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Stability and Security.

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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.

Contents

Editorial close: May 12, 2020, and June 2, 2020 (COVID-19 special report)

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

Call for applications: Klaus Liebscher Economic Research Scholarship

The Oesterreichische Nationalbank (OeNB) invites applications for the Klaus Liebscher Economic Research Scholarship. This scholarship program gives outstanding researchers the opportunity to contribute their expertise to the research activities of the OeNB's Economic Analysis and Research Department. This contribution will take the form of remunerated consultancy services.

The scholarship program targets Austrian and international experts with a proven research record in economics and finance, and postdoctoral research experience. Applicants need to be in active employment and should be interested in broadening their research experience and expanding their personal research networks. Given the OeNB's strategic research focus on Central, Eastern and Southeastern Europe, the analysis of economic developments in this region will be a key field of research in this context.

The OeNB offers a stimulating and professional research environment in close proximity to the policymaking process. The selected scholarship recipients will be expected to collaborate with the OeNB's research staff on a prespecified topic and are invited to participate actively in the department's internal seminars and other research activities. Their research output may be published in one of the department's publication outlets or as an OeNB Working Paper. As a rule, the consultancy services under the scholarship will be provided over a period of two to three months. As far as possible, an adequate accommodation for the stay in Vienna will be provided.[1]

Applicants must provide the following documents and information:
- a letter of motivation, including an indication of the time period envisaged for the consultancy
- a detailed consultancy proposal
- a description of current research topics and activities
- an academic curriculum vitae
- an up-to-date list of publications (or an extract therefrom)
- the names of two references that the OeNB may contact to obtain further information about the applicant
- evidence of basic income during the term of the scholarship (employment contract with the applicant's home institution)
- written confirmation by the home institution that the provision of consultancy services by the applicant is not in violation of the applicant's employment contract with the home institution

Please e-mail applications to *scholarship@oenb.at* by the end of October 2020.

Applicants will be notified of the jury's decision by end-November.

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[1] *We assume that the coronavirus crisis will have abated by next year. We are also exploring alternative formats to continue research cooperation under the KLERS program for as long as we cannot resume visits due to the pandemic situation.*

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

Management summary

In reaction to the COVID-19 pandemic, we have shortened the reports section of this edition of the Financial Stability Report and included a first assessment of the impact of the crisis on financial stability (from page 39). The reports section focuses on developments in 2019 and early 2020 (depending on data availability), with May 12, 2020, as the cutoff date for data. The cutoff date for the special report on the impact of the COVID-19 crisis was June 2, 2020. More recent news and updates on the COVID-19 crisis are continuously being published on our website (https://www.oenb.at/Publikationen/corona.html).

Austrian banks are resilient against external shocks as they enter the COVID-19 crisis

The pace of the global economy was slowing already in 2019, affecting growth in Austria and Central, Eastern and Southeastern Europe (CESEE), but the COVID-19 outbreak at the beginning of 2020 and the ensuing lockdown measures sent the world economy into a tailspin. Unprecedented monetary, financial and fiscal policy measures launched simultaneously all over the world helped stabilize market sentiment. For instance, the ECB responded to the crisis by adopting a wide-ranging set of measures that will help mitigate the economic and financial fallout of the pandemic. Nevertheless, market volatility remains high and risks to financial stability have been increasing.

During the slowdown in 2019, Austrian corporate profitability weakened, affecting both the resilience and the internal financing of Austrian nonfinancial corporations, whose use of external financing declined slightly as slower investment growth reduced their financing needs. Like previously, the bulk of external financing came in the form of debt. Thus, the debt-to-income ratio – which was still higher than before the onset of the financial crisis in 2008 – rose slightly further. In contrast, the debt-to-income ratio of households was slightly lower than during the financial crisis. The debt servicing capacity of both nonfinancial corporations and households was supported by the current low interest rate environment.

Loans by Austrian MFIs contributed almost half of nonfinancial corporations' external financing in 2019. Lending by Austrian banks to domestic nonfinancial corporations gained impetus due to crisis-related short-term funding needs from March 2020 onward, after having abated somewhat toward the end of 2019 and in the first two months of 2020. Households invested in capital market instruments encountered sizable (unrealized) valuation gains in 2019, but the sharp correction of financial asset prices due to the COVID-19 crisis brought about an erosion of valuations. Given that Austrian households are not heavily invested in the capital market, the recent volatility does not jeopardize financial stability in Austria.

Driven by mortgages and lending to the real estate sector, Austrian banks' annual loan growth accelerated in 2019. However, new housing loans are increasingly showing higher debt service-to-income and debt-to-income ratios, highlighting the importance of banks complying with the guidance on sustainable real estate financing issued by the Austrian Financial Market Stability Board (FMSB).[1]

Austrian banks' profits declined slightly year on year, to EUR 6.7 billion, in 2019, which can be attributed to rising operating and risk costs that offset increases in the main sources of income. However, as cyclically low risk costs appear to have bottomed out, and cost inefficiencies persist, the COVID-19 crisis will weigh on the

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[1] *See https://www.fmsg.at/en/publications/press-releases/2018/17th-meeting.html.*

sustainability of profits. Especially increasing provisioning needs due to deteriorating credit quality will take a toll on banks' profitability in 2020 and beyond.

The Austrian banking sector's common equity tier 1 (CET1) ratio had stood at over 15% before the COVID-19 crisis hit, as significant macroprudential capital buffers had been built up in time. The recently completed IMF Financial Sector Assessment Program (FSAP) also confirmed the resilience of Austria's banking sector, and the IMF-OeNB stress test showed that the sector can withstand severe macrofinancial shocks. Given the supervisors' strong recommendation that banks should be prudent in their profit distribution policies, Austrian banks have enough room for maneuver to continue providing their critical services to the real economy in Austria and in their host markets.

COVID-19 crisis increases financial stability risks

The COVID-19 crisis has led to a massive slump in the global economy, as companies reduced their activities or even closed down production, and consumption plummeted. To support firms' liquidity, a number of policy measures were implemented. In addition, central banks and banking supervisors acted to support banks' capacity of lending to the real economy. However, additional bank lending will increase corporate indebtedness, which could result in a growing number of defaults in the future. Compared to the great financial crisis, Austrian banks were more resilient when the COVID-19 crisis struck and supported lending to the real economy, thus being part of the solution of the current crisis. OeNB scenario analyses show that operating income will decline significantly and credit risk costs will be elevated over the coming years, but banks' strong capitalization can buffer these negative effects. Still, many uncertainties cloud the systemic risk assessment. The biggest strain on financial stability is likely to result from a deterioration in banks' loan quality, especially when payment moratoria and government guarantees expire. Furthermore, the strong V-shaped recovery on capital markets highlights that there is a disconnect between the situation in the real economy and investors' expectations, which may lead to further volatility in asset prices.

