreign currency loans



### Insolvencies



Source: OeNB, ECB, Eurostat, KSV 1870.

<sup>1</sup> Euro area: euro-denominated loans only.

## Expansion of household loans gains momentum

### Private consumption growth above historical average

The favorable cyclical position of the Austrian economy is reflected in labor market developments, with the number of payroll employees growing by 1.9% in 2017 and the number of unemployed decreasing by 4.9%. Despite the improved labor market situation, which clearly fostered consumer sentiment in the course of 2017, nominal household income growth halved to 1.7% in 2017 (compared to 3.9% in 2016). This drop was triggered by the end of the positive stimulus of the tax reform that had come into force at the beginning of 2016. Coupled with increased HICP inflation (2.2% in 2017), real disposable household income even slightly shrank by 0.2% in 2017. Looking at the structure of Austrian households' disposable income, wages climbed slightly whereas property income and mixed income accruing to self-employed households decreased. As households aimed to smooth their spending levels, private consumption growth stayed at the same rate as in 2016 (1.5%), which is slightly above the average consumption growth rate recorded between 1999 and 2016 (1.3%). This resulted in a clear drop in the saving ratio (from 7.9% to 6.4%). Furthermore, the composition of households' disposable income may also have reduced their propensity to save as property income usually has a higher marginal saving ratio than earned income.

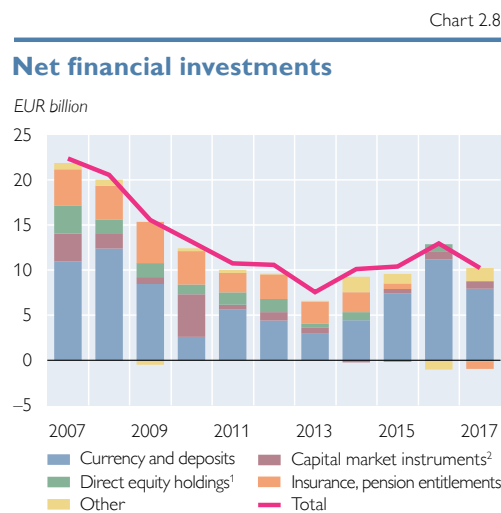
Saving rate  
decreased in 2017

### Households' financial investments decrease

The decrease in households' saving ratio was reflected in a reduction of their financial investments by 21% to EUR 10.2 billion in 2017. This was less than half of the values seen before the onset of the crisis (see chart 2.8).

In the low nominal interest rate environment, households continued to display a strong preference for highly liquid assets. In 2017, they shifted EUR 14.0 billion into overnight deposits with domestic banks (and another EUR 0.6 billion into cash holdings). For the third year straight, the build-up of overnight deposits surpassed total financial investments, implying a considerable substitution of other financial assets. In contrast, bank deposits with an agreed maturity continued to decline, dropping by EUR 6.6 billion in 2017 (see the left-hand panel of chart 2.9). Taking a longer-term perspective, households increased their overnight deposits by EUR 88 billion between end-2008 and end-2017 (which was the equivalent of 87% of total financial investment in that period), while deposits with an agreed maturity were reduced by EUR 41 billion. As a result, the share of overnight deposits in total financial assets has more than doubled to 21% since end-2008 while the share of deposits with an agreed maturity has almost halved to 16%.

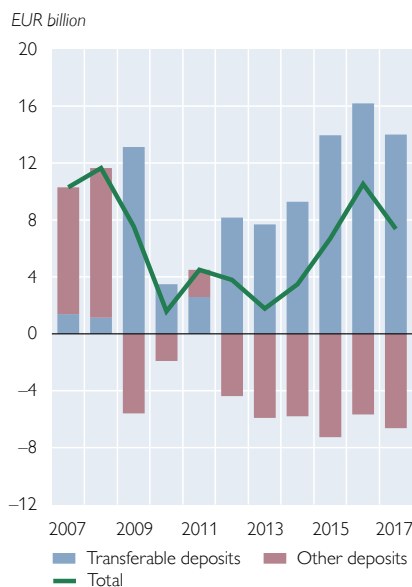
Transferable  
deposits expand  
further



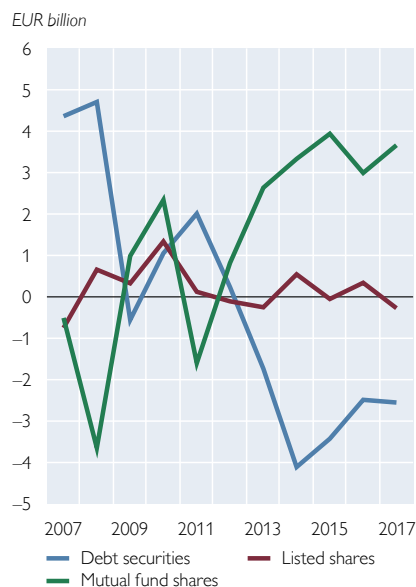
Ongoing shifts into  
mutual funds

## Households' net investments in selected financial instruments

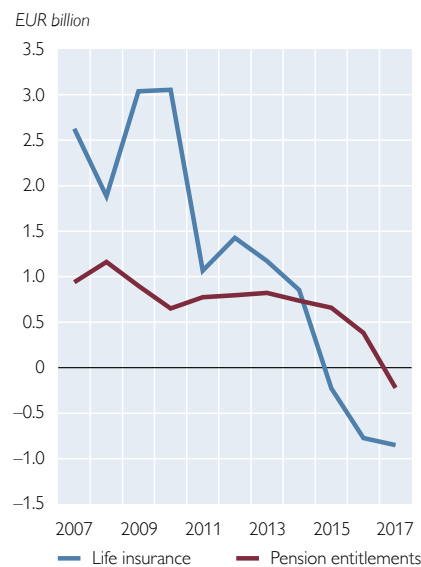
## Deposits



## Capital market instruments



## Life insurance and pension entitlements



Source: OeNB.

Note: 2017 data are preliminary.

in particular bonds issued by banks, reflecting continued redemptions over the past few years. In the period 2012–2017 (in which households saw sizeable unrealized valuation gains in their portfolio; see below), their securities portfolio shrank by EUR 14.1 billion (see the middle panel of chart 2.9). As freed-up funds were partly transferred into mutual funds, net investments in mutual funds reached EUR 17.4 billion over the same period. Investments in listed shares remained mute, amounting to only EUR 0.2 billion since 2012 (and were even negative last year). In total, households' net financial investments in capital market instruments were quite moderate in recent years, totaling EUR 3.5 billion in the years from 2012 to 2017. This weak development is all the more remarkable as, at the same time, the Austrian household sector recorded sizeable unrealized valuation gains in its securities portfolios, amounting to EUR 16.7 billion since 2012 (EUR 4.9 billion of which were recorded in 2017). In 2017, as a result of rising stock prices, listed shares accounted for the lion's share of valuation gains, which came to 19% of the holdings of listed shares at end-2016; for mutual fund shares, gains equaled 1.7% of households' portfolio.

Thus, valuation effects were the main driver of the increase in the Austrian household sector's capital market exposure, contributing more than 80% to its increase between 2012 and 2017. As for listed shares, all of the increase in households' nominal holdings in this period was accounted for by (unrealized) valuation gains. 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 investments into stocks in particular are very much concentrated in the portfolios of higher-income households, 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 were negative in 2017 (see right-hand panel of chart 2.9). For life insurance policies, disbursements outstripped contributions for the third year in a row. In 2017, the negative net investment amounted to EUR 0.8 billion. The negative net investment in life insurance can be attributed inter alia to the sharp slump in one-time premium life insurance policies due to the currently low interest rates and changes in the tax treatment for life insurance policies.<sup>7</sup> A large proportion of gross inflows into these instruments did not result from 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 if these are converted into euro-denominated loans). Investments in pension entitlements (including both claims on pension funds and direct pension benefits granted by private employers), which had recorded falling net growth rates for several years, turned negative for the first time in 2017, amounting to –EUR 0.2 billion.

Net investments in life insurance policies again negative

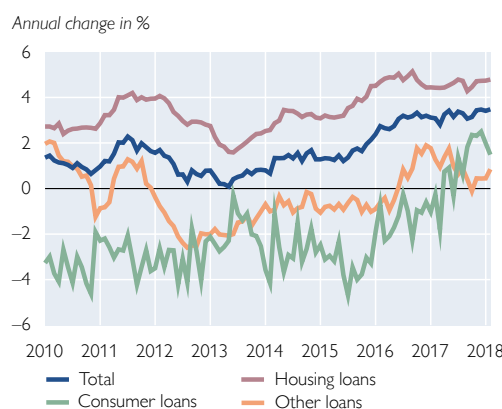
### Loans to households gain further momentum

The growth rate of bank lending to households gained further momentum in recent months. In February 2018, bank loans to households (adjusted for reclassifications, valuation changes and exchange rate effects) increased by 3.5% year on year in nominal terms. Euro-denominated loans continued to grow briskly (by 6.2%), while foreign currency loans continued to contract at double-digit rates; by February 2018, they had fallen by 14.6% year on year, partly reinforced by the depreciation of the Swiss franc against the euro. The dynamics of loan growth is expressed by the fact that since 2017, loans for all purposes showed positive nominal year-on-year growth rates (see chart 2.10). In February 2018, consumer loans, which had been shrinking for almost ten years, grew by 1.5% year on year, and other loans by 0.7%. However, the main contribution to loan growth came from housing loans, not only because they are the most important loan category for households – accounting for almost two-thirds of the outstanding volume of loans to households – but also because their growth rate, reaching 4.8% year on year in February 2018, was the highest among all loan categories. Lately (i.e. in the second half of 2017), year-to-year growth rates of housing loans to households were broadly in line with that of property prices.

Housing loans are main contributors to loan growth

Chart 2.10

### Loans to households



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

### Credit conditions remain favorable

Credit terms continued to be favorable as interest rates for new bank loans decreased slightly below the already very low levels recorded in the preceding years. At 1.83%, average interest rates on euro-denominated housing loans to households were 11 basis points lower in February 2018 than one year earlier. The interest rate on variable rate housing loans (with a rate fixation period of up to one year) decreased by 19 basis points to 1.61%. The effective annual rate of interest on housing loans, which reflects total borrowing costs (interest rate component and related charges), dropped by 10 basis points year on year to reach 2.22% in February 2018.

The conditions for taking out housing loans also remained favorable. According to the results of the BLS, banks' credit standards for housing loans to households remained stable overall in 2017 and the first quarter of 2018. At the same time, banks reported a slight but continuous increase in households' demand for housing loans. They attributed this increase primarily to growing consumer confidence as well as to the general level of interest rates. Additionally, improving housing market prospects, including expectations of rising house prices, have been mentioned in recent survey rounds. The rise in house prices registered over the past years (see below) may have boosted the funding needs for real estate investment.

### Households' currency and interest rate risks

#### Households' debt-to-income ratio stable

By end-2017, the household sector's total gross liabilities amounted to EUR 184.5 billion according to financial accounts data, up 2.1% in nominal terms against one year earlier. Households' debt-to-income ratio remained broadly stable at 90% (see upper left-hand panel of chart 2.10). Accordingly, the debt ratio of Austrian households remained lower than that of households in the euro area as a whole.

#### Share of variable rate loans on the decline

The share of variable rate loans (loans with an initial rate fixation period of up to one year) continued to decrease in 2017. In the final quarter of 2017, they accounted for 59% of new lending (in euro) to households compared to 89% in the same quarter three years earlier; over the same period, their share in housing loans narrowed from 86% to 51%.<sup>8</sup> But despite this recent decline, the share of variable rate loans is still quite high by international comparison. At the same time, this implies lower current interest expenses resulting from a positive slope of the yield curve, which favorably affects debt servicing. In the fourth quarter of 2017, households' interest expenses equaled 1.7% of their 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 had started to fall). However, the high share of variable rate loans in total lending implies a considerable exposure of the household sector to interest rate risks over the medium term.

#### Foreign currency loans remain a risk

Likewise, despite a substantial decrease over the past few years, the still high share of foreign currency loans in the total stock of lending remains a risk factor, especially for households with a low debt servicing capacity. By the end of 2017, the share of foreign currency loans had fallen to 10.5%, about one-third of the peak value reached around ten years ago. The foreign currency share varies considerably depending on a loan's purpose. For housing loans, it was 13.7%, for

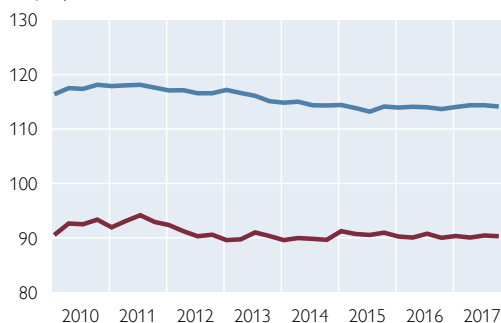
<sup>8</sup> In return, new housing loans with a very long interest fixation period (more than ten years) increased from less than 2% in 2014 to more than one-quarter at the end of 2017.

Chart 2.11

## Indicators of household indebtedness

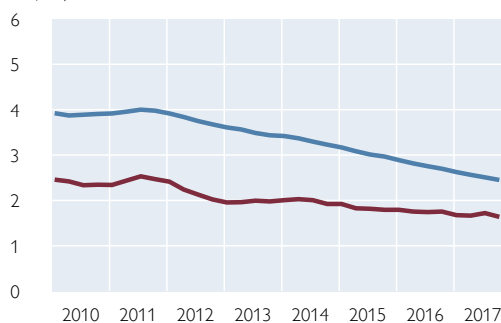
### Liabilities

% of disposable income



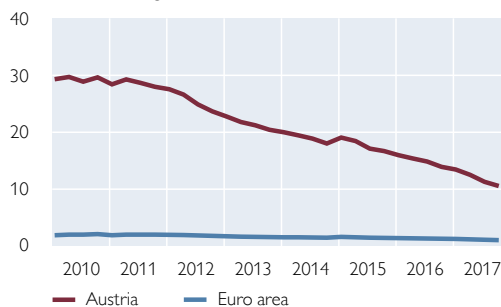
### Interest expenses<sup>1</sup>

% of disposable income



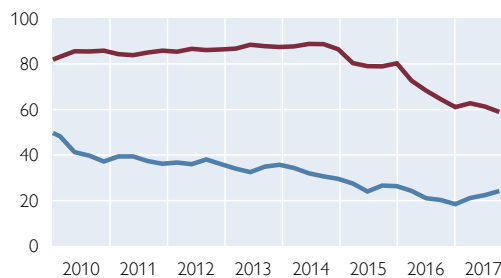
### Foreign currency loans

% of total outstanding stock of loans



### Variable rate loans

% of total new euro-denominated loans



Source: OeNB, Statistics Austria, ECB, Eurostat.

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

consumer loans 3.2 % and for other loans 5.7%. Almost all outstanding foreign currency-denominated loans are denominated in Swiss franc (close to 97%).<sup>9</sup>

## Residential property prices in Austria continue to rise

Residential property prices in Austria continued to rise in 2017 and in early 2018. Again, as in the past three years, the “Austria excluding Vienna” aggregate showed more pronounced price growth, reaching 10.0% in the first quarter of 2018, compared to 3.5% in Vienna. 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, rising by 2.2% year-on-year in real terms. The number of building permits in Austria was up 8% in 2017 against the – already very high – corresponding 2016 figure.

Reflecting this pick-up in price dynamics, the OeNB fundamentals indicator for residential property prices in Vienna went up slightly to 21.7% in the first quarter of 2018. For Austria as a whole, the indicator reached 11.2%, implying that the increasing overvaluation observed in recent years continued.<sup>10</sup>

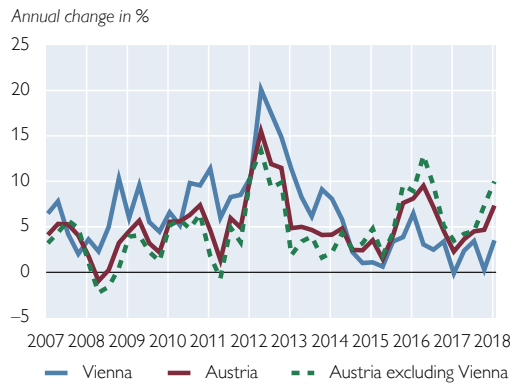
Property price growth slows down in Vienna, but accelerates in the rest of Austria

<sup>9</sup> For details on the systemic risk assessment of foreign currency loans in Austria and CESEE, please refer to p. 42 et seq.

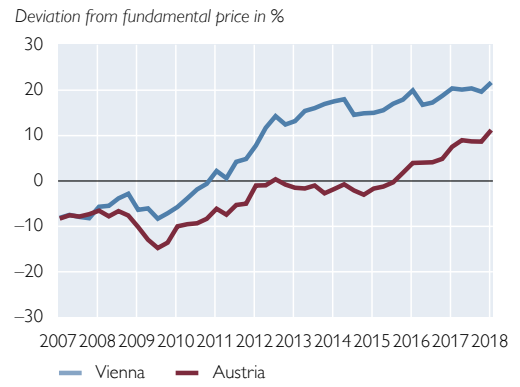
<sup>10</sup> For further analyses and data on the Austrian real estate market, see <https://www.oenb.at/en/Monetary-Policy/real-estate-market-analysis.html>.

### Austrian residential property market

#### Residential property prices



#### OeNB fundamentals indicator for residential property prices



Source: DataScience Service GmbH, Vienna University of Technology, OeNB.



# Austrian financial intermediaries: strong profits, but banks need to further improve structural efficiency

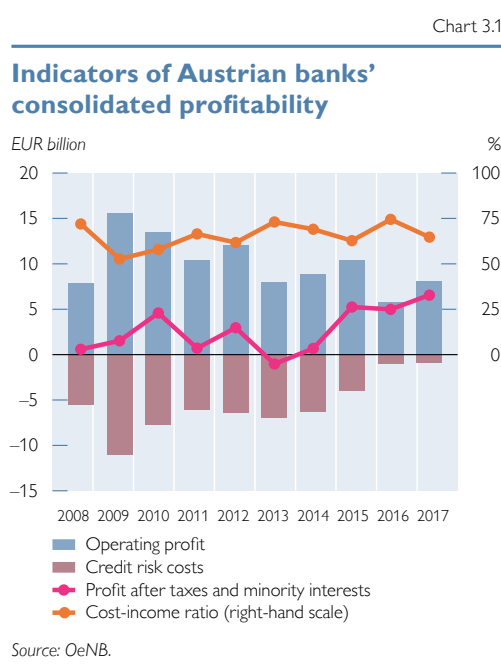
## Profits of Austrian banks at post-crisis high in 2017

Ten years after the collapse of the U.S. investment bank Lehman Brothers in 2008 and the height of the global financial crisis, the Austrian banking sector recorded its highest consolidated post-crisis profitability, both in absolute and relative terms. Austrian banks earned EUR 6.6 billion in 2017, which is nearly one-third more than in the previous year (see chart 3.1).<sup>1</sup> This translated into a return on average assets of 0.8% (2016: 0.6%), which is well above EU levels (0.4%).<sup>2</sup>

Analyzing the aggregated profit and loss statement in more detail, operating income was only slightly higher than in 2016 (+2% year on year), as net interest income (NII) was flat and fees and commissions income (FCI) expanded by 5% year on year. These growth rates prolonged a multi-year trend in earnings generation, with the importance of FCI continuing to slowly expand at the expense of NII, which primarily reflects the fall in the net interest margin since 2015 as a consequence of the low interest rate environment. The interest margin of Austrian banks' consolidated operations stood at 1.5% in 2017, unchanged from 2016. On the cost side, both staff and administrative expenses fell in 2017 (−4% year on year). Combined with a strong fall in other

operating expenses, this led to a noticeable reduction in operating expenses year on year (−11%). These positive cost-income trends improved the cost-income ratio (CIR) of the Austrian banking sector by 10 percentage points (to a still elevated 65%) and lifted the operating profit by 41% to EUR 8.1 billion. Credit risk costs remained low (EUR 0.9 billion in 2017), as the macroeconomic backdrop continued to be highly supportive and nonperforming loans (NPLs) were being tackled, which lent further support to the strong profitability of Austrian banks in 2017.

In retrospect, several conclusions can be drawn with regard to Austrian banks' profitability over the last decade and in particular the substantial expansion of their consolidated profitability seen over the last few years. First, banks reduced their size from 2013 on, with average total assets down by one-fifth compared to their peak in 2012;<sup>3</sup> at the same time, their absolute profits recovered to their pre-crisis level (2007: EUR 6.8 billion). And second, this recovery was not driven



<sup>1</sup> In 2016, the profitability of the Austrian banking sector was burdened by one-off bank levy payments.

<sup>2</sup> Source: EBA Risk Dashboard, data as of Q4 2017.

<sup>3</sup> When comparing the average total assets in 2008 and 2017, the decline comes to 16%. The transfer of UniCredit Bank Austria's CESEE subsidiaries to its Italian parent bank in 2016 played a large role in this downsizing.



Unconsolidated profits reach record high

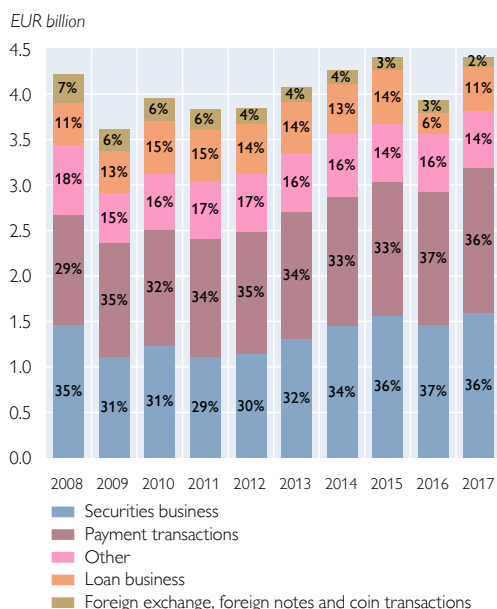
by operating profits, as their level in 2017 was barely above that seen in 2008 and still subject to a high CIR, but stemmed from a drastic reduction of credit risk costs.

Now banks should use the currently benign environment of buoyant economic activity in Austria and their host markets (especially in CESEE) to address structural cost issues in order to foster the sustainability of their profits, improve their prospects (e.g. by investing in digitalization) and ensure that they have enough room for maneuver in potential future downturns.

Austrian banks' unconsolidated profits increased significantly already in 2016 and climbed even more rapidly in 2017 (by 10% year on year to EUR 4.9 billion). Operating profits increased to EUR 6.6 billion, driven by a surge in securities and investment earnings, net fees and commissions income and reduced operating expenses.

Chart 3.2

### Fees and commissions income of Austrian banks



Source: OeNB.

Note: Unconsolidated data.

Fees and commissions income was propelled by an increase in the loans business in 2017, which more than doubled compared to the previous year. The comparatively low figure in 2016 was driven by a one-off effect, however, due to a change in accounting treatment (see chart 3.2).

An adverse effect emanated from unconsolidated net interest income, which continued its fall in 2017 (by EUR 310 million). This was a decline of 3.6% compared to the previous year and driven by markedly lower net income from cross-border business but also slightly lower results from domestic activities. The overall net interest margin declined to around 105 basis points (3 basis points below the 2016 figure).

Austrian banks reduced their operating expenses in 2017 by 6.5% and their cost-income ratio by more than 5 percentage points to an improved 66%.<sup>4</sup> Risk provisioning continued to

be low, as the share in total operating profits amounted to only 14% in 2017, compared to an average 45% over the last twenty years.

CESEE profits increase significantly

Austrian banks also benefited from the economic upswing in CESEE in terms of loan growth, credit quality and profitability. The net result after taxes of Austrian subsidiaries in CESEE increased by 12% in 2017 and amounted to EUR 2.6 billion, almost reaching the level of 2008 (EUR 2.9 billion).<sup>5</sup> The largest contribution to profitability in absolute terms came from the Czech Republic, and, for the first time since 2005, all results on a single country basis had been positive.