Recommendations by the OeNB

The Austrian financial market has weathered the COVID-19 crisis well so far but reduced economic output and a higher debt burden are increasing medium-term risks to financial stability. Alongside persistent challenges from the low interest rate environment, deteriorating credit quality and rising provisioning needs will put downward pressure on banks' profitability. Against this backdrop, the OeNB recommends that banks take the following measures:
- Refrain from and/or postpone share buybacks and consider the distribution of dividends, profits as well as bonuses with particular care[2] in line with national and international recommendations and regulation in order to preserve capital.
- Prepare for the time when public support measures expire and ensure transparency regarding the credit quality of loan portfolios.
- Apply sustainable lending standards in real estate lending, both in Austria and in CESEE, and comply with the quantitative guidance issued by the Financial Market Stability Board.

[2] *In line with the FMA's current information about COVID-19 measures: https://www.fma.gv.at/en/covid-19/.*

- Continue efforts to improve cost efficiency and operational profitability, even under the currently difficult circumstances.
- Develop adequate strategies to deal with the challenges of digitalization, new technologies and cybersecurity, in particular in light of the experience of the COVID-19 crisis, which has highlighted the importance of digital services.

International macroeconomic environment: COVID-19 pandemic sparks severe global downturn

Health crisis triggers a global recession

The global coronavirus outbreak in early 2020 and the ensuing massive containment measures have led to a dramatic fall in global economic activity. Initial hopes that the epidemic could be confined to China and the global economy would only be impacted through trade spillovers were soon dashed. Instead, the virus spread from Asia to Europe and the rest of the world within only a few weeks. Virtually every country had to go into shutdown and introduce social distancing measures to block the transmission of the virus, which had dramatic consequences for the economy: In the first quarter, China recorded the first economic contraction in decades, at –6.8% (year on year) a particularly severe one, and the euro area economy contracted by 3.1%. In the U.S.A., the economy grew by only 0.3% year on year, although the disease had just started to spread at the end of the first quarter.[1]

The IMF expects global real GDP to decline by 4.9% in 2020 – putting global growth almost 8 percentage points below the performance of 2019 –, which is a significantly deeper slump than that seen during the global financial crisis.[2] Under the assumption that the pandemic will be fading and restrictions will be gradually lifted in the second half of 2020, the IMF expects a V-shaped recovery, with global economic growth rebounding sharply to 5.4% in 2021. Depending on the fiscal response, the recovery is unlikely to be completed by the end of the forecast period. Inflation is expected to be subdued given low demand and record low crude oil prices. However, the high level of uncertainty about the course of the COVID-19 pandemic makes economic forecasts extremely difficult.

The crisis is aggravated further by the contracting real economy elevating the risks to financial stability.[3] The sudden interruption of economic activity and the associated uncertainty have led to strong asset price corrections. Investors are fleeing to safe havens, while funds and companies are trying to increase their liquidity buffers, and speculative dynamics can trigger emergency sales. As a result, borrowing costs are increasing, particularly in countries that rely more heavily on capital market financing. This, in turn, has been dampening economic activity even further and exacerbating default risks, while rising unemployment has elevated the risks of household loans. All these factors are affecting especially countries dependent on foreign funding. Sudden and record high capital outflows have raised concerns over currency and debt crises in emerging and developing economies. Over 90 countries are already seeking emergency financial assistance from the IMF, which has secured USD 1 trillion in lending capacity.

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[1] *OECD.Stat Web Browser.*

[2] *IMF. 2020. World Economic Outlook – June 2020 Update.*

[3] *IMF. 2020. Global Financial Stability Report, April.*

Unprecedented monetary, financial and fiscal policy measures applied simultaneously all over the world have helped to stabilize market sentiment. However, volatility and risks remain high. Unlike in 2008, finance is now just a transmitter and amplifier of the crisis, but not a trigger. After the financial crisis, the banking sector was trimmed back and, in advanced economies, it is now better capitalized, but the shadow banking sector is bigger than it was during the great financial crisis. Corporate loans have peaked recently and could pose significant vulnerabilities, particularly in the energy sector, which has also been hit by a concurrent oil price war between OPEC and Russia.

The combined supply and demand shock has led to sharp increases in public debt. First, health expenditure started to increase. Second, automatic stabilizers started to work via increasing expenditure on unemployment and decreasing government revenues. Third, historically unique fiscal packages were launched in order to prevent the collapse of entire economic sectors and to partially compensate for the loss of business and household incomes. In addition to an increase in private debt, these measures also imply a rapid buildup of public debt. In the wake of the pandemic, the question of debt sustainability will need to be addressed again, particularly in the euro area due to the unfinished architecture of Economic and Monetary Union, where several Member States are lacking fiscal space.

The U.S. economy is expected to suffer a dramatic contraction in 2020 despite exceptionally supportive macroeconomic policies. The IMF projects the economy to shrink by 8.0% in 2020 (see chart 1.1), with unemployment rising above 10%, a level that has not been reached for many decades. In 2021, growth is expected to rebound to 4.5%, supported by unprecedented monetary and fiscal policies. The U.S. Federal Reserve (Fed) cut its federal funds

Chart 1.1

IMF forecast (June 2020): GDP growth in 2020 and 2021
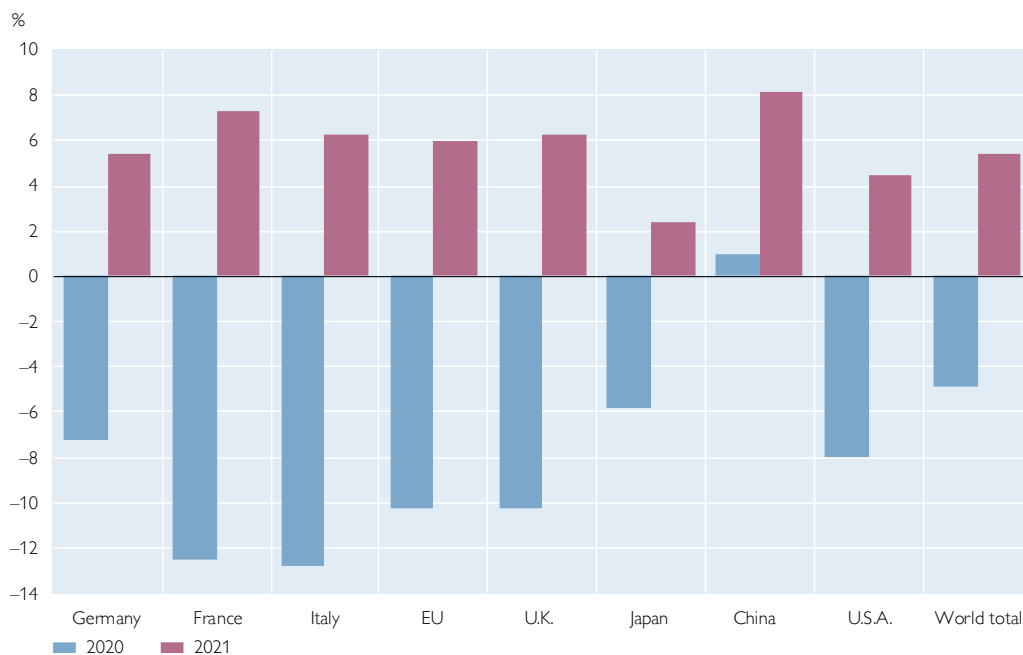
Source: IMF (WEO).

target rate by 150 basis points to a range of 0% to 0.25% and started an unrestricted purchase of Treasury securities and asset-backed securities at a faster pace than during the global financial crisis. Several other unconventional measures have also been taken, including swap lines for other currencies in exchange for U.S. dollars, aimed at providing liquidity, restoring regular market functioning and supporting financing conditions. Meanwhile, the U.S. Treasury launched a fiscal stimulus package worth some USD 2.2 trillion (around 11% of GDP) to ease the effects of the partial shutdown on economic activity. The IMF expects the general government deficit to soar to above 15% of GDP in 2020 and the debt level to increase to over 130% of GDP.

China was the first country hit by the pandemic and saw a sharp contraction of economic activity in the first two months of 2020. The Chinese economy was also first to start to gradually recover; however, this recovery has been dampened by a slump in external demand and a potential renewed trade dispute with the U.S.A. The IMF expects the Chinese economy to still grow by 1.0% in 2020 and to pick up by 8.2% in 2021, but this forecast is subject to great uncertainty.

In Japan, GDP is set to slump in 2020 due to a shock to external demand and lockdown-related demand suppression. The IMF expects GDP to decline by 5.8% and a gradual recovery leading to 2.4% growth in 2021. Despite limited policy space and high uncertainty, the government has adopted a record JPY 117 trillion emergency spending package, and the Bank of Japan has announced unlimited purchases of government bonds and that it would multiply its buying of corporate debt.

The euro area economy is expected to shrink even more dramatically. The Eurosystem forecasts GDP to plummet by 8.7% in 2020 – more than ever before – and to grow by 5.2% and 3.3%, respectively, in 2021 and 2022. Given elevated uncertainty, the forecast is based on specific assumptions about the course of the COVID-19 pandemic and the associated containment measures. The European Commission's spring forecast projects a milder drop in GDP for Austria (–5.5%) and Germany (–6.5%), while Italy (–9.5%), Spain (–9.4%) and France (–8.2%) will be hit harder. The subsequent recovery across countries will depend on various factors, such as tourism and other overproportionally COVID-19-impacted sectors. Fiscal deficits are expected to increase, entailing a further rise in – already high – public debt levels, particularly in Greece and Italy (to roughly 196% and 159% of GDP, respectively, in 2020).

Together, the EU and its Member States have mobilized 3% of EU GDP in fiscal measures and 16% of EU GDP in liquidity support. Against the backdrop of increased divergences between Member States and debt sustainability concerns with regard to potential ramifications for the resilience of Economic and Monetary Union, there have been debates about a coordinated crisis response and solidarity instruments. So far, the European Council has agreed on three safety nets for workers, businesses and Member States, with funds totaling EUR 540 billion. These include temporary support to mitigate unemployment risks in an emergency (SURE), an EIB guarantee fund and a European Stability Mechanism precautionary credit line (ECCL). Furthermore, the European Commission has put forward a proposal for a recovery plan for Europe, funded by the Commission issuing bonds of up to EUR 750 billion, mainly in the period 2020 to

2024. The Commission would then grant and lend proceeds to EU countries to finance their reform and resilience plans in line with the objectives identified in the European Semester, including the green and digital transitions. The repayment of funds raised would start in the next multiannual financial framework and continue for decades, partly via additional EU resources. Negotiations on the proposal with the European Council and the European Parliament are underway.

The ECB has responded to the crisis by adopting a wide-ranging set of measures that help mitigate the economic and financial fallout of the pandemic. In March 2020, the ECB's Governing Council announced a temporary pandemic emergency purchase programme (PEPP). Its initial volume of EUR 750 billion was increased to EUR 1,350 billion in June, and its horizon was extended to mid-2021. This measure came on top of an additional EUR 120 billion envelope under the asset purchase programme (APP). Together, these measures amount to roughly 10% of euro area GDP. Given subdued inflation expectations, the Governing Council left the key interest rates unchanged at 0.0% (main refinancing operations), 0.25% (marginal lending facility) and −0.50% (deposit facility). Its forward guidance on low key interest rates for an extended period of time also remained unchanged depending on its assessment of the outlook for price stability (since September 2019). Furthermore, the ECB is channeling funds directly to banks under stress at an interest rate below its deposit facility rate at −0.75%. In sum, the Eurosystem is making available up to EUR 3 trillion in liquidity through refinancing operations. Moreover, European banking supervisors have also freed up an estimated EUR 120 billion of extra bank capital, allowing banks to operate temporarily below the level of capital defined by the Pillar 2 Guidance and bringing forward the implementation of less stringent Capital Requirements Directive V rules on the composition of Pillar 2 requirements (P2R).

CESEE: deteriorating international environment dented GDP growth in 2019 but banking sector profitability remained solid

The pace of global economic activity remained weak throughout 2019 as the momentum in manufacturing activity had weakened substantially. Rising trade and geopolitical tensions increased uncertainty about the future of the global trading system and international cooperation more generally, taking a toll on business confidence, investment decisions and global trade already in the course of 2019. World trade growth contracted throughout the second half of 2019 and declined to its lowest level since 2009.

External headwinds led to a deceleration of GDP growth in Central, Eastern and Southeastern Europe (CESEE). In the CESEE EU Member States, growth weakened especially in the second half of 2019 as lower international demand fed through to industrial production, investments and exports in many countries. At the same time, private consumption remained broadly robust, fueled by the ongoing momentum in the region's labor markets reflecting strong wage

growth, low unemployment and stable consumer sentiment. Against this back-drop, growth came in at an average 3.7% in 2019, after 4.4% in the previous year.[4]

Russia and Turkey reported lower GDP growth in 2019 than in 2018. In both countries, however, economic activity strengthened in the second half of the year. In Russia, it was especially private consumption that drove the uptick, while the lower oil price and lackluster fixed investment continued to weigh on the economy and kept annual growth at a moderate 1.3% in 2019. Turkey benefited from a positive base effect, recovering from a severe recession in the second half of 2018, and private consumption growth accelerated on the back of a sharp credit expansion. Despite notably higher growth readings at the end of 2019, average annual growth was weak at only 0.9% in 2019, however. Economic activity in Ukraine remained broadly unchanged at 3.2% in 2019. In all CESEE countries, the ensuing coronavirus crisis led to a notable deceleration of economic activity in the first quarter of 2020.