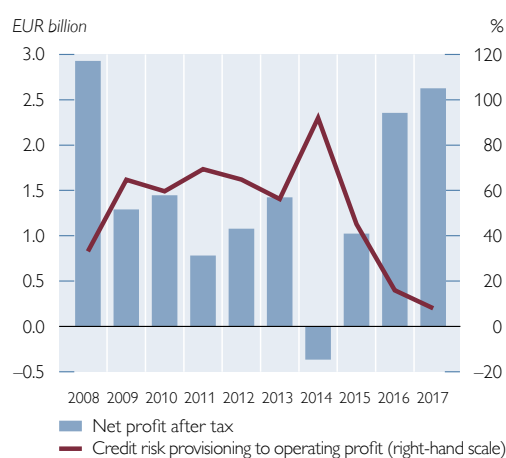
<sup>4</sup> However, this strong improvement was also caused by a negative one-off effect that burdened provisioning requirements in 2016.

<sup>5</sup> The figure for 2008 also excludes UniCredit Bank Austria's CESEE subsidiaries.

The main driver of profitability in 2017 was the historically low level of credit risk provisioning. Loan loss provisioning was half of previous years' value and only one-fifth of its 2008 level. To put this decline into perspective: while the ratio of credit risk provisioning to operating profit amounted to 33% in 2008, it was only 8% in 2017. However, these low levels have to be seen in context with the currently prevailing macroeconomic environment as credit risk provisions are very cyclical.

The second most important driver of profitability – albeit with a less pronounced impact than credit risk provisioning – was the increase in net interest income. With a share of 67%, net interest income (NII) is by far the most important component of operating income. While NII was under pressure between 2008 and 2016, it started to increase in 2017, rising by 3% year on year. The net interest margin (NIM), i.e. NII to total assets, shrank by 1 percentage point to 2.6% between 2008 and 2017. Fees and commissions income is the second most important income source, accounting for a share of 29% in operating profit. It rose by 6% from EUR 2.2 billion to EUR 2.3 billion in 2017.

Chart 3.3  
**Profitability of Austrian subsidiaries in CESEE**



Source: OeNB.

Note: Time series without UniCredit Bank Austria AG's subsidiaries.

Although total assets of Austrian subsidiaries in CESEE increased by 8%<sup>6</sup> from 2008 to 2017, net loans to nonbanks almost stagnated in this period.<sup>7</sup> Loan growth picked up in 2017, however, mainly in the Czech Republic, Slovakia and Hungary (with yearly growth rates of 15%, 13% and 11%, respectively). In the Czech Republic and Slovakia, growth rates were comparatively high for corporate loans, housing loans and consumer loans. In Romania, credit growth was mainly registered in corporate and consumer lending, whereas in Russia, housing loans expanded particularly strongly. Austrian banks' subsidiaries in Hungary registered credit growth exclusively in the consumer loan segment. Overall, household loans in the loan book outpaced corporate loans in 2017, with lending in local currency prevailing. Furthermore, interbank claims rose substantially in 2017, accounting for 9% of total assets.

Turning to liabilities, customer deposits rose by 26% from 2008 to 2016 and by 10% in 2017. The share of deposits in total assets rose from 56% in 2008 to 73% in 2017, while at the same time interbank liquidity transfers were substantially reduced. This developments were supported by the Austrian supervisory Sustainability Package (for further details, please refer to page 39 of this report).

<sup>6</sup> Adjusted for the transfer of ownership of UniCredit Bank Austria's CESEE subsidiaries to its Italian parent bank in 2016.

<sup>7</sup> One of the reasons was that holdings of debt securities (e.g. government bonds) had been rising since 2008 and temporarily peaked in early 2013. After a subsequent decline until 2014, Austrian subsidiaries have been increasing their debt securities holdings again.

NPLs at  
Austrian banks  
continue to drop

### Credit quality of Austrian banks improved further – nonfinancial corporations account for two-thirds of remaining NPLs

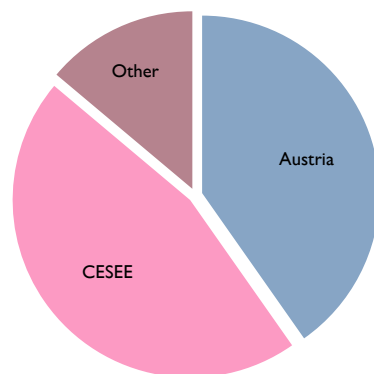
Austrian banks have further reduced their total NPLs: at end-2017, they totaled EUR 21 billion, of which 46% were originated in CESEE and 40% in Austria. Nearly two-thirds of total NPLs were claims on nonfinancial corporations and approximately one-third were claims on households (see chart 3.4).<sup>8</sup> The consolidated NPL ratio<sup>9</sup> of the Austrian banking system came to 3.4%, which compares with an NPL ratio of 2.5% for the domestic business alone. General provisions amounted to 2.2% of consolidated loans, with the coverage ratio at 63%. (If only provisions explicitly made for NPLs were considered, this ratio would decrease to 52%.)

According to the European Banking Authority (EBA), the NPL ratio of Austrian banks has fallen below the European average. Austrian banks that report to the EBA had an NPL ratio of 3.7% at the end of 2017, while the average stood at 4.0%, which was mostly driven by countries like Greece, Italy or Portugal.

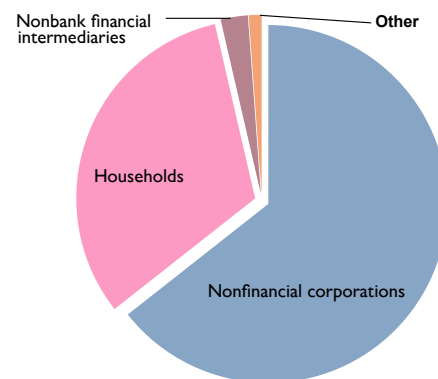
Chart 3.4

#### NPLs of the Austrian banking sector as of end-2017

NPLs broken down by residence



NPLs broken down by borrower



Source: OeNB.

Note: Data include domestic and cross-border business as well as subsidiaries.

Austrian CESEE  
subsidiaries improve  
their NPL ratio to  
below 5%

Austrian banking subsidiaries in CESEE have further improved their loan quality, as their NPL ratio for all loans and advances came to 4.5% at the end of 2017.<sup>10</sup>

The aggregate NPL ratio of loans to households and nonfinancial corporations stood at 6.3%, and the coverage ratio was 72%.<sup>11</sup> At the country level, NPL ratios at Austrian subsidiaries in this segment continue to be highly heterogeneous: While the ratio remained low in the Czech Republic and Slovakia (at 2.6% and 3.5%, respectively), it still ranged from 8% to 14% in Hungary, Romania and

<sup>8</sup> Nearly half of all NPLs of Austrian banks are not overdue, but deemed unlikely to be repaid and therefore classified as NPLs. 12% of NPLs are overdue between 90 days and one year and approximately 40% are overdue more than one year. At the borrower level, NPLs to households are less often categorized as unlikely to be repaid, but rather “more than one year overdue”.

<sup>9</sup> This ratio represents the share of nonperforming loans in total loans of Austrian banks.

<sup>10</sup> Regarding the NPL ratios at the CESEE country level, please refer to chart 1.3.

<sup>11</sup> When only considering provisions explicitly built for NPLs, this ratio would decrease to 61%.

Croatia. At the end of 2017, foreign currency loans exhibited weaker credit quality than local currency loans, as the former's NPL ratio was still high at 8.5% (but down from 13.5% at end-2016), while the NPL ratio for domestic currency loans was 4.8%.

A number of initiatives on how to deal with NPLs were launched at the European level during 2017. The European Council set out an action plan to tackle NPLs in July 2017, which stressed that a comprehensive approach combining a mix of complementing policy actions at national and at the European level is the most effective way to address the existing stock of NPLs as well as the emergence and accumulation of new NPLs on banks' balance sheets.

In March 2018, the ECB published an addendum to its 2017 guidance to banks on NPLs. It describes supervisory expectations regarding the timely provisioning for loans classified as nonperforming from April 2018 onward. The addendum is not legally binding but serves as a basis for the supervisory dialogue between significant institutions and the ECB in its capacity as the competent supervisory authority.

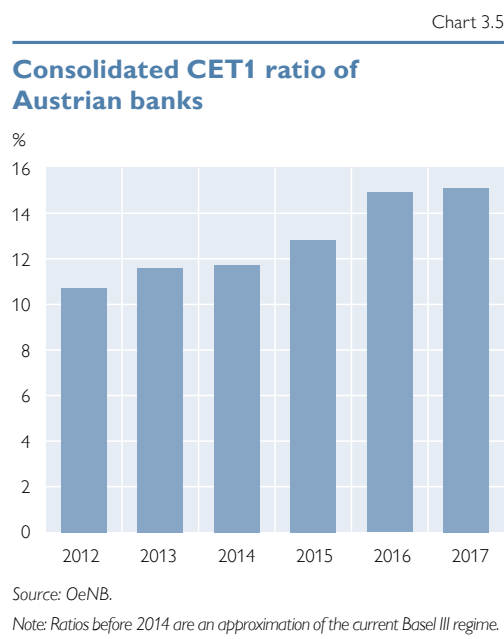
Also in March 2018, the European Commission presented a comprehensive package of measures to reduce NPLs. The Commission's proposals must now go through the European legislative process before becoming binding for banks.

Progress in  
European initiatives  
to tackle NPLs

### Capitalization of Austrian banks improved slightly, but momentum is fading

Until the third quarter of 2017,<sup>12</sup> EU banks continued to strengthen their capital ratios and their common equity tier 1 (CET1) ratio increased to 14.6%. This growth was driven by both an increase in capital and a decrease in the total risk exposure (mostly credit risk).

In 2017 as a whole, Austrian banks increased their CET1 capital by more than 4% to EUR 68 billion, which corresponds to 15.1% of their total consolidated risk-weighted assets (see chart 3.5). This is only a minor year-on-year improvement, however, given profits at a post-crisis high and a substantially reduced banking levy, showing that Austrian banks have lost some momentum in improving their capitalization compared to previous years. As a consequence, the CET1 ratio of Austrian significant institutions (SIs) fell further behind the SSM average in 2017 (13.3% versus 14.6%). Therefore, the OeNB encourages banks – especially SIs – to reinvigorate their efforts to improve their capitalization.



<sup>12</sup> Full-year figures were not available at the cutoff date.

Further  
improvements in  
regulation of capital  
requirements

Austrian subsidiaries in CESEE increased their CET1 capital by 5.5% in 2017, with pronounced improvements in the Czech Republic, Poland and Romania. As a result, their overall CET1 ratio went up to 15.4%.

December 2017 saw the finalization of the Basel III capital framework. This global standard applies to banks with different business models, and it takes this into account by seeking to strike a balance between risk sensitivity and simplicity: While on the one hand, banks are allowed to take into account their specific risk experience and use internal models to calculate capital requirements, Basel III also establishes safeguards, such as input and output floors, that will prevent capital requirements from falling below a certain level. The recommendations of the Basel Committee on Banking Supervision are yet to be implemented in European law.

Given that a sound risk-based capital framework is an essential part of a stable banking system, internal models used by banks have to yield adequate risk weights for assets. In this context, the ECB made further progress in its targeted review of internal models (TRIM). It aims to assess the current adequacy and appropriateness of approved Pillar 1 internal models used by significant institutions. The first phase of the project started in April 2017. Furthermore, the ECB is also working on an update of its guide to internal models.

Box 2

#### Dividend policies of Austrian banks

*In the aftermath of the global financial crisis, when the banking industry was faced with a difficult environment, Austrian credit institutions pursued a constrained dividend policy. After a period with strained economic conditions, five Austrian banking groups first concentrated on paying back the participation capital issued in 2009 (amounting to EUR 5.4 billion).<sup>1</sup> Related to that, the payment of dividends was subject to a number of restrictions. After the redemption of the aforementioned capital injections, Austrian supervisors expressed their expectations that banks should focus on earnings retention in order to bolster their capital base. As a result, the regulatory capital ratios of Austrian banks improved gradually over time.*

*As profitability returned to decent levels recently, profit-sharing demands from capital markets and investors gained momentum. In response, Austrian institutions have increased their dividend payments, and board members of credit institutions are also getting more expansive on their future guidance for dividend payments and increasing payout ratios.*

*However, all dividend payment proposals of Austrian credit institutions are periodically monitored by the supervisory authority and compared with the ECB's recommendation on dividend distribution policies. The recommendation includes, inter alia, the commitment of establishing internal dividend policies using conservative and prudent assumptions in order to satisfy the applicable capital requirements and outcomes of the supervisory review and evaluation process on a consolidated and an individual basis (including combined buffer requirements). The aim is to ensure an adequate balance between earnings retention and dividend payments.*

<sup>1</sup> In October 2008, the Austrian government adopted a set of measures aimed at stabilizing the financial system. The support scheme was extended in June and December 2009 with the European Commission's approval under EU state aid rules.

#### Austrian banks and their subsidiaries continue to have strong liquidity positions

The liquidity coverage ratio (LCR) is defined as the ratio of high-quality liquid assets (HQLA) relative to stressed net outflows arising over a period of 30 days. It aims to ensure that institutions have a sufficient amount of highly liquid assets at their disposal to withstand conditions of severe funding stress for at least 30 days

at all times. The LCR as a minimum requirement was gradually phased in and reached its final value of 100% at the beginning of 2018.

As of end-2017, all Austrian institutions reported LCRs above the regulatory minimum. The weighted average LCR amounts to 145% at the unconsolidated level and 151% at the consolidated level. The constantly high LCR figures reflect the overall solid short-term liquidity position of the Austrian banking system.

The distribution of the liquidity buffer remains unchanged and is concentrated in the highest category of eligible level 1 assets, which accounts for 94%, while the share of level 1 covered bonds remains at 5%. Level 2a and level 2b assets account for less than 1% each. Within the classification of level 1 assets, government bonds and central bank assets account for more than 80%.

However, the liquidity risk exposure in Swiss francs is relatively high at the aggregate level. The cumulated liquidity shortfall after one month and after three months amounts to EUR 4.2 billion and EUR 6.6 billion, respectively. This shows that while most banks seem to have heeded the lessons of the crisis, very few outliers have not. The Austrian banking system's U.S. dollar liquidity is ample at the aggregate level.

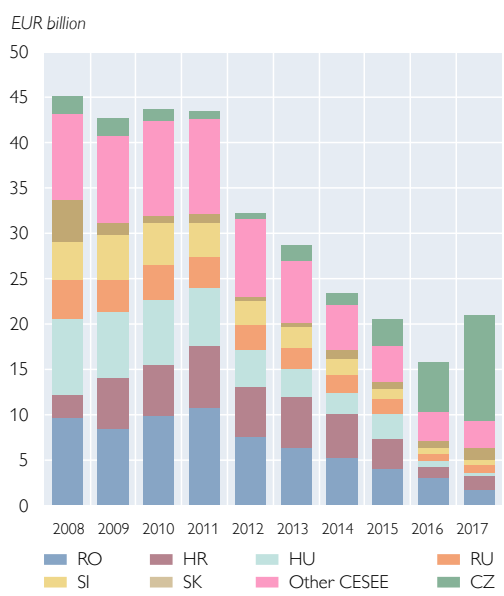
The Austrian supervisory guidance on strengthening the sustainability of the business models of large internationally active Austrian banks ("Sustainability Package") stipulates that the supervisory authorities monitor the stock and flow loan-to-local stable funding ratios (LLSFRs) of the foreign subsidiaries of Austria's largest banks.<sup>13</sup> As of end-2017, all 23 monitored subsidiaries of Erste Group Bank and Raiffeisen Bank International had a sustainable local refinancing structure (compliant with the guidance). Year on year, the aggregated stock LLSFR remained stable at 75% and two-thirds of all subsidiaries displayed a ratio below 80%, which is well below the early warning threshold of 110%.

An important consequence of the subsidiaries' stronger reliance on local funding is the substantial decrease in (gross) intra-group liquidity transfers from Austrian banks to CESEE credit institutions, which have more than halved since end-2011 and stood at

Large Austrian banks' local refinancing structure in CESEE remains sustainable

Chart 3.6

### Intra-group liquidity transfers to CESEE credit institutions



Source: OeNB.

<sup>13</sup> The supervisory guidance was adopted by the OeNB and the FMA in 2012 and reviewed at the end of 2017. During this review, two of the three pillars of the original guidance – relating to capitalization and recovery and resolution planning – were withdrawn. For further details, please refer to <https://www.oenb.at/en/financial-market/financial-stability/sustainability-of-large-austrian-banks-business-models.html>. Please note that due to the transfer of the CESEE subsidiaries of UniCredit Bank Austria to its Italian parent bank in 2016, this bank is no longer an addressee of the supervisory guidance.



EUR 21 billion at end-2017 (see chart 3.6).<sup>14</sup> Notwithstanding the overall improvement in the balance of the refinancing structure of Austrian banks' CESEE subsidiaries, supervisors must continue to monitor the LLSFR in order to avoid potential future boom-bust-cycles in local lending.

Box 3

### The capacity of banks in CESEE to issue MREL-eligible debt

*Sensible minimum requirements for own funds and eligible liabilities (MREL) for European banks which reflect actual banking structures and statutory resolution objectives are a key prerequisite for successful resolution processes in crisis situations.*

*As regards the issuance of MREL-eligible liabilities (i.e. debt instruments), banks are facing local European capital markets that show a wide variation in size and level of development. While access to international capital markets does not pose much of an impediment for significant institutions (SIs), the situation for banks in CESEE is ambiguous. Therefore, in 2017, the FMA together with the OeNB conducted a survey to assess the capability of credit institutions operating in CESEE to issue MREL-eligible debt, both locally and also in international markets. The results show that not only are local CESEE markets currently at an early stage of development compared with the euro area but also heterogeneous in this respect (see table 1).*

Table 1

### Comparison of national bond markets in the EU

	EA-19	AT	CZ	SK	HU	PL	RO	HR	BG
	% of GDP								
Total outstanding stock (in local currency)	122.4	115.0	40.9	52.4	40.0	36.2	14.3	11.3	6.2
thereof									
government bonds	66.3	71.1	28.9	40.6	35.7	29.7	14.0	10.7	6.0
corporate bonds	29.6	14.3	2.7	6.2	1.0	3.8	0.1	0.4	0.2
bank bonds	26.3	29.7	9.3	5.6	3.4	2.7	0.3	0.1	0.04

Source: ECB, Eurostat, OeNB.

Note: Data as of end-2016 (euro area countries) and end-2015 (non-euro area countries).

*These differences may also impact on the ability of banks in CESEE to raise sufficient MREL-eligible funds. The observed figures suggest that two different groups can be identified: The debt markets in the Czech Republic, Slovakia, Hungary and Poland may be still significantly less deep in terms of volumes than the average euro area debt market but show a sufficient degree of development and profit from positive market sentiment; this suggests that issues ranging from covered bonds to additional tier 1 capital are feasible. In Romania, Croatia and Bulgaria, however, market participants only have very limited access to international markets and are therefore more limited in terms of instruments they can issue.*

*For the first group of countries, the survey results suggest that the potential annual issuance volume in local markets ranges from EUR 200 million to 300 million and that in international markets ranges from EUR 100 million to 750 million (depending on the type of instrument). For the second group, the ranges are EUR 100 million to 200 million (local issuances) and up to EUR 500 million (international markets).*

<sup>14</sup> *Bucking the general declining trend, transfers to the Czech Republic skyrocketed over the last years and now make up more than half of all transfers, although the affected subsidiaries' refinancing position is typically strong.*

*In preparation of a capital market transaction, banks should fulfill some crucial prerequisites in the first place:*

- *obtaining at least one rating from a renowned rating agency,*
- *establishing a debt issuance program,*
- *building up investor appetite and confidence (for instance by roadshows, investor calls and press conferences) and*
- *(optionally) developing a secondary market curve by starting to issue covered bonds.*

*In case of cross-border banking groups operating with a subsidiary in CESEE, the entity to access capital markets is determined by the resolution approach: While a single point of entry (SPE) implies that the parent company handles the fulfillment of all external MREL, in a multiple point of entry (MPE) approach, the subsidiary needs to fulfill its targets on its own. To overcome potential issuance constraints in the latter case, one solution could be transitional periods that give the concerned subsidiaries sufficient time to build up enough MREL-eligible debt instruments.*

### **Macprudential policy in Austria: OeNB calls for caution regarding real estate lending standards**

Residential real estate lending of Austrian banks continues to involve limited systemic risks, which is mainly due to the high risk-bearing capacity of both lenders and borrowers. Furthermore, loan growth rates and prices of residential real estate have stabilized. Yet, given the possibility of weakening lending standards against the backdrop of record low interest rates, the OeNB reiterates its call for prudent lending in real estate loans.

Systemic risk from  
real estate lending  
remains limited

The volume of loans granted by Austrian banks to domestic households for the purpose of funding residential real estate increased by 4.7% between end-2016 and end-2017. Growth had hovered around similar levels since the end of 2015, but recent growth rates remained substantially below those seen before the global financial crisis. Growth in residential real estate prices stabilized in 2017, albeit early 2018 saw some uptick (see section “Corporate and household sectors in Austria” for more details). It is worth noting that the growth rates of residential real estate loan volumes and prices have not correlated over the past decade, indicating that price surges of the past were not funded by excessive borrowing by real estate buyers.

Against the backdrop of (mostly) sustainable lending standards in the past, record low interest rates and strong economic growth, NPL ratios have remained low. At the end of 2017, the NPL ratio of loans collateralized by residential real estate granted to domestic borrowers by IFRS banking groups<sup>15</sup> was 1.6%, which is the same level recorded a year ago. Furthermore, Austrian banks’ residential real estate loans made up about 150% of their aggregate CET1 capital at end-2017. This ratio is well below the EU average but has edged upward in the recent quarters, as has the share of residential real estate loans in banks’ balance sheets over the past decade (yet, their weight – under 15% at end-2017 – still remains rather limited).

Data at the borrower level – i.e. micro data regarding households’ risk-bearing capacity – from the Eurosystem’s Household Finance and Consumption Survey

<sup>15</sup> This information is available for IFRS banking groups only; they account for more than two-thirds of the market.



(HFCS)<sup>16</sup> show that Austrian households that borrow in order to buy residential real estate typically display income and wealth levels far above the median, while households with lower income and wealth benefit from subsidized and social housing as well as Austria's highly regulated rental market.<sup>17</sup> The evolution of macroeconomic indicators shows stable (if not decreasing) levels of household indebtedness in Austria: Both households' overall debt in relation to GDP and their mortgage loan volumes in relation to all households' disposable income stood at about 50% as of end-2017. In addition, given that the shares of foreign currency and variable rate loans have declined, borrowers' exposure to exchange rate and interest rate risks has also decreased.

OeNB calls on banks to exercise caution in real estate lending

The systemic risks for the Austrian banking sector from residential real estate lending remain rather limited. Nonetheless, the OeNB sees some challenges for financial stability ahead: the share of housing loans in banks' balance sheets is increasing and lending standards show indications of unsustainability for a non-negligible share of newly granted loans. Against the backdrop of record low interest rates, strong increases in property prices over the past decade and positive macroeconomic sentiment, the OeNB calls on Austrian banks to exercise caution with regard to lending standards. The OeNB will also intensify its supervisory dialogue with banks regarding their risk stance toward real estate lending.