Despite somewhat lower growth rates, inflation has been mostly trending higher in the CESEE EU Member States. Strong economic activity in the past three years, emigration and a lack of skilled workers translated into rising unit labor costs that increasingly impacted on the general price level. In January 2020, average inflation in the CESEE EU Member States rose to 3.7%, the highest level since late 2012. Price pressures, however, abated somewhat in February 2020.

Against this backdrop, the central banks of the Czech Republic, Hungary, Poland and Romania missed their inflation targets in 2019, at least temporarily. The Czech central bank increased its policy rate by 25 basis points in May 2019 and by another 25 basis points to 2.25% in February 2020 to put a hold on this development. The other central banks left their policy rates unchanged until the corona- virus pandemic reached CESEE.

In Turkey, price growth was highly volatile in 2019 and early 2020. Inflation came down from around 25% in late 2018 to a three-year low of 8.6% in October 2019. From November onward, inflation accelerated again, reaching 12.4% in February 2020, owing in part to unfavorable base effects and higher energy prices. The Turkish central bank cut its one-week repo rate, the main policy rate, in three steps from 24% in May 2019 to 14% in October 2019 and then continued to reduce it step by step to 10.75% by the end of February 2020, despite currency depreciation and the uptick in inflation.

Russia and Ukraine were the only countries with a clear downward trend in inflation in recent months. In Russia, price growth declined to 2.3% in February 2020 (from 5.4% a year earlier), well below the central bank's target of 4%. The most important building block of this development was a base effect from a value-added tax increase in January 2019. Other disinflationary factors include a decline in prices of food products and non-food goods. In Ukraine, consumer price inflation fell to 4.1% at end-2019 and thus reached the National Bank of Ukraine's inflation target range of 5% ±1 percentage point. Lower energy

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[4] *For a more thorough overview of recent macroeconomic developments in CESEE and the outlook for the region, see: Developments in selected CESEE countries: Coronavirus overruns the region. In: Focus on European Economic Integration Q2/20. OeNB. 7–49; and Outlook for selected CESEE countries: Economic activity in the CESEE-6 region will take a deep dive in 2020 and then recover hesitantly, Russian economy set to contract in 2020. In: Focus on European Economic Integration Q2/20. OeNB. 50–64.*

Table 1.1

Selected macroeconomic and banking sector indicators for CESEE

		Slovenia	Slovakia	Czech Republic	Poland	Hungary	Bulgaria	Romania	Croatia	Ukraine	Russia	Turkey
		%										
Real GDP growth (year on year)	2018	4.1	4.0	2.8	5.1	5.1	3.1	4.4	2.7	3.4	2.5	2.8
	2019	2.4	2.3	2.6	4.1	4.9	3.4	4.1	2.9	3.2	1.3	0.9
HICP inflation (year on year)	2018	1.9	2.5	2.0	1.2	2.9	2.6	4.1	1.6	11.0	3.0	16.3
	2019	1.7	2.8	2.6	2.1	3.4	2.5	3.9	0.8	7.9	4.6	15.2
Policy rate (end of period)	2018	0.0	0.0	1.8	1.5	0.9	..	2.5	..	18.0	7.8	24.0
	2019	0.0	0.0	2.0	1.5	0.9	..	2.5	..	13.5	6.3	12.0
Growth of credit to the private sector (year on year, end of period)	2018	1.9	8.4	6.8	6.4	9.9	8.3	7.9	2.4	6.5	12.3	1.2
	2019	4.3	6.8	5.0	5.0	12.4	9.4	5.5	3.4	–3.6	10.4	6.4
Share of foreign currency-enominated credit (as a share of total credit to the private sector, end of period)	2018	2.0	0.1	14.1	20.8	24.0	34.9	34.0	54.7	42.9	13.6	41.3
	2019	1.7	0.1	14.5	19.2	23.8	33.2	32.4	51.5	37.0	11.4	38.6
Nonperforming loans (as a share of total credit, end of period)	2018	2.3	3.0	3.1	6.8	2.2	5.1	5.0	9.8	52.9	18.0	4.1
	2019	1.1	2.8	2.4	6.4	2.6	4.2	4.1	5.5	48.4	17.1	5.7
Return on assets	2018	1.4	0.8	1.1	0.7	1.4	1.7	1.6	1.2	0.9	1.5	1.8
	2019	1.5	0.8	1.2	0.7	1.2	1.5	1.4	1.4	3.1	2.2	1.4
Capital adequacy ratio	2018	19.8	18.3	19.6	19.0	19.7	20.4	20.7	23.1	16.2	12.2	16.9
	2019	18.5	18.2	21.3	19.1	16.9	20.2	20.0	23.2	19.7	12.3	18.0

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

prices and declining core inflation (supported by the appreciation of the hryvnia) brought down headline inflation rates.

Against the backdrop of disinflationary developments, both central banks adjusted their policy rates. The Russian central bank cut its key rate in six steps from 7.75% in January 2019 to 6% in late February 2020, citing disinflationary pressures and – in its February move – rising risks of a substantial global economic slowdown. The Ukrainian central bank cut its key police rate in six steps from 18% in April 2019 to 11% in February 2020.

Growth of domestic loans to the private sector was solid and broadly in line with fundamentals throughout most of CESEE, reflecting strong domestic demand in an environment of low interest rates and ample liquidity. On average, however, loan growth (nominal lending to the nonbank private sector adjusted for exchange rate changes) decelerated somewhat in the CESEE EU Member States (to around 5.5% annually at the end of 2019). This was attributable to lower GDP growth rates and regulatory action aimed at putting a brake on loan growth, which had become too swift in certain loan segments, in particular for housing loans. The latter have been fueled by strong housing demand and ever-increasing house prices (+8.9% in 2019). Several CESEE countries introduced macroprudential measures and/or recommendations to slow down these developments. Furthermore, countercyclical capital buffers were activated in Bulgaria, the Czech Republic and Slovakia. Before the coronavirus crisis hit

the region, those buffers stood at 1%, 1.75% and 1,5% respectively, at the end of February 2020.

In Russia, loan growth was among the highest of the region despite sluggish economic activity and a relatively high nonperforming loans (NPL) ratio. Retail lending (as opposed to corporate lending) continued to expand swiftly (+18.5% in December 2019). That said, the spike of the retail lending expansion – notably that of unsecured consumer loans – has passed, thanks to the central bank's prudential tightening measures and the easing of loan demand on the back of unstable household income growth.

After a trough in mid-2019, accelerating consumer loan growth substantially heated up general credit dynamics in Turkey. Loans to households expanded strongly on the back of easing credit standards, falling interest rates and recovering domestic demand. The growth of loans to corporations recovered as well but remained on a much lower level.

Ukraine was the only country in the region that reported a clear deceleration of loan growth amid strongly contracting lending to corporations. The decline was driven by banks' efforts to resolve bad debt (through write-offs, repayments and restructuring) and by a statistical effect related to the exclusion of data from banks that were undergoing liquidation. Lending activities also continued to be hampered by the large share of NPLs and outstanding issues concerning the protection of creditor rights.

NPLs continued their downward trend also in 2019 and returned to levels seen up to 2008 throughout most of the region. In Slovakia and Slovenia, NPL ratios even reached historical lows. A notable increase in NPLs was reported only for Turkey, reflecting the financial difficulties associated with the 2018 financial turbulences faced by indebted companies, particularly those with debt in foreign currency (FX).

The reduction of NPL ratios was accompanied by a further decrease in FX loans. This is especially true for loans to households, whose share in total loans is already close to zero in the Czech Republic, Hungary, Russia, Slovakia and Slovenia. In the other countries, the average share of FX loans in total loans declined from around 24% in late 2018 to 19.4% at the end of 2019.

It needs to be noted, however, that the FX share in loans to corporates remains notably higher and is trending down only slowly. At the end of 2019, such loans on average accounted for 32.2% of total loans, down only 1 percentage point from the previous year. FX loans to corporates have received more attention from policymakers recently.[5] In October 2019, the IMF intensified its warnings on high levels of corporate debt in emerging markets, as the search for yield in a prolonged low interest rate environment has led to stretched valuations in risky asset markets, raising the possibility of sharp, sudden adjustments in financial conditions. The sharp depreciation of the Turkish lira in 2018 illustrated potential risks.

Robust loan growth and improving asset quality have contributed to sound banking sector profitability in most of the CESEE region. Compared to 2018, the average return on assets (RoA) in the CESEE EU Member

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[5] It needs to be noted that corporates are usually hedged to a certain extent against exchange rate swings, as part of their (export) income is denominated in foreign currency.

States remained unchanged at 1.2% at end-2019. Profitability has hovered around this level for the past four years and came close to the figures observed in the boom period prior to the great financial crisis. The Ukrainian banking sector continued to recover from a long period of losses and reported a record high RoA of 3.2% at the end of 2019. This positive development reflected a decline of provisioning to the lowest level since 2007 after the nationalization of Privatbank in December 2016. Furthermore, strong operational profitability driven by a high net interest margin positively impacted on annual results. In Russia, profitability increased on the back of a release of provisions and profitable retail loan expansion. The banking sector's RoA climbed from 1.5% in 2018 to 2.2% in 2019.

The profitability of Turkish banks declined in the review period and reached a long-term low, with the RoA standing at 1.4%. This primarily reflected higher provisioning needs for NPLs, while net interest income and other noninterest income (especially from derivative transactions) also weighed on profitability.

Capital adequacy ratios have remained mostly solid, ranging between 16.9% in Hungary and 23.1% in Croatia in the CESEE EU Member States at the end of 2019. A notable decrease in capitalization was only observed in Hungary as risk-weighted asset outgrew regulatory capital. Capital adequacy ratios in Turkey and Ukraine were at a level comparable to that seen in the EU Member States. In Ukraine, a clear upward trend in capitalization was reported as profitability shot up, while capitalization was markedly below CESEE regional averages only in Russia (at 12.3%).

Corporate and household sectors in Austria: mounting vulnerabilities in the wake of the crisis

Austrian nonfinancial corporations' profits stalled in 2019

The Austrian economy was already slowing when COVID-19 hit. In a weakening international environment, economic growth in Austria had decelerated in 2019, with the decline being most pronounced in the export-oriented sectors of the economy. Against this backdrop, nonfinancial corporations became increasingly cautious about their investments. The measures to contain the spread of COVID-19 heavily affected the economy, leading to a sudden interruption of activity in large parts of the economy and throwing the Austrian economy into a severe recession. As a result, vulnerabilities in the corporate sector have increased considerably.

Amidst the slowdown of economic growth, corporate profitability weakened in 2019. In the final quarter, the gross operating surplus[1] of Austrian nonfinancial corporations decreased by 1.4% year on year in real terms (based on four-quarter moving sums), the first drop in six years. Profitability had already been on a downward trend for the past two years. In the fourth quarter of 2019, the gross profit ratio amounted to 41.2%, down 1.3 percentage points against one year earlier. Profitability had not yet returned to the levels seen before the global financial crisis. The slowdown in operating income also affected internal financing, the most important source of funds for Austrian nonfinancial corporations. Measured as the sum of changes in net worth and depreciation, internal financing remained virtually unchanged in 2019 against the high levels registered in the three previous years, amounting to EUR 57.7 billion.

Nonfinancial corporations' use of external financing declined slightly in 2019. Slower investment growth reduced the financing needs of corporations. According to preliminary financial accounts data, external financing was 1.8% below the value for 2018 (which in turn had fallen by more than one-quarter against the year before), amounting to EUR 18.4 billion. Equity financing, which had been slightly negative in 2018, remained low in 2019, providing only 10% of external financing, about one-quarter of which were listed stocks.

The bulk of external financing came in the form of debt, which, however, was EUR 3.1 billion or 16% lower in 2019 compared with 2018. Debt financing was mainly long-term (with maturities over one year), while short-term funding decreased. Almost all net debt flows came from

Chart 2.1

Gross operating surplus of Austrian nonfinancial corporations[1]

Annual change in %, real (left-hand scale)

% of gross value added (profit ratio) (right-hand scale)

Source: Statistics Austria.

[1] *Four-quarter moving sums.*

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[1] *Gross operating surplus and mixed income (self-employed and other nonincorporated businesses income).*

domestic sources, with the financial sector and other nonfinancial corporations accounting for roughly one-half each. Within debt financing from other nonfinancial corporations, trade credit continued to play a prominent role. Yet, trade credit, which typically moves in tandem with overall economic activity, fell by more than one-third against 2018 (including cross-border flows). In contrast, loans from other enterprises, which largely reflect transactions within corporate groups, increased slightly. Net debt flows from the domestic financial sector were attributable to monetary financial institutions (MFIs).

Loans by Austrian MFIs contributed almost half of nonfinancial corporations' external financing in 2019. After abating somewhat toward the end of 2019 and in the first two months of 2020, lending by Austrian banks to domestic nonfinancial corporations gained impetus due to crisis-related short-term funding needs. In March 2020, its annual growth rate (adjusted for securitization as well as for reclassifications, valuation changes and exchange rate effects) reached 6.4% in nominal terms against 5.4% in the month before (see left-hand panel of chart 2.2). Still, this was noticeably below the 7.2% recorded one year earlier as well as below the loan growth rates recorded in the run-up to the financial crisis.[2]

Before the crisis struck, loan growth had been driven mostly by long-term loans. On the one hand, long-term loans are most relevant for business fixed capital investment. On the other hand, this at least in part reflects the industry structure of the portfolio of loans to nonfinancial corporations. Real estate-related industries (construction and real estate activities) remained the main driver of MFI lending to the corporate sector, accounting for 60% of total loan expansion in 2019 (adjusted for reclassifications and valuation changes but not for exchange rate effects). Loans to these industries – in particular to real estate activities, which account for 75% of outstanding loans – are predominantly long-term. In contrast, in industries such as manufacturing and trade, where loan growth had been much lower or even negative, less than half of the outstanding loan volume is long-term. In March 2020, however, the largest part of loan growth was attributable to short-term lending, reflecting current funding requirements.