Countercyclical capital buffer rate remains at 0%

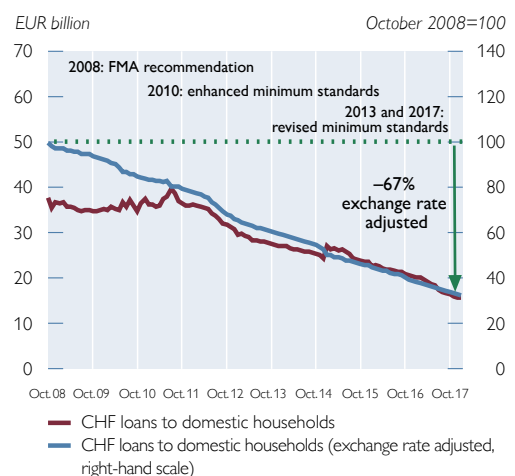
However, there are no signs of excessive growth of total credit, given that its main indicator, the credit-to-GDP gap, remains negative for Austria. Therefore, the Austrian Financial Market Stability Board recommends that the FMA leave the countercyclical capital buffer rate at 0% of risk-weighted assets from July 2018.<sup>18</sup>

### Volume of foreign currency loans continues its year-long downward trend

The measures taken by the Austrian supervisory authorities to curb foreign currency lending still have a positive impact: the outstanding volume of foreign currency (FX) loans to domestic nonfinancial borrowers continued its

Chart 3.7

### Swiss franc-denominated loans to Austrian households



Source: OeNB.

<sup>16</sup> HFCS data are only available at a time interval of three to four years and the latest results stem from the 2014 wave.

<sup>17</sup> See, e.g., Albacete, N., P. Fessler and P. Lindner (2016). The distribution of residential property price changes across homeowners and its implications for financial stability in Austria. In: *Financial Stability Report 31*. Vienna: OeNB. 62–81.

<sup>18</sup> The credit-to-GDP gap is defined as the difference between the credit-to-GDP ratio and its trend. A positive gap indicates that the current credit-to-GDP ratio is higher than its trend, which, according to the methodology proposed by the Basel Committee on Banking Supervision (BCBS), indicates excessive credit growth. For further details regarding the countercyclical capital buffer in Austria, please refer to [https://fmsg.at/dam/jcr:70d08b35-4158-499d-acca-24a952a2c9ae/Indicators\\_CCyB\\_FMSG\\_1\\_2018.pdf](https://fmsg.at/dam/jcr:70d08b35-4158-499d-acca-24a952a2c9ae/Indicators_CCyB_FMSG_1_2018.pdf)

downward trend in 2017, declining by 18.6% on an exchange rate-adjusted basis. At the end of 2017, these loans made up EUR 22 billion, with loans to households accounting for about three-quarters of this volume. The Swiss franc is the dominant loan currency by far, representing 96% of total FX loans to households.

Since October 2008, when the FMA strongly recommended that banks refrain from granting new FX loans to households, their exchange rate-adjusted volume declined by 67% (for Swiss franc denominated loans, see chart 3.7). Owing to the steady decline, the share of FX loans in total loans to households fell sharply, coming to 10.5% at end-2017, well below its all-time high of 31.7% in spring 2006. Based on their substantial decline and the size of the remaining portfolio, FX loans do not represent systemic risks for the Austrian financial system.

Foreign currency loans are not a systemic risk

Notwithstanding positive developments, legacy issues continue to be a concern and warrant close monitoring. Around three-quarters of FX loans are bullet loans coupled with repayment vehicles. Due to unfavorable exchange rate movements<sup>19</sup> and the underperformance of repayment vehicles, these loans may face a funding shortfall between the expected final value of repayment vehicles and the amount outstanding at loan maturity. In order to monitor the repayment vehicles' performance with a special view to assessing potential funding shortfalls at maturity, the OeNB, in cooperation with the FMA, conducts a yearly survey among a representative sample of Austrian banks. This year's survey showed that at the end of 2017, the estimated total shortfall stood at EUR 4.4 billion or 29% of the outstanding loan volume.<sup>20</sup> As three-quarters of all repayment vehicle loans have a remaining maturity of more than seven years, it is imperative to use the remaining time to address any issues. Therefore, the OeNB strongly recommends that banks and borrowers intensify their bilateral negotiations to find sustainable, tailor-made solutions and thereby mitigate risks stemming from these loans.

Funding shortfall remains a risk associated with loans linked to repayment vehicles

Austrian banks' CESEE subsidiaries further reduced their FX loan volumes. In 2017, the volume of FX loans fell by 2.1% (exchange rate adjusted) to EUR 31 billion and the share of FX loans in total loans dropped by 3.4 percentage points year on year (to 27% at the end of 2017). The FX share in loans to households declined particularly sharply, from 21% to 17%. The major currency in the FX loan segment is the euro, accounting for 78% of total FX loans, with the Swiss franc and U.S. dollar accounting for the remainder (11% and 10%, respectively).

Austrian banks' CESEE subsidiaries continue to reduce foreign currency loan volumes

<sup>19</sup> Such as the sharp appreciation of the Swiss franc against the euro since the extension of loans.

<sup>20</sup> Please note that due to currency movements and the performance of repayment vehicles, these are volatile figures.

### Crypto coins: current risks and future perspectives

Crypto coins are private digital tokens, sometimes referred to as “currencies;” ownership of such tokens can be transferred and recorded through a decentralized mechanism, sometimes referred to as “payment system.” After the emergence of bitcoin in 2009, more than one thousand crypto coins have emerged over the last decade.

A number of crypto coins can be traded on private platforms among private users against official currency. In contrast to official currencies, most crypto coins are not the liability of an issuer that holds assets and manages the resulting balance sheet in order to stabilize the coins’ value. As a result, their market value, depending on supply and demand, can be very unstable. While this instability makes them unattractive for monetary purposes (i.e. making payments, comparing prices and storing value) as long as stable official currencies are available, it invites speculative activity.

#### **No major financial stability risk while the market is still small ...**

2017 saw an extraordinary rise of market activity and prices for many crypto coins. In the first quarter of 2018 however, market activity dropped significantly from a high reached in the previous quarter, while exhibiting persistent volatility.<sup>1</sup>

Close to 200 coin trading platforms are known across the globe. Due to the small size of these markets, they currently do not pose a significant risk for financial stability. The global market value of all crypto coins combined was EUR 233 billion as of mid-April 2018, corresponding only to one-third of the gross financial assets owned by households in Austria (EUR 646 billion).<sup>2</sup>

#### **... but regulation is warranted due to risks to investors**

Most crypto coins are deliberately designed to avoid government involvement. Therefore many coin-related activities are not subject to regulation and supervision in most jurisdictions. This results in significant risks for individual investors. The European supervisory agencies have issued a number of warnings in order to raise awareness for consumer protection issues related to significant price risks, lack of robust and transparent markets, cyber risks etc. In addition to echoing these warnings, the FMA has published on its website some guidance regarding the current regulatory and supervisory treatment of crypto-related activities in Austria.<sup>3</sup> The OeNB has also warned about the risks associated with crypto coins and continually aims to contribute to a proper understanding of these phenomena through various public communication efforts.

Continued supervisory monitoring is aimed at preventing any spillover of risks from crypto markets to the regulated and supervised financial sector. In order to prevent the use of crypto coins for money laundering purposes, the EU updated its Anti-Money Laundering Directive in December 2017. As a result, providers of electronic wallets for storing crypto coins and of platforms for trading will be required to check the identity of their customers. It has also been observed that banks seek to fulfill their existing obligations under these laws by requiring customers that intend to transfer proceeds from selling crypto coins to their bank accounts to provide documentation on the origin of such proceeds.

With regard to tax obligations, authorities in Austria and other countries have clarified that existing tax laws apply to various crypto-related activities.<sup>4</sup> Austria’s Ministry of Finance has recently set up an advisory panel to explore possible regulatory measures with respect to crypto coins and other financial technologies with a view to promoting the beneficial use of innovation, including the use of coins to raise funds for business projects (so called “initial coin offerings”).<sup>5</sup>

<sup>1</sup> <http://www.imf.org/en/Publications/GFSR/Issues/2018/04/02/Global-Financial-Stability-Report-April-2018>

<sup>2</sup> Sources: <https://www.oenb.at/isaweb/report.do?lang=DE&report=801.1.2>; <https://coinmarketcap.com/coins/views/all/>

<sup>3</sup> <https://www.fma.gv.at/en/cross-sectoral-topics/fintech/fintech-navigator/>

<sup>4</sup> [https://bmf.gv.at/steuern/kryptowaehrung\\_bestuerung.html](https://bmf.gv.at/steuern/kryptowaehrung_bestuerung.html) (available in German only).

<sup>5</sup> <https://www.bmf.gv.at/presse/LoegerKryptowaehrungen.html> (available in German only).

*On an international level, the G 20 have called for continued monitoring of these markets, whereas the EU has started to explore the potential areas for regulation in the context of its “Fintech Action Plan.”*

**Blockchain: a future world without intermediation?**

*Blockchain, the payment system used in bitcoin and some other crypto coins, is often referred to as the “Internet of value.” Whereas the Internet uses a decentralized mechanism to store, publish and transfer digital information that can be easily copied, blockchain is a decentralized mechanism to store, publish and transfer digital information that cannot be copied, e.g. unique tokens in limited quantity (“coins”).*

*While both new and established participants in many industries, including the financial sector, currently investigate the possibility of employing blockchain and various other technical innovations for various purposes (e.g. cost saving, introducing new products etc.), there is no reason to expect that blockchain will eliminate the function of intermediaries like banks. To a large extent, financial intermediation and processing payments is more than just the transfer of cash between persons (e.g. between payer and payee, saver and debtor, etc.); it also implies that financial intermediaries take over risks on behalf of customers. Blockchain might provide a secure way for transferring and recording digital tokens, but neither does it eliminate nor absorb risks regarding the token’s accessibility, value, liquidity etc. Unless these risks are borne by an intermediary, they will remain with the individual customer.*

## **Prolonged period of low interest rates as a challenge for the insurance sector**

Despite improved economic conditions for insurance companies, the persistent low yield environment and the risk of a sudden rise in interest rates remain a challenge.

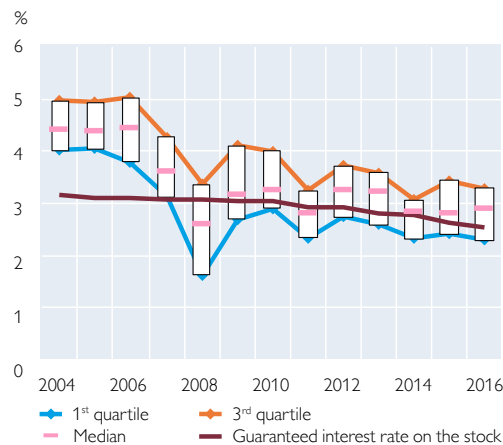
Especially life insurance companies have been suffering under these market conditions. In view of the prevailing low interest rates, the FMA lowered the maximum guaranteed rate in life insurance plans from 1% to 0.5% as from January 1, 2017 (for new contracts only). Life insurers continue to adapt to this challenging environment by shifting their business mix toward products that are directly linked to market performance, in which the investment risk is borne by the policy holder. As a result of these developments, life insurance products have become less attractive and premiums decreased by about 5% in 2017. This was strongly driven by a fall in single premiums (–21% year on year), but regular premiums also declined, continuing their negative growth for the seventh consecutive quarter.

The right-hand panel of chart 3.8 shows that in spite of all adversities, investment returns (i.e. the share of profits from investments in average total investments) of life insurance companies (blue line) are about 1 percentage point higher than the average guaranteed rate on the stock (yellow dots). The left-hand panel shows a similar result in more detail: for most life insurance companies the return on assets is higher than the guaranteed interest rate on the stock.

Life insurers’ average return of investment is higher than average guaranteed interest rate

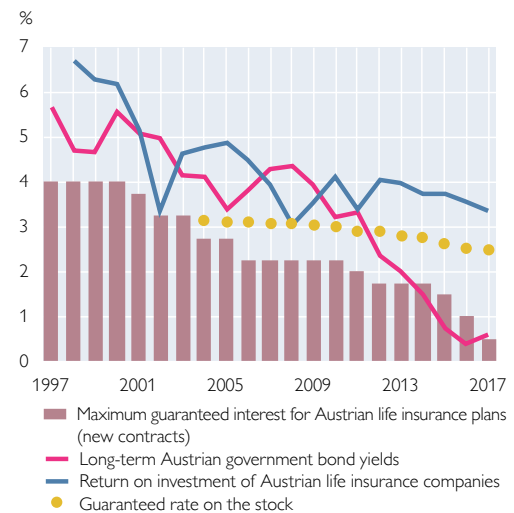
### Returns of Austrian life insurance companies

**Rate of return of Austrian life insurance companies compared with the average guaranteed rate**



Source: FMA (insurance statistics).

**Return on investment and guaranteed interest rates**



Source: FMA, OeNB.

**Regulatory and economic environment leads to significant change in investment behavior**

The Austrian insurance sector has been adapting to the macroeconomic environment as well as to regulatory challenges such as Solvency II. Both the adaptations to these new rules and the low interest rate environment have been driving the investment behavior of insurance companies to a certain extent. From 2009 to 2017, the exposure to bank securities was significantly reduced (by 20 percentage points) while investments in government bonds increased by 5 percentage points. Also, compared to insurance companies in other European countries, Austrian insurers hold a smaller proportion of their assets in government bonds (median of 14% versus 30% at large European insurers with total assets above EUR 12 billion as of December 31, 2016).<sup>21</sup> However, the Austrian insurance market is very heterogeneous, and a small number of large insurance undertakings account for the majority of assets (e.g. the top 5 account for more than 70% of total assets).

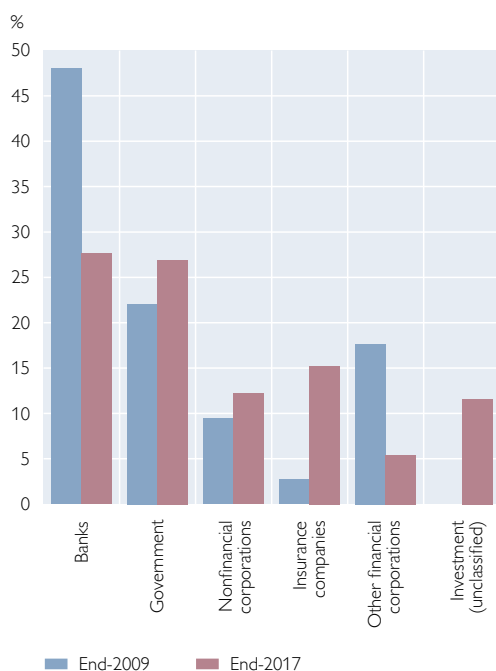
As the Solvency II-induced capital requirements and asset-liability management activities address the duration gaps of life insurers and make short-term securities particularly unattractive, given the long duration of life insurers' liabilities, there has also been a shift in the terms of securities' durations from short durations (2 to 5 years) toward the 10-to-15 and 15-to-29 year bands. Insurers apparently anticipated the new rules before they came into effect, because the shifting took place already before the introduction of Solvency II; as a consequence, between 2014 and 2016 no significant shifts could be observed.

<sup>21</sup> Source: EIOPA.

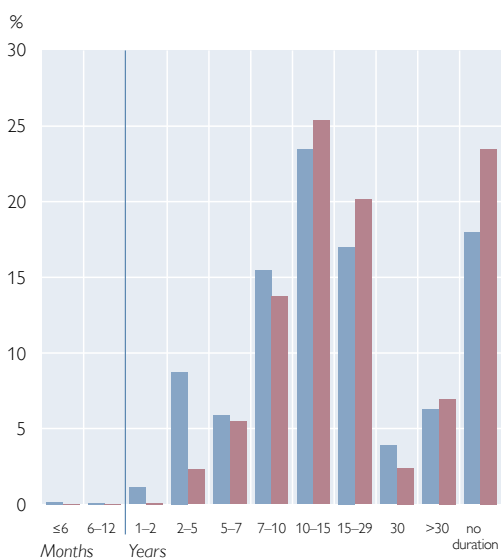
Chart 3.9

### Austrian insurance companies have changed their investment behavior

Asset allocation of insurers' investments in securities



Original maturity of insurers' investments in securities



Source: OeNB.

### Adapted framework for payment services continues to pose challenges

The revised European Payment Services Directive (PSD2) is expected to be transposed into Austrian law through the adoption of the new Austrian Payment Services Act (Zahlungsdienstegesetz, ZaDiG), which will take place with a delay of around half a year in June 2018. The main innovations include the introduction of a new category of regulated payment services (i.e. payment initiation and account information services offered by so-called third party providers) as well as substantially increased security requirements, such as strong customer authentication.

However, there are essential practical issues that are still unresolved due to delays in the implementation of the accompanying European regulatory technical standard (RTS). In particular, this concerns the specifications for common and secure open communication standards, which are the basis for the obligatory communication between the different payment service providers (banks, payment institutions and the new third party providers). The relevant RTS will not be applicable before September 2019, which causes serious challenges for market participants that are currently developing solutions for mutually compatible application programming interfaces (APIs). Besides, crucial current developments in electronic payments, such as the distributed ledger technology and virtual currencies (see box 4 on crypto coins in this report), are currently covered neither by the PSD2 nor by the new ZaDiG. In this environment, it remains to be seen to what extent (new) market participants will apply for licensing or registration as payment institutions in Austria under the new regime.

Special topics



# Digitalization in financial services and household finance: fintech, financial literacy and financial stability

Helmut Elsinger,  
Pirmin Fessler,  
Judith Feyrer,  
Konrad Richter,  
Maria Silgoner,  
Andreas Timel<sup>1</sup>

*In this study we characterize and discuss digitalization in the financial services industry, focusing on the link between fintech and financial stability. Digitalization and the emerging fintech industry offer a large variety of new products and ways to save. As a result, the process of matching savers with investors will become more direct and the share of wealth invested through other channels than the traditional bank lending channel will increase further. At the same time, the volume of intermediated private wealth is rising as a share of GDP. These developments will likely require changes in regulation and supervision but also new approaches toward financial education, as the more direct link between savers and investors calls for new forms of financial literacy.*

*JEL classification: G11, D14, G15, G18, I22*

*Keywords: household finance, portfolio choice, digitalization, fintech, financial literacy, financial stability*

In the current environment of fast digitalization, the financial industry is changing rapidly. After decades of bank-based finance, we are now confronted with new savings vehicles that offer a more direct matching of lenders and borrowers. This implies that there are more choices available to both households seeking to insure themselves against the contingencies of life, and to firms looking for ways to finance the production of goods and services. The advantages of fintech come with new risks. As the OECD (2016) rightly points out, some of these risks are market driven, some stem from regulation and supervision and others from unprepared consumers. Not only is access to financial products changing, but also the need to invest savings. Long periods of peace have allowed for an unprecedented accumulation of wealth. Combined with demographic developments, this implies that, in the future, we will be seeing increasing volumes of inherited wealth and rather affluent households with substantially higher capital-to-income ratios. Also, the public welfare system has been slowly declining over the past decades, which means that consumers need additional savings for bad times and for retirement. As a result, the relevance and volume of private wealth is increasing strongly.

Maintaining a sound and stable financial system in the face of rapid digitalization will require a combination of regulation, consumer protection and educational approaches. Informed consumers make better decisions.

The remainder of this study is structured as follows. Section 1 defines the concept of fintech and characterizes the fintech industry in Austria. In section 2, we discuss financial literacy in Austria and new needs for financial education that emerge from digitalization trends. Section 3 delivers facts about the increase of intermediated private wealth, and section 4 concludes.

<sup>1</sup> Oesterreichische Nationalbank, Economic Studies Division, [helmut.elsinger@oenb.at](mailto:helmut.elsinger@oenb.at); Foreign Research Division, [pirmin.fessler@oenb.at](mailto:pirmin.fessler@oenb.at); Communications and Financial Literacy Division, [judith.feyrer@oenb.at](mailto:judith.feyrer@oenb.at); Supervision Policy, Regulation and Strategy Division, [konrad.richter@oenb.at](mailto:konrad.richter@oenb.at); Foreign Research Division, [maria.silgoner@oenb.at](mailto:maria.silgoner@oenb.at); and Supervision Policy, Regulation and Strategy Division, [andreas.timmel@oenb.at](mailto:andreas.timmel@oenb.at). Opinions expressed by the authors of studies do not necessarily reflect those of the Oesterreichische Nationalbank or of the Eurosystem. The authors would like to thank Elisa Huber and the anonymous referee for helpful comments and valuable suggestions.

## 1 Fintech on the rise

The term fintech describes applications of technology for financial services. As such, the term is not clearly defined, since different authors include different technologies in their definitions. To create further confusion, the term is used to describe both technological innovations (“fintech”) as well as companies<sup>2</sup> that use these innovations (“fintechs”).

In this article we define fintech in a rather broad sense, including all technologically enabled financial innovations with material effects on markets, households and businesses.<sup>3</sup> However, in order to focus our analysis, we do not discuss so-called cryptocurrencies<sup>4</sup>, for instance.

Fintech gives a substantial part of the population access to a large variety of financial products. In current discussions it is often argued that technological advances make it possible to lower the costs of services and to tailor products such as payments, transfers, insurance, credit or savings. Innovations are supposed to either create new products (horizontal innovation) or better products (vertical innovation). At present, most innovations in the financial industry can be considered vertical innovations as they increase and speed up the accessibility of existing products and services, such as managing a financial account, matching savers and investors, managing payments, providing guidance for portfolio choices, or analyzing (big) data. Still, some innovations, such as peer-to-peer lending, might be considered a horizontal innovation.

### 1.1 Fintechs’ business models and technologies

The business models of fintech companies are wildly diverse. While all of them generally revolve around introducing innovative technologies to the financial sector, their focus ranges from backend developments to customer services and consulting. Most Austrian fintechs can currently be found in the areas of payment services, clearing and settlement services, as well as investment services.

The technologies promoted by fintechs are also quite varied. Although categorization is still quite fluid, they often relate to the following issues:

- big data (analytics), e.g. sentiment analysis, unstructured data lake analysis;
- artificial intelligence, e.g. chatbots, appliances of machine learning;
- cryptography, e.g. for the purposes of cryptocurrencies;
- distributed ledger technology, e.g. blockchain, Ethereum, R3 Corda.

### 1.2 Fintechs in Austria

When talking about Austrian fintechs, we need to distinguish between (1) companies that are established in Austria, (2) those that operate out of other EU countries<sup>5</sup> and (3) those that operate from outside the EU. From a national supervisory

<sup>2</sup> As we will later see, these companies also come in different flavors – ranging from small innovative startups to big Internet incumbents.

<sup>3</sup> The European Banking Authority (EBA) fully describes fintech as “technologically enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services” (EBA, 2017).

<sup>4</sup> In this article, we deliberately refrain from discussing crypto token systems such as bitcoin; for an excellent discussion of this topic, please see Beer and Weber (2014) and Weber (2016).

<sup>5</sup> This is made possible by EU law, which defines freedom of establishment and freedom to provide services as crucial elements of an internal market for the EU (often synonymous with the loose term “EU passporting”).

perspective, category (1) fintechs are most important. Any company in Austria that provides banking services generally needs a banking license.<sup>6</sup> The same holds true for insurance companies and other regulated financial institutions. Many Austrian-based fintech firms, however, have switched their focus from acquiring a license to cooperating with licensees (i.e. supervised financial institutions) or concentrating on specific niches that do not require any license. In May 2018, less than a handful of fintechs held licenses for their business. The great majority is still without (need of) license by Austrian authorities or they fall under categories (2) or (3).

At the moment it is a substantial challenge to get a comprehensive overview of this bulk of mostly unlicensed fintechs. The market is characterized by high uncertainty caused by frequent and speedy rises and failures of startups. Moreover, there is no standardized sector categorization<sup>7</sup> and no regular tracking in place (like, e.g., regulatory reporting for banks) that would allow for a systematic monitoring of the institutions. At present, the best way to keep track of fintechs' activities is by constant exchange with different participants of the fintech ecosystem (practitioners, banks, official institutions, etc.).