Corporate loan demand surged in the first quarter of 2020. According to the Austrian results of the euro area bank lending survey (BLS), loan demand was particularly high for short-term loans, reflecting emergency financing needs for inventories and working capital due to the COVID-19 crisis, as well as for debt refinancing, restructuring and renegotiation. For the second quarter of 2020, banks expected net demand for loans to increase further. At the same time, Austrian banks said that they had tightened their credit standards only slightly in the first quarter of 2020, which might also be the result of the policy measures taken by the Eurosystem immediately after the outbreak of the COVID-19 crisis and the higher resilience of the Austrian banking sector. The share of rejected applications for loans to enterprises remained stable in the first quarter of 2020, after having increased in the three previous years.

Before the onset of the crisis, nonfinancial corporations continued to have substantial liquidity at their disposal. Credit lines granted by banks

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[2] At the cutoff date, financial accounts data were available up to the fourth quarter of 2019. More recent developments of financing flows are discussed based on data from the MFI balance sheet statistics.

continued to increase up to the first quarter of 2020, rising by 5.9% year on year in March 2020. As firms utilized only a part, undrawn credit lines available to enterprises increased in the second half of 2019 and the first quarter of this year, rising by 5.0% year on year in March 2020. Moreover, firms' transferable deposits continued to rise (by 6.5% in March 2020). In real terms, transferable deposits were twice as high as before the onset of the financial crisis in 2008. These liquidity buffers provided corporates with some resilience against temporary funding stress even if they may have been insufficient in many cases. Responding to firms' immediate liquidity needs, the government stepped in with loan guarantee schemes to support Austrian small and medium-sized enterprises.

Credit conditions were tightened following the outbreak of the COVID-19 crisis. Bank lending rates remained low until February 2020. In March 2020, however, interest rates on new loans to nonfinancial corporations rose on average by almost ¼ percentage point against the month before, probably reflecting higher risk premiums. In the BLS, banks replied that interest margins widened in the first quarter of 2020, both on average loans to nonfinancial corporations and – to a larger extent – on riskier loans to firms. Other terms and conditions, such as collateral requirements and loan covenants, were left unchanged overall, according to the survey.

The debt sustainability of Austrian nonfinancial corporations deteriorated slightly in 2019. In the course of the year, the debt-to-income ratio of the corporate sector increased by 6 percentage points to 396% (see left-hand panel of chart 2.3), as the growth of financial debt (measured in terms of total loans raised and bonds issued), despite being rather low at 1.8%, surpassed the expansion rate of gross operating surplus. Compared to 2008, i.e. the time before the onset of the financial crisis, the debt-to-income ratio of nonfinancial corporations was about 50 percentage points higher, pointing to comparatively weaker medium-term corporate debt sustainability.

Chart 2.2

MFI loans to Austrian nonfinancial corporations and households (2007–2020)

Loans to nonfinancial corporations

Annual change in %

Loans to households

Annual change in %

Source: OeNB.

The debt servicing capacity of the corporate sector was supported by the low interest rate environment. The interest burden of nonfinancial corporations remained at historically low levels in 2019. The ratio of interest payments for (domestic) bank loans to gross operating surplus remained unchanged in 2019, at less than 3%, compared to more than 9% in 2008 (see middle panel of chart 2.3). While declining interest rates reduced the interest service burden on both outstanding variable rate loans and new debt, the buoyant increase of loan volumes as well as the shift toward long-term loans – which still have slightly higher interest rates than short-term loans – caused interest expenses to rise. The share of variable rate loans in new euro-denominated loans, which had declined in the years before, rebounded, climbing by 3.7 percentage points to 84.7% in the final quarter of 2019.

The number of insolvencies declined by 9% in the first quarter of 2020. However, according to the creditor protection agency KSV 1870, this reduction was mainly due to the last two weeks in March, which brought about a 50% drop in insolvencies resulting from the temporary suspension of the obligation for corporations to file for bankruptcy in the event of overindebtedness. Looking ahead, insolvencies are expected to rise significantly, in the majority of cases caused by liquidity problems, but overindebtedness will also be a factor as the ability to refinance critically depends on a company's equity position.

Household loans in Austria continued to grow

Households' financial investments rose by 12% to EUR 15.6 billion in 2019. The increase in financial investments was mainly attributable to net investments in capital market instruments, which increased from EUR 0.4 billion in 2018 to EUR 2.5 billion in 2019. Households continued to transfer funds to mutual funds and also invested in listed stocks, while direct holdings of debt securities were reduced. For all three asset categories, households experienced (unrealized) valuation gains of EUR 10.5 billion in 2019, equivalent to 9.7% of the amount outstanding at the end of the year before. However, the sharp correction of financial asset prices in the wake of the COVID-19 crisis brought about a heavy erosion of valuations from March 2020 onward. Yet, capital market investments in general and stocks in particular are very much concentrated in the portfolios of households with higher income, as the results of the Household Finance and Consumption Survey (HFCS) for Austria show.

In the low nominal interest rate environment, households continued to prefer liquid assets. Households put about EUR 13.7 billion – equivalent to almost 90% of total financial investments – into overnight deposits with domestic banks. Net investments in (both life and non-life) insurance remained negative in 2019, while net investments in pension entitlements (including both claims on pension funds and direct pension benefits granted by private employers) as well as investments in severance funds remained broadly stable.

Bank lending to households maintained its momentum up to the first quarter of 2020. In March 2020, bank loans to households (adjusted for reclassifications, valuation changes and exchange rate effects) rose by 4.3% year on year in nominal terms (see right-hand panel of chart 2.2). Reflecting the decrease in consumption of durables in 2019, consumer loans were down 1.0% year on year. Other loans, which include loans to sole proprietors and unincorporated
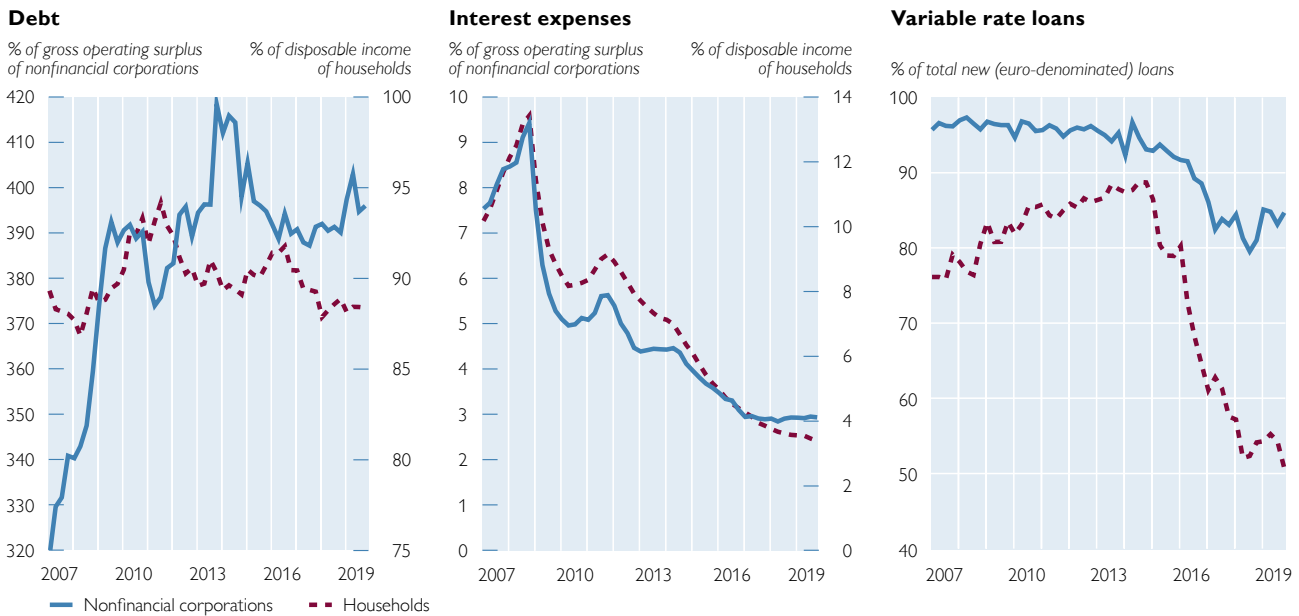
enterprises, rose by 1.5%. The main contribution to loan growth came from hous-ing loans, not only because the latter are the most important loan category for households – accounting for more than two-thirds of the total outstanding volume – but also because they registered the highest growth rate of all loan purpose types, reaching 6.0% year on year in March 2020. The vivid expansion of housing loans in 2019 reflected, among other things, the growth in the number and the volume of real estate market transactions. The transaction volume increased by 7.8% to EUR 34.4 billion in 2019, according to data compiled by REMAX. According to the BLS, Austrian banks reported an even stronger increase in house-hold demand for housing loans in the first quarter of 2020 than in 2019. At the same time, banks left their credit standards for housing loans unchanged.

The conditions for housing loans remained favorable. Interest rates for new housing loans from banks fell further in 2019 and in the first two months of 2020 but increased by 4 basis points in March 2020. As to interest margins, banks replied in the BLS that margins on average housing loans were stable in the first quarter of 2020, after having been lowered continuously in the past three years, whereas margins on riskier loans were tightened somewhat.

Aggregate credit risk indicators of the household sector remained broadly stable in 2019. Total gross liabilities of the household sector grew by 3.3% in nominal terms in 2019, somewhat more slowly than net disposable income, resulting in a slight decrease of the debt-to-income ratio to 88.4%, which was slightly higher than in 2008 and about 6 percentage points lower than at the height of the global financial crisis (see left-hand panel of chart 2.3). While households entered the COVID-19 crisis with some resilience regarding their incomes thanks to solid wage growth up to the onset of the crisis, the ensuing shock has severely affected incomes and triggered a stark increase in unemployment, strongly impairing household resilience.

Low interest rates have reduced debt servicing costs. Households' interest expenses on outstanding bank loans equaled 1.5% of aggregate disposable income in the fourth quarter of 2019, more than 2 percentage points less than in 2008. A further mitigating – albeit only short-term – effect should come from the loan repayment moratorium that borrowers can request for payments until mid-2020 if their ability to repay has been adversely affected by the COVID-19 crisis. Although the share of loans with an initial rate fixation period of up to one year declined further, more than half of all new loans (50.7%) extended to house-holds in the fourth quarter of 2019 were variable rate loans. However, regardless of this recent decline, the share of variable rate loans is still quite high compared to the euro area average. Also, FX loans (which are mostly variable rate loans) decreased further in 2019 – to 8% of all outstanding loans (and about 10% for housing loans) – but remain risky.

Chart 2.3

Risk indicators for Austrian nonfinancial corporations and households

Debt

% of gross operating surplus of nonfinancial corporations

% of disposable income of households

Interest expenses

% of gross operating surplus of nonfinancial corporations

% of disposable income of households

Variable rate loans

% of total new (euro-denominated) loans

— Nonfinancial corporations   ▪ ▪ Households

Source: OeNB, Statistics Austria.

Residential property prices in Austria continued to rise up to the outbreak of the crisis. In the first quarter of 2020, prices were 3.4% higher than one year earlier. The OeNB fundamentals indicator for residential property prices reached 12.3% in the fourth quarter of 2019, implying that the overvaluation observed in recent years abated slightly in 2019.

Austrian financial intermediaries: banks' profits remained high, but low interest rates challenged the life insurance sector in 2019

Austrian banks performed well in 2019

Consolidation in the banking sector continued

The Austrian banking sector increased in size in 2019, while the number of banks continued to decline. The consolidated total assets of the Austrian banking sector jumped over the EUR 1,000 billion mark in 2019 for the first time since 2016. At the same time, the number of banks dropped further to 573. This corresponds to a reduction of 24 head offices over the last twelve months. The number of bank branches in Austria declined to 3,521, down 3% compared to the previous year. Since 2008, the reduction in the number of banks (minus one-third) and the number of branches (minus one-fifth) has been significant. While the consolidation continued in the domestic market, Austrian banks further expanded their network of foreign branches, especially in Germany, where nearly half of all 229 foreign branches are located.

Foreign claims of Austrian banks continued to climb in 2019, reaching EUR 401 billion at the end of 2019 (on an ultimate-risk basis). This corresponds to an increase of 7% compared to the previous year and 43% of consolidated total assets. The strongest increases in absolute terms were recorded in Spain, Russia, Slovakia and the Czech Republic, while exposure reductions took place for example in Turkey and Liechtenstein.

Low interest rates, increasing competition from online banks and the varying speed of adaptation to new business models are shaping the Austrian banking sector. Cooperative banks increased their market share by 2% over the past few years, while joint stock banks and building societies lost shares in terms of total assets.[1] Online banks also improved their market position.

Austria banks' profits declined slightly in 2019

The Austrian banking sector earned a net profit of EUR 6.7 billion in 2019. This translates into a decline of 3% compared to 2018 and a return on average assets (RoA) of 0.7%, which was substantially higher than the average RoA for the EU banking sector (0.4%).