As the rules laid down at the European level in Payment Services Directive 2 (PSD2<sup>8</sup>) started to apply at the national level in January 2018 and new types of payment licenses have been introduced, the number of fintechs may rise noticeably. On the other hand it is not yet clear how existing financial institutions and a restrictive data protection regime will mesh with such a newly developing market. In effect, a multitude of factors surrounding PSD2 are still unknown, and it remains to be seen how they will play out over the course of 2018 and beyond.

### 1.3 The small versus the big

PSD2 is not the only uncertainty for Europe and the Austrian market. In the past, big Internet incumbents have proven able to create new markets with unique ideas, self-sufficient infrastructures and innovative technological use. In recent years, their appetite for innovation has started to stretch slowly into the financial services sector. By now, the biggest players in the market already have established infrastructures and technologies that are potentially capable of thoroughly changing conventional payment and credit markets. They will likely play a major role and therefore also deeply influence fintech technologies as well as companies.

For the last two years, most incumbents have been expanding their businesses into (micro) payment services. At least one of the leading tech companies has entered the credit market business with a lending platform and nondisclosed rating models. This company only relies on its own world-spanning infrastructure. It is safe to assume that its rating models are built on real-time information at a very granular level (payment behavior, shipping, customer ratings and comments, etc.).

It is not hard to imagine that, because of the capabilities of such huge technological companies, these initiatives may easily have noticeable effects on a number

<sup>6</sup> As of January 2018, there are three fintech companies operating under a regular license. Furthermore, a number of companies (mostly payment institutions) are seen as possible candidates for licensing in the near future.

<sup>7</sup> Fintechs usually defy any easy sector categorization as they operate based on various different business models in various stages of growth and maturity, from small startups to vast incumbents like Google (see next section).

<sup>8</sup> The PSD2 follows up on a former EU Directive with the aim of, very generally speaking, regulating market conditions and competition for payment providers. It had to be transposed into national law by January 2018.

of industries ranging from the retail sector to banking. Fintechs are usually built on a wealth of information about customers that banks, or indeed any other sector, cannot hope to obtain.

#### **1.4 Through a regulatory lens**

Fintech is the subject of heated debates among regulators all over the globe. Europe is no exception, with opinions spanning a broad range of controversial views. The U.K. and Switzerland are on the forefront of fintech liberalism and promote regulatory sandboxing as a licensing model. Under such a regime, supervisors intensely accompany selected fintech companies through their startup phase and enable them to test innovative products on a small scale in the market. Most European countries, however, including Germany and Austria, favor a “same risk, same business, same rules” approach, while still arguing for proportionality in regulatory requirements.

The OECD (2016) rightly points out different risks that might become relevant with the rise of fintech. The most important market-driven risks are potential misuse and fraud in digital services as well as issues of data confidentiality and digital profiling. Marketing practices that reinforce behavioral biases (e.g. self-control problems, short-termism) can turn out problematic if access to credit and investment products expands rapidly. Furthermore, the Financial Stability Board (FSB, 2017) has pointed out potential financial risks, such as maturity mismatches in fintech lending and liquidity mismatches that may arise because fintech credit platforms typically do not hold client money and therefore by definition do not perform liquidity transformation.

The uneven protection within and across countries with regard to different service providers is one of the main regulation-driven risks. Cross-border selling, regulatory arbitrage and inadequate disclosure make it difficult for consumers to base their financial decisions on valid and complete product information. Often, fintech activities are not covered by existing legislation. Especially with smart contracting and robo-advisors there are issues of legal uncertainty. Furthermore, it might prove difficult to identify accountable firms and obtain certainty about liability in case of losses, especially in fintech cases where no bank or other legal entity is the custodian of all records involved (FSB, 2017).

And finally, there are consumer-driven risks: Consumers lack experience with (complex) financial products and have to deal with new forms of access to finance via fintech. Clearly, consumers need broader skills to successfully navigate fintech. Many fintech applications not only require financial literacy in a traditional sense, i.e. knowledge about financial products and their functioning or basic skills to calculate costs and assess risks, but also necessitate media literacy competencies in a broader sense.

## **2 Redefined financial literacy needs in a fintech era**

Evidence from surveys suggests that people lack important knowledge for dealing with regular financial terms and products. For Austria, Fessler et al. (2007) show that younger people tend to have a lower level of financial literacy than older age cohorts based on data from the Household Survey on Financial Wealth. Not many households own risky financial products, and those that do usually rely on advice by their respective banks. Silgoner et al. (2015) confirm that there are important

financial literacy gaps in the population, analyzing data from the Austrian Survey of Financial Literacy (ASFL), the national contribution to the OECD/INFE survey on adult financial literacy (OECD, 2016). With the emergence of new fintech-based financial products, these knowledge gaps may become even more problematic, given the large spectrum of available choices and the lack of face-to-face advice.

## 2.1 Are Austrians open to new fintech products?

The ASFL makes it possible to draw tentative conclusions about respondents' affinity to new technologies and their potential openness toward new fintech products: According to survey results from end-2014, only 17% of respondents in Austria have a mobile phone payment account (chart 1). Even for the youngest age cohorts this share is only about 25%.

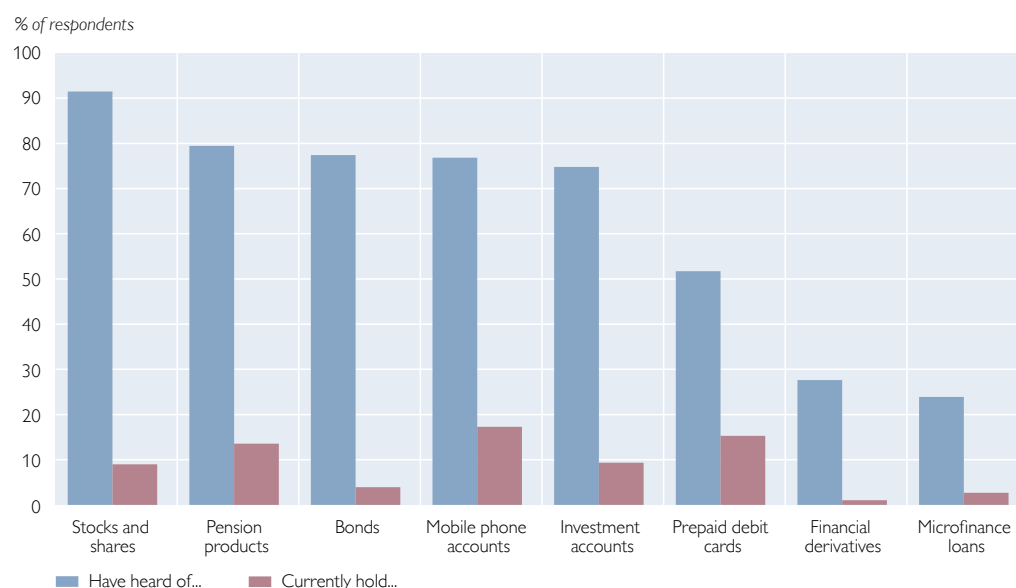
Furthermore, only 14% of respondents in Austria declare that product-specific or best-buy information found on the Internet is the source of information which most influences their financial product choice, as compared to more traditional sources of information, e.g. mail, newspapers, financial advisors or bank branches. Again, the share of respondents that tend to use the Internet as a source of product information is only slightly higher for the youngest age cohorts, remaining below 20%.

Overall, this suggests that the level of technical affinity is rather moderate in Austria. This message is supported by a cross-country comparison based on a World Bank indicator for the share of the population using the Internet (World Development Indicators): For Austria, the share was 84% in 2015, slightly higher than the euro area average (80%), but lower than in its neighboring countries such as Germany and Switzerland (88%) or the Nordic countries (more than 90%).

Second, Austrian financial market participants appear to be rather traditional and cautious in their investment behavior. According to the ASFL, only 20% of the respondents in Austria currently hold investment funds, stocks, shares, bonds,

Chart 1

### How familiar are Austrians with selected financial products?



Source: OeNB, Austrian Survey of Financial Literacy (ASFL) 2014.

financial derivatives, or have invested in microfinancing or crowd financing (chart 1), even though a majority of people have already heard of these financial products.

This rather cautious investment behavior of the Austrian population is consistent with the self-assessed high risk aversion of respondents. According to the ASFL, almost half (47%) of respondents state that they prefer investments that are characterized by “low return, no risk” as compared to more risky, but also more profitable alternatives. Given this high risk aversion, it is questionable whether easier access to riskier financial products through fintech innovations will be able to unblock the general skepticism against such products.

Finally, according to the ASFL, 24% of respondents have either taken out or could imagine taking out a loan for a rather short term or risky purposes. New fintech products may facilitate access to loans that are granted without thorough checks of the overall financial standing of the households in question.

## **2.2 Will fintech redefine financial literacy needs?**

Fintech products may facilitate access to sophisticated financial products. If people lack the necessary knowledge to judge the risk profile of these products, easier access may entail new financial stability risks. And the knowledge necessary to understand the quality or the risks of new financial products or the skills needed to use the related IT technology (e.g. web-based applications, smartphones, etc.) certainly go beyond the aspects captured by traditional financial literacy surveys.

To successfully navigate new technologies, customers require additional skills and competences in terms of technical understanding and use of digital services. But in addition to that, a major challenge will be to distinguish between legitimate, reliable providers and shady ones, and to reflect on the consequences of fintech-related decisions. These skills are close to those discussed in the media literacy literature. Media literacy is a wide concept that, according to the definition put forth by the EU Media Literacy Expert Group (MLEG), “includes all technical, cognitive, social, civic and creative capacities that allow a citizen to access, have a critical understanding of the media and interact with it” (European Commission, 2016). The reflective component is very important for media literacy. In addition to the formation of certain skills, abilities and knowledge, this aspect also requires a critical evaluation of the choice set, an understanding of whom to trust and whom to ask for advice, and an awareness of the limits of one’s own knowledge (Fessler and Swertz, 2010). We believe that these aspects are likely to be key in a future definition of financial literacy. Incidentally, Buckingham (2009) was among the first arguing for a digital literacy policy to tackle potential challenges resulting from digitalization.

## **3 Determinants of the degree of financial intermediation**

There are several factors that determine the volume of assets and liabilities channeled through the financial system. In this study, we will focus on two factors that have recently become evident. First, the capital-to-income ratio is rising, accompanied by an increase of inherited wealth relative to wealth accumulated through lifetime income. Second, we are observing a relative decrease of public investment, accompanied by a dismantling of the welfare state.



Both phenomena imply that more private wealth will be available in the financial system. In the first case because households will have more assets than in earlier generations as the assets their parents accumulated in the peaceful and prosperous era since World War II add to what they can accumulate through lifetime income. This channel of intergenerational transmission works mainly through households which would also be wealthy without inheritances received. As for the second factor, the relative decline in public expenditure in welfare gives rise to a need for precautionary saving, saving for old-age provision or even education or health needs. This channel works mainly through middle class households that can still reduce their current consumption out of income but do not have large amounts of wealth.

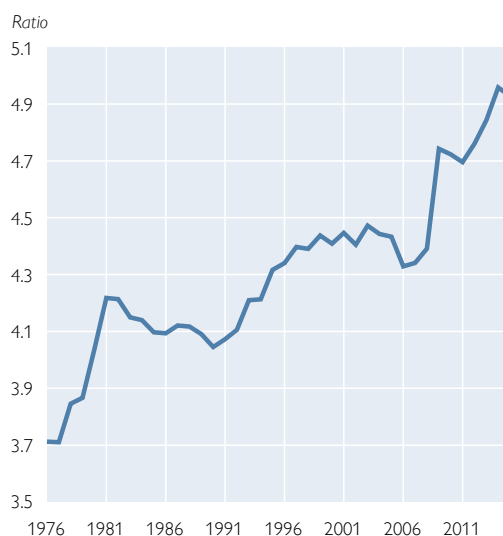
From the perspective of supervision, the riskiness of private investments is becoming more relevant. In the event of large private losses, a lack of state intervention would imply the risk of (old age) poverty. This reasoning increases the incentive for a bailout of a bank even in the absence of a “too big to fail” case. But supervision and control might be more difficult in a decentralized digitalized system of financial intermediation.

Like all over the developed world, the capital-to-income ratio is also rising in Austria. This ratio is defined as all capital (real assets, such as land, machinery or dwellings, and financial assets, such as bank accounts, stocks or bonds) divided by all yearly (capital or labor) income. But capital itself is accumulated past income. So the higher the capital-to-income ratio, the more assets are available in the economy relative to the amount of income generated in a given year. Put differently, past income (or labor) becomes more important relative to current income (or labor). As accumulated capital is transferred across generations, this also implies that inherited assets gain in importance compared to assets that are saved out of (labor) income in one’s own lifespan (see chart 2).

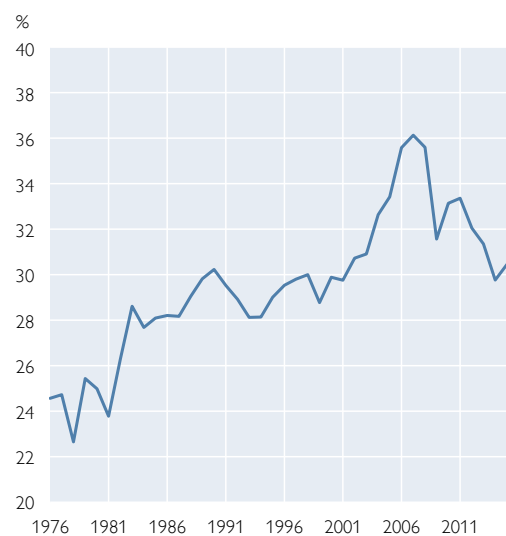
Chart 2

### The rise in capital since the mid-1970s

#### Capital-to-income ratio



#### Share of capital income in total income



Source: Statistics Austria, OeNB.



Public welfare is a substitute for private wealth accumulation (see Fessler and Schürz, 2015). In terms of volume, pension and health insurance systems are most important. If pension and health insurance were to be privately organized, all the necessary savings would be channeled through the financial system, substantially increasing the volume of private assets. The same is true for education. In the United States, education loans add up to roughly USD 1,400 billion<sup>9</sup>, so about USD 4,300 per capita. If Austria had an education system like the one in the United States, this would roughly add USD 35 billion in assets and debt to the Austrian financial system. Numbers for pensions and healthcare would exceed this by far. This illustrates the substitution between public welfare and private wealth.

In an ever more capital-intensive economy, ever-increasing investments are necessary to secure stable growth. A more capital-intensive economy also requires ever more educated people. This means educational expenditures need to rise in relation to GDP as productivity increases in education lag behind those in other sectors of the economy, and thus become (relatively) more expensive. This principle applies to many government expenditures, including infrastructure and health. The constantly rising state expenditures as a share of GDP since the emergence of capitalism were regarded as necessary for the progress of the capitalist economy (Wagner, 1893; Schumpeter, 1939). The increasing complexity and integration of production and urbanization is constantly raising the cost of delivering functioning markets, which, for instance, need to ensure the enforceability of property rights. As tax revenues and expenditures as shares of GDP have stayed rather constant in the last decades this implies a relative decline – due to the lower productivity growth – in state spending.

#### 4 Concluding remarks

Fintech allows a larger share of the population access to a larger variety of financial products. It lowers the costs of many services and makes it possible to deliver more strongly tailored products. Fintech does not only affect payments and transfers but also insurance, credit and savings. It implies new technologies that require additional skills and competences in terms of technical understanding and use of digital services. Therefore, consumers need new forms of financial literacy, closely related to concepts of media literacy.

On top of these developments, the volume of intermediated private wealth will rise, primarily for two reasons: First, the capital-to-income ratio is rising, accompanied by an increase of inherited wealth relative to wealth accumulated through lifetime income. Second, we are observing a relative decrease of public investment, accompanied by a dismantling of the welfare state. As private wealth rises, financial stability becomes more important, especially given the growing importance of private wealth (and the lessening role of the state) in insuring against the contingencies of life.

For central banks it will be important to closely monitor the interactions between fintech, financial literacy and financial stability to understand how financial intermediation might be transformed in the future, but also to be able to make informed policy choices and express sound recommendations in the fields of supervision, regulation and consumer protection.

<sup>9</sup> See <https://www.federalreserve.gov/releases/g19/current/default.htm>, retrieved on May 28, 2018.

## References

- Beer, C. and B. Weber. 2014.** Bitcoin – The Promise and Limits of Private Innovation in Monetary and Payment Systems. In: Monetary Policy & the Economy Q4/14. Vienna: OeNB. 53–66.
- Buckingham, D. 2009.** The future of media literacy in the digital age: some challenges for policy and practice. Second European Congress on Media Literacy, Bellaria, Italy, 21–24 October 2009. <http://www.medienimpulse.at/articles/view/143>
- European Banking Authority. 2017.** Discussion Paper on the EBA’s approach to financial technology (FinTech). EBA/DP/2017/02. <https://www.eba.europa.eu/documents/10180/1919160/EBA+Discussion+Paper+on+Fintech+%28EBA-DP-2017-02%29.pdf>
- European Commission. 2016.** Mapping of media literacy practices and actions in EU-28. <https://ec.europa.eu/digital-single-market/en/news/reporting-media-literacy-europe>
- Fessler, C. and C. Swertz. 2010.** Literacy – Facetten eines heterogenen Begriffs. Medienimpulse. Beiträge zur Medienpädagogik. 4/2010. <http://www.medienimpulse.at/articles/view/272>
- Fessler, P., M. Schürz, K. Wagner and B. Weber. 2007.** Financial Capability of Austrian Households. In: Monetary Policy and the Economy Q3/07. Vienna: OeNB. 50–67.
- Fessler, P. and M. Schürz. 2015.** Private wealth across European countries: the role of income, inheritance and the welfare state. Working Paper Series 1847. European Central Bank. September 2015.
- FSB (Financial Stability Board). 2017.** Financial Stability Implications from FinTech. Supervisory and Regulatory Issues that Merit Authorities’ Attention. June 2017. <http://www.fsb.org/wp-content/uploads/R270617.pdf>
- OECD. 2016.** OECD/INFE international survey of adult financial literacy competencies. <http://www.oecd.org/finance/oecd-infe-survey-adult-financial-literacy-competencies.htm>
- OECD. 2017.** G20/OECD INFE report on adult financial literacy in G20 countries. <http://www.oecd.org/finance/g20-oecd-infe-report-adult-financial-literacy-in-g20-countries.htm>
- Schumpeter, Joseph A. 1939.** Business Cycles. A Theoretical, Historical and Statistical Analysis of the Capitalist Process. New York/Toronto/London: McGraw-Hill Book Company.
- Silgoner, M., B. Greimel-Fuhrmann and R. Weber. 2015.** Financial literacy gaps of the Austrian population. In: Monetary Policy & the Economy Q2/15. Vienna: OeNB. 35–51.
- Wagner, A. 1893.** Grundlegung der Politischen Ökonomie. Teil I: Grundlagen der Volkswirtschaft, (3. Auflage). Leipzig: C.F. Winter’sche Verlagshandlung.
- Weber, B. 2016.** Bitcoin and the legitimacy crisis of money. In: Cambridge Journal of Economics, Volume 40, Issue 1, 1 January 2016. 17–41.

# The Russian banking sector: between instability and recovery<sup>2</sup>

Stephan Barisitz<sup>1</sup>

*Russian banks seem to be slowly emerging from the country's 2014–15 economic and financial crisis, which had been triggered by the oil price plunge and Western sanctions. While the economy has recovered from the recession and macroeconomic stability has been re-established (including record-low inflation), GDP growth is still modest. Lending has gone from a crisis-driven credit crunch to a retail-driven recovery, while deposits, buoyed by sustained confidence, have expanded. However, some medium-sized private banks, burdened by legacies of mishandled crisis-triggered takeovers of smaller outfits, collapsed in the second half of 2017, delaying the overall improvement of credit quality, profitability and capital adequacy. In reaction, the central bank nationalized and bailed out these systemically relevant players and established a “bad bank” to more effectively control restructuring procedures. While credit risk and related-party lending risk remain serious, shock-absorbing factors are ample and have further accumulated (including high foreign currency reserves, sizable net external assets and a solid fiscal position).*

*JEL classification: G21, G28, P34*

*Keywords: banking sector, banking crisis, connected lending, credit risk, nonperforming loans, recovery, restructuring, Russia, sanctions*

Russian banks seem to be slowly emerging from the country's 2014–15 economic and financial crisis. This brief study analyzes these developments, focusing in particular on the banking turbulences of the second half of 2017 and how they have been overcome.<sup>3</sup> Section 1 outlines the macroeconomic background. Section 2 first deals with overall banking developments and then focuses on structural elements of turbulences in some medium-sized private banks in the second half of 2017. The measures taken by the Central Bank of the Russian Federation (Bank Rossii – BR) to address these failures are gauged in section 3. Section 4 gives an assessment of current Russian banking risks and shock-absorbing factors. Section 5 concludes with an outlook.

## 1 Macroeconomic background: from mild recession to modest growth amid sanctions

In 2015, the near-halving of the oil price (Urals grade crude, annual average) to USD 51/barrel coupled with the imposition of Western sanctions in the context of the Ukrainian crisis<sup>4</sup> pushed Russia into recession, with GDP declining by 2.8%. However, the ruble's flexible exchange rate (from November 2014) protected the profitability of the resource sector as well as budget proceeds (expressed in rubles), since lower U.S. dollar-denominated oil revenues were compensated for by the ruble's devaluation. Yet the slide of the ruble also fueled inflation, which, after spiking in early 2015 (April: 16.4%), slowly declined, given weakened demand as

<sup>1</sup> Oesterreichische Nationalbank, Foreign Research Division, [stephan.barisitz@oenb.at](mailto:stephan.barisitz@oenb.at). Opinions expressed by the authors of studies do not necessarily reflect the official viewpoint of the Oesterreichische Nationalbank or of the Eurosystem. The author wishes to thank Julia Wörz (OeNB) for her valuable comments and suggestions.

<sup>2</sup> Editorial close: May 15, 2018.

<sup>3</sup> This article is an update of Barisitz (2015). It thus covers the period from around mid-2015 to early 2018 and provides an outlook.

<sup>4</sup> The strongest restrictive measures imposed include tight limits on the access of large Russian state-owned banks (SOBs) and state-owned enterprises (SOEs) to EU and U.S. capital markets and bank loans. As a consequence, many Russian credit institutions and firms have been effectively cut off from financing on Western markets.

well as the BR's resolute monetary policy response. After the key rate (the repo auction rate) had been sharply raised (to 17%), it was very gradually lowered. Although the oil price declined further by about one-fifth in 2016, Russia's GDP growth practically stabilized that year (−0.2%), probably helped again by the flexible exchange rate (−10% depreciation of the annual average against the U.S. dollar), as well as by a modest fiscal stimulus. Inflation fell to 5.4% at end-2016.

Buoyed by the oil price's moving back up by one-quarter in 2017, private consumption and fixed capital formation were the driving forces of the ensuing recovery, which, however, has been relatively modest so far (2017 GDP growth: +1.5%). This is because of a persistently weak investment climate, even if some institutional parameters appear to have improved in recent years.<sup>5</sup> The BR upheld its strict monetary policy stance (key rate: 10% at early 2017), and inflation further receded to one of its (so far) lowest levels (end-2017: 2.5%, end-March 2018: 2.4%), helped by an oil price rise-triggered partial revaluation of the ruble. As the BR's inflation target of 4% continued to be clearly undershot, the monetary authority cautiously reduced its key rate, which in mid-April 2018 stood at 7.25%. Not least due to sanctions and forced deleveraging, Russia's relatively low external debt declined and at end-2017 came to 32% of GDP (EUR 424 billion). After reaching a trough in early 2015, the country's international reserves (including gold) recovered and eventually exceeded the level they had held prior to the crisis of 2014–15. At end-2017, they stood at 28% of GDP (mid-May 2018: EUR 386 billion). The latest round of U.S. sanctions (of early April 2018) against individual Russian businessmen and their enterprises is also punishing non-U.S. firms for doing business with these players. As a result, the ruble depreciated by about 5% and uncertainty (temporarily) increased.

## 2 Banking developments

### 2.1 From credit crunch to a hesitant, retail-driven lending recovery

The weakening recession, followed by the return to economic growth, as well as the authorities' successful macro-stabilization efforts contributed to a turnaround in lending, even if credit activity is yet humble overall. While total loans (to resident sectors, excluding the interbank sector) still declined by a cumulative 17% in 2015 and 2016 (in real terms and exchange rate-adjusted), they recovered to a growth rate of 5% at end-March 2018 (year on year) (see table 1). Like before the crisis of 2014–15, retail lending has been volatile (2015–16: −19%, in real terms and exchange rate-adjusted) and is now leading the credit recovery (end-March 2018: +13% year on year). Mortgage loans, meeting high pent-up demand for housing, increasingly dominate retail lending (Bank Rossii, 2018, pp. 15–16). Mortgage loans' share in total household loans rose from 35% in mid-2015 to 43% at end-March 2018. Meanwhile, loans to enterprises (2015–16: −15%) are still in sluggish terrain (end-March 2018: +2%). While the share of foreign currency-denominated loans in total loans to enterprises spiked at end-2015, reaching almost one-third, this share declined to 20% at end-March 2018. The share of foreign currency loans in retail credit is negligible. Benefiting from continued high real interest rates, deposits started to expand in 2016 and grew by 7% by March 2018 (year on

<sup>5</sup> Thus, Russia is reported to have substantially improved its ranking in the World Bank's Doing Business Report from 2010 to 2017, namely from 124<sup>th</sup> to 35<sup>th</sup> place (Titov, 2017).

year). Weak lending, coupled with depositors' sustained confidence, drove down the loan-to-deposit ratio from 108% at end-2015 to 95% two years later; a turn-around now appears to be happening, though (Khromov, 2018b, p. 21).

The recession in 2015, followed by economic stagnation in 2016, and the lack of new lending pushed the nonperforming loan (NPL) ratio from 8% (narrow definition) and 16% (broader definition, including doubtful loans)<sup>6</sup> to 10% and 18%, respectively, between mid-2015 and end-2016. NPL ratios have since largely remained at this elevated level. The likely positive effect of the economic recovery that started in 2017 on credit quality was probably offset by the instability triggered by the insolvencies of three medium-sized private banks that year. The build-up of loan-loss provisions has continued to lag somewhat behind NPLs of the narrow definition and to reach but half of NPLs of the broader definition (Vasileva, 2017, p. 5); at end-March 2018, provisions came to 9.6% of the value of total loans. The banking sector's liquidity appears to have stabilized,<sup>7</sup> and another sign that the crisis conditions are waning comes from the reversal of credit institutions' net position vis-à-vis the BR: whereas in mid-2015, the sector's net liabilities to the monetary authority still came to 7% of the sector's total balance sheet value, this changed to a net claim position of 3% at end-March 2018. Sanctions and forced deleveraging contributed to driving down banks' foreign debt from 11% of their total liabilities in mid-2015 to 7% at end-2017.

Supported by higher net interest margins, banks' profitability has been gradually recovering from its low point reached in late 2015,<sup>8</sup> but has remained modest. The sector's return on equity (ROE) rose from 2.3% at end-2015 to 14.4% in mid-2017, before receding to 8.5% at end-March 2018. The weakening of overall profitability in the second half of 2017 was influenced by the banking turbulences already mentioned (see the following subsection). As table 1 shows, banks' aggregate capital adequacy ratio, which had declined to 12% in the second half of 2017, came to 13% at the end of the first quarter of 2018.

## 2.2 Banking recovery burdened by turbulences in 2017

The most important factor that put pressure on profitability in the second half of 2017 was a substantial increase of loan loss provisions and other asset write-downs. This was because of restructuring measures launched in August and September 2017 for Otkrytie Bank and Binbank, and in December for Promsvyazbank; all three were private domestically-owned banks (Khromov, 2018a, p. 21). By asset size, Otkrytie was the eighth, Promsvyazbank the tenth, and Binbank the twelfth largest Russian credit institution. Together, the three players accounted for about

<sup>6</sup> For details about the respective narrow and broader NPL definitions, see explanations in footnotes 2) and 3) of table 1. For a more elaborate discussion of these matters, see Barisitz, 2013.

<sup>7</sup> Thus, among other indicators, the ratio of liquid assets to short-term obligations rose from 133% in mid-2015 to 175% at end-March 2018.

<sup>8</sup> While the banking sector's aggregate profits remained positive throughout the crisis period, if temporarily descending close to zero, many banks made losses. In fact, (majority state-owned) Sberbank, well-managed and the country's largest bank by far (27% of total sector assets at end-2017), has generated the lion's share of sector profits in recent years and benefited from the crisis-triggered flight to safety. And so have some of the largest foreign-owned banks, which have also earned satisfactory profits. VTB (Vneshtorgbank, state-owned), the country's second-largest bank (16% of total assets) has posted much weaker profitability. Meanwhile, a large number of smaller and partly medium-sized banks' earnings dipped into the red. Numerous unviable outfits were wound up by the BR (see below).

Table 1

**Russia: selected banking sector stability indicators**

	End-2014	End-2015 <sup>7</sup>	End-2016	Mid-2017	End-2017	End-March 2018
	%					
<b>Credit risk</b>						
Total loans (annual real growth, exchange rate-adjusted) <sup>1</sup>	+1.5	-11.3	-6.1	-3.5	+1.8	+4.5
Loans to households (share in total loans)	29.7	26.3	28.6	29.5	31.1	31.6
Nonperforming loans (as a share of total loans including interbank, narrow definition) <sup>2</sup>	6.8	8.3	9.5	9.8	10.0	10.8
Nonperforming loans (as a share of total loans, including interbank, broader definition) <sup>3</sup>	13.6	16.5	18.0	17.8	17.5	17.7
<b>Market and exchange rate risk</b>						
Foreign currency loans (share in total loans)	18.3	23.6	16.7	15.5	14.5	13.5
Foreign currency deposits (share in total deposits)	29.6	34.3	27.2	25.4	23.5	23.5
<b>Liquidity risk</b>						
Total deposits (annual real growth, exchange rate-adjusted) <sup>4</sup>	-1.6	-0.4	+0.7	+6.5	+10.1	+6.5
Loan-to-deposit ratio	123.8	108.2	102.5	97.1	95.2	96.3
Banks' external assets (share in total assets) <sup>5</sup>	13.7	16.1	12.7	13.1	11.0	11.3
Banks' external liabilities (share in total liabilities) <sup>6</sup>	10.7	9.6	7.4	6.7	5.7	6.0
<b>Profitability</b>						
Return on assets	0.9	0.3	1.2	1.7	1.0	1.0
Return on equity	7.9	2.3	10.3	14.4	8.3	8.5
<b>Shock-absorbing factors</b>						
Capital adequacy ratio (capital to risk-weighted assets)	12.5	12.7	13.1	12.9	12.1	13.0
Tier 1 capital ratio N 1.2 (Basel III)	9.0	8.5	9.2	9.4	8.5	10.0
Loan-loss provisions (ratio to total loans)	6.5	7.8	8.5	8.6	9.3	9.6
<b>Memorandum items</b>						
Total banking sector assets (ratio to GDP)	98.0	99.5	93.0	91.2	93.6	89.6
Share of majority state-owned banks in total banking assets	56.6	56.3	56.0	..	61.5	..
Share of majority foreign-owned banks in total banking assets	13.9	13.9	13.0	13.0	12.3	12.2
CPI inflation (year on year, end of period)	11.4	12.9	5.4	4.4	2.5	2.4
Total number of operating credit institutions	834	733	623	589	561	542

Source: Central Bank of Russia, Raiffeisen Research, OeNB calculations.

<sup>1</sup> Loans and other placements with nonfinancial organizations, government agencies and individuals.

<sup>2</sup> Share of problem loans (category IV) and loss loans (category V) according to CBR regulation no. 254 (CBR 2004).

<sup>3</sup> Share of doubtful (category III), problem (category IV) and loss loans (category V) according to CBR regulation no. 254 (CBR 2004).

<sup>4</sup> Deposits and other funds of nonfinancial organizations, government agencies and individuals.

<sup>5</sup> Funds placed with nonresidents, including loans and deposits, correspondent accounts with banks, securities acquired.

<sup>6</sup> Funds raised from nonresidents, including loans from foreign banks, deposits of legal entities and individuals.

<sup>7</sup> Data for 2015 are subject to regulatory forbearance measures and therefore may not be fully comparable to other data.

7% of total banking assets at end-2016. Also, they were highly interconnected with other financial institutions, and therefore considered “too big to fail,” as opposed to numerous other players. In the restructuring process, considerable amounts of over-valued high risk assets were detected in these banks, pushing the sector’s total loan loss provisions up to a level equaling that attained in the financial crisis of 2008–09. In this connection, the persistence of “pocket banks” and of “connected lending” or “related-party lending” in Russia has to be emphasized. As explained in Barisitz and Lahnsteiner (2010, p. 84), pocket banks tend to function as de facto extended financial departments or treasury accounts of owner firms or businesspersons.



While the BR has been combating such practices in recent years (see section 3), they obviously still exist.<sup>9</sup>

Flawed business models, over-ambitious and speculative growth strategies and the misrepresentation of asset quality feature among the most common shortcomings that led to the bank failures mentioned above (World Bank Group, 2017, p. 17). Periods of rapid asset growth had been typically linked to attracting deposits with very high interest rates and/or to important acquisition activities. Such acquisitions of other troubled credit institutions suffering from the recession or from their own overly risky decisions were in some cases even supported by public financing.<sup>10</sup> In such cases, the authorities' crisis response strategy apparently included promoting or accepting mergers between individual "healthy" and "sick" banks. However, public assistance provided by BR soft loans via the Deposit Insurance Agency (Agentstvo po strakhovaniyu vkladov, ASV) did not always serve to clean up the acquired outfit as intended. Rather, BR financial support seems to have been, at least partly, invested into purchasers' own business schemes (Khromov, 2018a, p. 22; Triebe, 2017). Public financial means turned out to be at least partly wasted, structural shortcomings remained unattended, and, following major liquidity problems, the above three systemically relevant banks were eventually nationalized and bailed out. In order to overcome regulatory weaknesses, the authorities subsequently strengthened the bank resolution framework (see section 3). In any case, the three important bailouts point to some continued fragility in Russia's banking system.

### 3 The central bank's measures to combat instability and support recovery in the sector

The overcoming of the crisis of 2014–15, including substantial recapitalization measures for the largest banks in 2015 (as explained in Barisitz, 2015, p. 77–78) allowed the BR to cancel regulatory forbearance in January 2016. However, it continued its policy of delicensing unviable banks, which resulted in a further reduction of the total number of banks in the country by 255 (or 32%), from 797 in mid-2015 to 542 at end-March 2018 (table 1). The banks taken out of the market were mostly relatively small players that had violated capital requirements, had been involved in connected lending or asset skimming and/or had been facing money laundering charges.

In June 2017, the authorities established a special Banking Sector Consolidation Fund (Fond konsolidatsii bankovskogo sektora – FKBS) to replace the less efficient open rehabilitation mechanism hitherto practiced. The FKBS, wholly owned and financed by the BR, allows the central bank to provide direct equity capital

<sup>9</sup> *The persistence of the above problems also reflects the fact that the BR's move from traditional detailed compliance-oriented supervision to proactive qualitative risk-based supervision is still ongoing. As Governor Nabiullina pointed out in a recent interview, the bulk of remaining adjustments in this direction should be completed in the course of 2019 (The Banker, 2017, p. 105).*

<sup>10</sup> *For instance, Otkrytie Bank had taken over privately-owned Trust Bank (32<sup>nd</sup> largest in terms of assets) in late 2014, when the latter was approaching insolvency. Otkrytie had also received long-term public financial support for cleaning up Trust Bank. In late 2016, Otkrytie agreed to buy the troubled insurance company Rosgosstrakh. In 2014, Binbank acquired five struggling entities of the Rost Group and a local arm of PrivatBank, a Ukrainian bank, as well as controlling stakes in Uralprivatbank and MDM Bank a year later. Promsvyazbank came to the rescue of floundering AvtoVAZbank. These steps were reportedly encouraged and partly funded by the BR (Euro-money, 2017, p. 12; Fitzgeorge-Parker, 2017, pp. 85–86).*



injections to banks (equity-based approach) – but only after wiping out shareholders' equity capital – instead of channeling below-market rate loans via the ASV (loan-based approach) (IMF, 2017, p. 15).<sup>11</sup> In this way, it is aimed to reduce moral hazard and a possible waste of resources associated with insufficient public control over financial assistance handed on to “healthy” banks entrusted with restructuring “sick” ones. The authorities hope to avoid a repetition of unnecessarily expensive bailouts, such as happened with Otkrytie or Binbank. Through the FKBS, the BR acquired ownership and took operative control of Otkrytie, Binbank and Promsvyazbank. Preliminary estimates of the BR put the total recapitalization costs of the three systemically relevant banks at EUR 14 billion to EUR 16 billion, of which about EUR 9 billion have already been spent.<sup>12</sup> As a result of the nationalizations, the share of majority state-owned banks in total sector assets is estimated to have risen to over 60%. While Otkrytie and Binbank are to be merged, cleaned up, turned into a competitive universal bank and privatized in a few years' time, the authorities have decided to transform Promsvyaz into a specialist public credit institution for servicing the defense industry and state procurement.

## 4 Assessment of current banking risks and shock-absorbing factors

### 4.1 Credit risk

From late 2015 to end-2016 credit quality further deteriorated and remained at a relatively high level in 2017 and early 2018 (NPL ratio according to narrow definition: about 10%, according to wider definition: 18%, see table 1). Although there are currently no substantive indications of further bank insolvencies, insolvencies like those that happened in the second half of 2017 could counteract the continuing economic recovery and keep the NPL ratio high. Apart from that, the quick bouncing back of retail lending (after a sharp contraction in 2015) may raise concerns about looming over-indebtedness among households.

### 4.2 Connected or related-party lending risk

While the BR has been quite rigorous in weeding out relatively small unviable banks, also on account of connected lending activities, it has obviously been less successful in uncovering or promptly dealing with dubious practices in some medium-sized or large banks, as the cases of Otkrytie, Binbank and Promsvyazbank show. This may have been influenced by some moral hazard generated by the latter banks' de facto status as “too big to fail.” In any case, wiping out shareholders' equity and tightening controls on financial assistance can help reduce the loss of public resources in the context of bailouts, although it raises questions as to the impact of the further increased size of the state sector. Also, there appears to be no guarantee that mispriced assets do not unexpectedly “emerge” in other cases.

<sup>11</sup> In addition, the BR launched a new emergency liquidity facility with expanded eligible collateral to support banks in case of distress.

<sup>12</sup> Taken together, the bailouts of these three private credit institutions, which all happened in the second half of 2017, constitute the largest bank bailout package in Russian and CESEE history. According to the BR governor, Elvira Nabiullina, immediately taking over failed banks' equity would have cost 25% to 30% less than the previous soft loan-dominated strategy (Financial Times, 2018). The authorities reportedly also plan to set up a “bad bank” to absorb and resolve the nonperforming assets of banks under restructuring (Russland Aktuell, 2018).

### 4.3 Exchange rate and liquidity risk

While these types of risk are less important than those mentioned above, the volatility of the oil price and of the ruble exchange rate as well as unevenly distributed liquidity across the banking sector may give rise to temporary instability. Sanctions-related restrained access to Western financial markets for large Russian enterprises and banks appears to play less of a role now than immediately after the imposition of the restrictive measures in 2014–15, given that the Russian economy, for the time being, seems to have “adjusted” to the sanctions. That said, the newest U.S. punitive measures (of April 2018) may impact profitability of some important Russian corporations and thereby indirectly dampen banks’ earnings and render them financially somewhat more fragile.

### 4.4 Shock-absorbing factors

Shock-absorbing factors have remained relatively strong overall in recent years, albeit not without pockets of weakness. While NPLs have increased, loan-loss provisions have also increased, although they still somewhat lag behind NPLs of the narrow definition. Capital adequacy has decreased in the second half of 2017 by 1 percentage point, before recovering again to 13% at end-March 2018.<sup>13</sup> However, the authorities have ample possibilities should further recapitalization exercises become necessary. General government gross debt came to 13% of GDP at end-2017.

The loan-to-deposit ratio is by no means excessive, depositors remain confident. Another factor providing a cushion are credit institutions’ net external assets (5% of total assets at end-March 2018). The fact that SOBs account for the majority of Russian banking assets (about two-thirds) implies that the authorities are directly responsible for the survival of most of the largest players, which may uphold confidence in uncertain times. Russia’s foreign currency reserves (including gold) expanded by about one-fifth from mid-2015 to mid-May 2018 and command a solid level (EUR 386 billion or 28% of GDP or 15 import months of goods and services). The country’s current account surpluses have slightly risen in recent years (2017: 2.5% of GDP), as have private capital outflows (2017: 2.0% of GDP). Finally, Russia sustains a sound fiscal position (2017: federal budget deficit: 1.4% of GDP), most recently buttressed by oil price rises (Q1 2018: federal budget surplus: 1.5% of GDP), as well as a sizable net investor position (about 17% of GDP).

## 5 Outlook

While the bank insolvencies of the second half of 2017 have raised concern and possible further turbulences cannot be ruled out, such instability would be highly unlikely to take on systemic proportions. The 25 top private domestically-owned banks – disregarding the bailed out nationalized players – make up about 15% of total banking assets and pursued quite diverse strategies during the crisis years (starting with the big, renowned and rather cautious Alfabank). With over 60% of the banking sector controlled by SOBs, and with state-owned corporations among the largest depositors in the sector, the Russian authorities can go a long way encouraging public players to support the smooth functioning of the banking system (Solanko, 2017). While the state’s predominant role in the sector may be a drag on competition and innovation, it can certainly help upholding economic stability.

<sup>13</sup> The regulatory minimum capital adequacy ratio (N1.0) for banks in Russia is 8.0% (Bank Rossii Instruction No. 139-I).

The BR's policy of delicensing unviable smaller outfits will probably continue in the next one to two years and may curb the total number of banks by approximately another one hundred. Unless unexpected events intervene (like another sharp and durable decline of the oil price or a severe escalation of geopolitical tensions and sanctions), economic recovery should bolster the fledgling lending recovery and have a positive impact on credit quality. Unless there is a rise in economic uncertainty, some further interest rate cuts in 2018–19 may be possible, which would also lend gentle support to the recovery. While the state has strengthened its positions in the sector in recent years, committed foreign-owned banks (FOBs), who – in contrast to many others – stayed in Russia through the crises of 2008–09 and 2014–15,<sup>14</sup> may also have expansion potential. However, as mentioned above, the still overall weak investment climate currently prevents a stronger recovery of the economy, including of the banking sector.

## References

- The Banker. 2017.** Elvira Nabuillina - Q&A. September. 104–105.
- Bank Rossii. 2018.** Doklad o denezhno-kreditnoy politike. March. 15–16.
- Barisitz, S. 2013.** Nonperforming loans in CESEE – an even deeper definitional comparison. In: Focus on European Economic Integration Q3/13. Vienna: OeNB. 67–84.
- Barisitz, S. 2015.** The Russian banking sector – heightened risks in a difficult environment. In: Financial Stability Report 30. Vienna: OeNB. 71–84.
- Barisitz, S. and M. Lahnsteiner. 2010.** Russian banks on the route of fragile recovery. In: Financial Stability Report 20. Vienna: OeNB. 77–85.
- Euromoney. 2017.** Russian bailouts: too many questions, too few answers. October. 10–12.
- Financial Times. 2018.** Once-proud private banking trio brought down. January 16.
- Fitzgeorge-Parker, L. 2017.** Russian regulator backs new bailout regime. In: Euromoney. December. 85–87.
- IMF. 2016.** Russian Federation – Financial System Stability Assessment. June.
- IMF. 2017.** Russian Federation – Staff Report for the 2017 Article IV Consultation. June 16.
- Khromov, M. 2018a.** Bankovskii sektor: protivorechivye itoga goda. In: Institut Gaidara. Monitoring ekonomicheskoy situatsii v Rossii. No. 4. February. 20–22.
- Khromov, M. 2018b.** Bankovskie vklady i kreditovanie v yanvare 2018 goda: netipichnaya dinamika. In: Institut Gaidara. Monitoring ekonomicheskoy situatsii v Rossii. No. 6. March. 20–21.
- Russland Aktuell. 2018.** CBR will Trust Bank zur Bad Bank machen. April 5.
- Solanko, L. 2017.** The Russian banking sector – where to next? BOFIT Bulletin Blog. September 20.
- Titov, D. 2017.** Rossia prodolzhaet podnimatsia v reitinge Doing Business. In: Ekonomika i Zhizn. November 3. 1–2
- Triebe, B. 2017.** Russlands Banken fallen wie Dominosteine. In: Neue Zürcher Zeitung. December 16.
- Vasileva, K. 2017.** Problemnaya zadolzhennost v bankovskoy sisteme opasno rastet. In: Ekonomika i Zhizn. September 15.
- World Bank Group. 2017.** Russia's Recovery: How Strong Are Its Shoots? Russia Economic Report. No. 38.

<sup>14</sup> FOBs account for about 12% of total banking sector assets in Russia. Their share has marginally declined since mid-2015 (13%). Among the FOBs that can boast a seasoned track record in the country feature UniCredit (Italy), Raiffeisenbank (Austria), Rosbank (Société Générale, France) and Citibank (U.S.A.).

# One policy to rule them all? On the effectiveness of LTV, DTI and DSTI ratio limits as macroprudential policy tools

*We employ household-level microdata to assess the effectiveness of macroprudential policy tools in identifying vulnerable households. We evaluate loan-to-value (LTV), debt-to-income (DTI) and debt service-to-income (DSTI) limits with regard to their impact on the following two potential errors: denying nonvulnerable households access to credit (type I) and not preventing vulnerable households from obtaining credit (type II). Therefore our analysis also takes into account the potential costs of falsely restricting credit access to financially sound households. Our data allow us to measure vulnerability based on current values the macroprudential tools refer to, as well as classical vulnerability measures not related to these tools. We find that policymakers' awareness of their own goals and preferences in terms of weights of type I and II errors are crucial to effectively use the macroprudential tools at hand. Our analysis delivers qualitative results to better understand the mechanics of macroprudential policy measures as well as a tool for their evaluation in terms of costs and benefits. However, to employ our tool for actually steering policy limits, a far larger sample or register data would be necessary, as an estimation based on our relatively small survey sample is not precise enough.*

Nicolas Albacete,  
Pirmin Fessler,  
Peter Lindner<sup>1</sup>

Refereed by:  
Marco Gross, ECB

*JEL classification: O50, G21, D12, C81*

*Keywords: macroprudential policy, financial stability, LTV, DTI, DSTI, household finance, financial vulnerability, HFCS*

Loan-to-value (LTV), debt service-to-income (DSTI) and debt-to-income (DTI) ratios are among the most widely discussed macroprudential policy tools. Especially the DSTI has been used for a long time in a relatively large and rising number of countries (Lim et al., 2011). Since summer 2017, legislation has been in force in Austria that enables supervisors to use these policy tools in the future.

In this paper we try to assess the potential effectiveness of these policy instruments in preventing (potentially) vulnerable households from taking up excessive debt, while not restraining financially sound households from getting credit. These two effects are the main motives of using LTV, DSTI and DTI limits. If the application of these ratios is effective, they prevent all (potentially) vulnerable households from borrowing, but at the same time do not prevent financially sound ones from taking out loans. Both failing to prevent vulnerable households from borrowing and erroneously denying sound households access to credit are potentially costly negative side effects of such policies.

There are only very few studies taking into account and analyzing the potential costs of introducing macroprudential policy tools. We follow an approach used by Banbula et al. (2016) to identify both error types: (1) type I, the incorrect identification of nonvulnerable households as vulnerable, which entails denying access to credit to households that should not be constrained in getting credit; and (2) type II, the incorrect identification of vulnerable households as nonvulnerable, which entails giving access to credit to households that should not be allowed to

<sup>1</sup> Oesterreichische Nationalbank, Economic Analysis Division, [Nicolas.Albacete@oenb.at](mailto:Nicolas.Albacete@oenb.at); Foreign Research Division, [Pirmin.Fessler@oenb.at](mailto:Pirmin.Fessler@oenb.at); and Economic Studies Division, [Peter.Lindner@oenb.at](mailto:Peter.Lindner@oenb.at). Opinions expressed by the authors of this study do not necessarily reflect the official viewpoint of the OeNB or of the Eurosystem. The authors would like to thank the referee for helpful comments and valuable suggestions.

take out loans. Neither error can be prevented if a small number of (potential combinations of) indicators are used. However, the preferences of the regulator with regard to weighting type I and II errors are important as together with their distribution, they imply the optimal limits to LTVs, DSTIs and DTIs.

In this paper we employ Household Finance and Consumption Survey (HFCS) data to analyze the effectiveness (as defined above) of LTV, DSTI and DTI limits. To do so, it is crucial to have access to borrower-level data. Borrower vulnerability among households depends on many characteristics at the household level. So far, the HFCS is the only source that provides a dataset which includes representative information with regard to all outstanding mortgage debt as well as all other debt of households at the borrower level. At the same time, it includes a large number of socioeconomic characteristics of these borrowers necessary for an analysis of risk. In particular, it includes household income as well as household balance sheets (including all assets and liabilities), which allow a calculation of exposure at default (EAD) and loss given default (LGD). Such calculations are necessary for an assessment of risk. The dataset also allows an assessment of vulnerability according to the (academic) literature but independent from LTV, DTI or DSTI ratios, which is a prerequisite for assessing the predictive quality of these measures with regard to vulnerability.

We employ nonlinear regression-based methods to examine the predictive capacity of the LTV, DTI and DSTI ratios and construct receiver operating characteristic (ROC) curves to illustrate this capacity. One advantage of this approach is that it allows a simulation-based evaluation of different sets of regulator preferences. Furthermore, it allows calculating the overlap between the three policy instruments with regard to errors I and II. Finally, HFCS data allow us to combine debt information at the time of the receipt of the loan with measures of household vulnerability as well as current EADs and LGDs. This is of utmost importance as what is relevant for financial stability is the resilience of households during the full life cycle of all of their loans and not only their resilience at the time of the receipt of one loan.

So our main questions are the following:

- Given a choice of a policy out of the policy set of LTV, DTI and DSTI limits, what is the quantitative size of error I, i.e. nonvulnerable households not obtaining a loan although they should obtain a loan?
- Given a choice of a policy out of the policy set of LTV, DTI and DSTI limits, what is the quantitative size of error II, i.e. households obtaining a loan although they should not obtain a loan?
- Questions (1) and (2) depend on the vulnerability measure used to identify a household as vulnerable. Therefore we use
  - standard measures independent of LTV, DTI and DSTI to evaluate (1) and (2)
  - the policy tools at hand to evaluate which of the measures (LTV, DTI, DSTI) is most representative of the joint consideration of the measures themselves.Put differently, if one considers all three measures to be similarly informative in terms of future risk, which one is the most effective ratio to use as policy tool?

The remainder of this paper is structured as follows. In section 1, we briefly summarize the relevant theoretical considerations and empirical challenges for an evaluation of LTV, DTI and DSTI for Austria. In section 2, we lay out the data we use as well as our estimation strategy. Section 3 discusses all results. Section 4 summarizes and concludes.

## 1 Theoretical considerations and empirical challenges

In subsection 1.1 we summarize basic theoretical considerations that we believe to be necessary to understand the problem of setting LTV, DTI or DSTI limits. Subsection 1.2 discusses the data restrictions we face when evaluating these policy tools and their potential effects.

### 1.1 Theoretical considerations

The basic idea of these macroprudential tools is to prevent households from taking out loans which have a relatively high probability of turning out to be unsustainable.

An LTV limit caps the amount of debt that may be taken out to finance a certain asset (mostly a house or an apartment); it sets a lower bound for the capital a borrower needs to purchase a property in relation to the value of the property. Under the assumption of stable prices, this threshold limits the maximum loss given default (LGD) in case of borrower default in the long run.

A DTI limit caps the amount of debt relative to a borrower's annual income. Therefore, it directly targets the borrower's debt sustainability in the medium term.

A DSTI limit directly caps a borrower's debt service and therefore, implicitly in combination with the maturity and interest rate, it also caps the debt level as such.

- When analyzing these policy tools, the following aspects are important to note:
- *The relevant unit of analysis.* The relevant unit is the borrower, not the credit. It is the borrower's income and the borrower's assets which are relevant for calculating these measures. An LTV, a DTI or a DSTI ratio is reasonable only at the borrower level. The borrower owns the collateral whose value is used in the LTV, the income in the DTI, and DSTI is the income of the borrower. Neither does refer to the loan itself. This is especially important as many borrowers have multiple loans. Calculating the DSTI or DTI ratio at the loan level is not informative without adjustment (of income or loans) for multiple loans. The same also holds for the LTV ratio. If multiple loans are used to finance one collateral, the sum of all the loans has to be taken into account for calculating the LTV; otherwise statistics at the loan level are not informative. A consolidated borrower perspective as proposed in the ESRB (2014) handbook prevents such pitfalls: In most cases, the household is the relevant borrower unit. It might have multiple sources of income and multiple loans. All loans and all income sources of all household members have to be taken into account to produce meaningful statistics for LTV, DTI and DSTI ratios. To assess the potential impact of defaults on financial stability, all assets of all household members must be used to calculate the EAD and LGD.
  - *The interconnectedness of the policy tools.* The three macroprudential policy tools under consideration – the LTV, the DTI, the DSTI – are connected to each other in different ways. Given a certain household with a certain income level and a certain residential property that the household wants to use as collateral, a higher loan level translates into a higher LTV, a higher DTI and a higher DSTI. This layer of interconnectedness implies a positive correlation of the three measures by their definition. However, given a bank's risk assessment, a bank might allow one measure to be relatively high if the other measures are relatively low. Or it might ignore one extreme value with good reason if the other measures are particularly low. This is not necessarily bad practice; on the contrary, it might be a sign of good risk assessment. To illustrate that, let us



assume a simple but – for the sake of outlay – rather extreme example. A household with rather low income inherits a property in an expensive area. The household wants to take out a loan to renovate the property and to be able to partly rent it out. Think of a house with several apartments in an Austrian tourist region. Such a household might have extremely high current DSTI and DTI ratios (due to their low actual income) but a rather low LTV ratio (due to the inherited property). It might be reasonable to grant credit to the household as the collateral in case of default is large and, therefore, the risk implied by LGD low. Also, the probability of default might be low as the income generated by renting out apartments to tourists after the necessary renovation will allow the household to easily sustain the debt. Such situations lead to a negative correlation between the three measures, especially at the tails of their distributions, induced by the bank's (correct) risk assessment.

- *The micro- and the macroprudential perspectives.* While generally it might make sense to control lending by introducing general lending standards to achieve a macroprudential goal, such as preventing debt-driven real estate booms, flexibility at the microprudential level is important because no single policy tool fits all micro-level situations (see example above). It may be reasonable to partly restrict competition between banks in order to prevent banks with sustainable risk assessment from being crowded out by those that do not assess risks adequately. It is, however, important to allow enough flexibility by means of exceptions in order not to exclude borrowers that are able to service their debt. The challenge is to create exceptions which still allow competition but do not restrain credit supply to those households that have been deemed nonvulnerable ex post and prevent costly bailouts of banks at the same time. The major problem is that the future development of household income, real estate prices, interest rates and economic variables in general at the point of receipt of the loan is unknown and can be estimated only roughly. That is why any choice of a certain policy rule should be as informed as possible and evaluated continuously.

## 1.2 Empirical challenges

A major problem when evaluating (potential) policy effects of macroprudential policy tools in Austria is the lack of adequate data. Austrian credit registers do not include any household loans below EUR 350,000, which implies that almost all mortgages are not included in credit registers. We therefore do not know the distribution of outstanding loans (including mortgages) of households based on register data. This will not change after the implementation of AnaCredit,<sup>2</sup> as it will not include loans to natural persons, including households in Austria. However, even if these register data include loans and their collateral, it would still be a challenge to consolidate them at the household/borrower level in order to produce real borrower-level LTV ratios. As the credit register does not include any information on borrowers' (current) incomes, useful DTI or DSTI ratios cannot be calculated. Besides, register data also lack information to create other

<sup>2</sup> *AnaCredit is a relatively new international effort to gather microdata concerning debt and borrower characteristics. For further information on AnaCredit, see [https://www.ecb.europa.eu/stats/money\\_credit\\_banking/anacredit/html/index.en.html](https://www.ecb.europa.eu/stats/money_credit_banking/anacredit/html/index.en.html).*



standard measures of household vulnerability, such as financial margins or minimum income requirements, as well as information on households' other assets, which is necessary for an assessment of risks by means of EADs and LGDs.

Because of this lack of information, the OeNB started to gather additional information on LTVs, DTIs and DSTIs of the mortgages granted by banks to households on a quarterly basis. One major problem here is that this information is available not at the borrower (i.e. the household) level, but at the loan level. It comes in the form of summary statistics instead of loan-level data, which makes it impossible to create any necessary combination of information on the borrower level, such as the joint distribution of LTV, DTI and DSTI ratios. This is a prerequisite for any comparative impact analysis of macroprudential policy, however. Neither does the information include all mortgages taken out in a certain quarter in Austria; it only refers to those granted by certain banks. Furthermore, it remains unclear what the terms income and household actually mean at the loan level. Finally, there is no information about outstanding mortgages or any other information on the stock of assets or liabilities at the loan level, which would be needed for estimates of EAD or LGD or any vulnerability measure for current outstanding debt.

Unfortunately, register data or other supervisory data are not available in a form suitable for an analysis of the effectiveness of the macroprudential policy tools discussed here. That is why we use data from the HFCS, a survey which gathers data on the complete household balance sheet across the euro area and beyond. Of course, there are several important downsides to survey data. Among the most severe ones is sample size. As the HFCS covers the overall household population in Austria, its design is not particularly suitable for analyzing the relatively small subset of Austrian mortgage holders. Any analysis is therefore limited with regard to depth and detail. Another disadvantage of survey data are potential measurement errors. Some households do not answer at all (unit nonresponse), and some do not answer particular questions (item nonresponse). Even though the HFCS tackles these problems with state-of-the-art methodology, such as multiple imputations and complex weighting, it still creates a fair amount of uncertainty with regard to all estimates. Nevertheless, the HFCS is the only data source in Austria which includes all the relevant information for a basic assessment of the effectiveness (as defined above) of macroprudential policy tools. The situation with regard to data on loans at the borrower level is generally similar – albeit not that bad – in many euro area countries. That is the reason why in recent years the HFCS became the major workhorse for analyzing questions of financial stability concerning households not only at the OeNB but at most central banks in the euro area as well as at the ECB (see e.g. Albacete et al., 2016a; Bendel et al., 2016; Christelis et al., 2015; Gross, M. and J. Población, 2017). Note that our analysis should be seen as qualitative assessment of the underlying mechanics and not as a quantitative assessment with the aim of coming up with an optimal policy. It would require a far larger survey sample or register data to be able to estimate optimal policies with the necessary precision.

## 2 Data and estimation strategy

In subsection 2.1, we briefly summarize information on the HFCS Austria 2014, which we use to conduct our analysis. Subsection 2.2 defines all necessary variables used as well as our estimation strategy.

### 2.1 Data

We use the second wave of the HFCS in Austria,<sup>3</sup> which was conducted 2014. The HFCS is a euro area-wide project which gathers information on the complete balance sheet of households along with a rich set of socioeconomic variables. The unit of observation is the household, which is usually the relevant borrower level in mortgages.<sup>4</sup> In particular, the HFCS includes information on all outstanding loans of households, including information on the loan at the time of loan receipt but also at the time the survey took place. It therefore allows us to take into account all the outstanding loans of all households in the sample, thereby providing a picture of total outstanding debt of households, of which the largest part (80%) by far are mortgages used to finance the household's main residence. Additionally, the HFCS also includes the value of the collateral at the time of its acquisition as well as an estimate of the value (market price) at the time of the survey interview. It also includes direct questions on the household's monthly debt service, including interest payments.

Furthermore, the HFCS covers all other assets and liabilities of the household as well as the income of all household members, which can be aggregated to the household level in order to calculate household income. Household vulnerability is assessed by a number of different measures commonly used in the international literature on household finance and related financial stability issues. The HFCS was designed to provide the necessary information to calculate most of them, such as financial margins based on basic consumption needs.

While the set of information gathered is almost ideal for analyzing questions of financial stability related to households, sample size is a major problem. The sample of 2,997 households is generally relatively large for Austria (by comparison, the Survey of Consumer Finances used at the Federal Reserve comprises about 6,500 observations to represent the U.S. household population, and the HFCS equivalent in Germany includes about 4,500 observation to represent a household population that is ten times the size of Austria's). At the same time, the subset of indebted households is still relatively small, as only 34% of Austrian households have any debt at all, and only 17% or roughly 400 households hold outstanding mortgage debt. Even though it is clearly preferable to have a relatively small number of arguably representative households and not a large number of households not representing the population of interest, the rather small sample size limits the potential detail in which we are able to analyze the data. This is the reason why we limit ourselves to

<sup>3</sup> A complete documentation of the methods used in the HFCS can be found in Albacete et al., 2016b, first results are reported in Fessler et al., 2016.

<sup>4</sup> We have no information on which household member is actually the person who took out the loan. However, as the focus of the analysis are mortgages which are secured by the home where all household members are living, the relevant unit of analysis is the household. Furthermore, in Austria, borrowers have full personal liability in case of default, which affects all their resources (i.e. present and future income and wealth), which they usually share with all other household members.

the general questions we posed in the introduction and must refrain from a more detailed socioeconomic characterization of the identified subgroups.

## 2.2 Estimation strategy

In our empirical setup, we closely follow the method first used by Banbula et al. (2016) to assess the effectiveness of macroprudential policy tools. Formally, we observe a cross section draw of indebted households  $i \in I$  and the joint distribution of certain household-level characteristics  $P(V, M)$ , where  $V$  denotes indicator variables indicating household vulnerability by means of standard measures of vulnerability, such as the financial margin, and  $M$  denotes our three macroprudential policy tools, LTV, DSTI and DTI. Note that we observe all variables for the actual point in time when the survey took place and additionally estimate LTV, DSTI and DTI ratios for the point in time when the household received the loan by employing the approach followed by Albacete and Lindner (2017), which uses retrospective information collected in the survey as well as Austrian national accounts statistics time series. However, the bulk of outstanding loans was taken out in the last 15 years (almost 70% of the first mortgages on households' main residences were taken out in 1999 or later).

Our main workhorse is a logistic regression of the form

$$P(V = 1|M) = \frac{1}{1 + e^{-(\alpha + M\beta)}}$$

in which we estimate the probability of being vulnerable ( $V=1$ ) using a constant ( $\alpha$ ) and the level of a macroprudential policy measure ( $M$ ). The resulting estimate of  $\beta$ ,  $\hat{\beta}$  then informs us about the relationship of the policy measure with regard to vulnerability. Furthermore, the estimated propensity scores  $\hat{p}_i$  for all households allow us to evaluate the predictive capacity of the policy measure in terms of sorting the households into the vulnerable or the nonvulnerable group. This predictive capacity is the main object of interest of our analysis as it informs us about how well a certain policy measure, which in fact is a loan characteristic at the time of acquisition of the loan, can predict if a household is vulnerable today. Particularly, we can evaluate how many households are sorted wrongly and identify the type of error they can be assigned to. A type I error occurs when households are predicted to be vulnerable even though they are not, and a type II error occurs when households are not predicted to be vulnerable even though they actually are (see table 1). By moving the threshold at which a household is considered to be vulnerable, i.e. denied credit, we can evaluate different policy regimes defined by different LTV, DTI and DSTI limits or any combination of those.

To indicate household vulnerability, we use two standard vulnerability measures: 1) the expenses-above-income measure, which indicates that a household directly responds that its expenses are regularly above its income when asked the corresponding question (see annex); and 2) the financial margin, which is based on a calculation of basic

Table 1

### Error types

	True state: vulnerable	True state: not vulnerable
Model result: vulnerable	True positive	False positive (type I error)
Model result: not vulnerable	False negative (type II error)	True negative

Source: OeNB.

living expenses and debt service recorded. If the sum of basic living expenses and debt service exceeds household net income, the financial margin is negative and the household is considered to be financially vulnerable. Both of these measures are information at the time of the interview, and the item debt service in the latter one takes into account all liabilities of the household.

In addition to that, this framework allows an easy evaluation of the correlations between policy measures and, therefore, their potential effectiveness. By defining vulnerability as failing to stay below certain thresholds of one or more of the other debt ratios, we can analyze which policy measure might be the most effective one to steer lending given the assumption that all are similarly good proxies of sustainable credit. Specifically, the setting allows us to test certain combinations of thresholds. On the basis of the existing literature (see e.g. Albacete and Lindner, 2013; Bankowska et al., 2017; or Giordana and Ziegelmeyer, 2017), we define the threshold for debt to assets (DTA) as 90%, the threshold for DSTI as 40% and the threshold for DTI as 5 years. A household is defined to be vulnerable, if at least one debt ratio<sup>5</sup> exceeds the corresponding threshold (first definition), or if at least two debt ratios exceed their corresponding threshold (second definition), or if all three debt ratios exceed their corresponding threshold (third definition).<sup>6</sup> Note that all of these analyses are only feasible given the joint distribution of all the measures and, therefore, the availability of all underlying variables at the borrower level (see section 1.1). As above, vulnerability is measured at the time of the interview and all assets or liabilities of the household are taken into account.

The definitions of all relevant variables can be found in table A1 in the annex.

The estimation of the probability of being vulnerable allows a graphical representation of the policy tools' predictive capacity at the time of the loan receipt for vulnerability observed at the time of the survey; this representation is known as the receiver operator characteristic (ROC) curve. For the readers' convenience, we shortly describe how the curve is constructed. The propensity score  $ps_i$  can be described as a realization of a continuous random variable  $PS$ . Given the threshold  $ps^*$ , a household is classified as vulnerable if  $PS > ps^*$  and nonvulnerable otherwise.  $PS$  therefore follows a propability density  $f_t(ps)$  if the household classified as vulnerable actually is vulnerable and  $f_f(ps)$  if it is not. The rate at which households are correctly and falsely classified as vulnerable are then given by

$$RC(ps^*) = \int_{ps^*}^{\infty} f_t(ps),$$

and

$$RW(ps^*) = \int_{ps^*}^{\infty} f_f(ps),$$

respectively. The ROC curve then plots  $RC(ps^*)$  against  $RW(ps^*)$  with the threshold  $ps^*$  as the (implicitly) varying parameter. As the threshold in our case refers to the

<sup>5</sup> Although, strictly speaking, the stock of debt is only used in one of these indicators, all three of them are based on information about the debt of the borrower and hence for the ease of reading are called debt ratios.

<sup>6</sup> The vulnerability measure based on the LTV takes into account the wealth position of a particular household whereas the other two measures – DSTI and DTI – take into account income information. As is common in the literature, we do not combine income and wealth at this stage, e.g. by taking DTI and looking at additional financial wealth (Gross and Población, 2017), but instead combine the three measures taking into account whether a household is vulnerable according to one, two or all three of the outlined indicators.

parameter of the policy choice at the time of loan origin, the ROC directly relates the choice of LTV, DTI or DSTI limit to the correctly and falsely denied share of household loans implied by the data – and also to vulnerability measured at the time of the survey. Note that implicitly, this also includes those households which are correctly and falsely granted credit. The ROC is therefore an ideal tool for analyzing the policy tools at hand as it is straightforward to implement and allows to directly interpret the effectiveness of the policy tools. We also model the preferences of policymakers by introducing weights for type I and type II errors and by assuming that they maximize the difference between the true positive rate and the false positive rate over all possible limit values of a given debt ratio. This criterion is known as the Youden index, which is maximized as follows:

$$\max_{ps^*} \{ [1 - (\varphi) * RWII(ps^*)] - [(1 - \varphi) * RW(ps^*)] \}$$

where  $\varphi$  is the weight for the type II error and  $RWII$  is the false negative rate. See subsection 3.2 for results.

### 3 Results

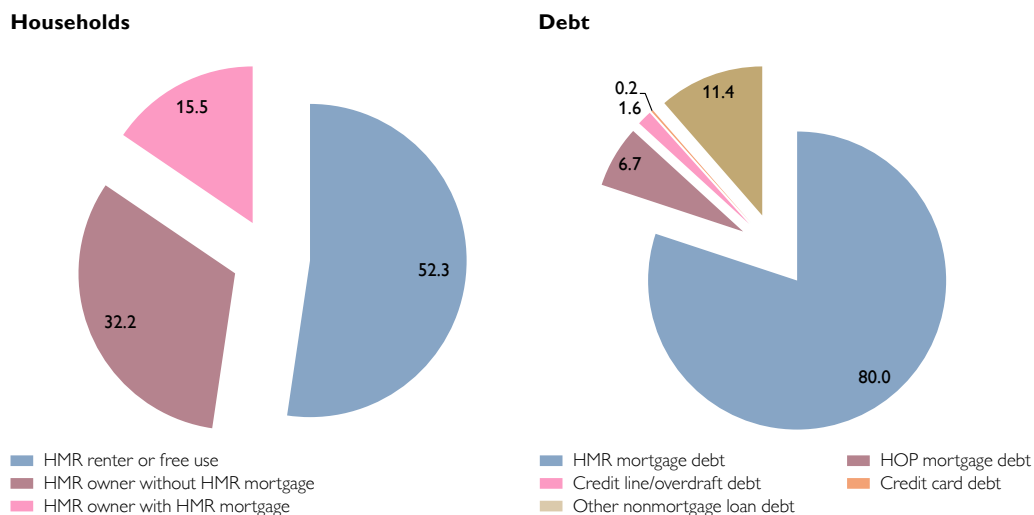
In subsection 3.1, we report descriptive results for household indebtedness and household vulnerability. Section 3.2 includes the results of our logistic estimations and the implied ROC curves.

#### 3.1 Household indebtedness

Roughly 48% of Austrian households own their main residence. About two-thirds of this share have no outstanding debt at all. About 15.5% of all households are owner-occupiers with outstanding mortgages (see left-hand panel of chart 1). About 80% of all household debt is mortgage debt related to Austrian households' main residences (HMR). Another 7% refers to mortgages collateralized by other property than main residences (HOP). Only about 13% of total household debt is uncollateralized (see right-hand panel of chart 1).

Chart 1

#### Distribution of households and their debt



Source: HFCS Austria 2014, OeNB.

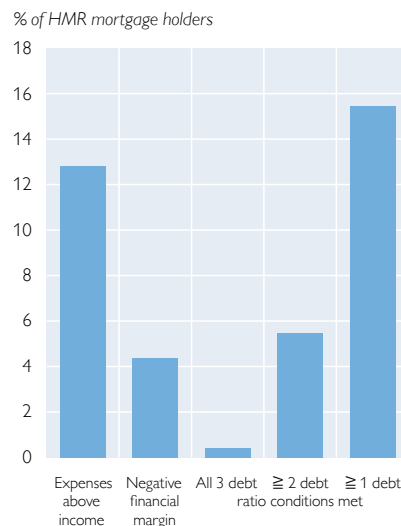
The set of HMR mortgage holders is the sample we analyze in this study. Chart 2 shows the prevalence of vulnerable households among these mortgage holders according to the different definitions under consideration. While 13% of HMR mortgage holders indicate that they had higher expenses than income during the last 12 months, only 4% have a negative financial margin at the time of the interview. The definition of financial margin follows a standard procedure from the literature, i.e. we take net income and deduct basic consumption expenditure and debt payment. Furthermore, almost 16% are vulnerable according to at least one out of the three debt ratios (DTA, DSTI and DTI), but only a tiny part (0.4%) are vulnerable according to all three ratios together. Here, we again use the standard definitions for a vulnerable household given by DTA over 90%, DSTI over 40% and DTI over 5 (see also section 2.2).

Chart 3 shows the distribution of the LTV, DSTI and DTI measures at the point of loan origination. This chart provides information on where in the distribution we would find a policy measure based on (one of) these three indicators. The HFCS collects information on initial and outstanding amounts of mortgages as well as on the value of real estate both at the time of ownership transfer and at the time of the interview. The former information can be used to estimate initial LTV and its distribution. For the income-based measures, “initial” income needs to be derived from current income and the aggregate change of income in the economy (see section 2.2).

The estimated median initial LTV among current Austrian HMR mortgage holders equals 61% (chart 3 at P50), the median initial DSTI equals 21% and the median initial DTI equals 3.5. The DSTI ranges from about 5% to about 50% of income, reflecting the fact that some income is used for living expenses. Around 25% of HMR mortgage holders have LTVs higher than 90% and around 20% of HMR mortgage holders have DSTIs higher than 40% or DTIs longer than about 6.5 years.

Chart 2

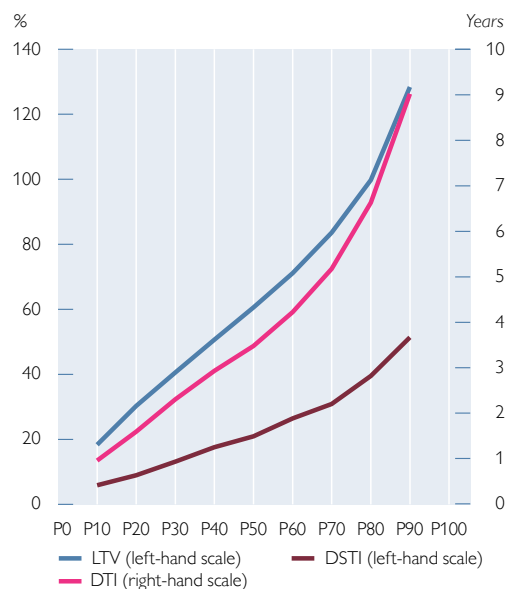
### Share of households characterized by different vulnerability measures



Source: HFCS Austria 2014, OeNB.

Chart 3

### HMR mortgage holders: percentiles of debt ratios at the time when the mortgage was taken



Source: HFCS Austria 2014, OeNB.



### 3.2 Effectiveness of policy tools

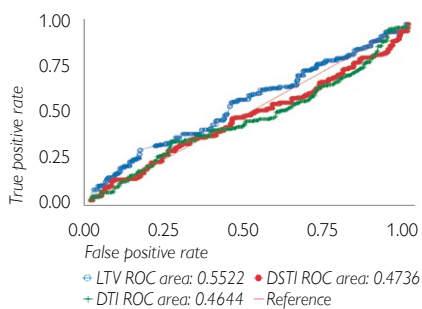
The basis of the following analysis is the estimation of the logit regressions described in section 2.2. One example of a distribution of the resulting predicted probabilities, i.e. propensity scores, based on one of these regressions is shown in chart A1 in the annex. It can be seen that in general, there is a positive correlation between each of the ratios – LTV, DTI and DSTI – and the indicator being classified as vulnerable. This means that, e.g., a higher LTV at loan origination is associated with a higher likelihood of being vulnerable ex post, as was expected. This translates into a rightward-shifted predicted probability distribution for households classified as vulnerable compared to their nonvulnerable counterparts.

Chart 4 shows the ROC curve and the ROC area statistic for the three policy instruments and for each vulnerability measure. The ROC curve coordinates are estimated as described in section 2.2. The curve shows the share of false positive (i.e. households that would be wrongly excluded from the mortgage market given a policy) against the share of true positive (i.e. households that have been denied credit and turn out to be vulnerable). The 45-degree line is the line of nondiscrimination, i.e. a policy on this line does not separate households in a meaningful way. The area under the ROC curve (ranges theoretically between 0.5 and 1) provides information of how effective a policy is to discriminate households that turn out to be vulnerable from those that are not. All five subfigures consider all three macroprudential policy variables and take several measures (expenses above income, negative financial margin, DTA of 90%, DTI of 5 years and DSTI of 40% as well as

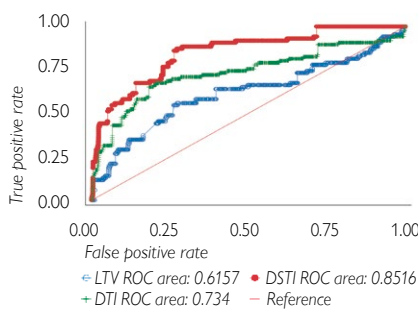
Chart 4

#### ROC curve and ROC area for three debt ratios

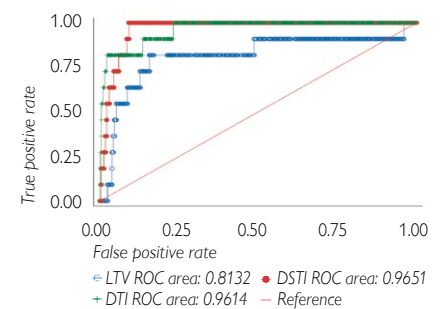
**Vulnerability measure:**  
expenses above income



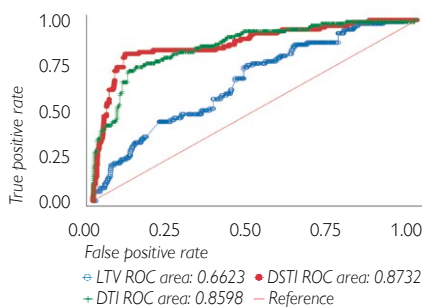
**Vulnerability measure:**  
negative financial margin



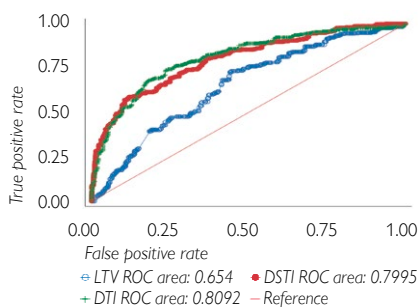
**Vulnerability measure:**  
all 3 debt ratio conditions met



**Vulnerability measure:**  
≥2 debt ratio conditions met



**Vulnerability measure:**  
≥1 debt ratio conditions met



Source: OeNB, HFCS Austria 2014.



combinations of the latter three) to define vulnerability. We find that the income-based policy variables (DSTI and DTI) reflect vulnerability relatively better than the asset-based ones (LTV). Except when measuring vulnerability by expenses above income, the ROC curves of DSTI and DTI always show much higher predictive power for vulnerability than the ROC curves of LTV. This can be seen from the higher ROC curves as well as the higher ROC area statistic.

The inner workings of the ROC curves can be understood from the following example. Suppose that one aims to reach a false positive rate not higher than 0.25. At this point, 25% of nonvulnerable HMR mortgage holders are wrongly classified as vulnerable. Suppose further that vulnerability is defined by the all-debt-ratios-conditions-met measure. This brings us to the subfigure headed “all three conditions met.” If the only macroprudential policy instrument available would be the LTV, then the ROC curve tells us that the true positive rate that could be reached would be 0.82 at the highest, meaning that 82% of the vulnerable HMR mortgage holders are correctly classified as vulnerable, or, the other way round, 18% of vulnerable households are wrongly classified as nonvulnerable. The implicit LTV limit behind these two rates would be 90%. However, if the only macroprudential policy instrument would be the DSTI, the reachable true positive rate would be 100% and the implicit DSTI limit would be 33%. And, finally, if the only macroprudential policy instrument would be the DTI, the corresponding true positive rate would be 100%, and the implicit DTI limit would be about 5.7 years. Thus, this example shows that it would be less costly to reach a false positive rate of 0.25 by using DSTI or DTI as a macroprudential tool rather than LTV.

Expenses above income does not seem to be a good measure of household vulnerability, as the ROC curves of the three macroprudential instruments all appear along the diagonal line; this means that the policy tools are as good as flipping a coin to explain this concrete measure of vulnerability. These findings are in line with Banbula et al. (2016), who find that DSTI appears to better reflect vulnerability measured by financial margin rather than by self-assessment. This vulnerability measure is, therefore, excluded for the remaining analysis.

An important element in policymaking are policymakers’ preferences. In the case of macroprudential policy using LTV, DTI or DSTI limits, this translates into the question of (implicitly) weighting type I and type II errors. Another element is the question of what to maximize. Let us assume that the policymaker maximizes the difference between the true positive rate and the false positive rate over all possible limit values of a given debt ratio (see section 2.2). Intuitively, this criterion reflects the intention to maximize the rate at which households are correctly classified as vulnerable and not vulnerable.<sup>7</sup>

Table 2 shows the corresponding optimal debt ratios resulting from this maximization depending on the weight that one puts on type I error and type II error. If vulnerability is defined according to the negative financial margin measure and both types of errors are equally weighted ( $\phi=0.5$ ) then the optimal LTV limit would be 84%, the optimal DSTI limit would be 30% and the optimal DTI limit 6 years. If less weight is put on type II error, which means that it is preferable to

<sup>7</sup> There are also other criteria of what to maximize. For example, minimizing the distance between the point (0,1) and the ROC curve or maximizing the product of true positive and false negative rates.

Table 2

**Optimal debt ratios according to the Youden index depending on weight for the type II error (FNR)**

Vulnerability measure	$\varphi=0.75$			$\varphi=0.5$			$\varphi=0.25$		
	LTV	DSTI	DTI	LTV	DSTI	DTI	LTV	DSTI	DTI
Negative financial margin	4.5	29.6	0.2	84.1	30.4	6.4	672.7	67.3	9.8
All 3 debt ratio conditions met	106.2	49.6	5.9	106.2	49.6	16.4	181.3	49.6	16.4
$\geq 2$ debt ratio conditions met	28.1	44.8	3.6	60.7	44.8	7.6	155.6	49.4	7.6
$\geq 1$ debt ratio conditions met	29.1	9.2	2.8	60.7	39.6	5.1	1,594.5	49.4	8.5

Source: HFCS Austria 2014, OeNB.

Note: The Youden index equals the difference between the true positive rate and the false positive rate over all possible limit values of a given debt ratio.

avoid false positive cases (nonvulnerable HMR mortgage holders wrongly classified as vulnerable), then the optimal limits will generally increase.

Table 2 clearly shows that for the Austrian population of households with a mortgage, the LTV is not a very effective tool to reach policy goals. It produces unrealistically low LTV limits that would be necessary if the policymaker put more weight on preventing type II errors, i.e. not identifying vulnerable households. It also produces unrealistically high LTV limits that would be necessary if the policymaker put more weight on preventing type I errors, i.e. denying credit to nonvulnerable households.

Risks to financial stability can be reduced most effectively by policies putting more effort into preventing the error of not identifying vulnerable households (type II error). However, at the same time, these policies will increase the occurrence of the error of denying credit to nonvulnerable households (type I error), which harms economic welfare. In order to quantify this trade-off one can take the following example (shown in box 1) illustrating how a certain tool can inform policy.

Box 1

Suppose that vulnerability is defined by the “1-debt-ratio-conditions-met measure.” In that case the risk to financial stability in terms of LGD is estimated to be 3.4% of total Austrian HMR mortgage debt.

Suppose further that in order to reduce this risk, the policymaker introduces an LTV limit of 61%, which corresponds to the optimal limit estimated in table 2 in case that both types of errors are equally weighted ( $\varphi=0.5$ ). Then the rate at which vulnerable households would be correctly classified as such would equal 74%, and LGD would be reduced from 3.4% to 0.5%. However, the rate at which nonvulnerable households would be wrongly classified as vulnerable would equal 45%, which corresponds to 37% of Austrian HMR mortgage debt.

If the policymaker introduced the optimal DSTI limit of 40% instead of the LTV limit, then the correct classification rate of vulnerable households would equal 62%, the LGD would be reduced from 3.4% to 1.8%, and the wrong classification rate of nonvulnerable households would equal 12%, which corresponds to only 7% of HMR mortgage debt.

Finally, if the policymaker introduced the optimal DTI limit of 5 years, then the correct classification rate of vulnerable households would equal 75%, the LGD would be reduced from 3.4% to 1%, and the wrong classification rate of nonvulnerable households would equal 19%, which corresponds to 20% of HMR mortgage debt. In this scenario, DTI would seem a reasonable policy tool because it combines a strong reduction in LGD with a better classification rate of nonvulnerable households, implying less economic cost.

In general, given that banks also use their own models to assess the creditworthiness of borrowers, it seems reasonable to put less weight on avoiding the type II error and more weight on avoiding the type I error since a vulnerable household that is not identified as such by macroprudential policy (type II error) still has to pass the creditworthiness analysis of the banks, but a nonvulnerable household wrongly identified as vulnerable by macroprudential policy (type I error) has no more chance to get a credit. To allow a certain volume of exceptions is another policy option to mitigate this problem and allow for more competition. However, it comes with many follow-up questions, which complicate policy evaluation.

#### 4 Summary and concluding remarks

In this paper, we adapt the approach of Banbula et al. (2016) and apply it to Austria. It provides a tool that lets us discuss the effectiveness of macroprudential policy tools in ex post discriminating households identified as vulnerable from their non-vulnerable counterparts. Like any policy measure, macroprudential policies may also affect households that are not targeted (false positive – type I – error) as well as miss some vulnerable households (false negative – type II – error); and these side effects should be taken into account when designing and applying the policy tools.

We find that DSTI and DTI have a much higher predictive power for vulnerability than LTV has. This suggests a higher effectiveness of income-based macroprudential policy tools compared to asset-based ones. Furthermore, policymakers' awareness of their goals and preferences in terms of weights of type I and II errors are crucial to effectively use any macroprudential tools. Our analysis delivers qualitative results to better understand the mechanics of macroprudential policy measures as well as a tool for their evaluation in terms of costs and benefits. If policymakers put more weight on avoiding the situation in which vulnerable households are classified as nonvulnerable (type II error) they will reduce the risks to financial stability more effectively. However, at the same time they will increase the risk that nonvulnerable households are classified as vulnerable (type I error), which could harm economic welfare. It might be reasonable to put less weight on avoiding type II errors and more weight on avoiding type I errors since a vulnerable household that has not been identified as such by macroprudential tools still has to pass the creditworthiness analysis of banks; on the other hand, a nonvulnerable household wrongly identified as vulnerable by macroprudential tools has no chance of getting a loan. An alternative policy option would be allowing a certain level of exceptions to mitigate this problem and to increase competition. But such an alternative option would provoke many follow-up questions, which, in turn, would complicate policy evaluation.

While generally it might make sense to control lending by introducing general lending standards to achieve a macroprudential goal, such as preventing debt-driven real estate booms, flexibility at the microprudential level is important as no single policy tool fits all micro-level situations (see example above). It may be reasonable to partly restrict competition between banks in order to prevent banks with a sustainable risk assessment from being crowded out by those that do not assess risks adequately. It is, however, important to allow enough flexibility – by means of exceptions – in order not to exclude borrowers who are able to service their debt.

Employing our tool for actually steering policy limits would require far more sample or register data, as an estimation based on our sample is not precise enough.

## References

- Albacete, N. and P. Lindner. 2013.** Household Vulnerability in Austria – A Microeconomic Analysis Based on the Household Finance and Consumption Survey. In: Financial Stability Report 25. Vienna: OeNB. 57–73.
- Albacete, N., P. Fessler and P. Lindner. 2016a.** The distribution of residential property price changes across homeowners and its implications for financial stability in Austria. In: Financial Stability Report 31. Vienna: OeNB. 62–81.
- Albacete, N., P. Lindner and K. Wagner. 2016b.** Eurosystem Finance and Consumption Survey 2014: Methodological Notes for the second wave in Austria. Addendum to Monetary Policy and the Economy Q2/16. Vienna: OeNB.
- Albacete, N. and P. Lindner. 2017.** Simulating the impact of borrower-based macroprudential policies on mortgages and the real estate sector in Austria – evidence from the Household Finance and Consumption Survey 2014. In: Financial Stability Report 35. Vienna: OeNB. 52–68.
- Banbula, P., A. Kotula, J. G. Przeworska and P. Strzelecki. 2016.** Which households are really financially distressed: how micro data could inform the macroprudential policy. IFC Bulletins chapters. In: Bank for International Settlements (ed.). Combining micro and macro data for financial stability analysis. Volume 41. Basel: Bank for International Settlements.
- Bankowska, K., J. Honkkila, S. Pérez-Duarte and L. Reynaert Lefebvre. 2017.** Household vulnerability in the euro area. IFC Bulletins chapters. In: Bank for International Settlements (ed.). Data needs and statistics compilation for macroprudential analysis. Volume 46. Basel: Bank for International Settlements.
- Bendel, D., M. Demary and M. Voigtländer. 2016.** Eine erste Bewertung makroprudenzieller Instrumente in der Immobilienfinanzierung. IW policy paper 7. Cologne: Institut der deutschen Wirtschaft Köln.
- Christelis, D., M. Ehrmann and D. Georgarakos. 2015.** Exploring Differences in Household Debt Across Euro Area Countries and the United States. Working paper 2015-16. Bank of Canada.
- ESRB. 2014.** The ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector. European Systemic Risk Board.
- Fessler, P., P. Lindner and M. Schürz. 2016.** Household Finance and Consumption Survey des Eurosystems 2014: First results of the second wave for Austria. In: Monetary Policy and the Economy Q2/2016. Vienna: OeNB.
- Giordana, G. and M. Ziegelmeier. 2016.** Household debt burden and financial vulnerability in Luxembourg. IFC Bulletins chapters. In: Bank for International Settlements (ed.). Data needs and statistics compilation for macroprudential analysis. Volume 46. Basel: Bank for International Settlements.
- Gross, M. and J. Población. 2017.** Assessing the efficacy of borrower-based macroprudential policy using an integrated micro-macro model for European households. In: Economic Modelling. Vol. 61. Issue C. 510–528.
- Lim, C., F. Columba, A. Costa, P. Kongsamut, M. A. Otani, T. Wezel and X. Wu. 2011.** Macroprudential Policy: What Instruments and How to Use Them? Lessons from Country Experiences. IMF WP/11/238.

## Annex

### Wording of the HFCS question on expenses above income:

“Again aside from any purchases of assets, over the last 12 months would you say that your (household’s) regular expenses were higher than your (household’s) income, just about the same as your (household’s) income or that (you/your household) spent less than (your/its) income?”

Coding:

- 1 – Expenses exceeded income
- 2 – Expenses about the same as income
- 3 – Expenses less than income

Table A1

### Definition of variables

Variable name	Variable definition
Dependent variables	
Expenses above income	1=expenses exceed income; 0=otherwise (see wording of the question in the annex)
Negative financial margin	1=the sum of total household debt service (from collateralized and noncollateralized debt) and estimated total household nondurable consumption exceed estimated total household net income; 0=otherwise
All 3 debt ratio conditions met	1=all of the following conditions met: current DTA <sup>1</sup> >90%, current DSTI <sup>2</sup> >40%, current DTI <sup>3</sup> >5 years; 0=otherwise
≥ 2 debt ratio conditions met	1=at least two of the following conditions met: current DTA <sup>1</sup> >90%, current DSTI <sup>2</sup> >40%, current DTI <sup>3</sup> >5 years; 0=otherwise
≥ 1 debt ratio conditions met	1=at least one of the following conditions met: current DTA <sup>1</sup> >90%, current DSTI <sup>2</sup> >40%, current DTI <sup>3</sup> >5 years; 0=otherwise
Explanatory variables	
LTV	HMR mortgage amount at the time when the highest mortgage was taken out divided by the value of the property at the time of its acquisition
DSTI	Annual HMR mortgage repayment divided by total household annual net income at the time when the highest mortgage was taken out
DTI	HMR mortgage amount at the time when the highest mortgage was taken out divided by total household annual net income at the time when the highest mortgage was taken out

<sup>1</sup> Current DTA is defined as total current household debt (collateralized and noncollateralized) divided by total current household assets (financial and real).

<sup>2</sup> Current DSTI is defined as total current household debt service (from collateralized and noncollateralized debt) divided by total current household net income.

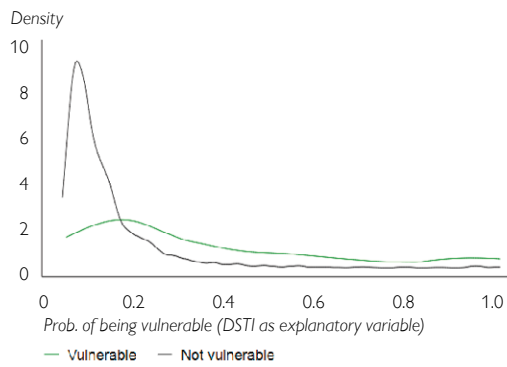
<sup>3</sup> Current DTI is defined as total current household debt (collateralized and noncollateralized) divided by total current household annual net income.

Source: Authors’ compilation.

Chart A1

### Distribution of predicted probabilities by vulnerability status

**Vulnerability measure:**  
**≥ 1 debt ratio conditions met**



Source: OeNB, HFCS Austria 2014

## Annex of tables



# Annex of tables

International financial market indicators	Table
<i>Short-term interest rates</i>	A1
<i>Long-term interest rates</i>	A2
<i>Stock indices</i>	A3
<i>Corporate bond spreads</i>	A4
Financial indicators of the Austrian corporate and household sectors	
<i>Financial investment of households</i>	A5
<i>Household income and savings</i>	A6
<i>Financing of nonfinancial corporations</i>	A7
<i>Insolvency indicators</i>	A8
<i>Housing market indicators</i>	A9
Austrian financial intermediaries	
<i>Structural indicators</i>	A10
<i>Total assets</i>	A11
<i>Sectoral distribution of domestic loans to nonbanks</i>	A12
<i>Loan quality</i>	A13
<i>Exposure to CESEE</i>	A14
<i>Profitability on a consolidated basis</i>	A15
<i>Profitability of Austrian banks' subsidiaries in CESEE</i>	A16
<i>Solvency</i>	A17
<i>Market indicators of selected Austrian financial instruments</i>	A18
<i>Key indicators of Austrian insurance companies</i>	A19
<i>Assets held by Austrian mutual funds</i>	A20
<i>Structure and profitability of Austrian fund management companies</i>	A21
<i>Assets held by Austrian pension funds</i>	A22
<i>Assets held by Austrian severance funds</i>	A23
<i>Transactions and system disturbances in payment and securities settlement systems</i>	A24

Cutoff date for data: June 12, 2018

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 rates<sup>1</sup>

	2010	2011	2012	2013	2014	2015	2016	2017
<i>Three-month rates, period average, %</i>								
Euro area	0.81	1.39	0.57	0.22	0.21	-0.02	-0.26	-0.33
U.S.A.	0.34	0.34	0.43	0.27	0.23	0.32	0.74	1.26
Japan	0.39	0.34	0.33	0.24	0.21	0.17	0.08	0.06
United Kingdom	0.70	0.87	0.83	0.51	0.54	0.57	0.50	0.36
Switzerland	0.19	0.12	0.07	0.02	0.01	-0.75	-0.75	-0.73
Czech Republic	1.31	1.19	1.00	0.46	0.36	0.31	0.29	0.41
Hungary	5.51	6.19	6.98	4.31	2.41	1.61	0.99	0.14
Poland	3.92	4.54	4.91	3.02	2.52	1.75	1.70	1.73

Source: Bloomberg, Eurostat, Macrobond.

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

Table A2

### Long-term interest rates<sup>1</sup>

	2010	2011	2012	2013	2014	2015	2016	2017
<i>Ten-year rates, period average, %</i>								
Euro area	3.78	4.31	3.05	3.01	2.28	1.27	0.93	1.17
U.S.A.	3.24	2.89	1.81	2.25	2.60	2.13	1.82	2.33
Japan	1.17	1.13	0.86	0.71	0.57	0.36	-0.04	0.05
United Kingdom	3.36	2.87	1.74	2.03	2.14	1.79	1.22	1.18
Switzerland	1.63	1.47	0.67	0.88	0.80	-0.02	-0.36	-0.08
Austria	3.23	3.32	2.37	2.01	1.49	0.75	0.38	0.58
Czech Republic	3.88	3.71	2.78	2.11	1.58	0.58	0.43	0.98
Hungary	7.28	7.64	7.89	5.92	4.81	3.43	3.14	2.96
Poland	5.78	5.96	5.00	4.03	3.52	2.70	3.04	3.42

Source: ECB, Eurostat, Macrobond.

<sup>1</sup> Yields of long-term government bonds.

Table A3

### Stock indices

	2010	2011	2012	2013	2014	2015	2016	2017
<i>Annual change in %, period average</i>								
Euro area: EURO STOXX	13.38	-3.60	-6.36	17.53	13.07	11.76	-9.67	17.16
U.S.A.: S&P 500	20.24	11.20	8.81	19.17	17.49	6.71	1.63	16.92
Japan: Nikkei 225	7.07	-5.81	-3.43	49.20	13.84	24.21	-11.92	19.53
United Kingdom: FTSE100	19.69	3.90	1.09	12.69	3.23	-1.38	-1.74	13.96
Switzerland: SMI	14.27	-6.96	4.88	24.14	9.28	4.23	-10.12	10.91
Austria: ATX	19.85	-3.69	-14.79	16.94	-2.36	1.28	-5.42	34.83
Czech Republic: PX 50	21.70	-5.10	-14.60	2.50	1.60	0.80	-11.50	14.30
Hungary: BUX	40.10	-8.70	-12.00	3.30	-3.90	17.30	28.90	31.50
Poland: WIG	33.60	4.40	-6.70	16.10	8.10	-0.30	-9.80	30.00

Source: Macrobond.

Table A4

**Corporate bond spreads<sup>1</sup>**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>Percentage points, period average</i>								
Euro area								
AA	1.42	2.13	1.67	0.89	0.59	0.72	0.80	0.74
BBB	3.01	3.98	3.75	2.25	1.71	1.89	2.11	1.71
U.S.A.								
AA	1.32	1.68	1.50	1.12	0.88	1.04	0.93	0.74
BBB	2.21	2.34	2.59	2.17	1.76	2.13	2.21	1.54

Source: Macrobond.

<sup>1</sup> 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 households<sup>1</sup>**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>EUR billion, four-quarter moving sum</i>								
Currency	1.0	1.1	0.6	1.2	0.9	0.7	0.6	0.6
Deposits	1.6	4.6	3.8	1.9	3.2	6.5	11.1	7.8
Debt securities <sup>2</sup>	1.5	1.8	0.2	-1.8	-4.2	-3.5	-2.7	-2.7
Shares and other equity <sup>3</sup>	1.7	0.8	1.1	-0.1	1.5	-0.3	1.2	-0.4
Mutual fund shares	2.4	-1.4	0.9	2.7	3.5	4.1	3.1	3.8
Insurance technical reserves	4.4	2.9	3.7	3.4	3.3	1.6	1.1	0.1
Other accounts receivable	0.0	0.2	0.0	0.0	1.7	1.1	-1.0	1.5
Total financial investment	12.6	10.0	10.3	7.3	9.9	10.2	13.4	10.7

Source: OeNB (financial accounts).

<sup>1</sup> Including nonprofit institutions serving households.<sup>2</sup> Including financial derivatives.<sup>3</sup> Other than mutual fund shares.

Table A6

**Household<sup>1</sup> income and savings**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>EUR billion, four-quarter moving sum</i>								
Net disposable income	173.8	178.3	185.4	185.6	189.7	193.2	200.9	204.4
Savings	16.8	14.2	16.6	13.3	13.0	13.4	16.0	13.1
Saving ratio in % <sup>2</sup>	9.6	7.9	8.9	7.1	6.8	6.9	7.9	6.4

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

<sup>1</sup> Including nonprofit institutions serving households.<sup>2</sup> Saving ratio = savings / (disposable income + increase in accrued occupational pension benefits).

Table A7

**Financing of nonfinancial corporations**

	2010	2011	2012	2013	2014	2015	2016	2017
	<i>EUR billion, four-quarter moving sum</i>							
Debt securities <sup>1</sup>	1.4	4.2	2.8	1.7	-0.7	0.0	0.7	-1.1
Loans	5.8	6.4	0.6	7.0	3.2	3.7	6.9	10.4
Shares and other equity	0.4	9.6	2.4	4.4	4.2	2.6	4.2	8.1
Other accounts payable	5.9	3.4	0.9	3.1	2.9	3.8	6.8	3.4
Total external financing	13.5	23.6	6.7	16.2	9.6	10.1	18.6	20.8

Source: OeNB (financial accounts).

<sup>1</sup> Including financial derivatives.

Table A8

**Insolvency indicators**

	2010	2011	2012	2013	2014	2015	2016	2017
Default liabilities (EUR million)	4,700	2,775	3,206	6,255	2,899	2,430	2,867	1,863
Defaults (number)	3,522	3,260	3,505	3,266	3,275	3,115	3,163	3,025

Source: Kreditschutzverband von 1870.

Note: Default liabilities for 2013 include one large insolvency.

Table A9

**Housing market indicators**

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Residential property price index</b>	<i>2000=100</i>							
Vienna	143.9	156.1	180.7	196.3	204.6	209.2	217.2	220.4
Austria	127.3	132.7	149.1	156.0	161.4	168.1	180.4	187.2
Austria excluding Vienna	121.1	124.0	137.4	141.1	145.4	152.9	166.7	174.9
<b>Rent prices<sup>1</sup></b>	<i>2000=100</i>							
Rents of apartments excluding utilities, according to CPI	100.0	103.3	107.8	111.2	115.6	120.7	124.4	129.6
<b>OeNB fundamentals indicator for residential property prices<sup>2</sup></b>								
Vienna	-3.0	3.0	11.6	15.4	16.3	16.4	18.2	20.1
Austria	-9.3	-6.0	-0.6	-1.7	-1.9	-0.4	4.3	8.5

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

<sup>1</sup> Free and regulated rents.

<sup>2</sup> Deviation from fundamental price in %.

Austrian financial intermediaries<sup>1</sup>

Table A10

## Structural indicators

	2010	2011	2012	2013	2014	2015	2016	2017
End of period, EUR million								
Number of banks in Austria	843	824	809	790	764	738	672	628
Number of bank branches	4,176	4,441	4,468	4,359	4,255	4,096	3,926	3,775
Number of foreign subsidiaries	107	105	101	93	85	83	60	58
Number of branches abroad	143	152	146	151	200	207	209	215
Number of bank employees <sup>1</sup>	79,625	79,706	79,110	77,712	75,714	75,034	74,543	73,712

Source: OeNB.

<sup>1</sup> Number of persons, including part-time employees, employees on leave or military service, excluding blue-collar workers.

Table A11

## Total assets

	2010	2011	2012	2013	2014	2015	2016	2017
End of period, EUR million								
Total assets on an unconsolidated basis	978,559	1,014,278	982,114	927,155	896,424	859,165	832,267	815,275
of which: total domestic assets	659,561	693,394	678,500	645,275	611,540	605,267	603,541	603,375
Total assets on a consolidated basis	1,130,853	1,166,313	1,163,595	1,089,713	1,078,155	1,056,705	946,342	948,861
Total assets of CESEE subsidiaries <sup>1</sup>	263,800	270,045	276,352	264,998	285,675	295,557	184,966	205,532
Leverage ratio (consolidated, %) <sup>2</sup>	5.8	5.8	6.1	6.5	6.1	6.3	7.6	7.5

Source: OeNB.

<sup>1</sup> 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.<sup>2</sup> Definition up to 2013: tier 1 capital after deductions in % of total assets. Definition as of 2014 according to Basel III.

Table A12

## Sectoral distribution of domestic loans to nonbanks

	2010	2011	2012	2013	2014	2015	2016	2017
End of period, EUR million								
All currencies combined								
Nonbanks	321,524	329,912	330,385	326,820	328,324	333,970	338,322	341,227
of which: nonfinancial corporations	135,427	138,840	140,384	140,329	136,606	137,235	136,963	143,113
households <sup>1</sup>	135,215	138,353	139,056	139,052	140,946	146,432	153,501	156,376
general government	26,374	28,976	27,972	25,970	28,102	28,076	27,630	24,292
other financial intermediaries	24,324	23,586	22,806	21,244	22,578	22,127	19,987	17,316
Foreign currency								
Nonbanks	58,746	57,231	47,652	40,108	36,288	33,950	30,089	22,181
of which: nonfinancial corporations	12,550	12,111	9,156	6,985	6,379	5,293	4,296	3,408
households <sup>1</sup>	40,040	38,716	32,905	28,385	25,374	24,423	21,224	16,486
general government	2,627	3,267	2,827	2,478	2,777	2,858	2,623	943
other financial intermediaries	3,525	3,133	2,761	2,257	1,759	1,374	1,945	1,343

Source: OeNB.

<sup>1</sup> Including nonprofit institutions serving households.

Note: Figures are based on monetary statistics.

<sup>1</sup> Since 2007, the International Monetary Fund (IMF) has published Financial Soundness Indicators (FSIs) for Austria (see also [www.imf.org](http://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 A13

**Loan quality<sup>1</sup>**

	2010	2011	2012	2013	2014	2015	2016	2017
	<i>End of period, %</i>							
Nonperforming loans in % of total loans (Austria <sup>2</sup> )	4.7	4.5	4.7	4.1	4.4	4.3	3.5	2.5
Nonperforming loans in % of total loans (consolidated)	8.0	8.3	8.7	8.6	7.0	6.6	4.9	3.4
Nonperforming loans in % of total loans (Austrian banks' subsidiaries in CESEE)	12.7	14.2	13.9	14.0	11.8	11.5	8.6	4.5
Coverage ratio <sup>3</sup> (Austria <sup>2</sup> )	x	x	x	x	x	x	x	59
Coverage ratio <sup>3</sup> (consolidated)	x	x	x	x	x	x	x	52
Coverage ratio <sup>3</sup> (Austrian banks' subsidiaries in CESEE)	43	43	48	53	57	59	67	61

Source: OeNB.

<sup>1</sup> As of 2017, data are based on Financial Reporting (FINREP) including total loans and advances. Data before 2017 only include loans to households and corporations.<sup>2</sup> Austrian banks domestic business.<sup>3</sup> Total loan loss provisions in % of nonperforming loans.

Table A14

**Exposure to CESEE**

	2010	2011	2012	2013	2014	2015	2016	2017
	<i>End of period, EUR million</i>							
Total exposure according to BIS <sup>1</sup>	209,352	216,086	209,818	201,768	184,768	186,397	193,273	210,616
Total indirect lending to nonbanks <sup>2,3</sup>	168,710	171,311	171,117	161,439	177,389	176,728	108,738	118,268
Total direct lending <sup>4</sup>	49,460	52,010	51,539	52,926	43,144	40,866	32,976	28,507
Foreign currency loans of Austrian banks' subsidiaries in CESEE <sup>3</sup>	84,601	88,282	85,382	79,047	76,736	69,317	32,576	31,027

Source: OeNB.

<sup>1</sup> As of mid-2017, comparability of data with earlier figures is limited due to several methodological adjustments in data collection.<sup>2</sup> Lending (net lending after risk provisions) to nonbanks by all fully consolidated bank subsidiaries in CESEE.<sup>3</sup> 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.<sup>4</sup> Cross-border lending to nonbanks and nonfinancial institutions in CESEE according to monetary statistics.

Table A15

**Profitability on a consolidated basis<sup>1</sup>**

	2010	2011	2012	2013	2014	2015	2016	2017
	<i>End of period, EUR million</i>							
Operating income	37,508	37,207	37,673	35,271	28,717	28,064	22,408	22,837
of which: net interest income	20,390	20,426	19,259	18,598	19,345	18,336	14,604	14,526
net fee-based income	7,678	7,592	7,260	7,590	7,741	7,730	6,562	6,886
net profit/loss on financial operations	997	845	1,137	670	426	-50	110	90
other operating income <sup>2</sup>	8,443	8,344	10,016	8,413	1,205	2,048	1,132	1,335
Operating expenses	24,030	26,839	25,582	27,318	19,833	17,612	16,685	14,772
of which: staff costs	9,941	10,279	10,391	10,378	9,543	8,959	8,774	8,416
other administrative expenses	6,262	6,316	6,410	6,628	6,569	6,830	5,818	5,583
Operating profit/loss	13,478	10,369	12,090	7,953	8,884	10,452	5,723	8,065
Net profit after taxes	4,577	711	2,966	-1,035	685	5,244	4,979	6,558
	%							
Return on average assets <sup>3</sup>	0.5	0.1	0.3	-0.0	0.0	0.6	0.6	0.8
Return on average equity (tier 1 capital) <sup>3</sup>	8.2	1.7	5.1	-0.7	0.7	8.8	8.3	10.6
Interest income to gross income	54	54	51	52	67	65	65	63
Cost-to-income ratio	57	66	61	73	69	62	74	64

Source: OeNB.

<sup>1</sup> 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.<sup>2</sup> Since end-2014, other operating income and other operating expenses have been netted under other operating income.<sup>3</sup> 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 A16

**Profitability of Austrian banks' subsidiaries<sup>1,2</sup> in CESEE**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>End of period, EUR million</i>								
Operating income	12,944	13,070	12,685	12,544	12,159	12,261	7,752	7,914
of which: net interest income	9,333	9,290	8,780	8,414	9,068	8,431	5,135	5,304
securities and investment earnings	47	67	66	63	27	49	57	71
fee and commission income	2,954	3,084	2,992	3,164	3,477	3,358	2,184	2,315
trading income	335	521	739	736	-251	642	681	381
other operating income <sup>3</sup>	-202	-141	-321	-374	-831	-528	-344	-157
Operating expenses <sup>3</sup>	6,186	6,325	6,363	6,253	6,413	6,264	4,084	4,216
of which: staff costs	2,870	2,972	2,992	2,922	2,978	2,896	1,956	2,052
Operating profit/loss	6,757	6,744	6,321	6,291	5,746	5,998	3,668	3,698
Net profit after taxes	2,063	1,876	1,999	2,201	672	2,050	2,354	2,627
%								
Return on average assets <sup>4</sup>	0.8	0.7	0.7	0.8	0.2	0.7	1.3	1.3
Return on average equity (tier 1 capital) <sup>4</sup>	9.2	7.2	8.2	8.4	9.9	9.5	14.3	14.3
Interest income to gross income	72	71	69	67	75	69	66	67
Cost-to-income ratio <sup>3</sup>	48	48	50	50	53	51	53	53

Source: OeNB.

<sup>1</sup> 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.<sup>2</sup> 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.<sup>3</sup> Since end-2014, other operating income and other operating expenses have been netted under other operating income.<sup>4</sup> 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 A17

**Solvency**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>End of period, EUR million</i>								
Own funds	86,228	88,071	88,204	88,994	87,584	87,793	80,699	83,157
Total risk exposure	653,313	649,613	621,925	578,425	562,790	537,447	442,870	450,989
<i>End of period, eligible capital and tier 1 capital, respectively, as a percentage of risk-weighted assets</i>								
Consolidated total capital adequacy ratio	13.2	13.6	14.2	15.4	15.6	16.3	18.2	18.4
Consolidated tier 1 capital ratio	10.0	10.3	11.0	11.9	11.8	12.9	14.9	15.4
Consolidated core tier 1 capital ratio (common equity tier 1 as from 2014)	9.4	9.8	10.7	11.6	11.7	12.8	14.8	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	2017
<b>Share prices</b>	<i>% of end-2010 prices, end of period</i>							
Erste Group Bank	100	39	68	72	55	83	81	108
Raiffeisen Bank International	100	49	77	62	32	35	44	77
EURO STOXX Banks	100	62	70	88	84	79	73	81
Uniq	100	64	67	63	53	51	49	60
Vienna Insurance Group	100	79	104	93	95	65	55	66
EURO STOXX Insurance	100	82	109	146	151	175	165	181
<b>Relative valuation: share price-to-book value ratio</b>	<i>%, end of period</i>							
Erste Group Bank	0.92	0.40	0.67	0.88	0.76	1.02	0.92	1.11
Raiffeisen Bank International	0.85	0.40	0.60	0.51	0.48	0.50	0.59	1.00
EURO STOXX Banks	0.67	0.49	0.58	0.81	0.77	0.74	0.71	0.83
Uniq	1.64	1.53	1.05	1.03	0.78	0.74	0.69	0.85
Vienna Insurance Group	1.07	0.95	1.07	1.02	0.98	0.79	0.62	0.71
EURO STOXX Insurance	0.79	0.65	0.75	1.07	0.93	1.02	0.89	1.05

Source: Bloomberg.

Table A19

### Key indicators of Austrian insurance companies

	2010	2011	2012	2013	2014	2015	2016	2017 <sup>1</sup>
<b>Business and profitability</b>	<i>End of period, EUR million</i>							
Premiums	16,652	16,537	16,341	16,608	17,077	17,342	16,920	16,975
Expenses for claims and insurance benefits	11,882	12,826	12,973	13,150	14,157	15,514	14,751	14,727
Underwriting results	373	295	455	592	477	475	560	581
Profit from investments	3,203	2,964	3,391	3,354	3,211	3,216	3,051	2,815
Profit from ordinary activities	1,101	1,162	1,395	1,524	1,421	1,354	1,414	1,244
Acquisition and administrative expenses	3,382	3,541	3,499	3,528	3,573	3,697	3,818	3,728
Total assets	105,099	105,945	108,374	110,391	113,662	114,495	114,707	137,280
<b>Investments</b>								
Total investments	98,300	99,776	103,272	105,496	107,442	107,933	108,897	109,235
of which: debt securities	38,223	37,813	37,614	39,560	41,667	41,517	43,241	44,030
stocks and other equity securities <sup>2</sup>	12,559	12,363	12,505	12,464	12,619	12,522	12,534	11,862
real estate	5,703	5,236	5,371	5,689	5,858	5,912	6,022	6,149
Investments for unit-linked and index-linked life insurance	15,325	15,870	18,330	19,127	20,179	19,776	20,142	20,587
Claims on domestic banks	16,458	16,405	16,872	16,687	15,800	15,492	13,793	10,313
Reinsurance receivables	1,229	1,733	1,933	824	918	971	1,027	1,036
	%							
<b>Risk capacity<sup>2</sup> (median solvency capital requirement)</b>	356	332	350	368	380	375	x	276

Source: FMA, OeNB.

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

Table A20

**Assets held by Austrian mutual funds**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>End of period, EUR million</i>								
Domestic securities	51,001	50,046	50,963	49,757	52,116	52,970	54,382	54,824
of which: debt securities	15,884	16,683	17,527	16,203	15,467	13,609	13,278	11,879
stocks and other equity securities	3,696	2,991	3,637	3,610	3,345	3,530	4,283	4,678
Foreign securities	96,684	87,458	96,854	99,647	110,397	114,833	120,330	128,836
of which: debt securities	61,744	58,695	63,661	62,972	69,642	70,326	69,911	70,353
stocks and other equity securities	15,540	12,097	14,208	16,278	17,910	18,521	20,145	22,924
Net asset value	147,684	137,504	147,817	149,404	162,513	167,802	174,712	183,661
of which: retail funds	88,313	78,299	84,158	83,238	89,163	91,626	94,113	97,095
institutional funds	59,372	59,205	63,659	66,167	73,350	76,177	80,599	86,572
Consolidated net asset value	123,794	116,747	126,831	128,444	138,642	143,249	148,682	156,173

Source: OeNB.

Table A21

**Structure and profitability of Austrian fund management companies**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>End of period, EUR million</i>								
Total assets	699	661	644	670	725	745	691	674
Operating profit	142	125	111	131	158	184	157	177
Net commissions and fees earned	302	284	283	310	368	411	402	407
Administrative expenses <sup>1</sup>	199	195	205	219	246	266	284	267
Number of fund management companies	29	29	29	29	29	29	29	30
Number of reported funds	2,203	2,171	2,168	2,161	2,118	2,077	2,029	2,020

Source: OeNB.

<sup>1</sup> Administrative expenses are calculated as the sum of staff and material expenses.

Table A22

**Assets held by Austrian pension funds**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>End of period, EUR million</i>								
Total assets	14,976	14,798	16,335	17,385	19,011	19,646	20,839	22,323
of which: direct investment	968	1,139	1,139	1,640	1,065	990	835	848
mutual funds	13,944	13,626	15,278	15,745	17,946	18,656	20,004	21,475
foreign currency (without derivatives)	x	x	5,714	5,964	7,578	7,279	9,169	x
stocks	x	x	4,805	5,472	6,250	6,200	6,972	7,867
debt	x	x	8,464	7,650	9,163	9,552	9,521	9,054
real estate	x	x	567	583	576	690	754	1,165
cash and deposits	1,181	1,624	1,488	2,033	1,598	1,850	1,863	2,192

Source: OeNB, FMA.

Table A23

**Assets held by Austrian severance funds**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>End of period, EUR million</i>								
Total direct investment	1,004	1,393	1,442	1,528	1,415	1,565	1,682	1,893
of which: euro-denominated	985	1,363	1,415	1,507	1,299	1,502	1,647	1,847
foreign currency-denominated	19	30	27	21	x	63	35	46
accrued income claims from direct investment	16	19	22	21	15	14	15	13
Total indirect investment	2,569	2,891	3,834	4,701	5,912	6,741	7,745	8,720
of which: total of euro-denominated investment in mutual fund shares	2,379	2,741	3,540	4,220	5,190	5,790	6,743	7,429
total of foreign currency-denominated investment in mutual fund shares	190	151	294	481	722	951	1,002	1,291
Total assets assigned to investment groups	3,573	4,284	5,254	6,218	7,306	8,294	9,412	10,597

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**

	2010	2011	2012	2013	2014	2015	2016	2017
<i>Number of transactions in million, value of transactions in EUR billion</i>								
<b>Large-value payment system (domestic, operated by the OeNB)</b>								
Number	1	1	1	1	1	1	1	1
Value	9,447	7,667	9,974	5,906	7,438	6,381	4,316	3,690
System disturbances	4	1	1	3	0	1	4	0
<b>Securities settlement systems</b>								
Number	2	2	2	2	2	2	2	2
Value	398	439	418	369	377	315	335	701 <sup>1</sup>
System disturbances	0	0	1	5	2	3	3	0
<b>Card payment systems</b>								
Number	583	591	633	673	856 <sup>2</sup>	901	963	1,061
Value	45	45	48	72	91 <sup>2</sup>	97	101	108
System disturbances	25	4	4	2	0	2	4	1
<b>Participation in international payment systems</b>								
Number	31	36	41	53	113	144	166	191
Value	1,164	1,306	1,820	1,643	2,463	2,420	3,029	3,242
System disturbances	0	0	0	0	0	0	0	0

Source: OeNB.

<sup>1</sup> Significant rise in reported values since T2S migration in February 2017.<sup>2</sup> In mid-2014, significant changes were implemented in the reporting of card payment data. On-us ATM transactions have been included since then.