The slight decline in profits can be attributed to rising operating and risk costs, which outweighed increases in the main sources of income. As chart 3.1 shows, net interest income, which makes up more than 60% of total operating income, rose by 2% in 2019, although the net interest margin slightly declined (to 1.5%). Fees and commissions income – accounting for nearly 30% of total operating income – rose by 2%. Given that trading losses were reduced and other operating income rose by 6%, total operating income increased by 4% to EUR 25 billion. However, operating costs grew much quicker: Their 7% rise was caused not so much by an increase in staff and administrative expenses,

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[1] The OeNB monitors seven banking subsectors in its analysis. These reflect the multitier structure of the banking sector, based on different business models, legal forms and ownership structures. Given their similar business models, Raiffeisen and Volksbanken are included in a single cooperative sector.

Chart 3.1

Consolidated profit and loss statement of the Austrian banking sector

EUR billion
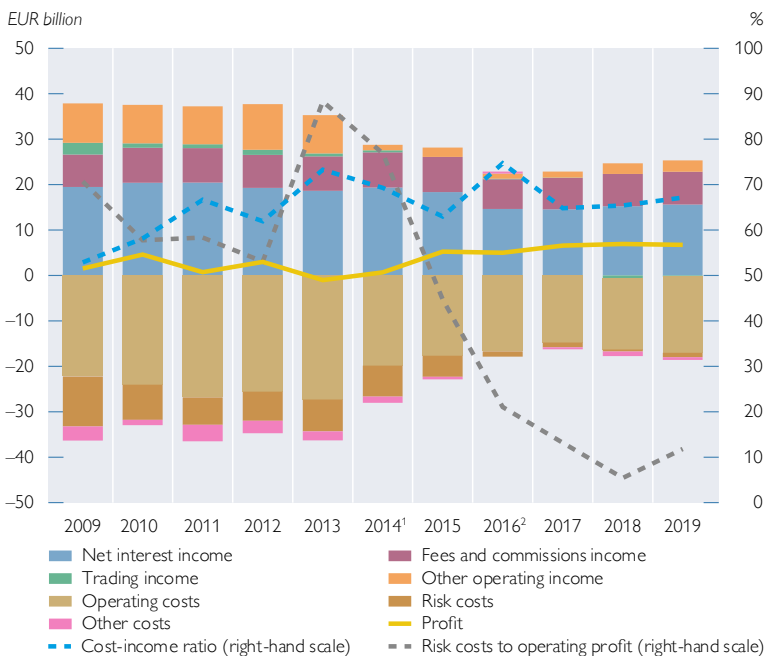
Source: OeNB.

[1] Since 2014, other operating income and other operating costs have been netted.
[2] In 2016, UniCredit Bank Austria's subsidiaries in CESEE were transferred to their Italian parent institution.

which only rose by 1%, but by significant other operating costs, such as the impairment of equity investments and tangible assets. Consequently, the cost-income ratio deteriorated from an already elevated 65% in 2018 to 67% in 2019. Operating profits declined to EUR 8.3 billion (–1% year on year). Since risk costs more than doubled (to EUR 1.0 billion), profits declined by 3% and reached EUR 6.7 billion in 2019.

Low risk costs in a benign macroeconomic environment supported rising profits over the past few years, but this trend seems to have abated. As Austrian banks' cost efficiency remains low and their risk costs appear to have bottomed out, the COVID-19 crisis will be challenging the sustainability of banks' profitability in 2020 and beyond. Much will depend on their ability to lend at risk-adequate margins, while keeping costs under control. Structural issues, which so far have been masked by cyclically low risk costs, will need to be addressed to ensure that banks have enough room for maneuver to continue providing their critical services to the real economy in Austria and their host markets.

Austrian banking subsidiaries in CESEE earned EUR 2.8 billion in 2019, slightly less than in 2018. Their net interest income, which represents the cornerstone of their business model, rose strongly, by 7% year on year, propelled by a rapid expansion of loans to nonbanks (+10% year on year) and a stable net interest margin (2.7%). Since fees and commissions income also increased by 7%, operating income also rose by 7% in 2019. Operating profits, however, were up by only 5%, as operating costs climbed by 8%. This increase was driven by higher staff costs, but in particular by impairments that rose by half (general administrative expenses were flat). As provisioning more than doubled to nearly EUR 0.5 billion,[2] profits declined by 3% to EUR 2.8 billion.

All major Austrian banking host markets in CESEE were profitable in 2019. The Czech Republic has been the most significant profit hub for Austrian banking subsidiaries since the beginning of this decade (except for 2013) and in 2019 contributed one-third to Austrian banking subsidiaries' total profits in CESEE. Austrian banks' subsidiaries in the Czech Republic and Russia together

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[2] This includes provisioning of EUR 153 million for losses expected from a decision of the Romanian High Court in relation to the business activities of a Romanian building society subsidiary (see Erste Group's Annual Report 2019 for further details).

accounted for half of all profits earned in CESEE that year. Also in the Czech Republic, profits increased markedly (+17% year on year), whereas Romania saw a sharp drop in profits (−66%, see also footnote 9).

Over the past decade, the deterioration in operating profitability in CESEE was masked by a very benign economic environment. As chart 3.2 illustrates, the net interest margin of Austrian banking subsidiaries declined from 3.3% in 2009 to 2.7% in 2019. When taking other income into account, the operating income margin fell from 5.0% to 3.9%. Since the changes in the impact of operating costs and other costs on the RoA cancel each other out, the near doubling in Austrian banking subsidiaries' RoA from 0.7% in 2009 to 1.3% in 2019 was due to a substantial reduction in credit risk provisioning. While these risk costs equaled 1.8% of average total assets in 2009, they only had a marginal

Chart 3.2

Austrian banks' subsidiaries in CESEE: return on assets (RoA) and its components (2009 versus 2019)

% of average total assets

■ Operating income 2019   ■ Costs 2019
■ RoA 2019   — 2009

Source: OeNB.

impact on profitability in 2019 (−0.1%). As the benign period of extremely low risk costs is likely to have come to an end with the COVID-19 crisis, banks' profitability in CESEE is likely to face substantial downward pressures.

Loan growth was high and loan quality improved in 2019

Lending to nonfinancial corporations – especially the real estate sector – and mortgage loans were driving loan growth in Austria in 2019, with the former gaining further momentum in 2020. Loan growth in Austria continued to be strong in 2019, with the annual growth of loans to domestic nonfinancial corporations remaining above 6% and the construction, real estate and housing sectors accounting for almost 60% of domestic corporate loan growth. Especially savings banks and cooperative banks recorded above-average loan growth rates in this segment. The growth of loans to households accelerated to more than 4% due to increasing volumes of mortgage loans (+5.7%). Unlike in many other European countries, consumer loans stagnated (+0.6%). In the first three months of 2020, lending by Austrian banks to domestic nonfinancial corporations gained further impetus due to crisis-related short-term funding needs, and lending to households maintained its momentum.[3]

Loan quality at Austrian banks improved further in 2019, as NPLs were reduced and loan volumes grew. As Austrian banks continued to profit from a still positive macroeconomic environment, the NPL ratios in both the

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[3] See also the section "Corporate and household sectors in Austria: mounting vulnerabilities in the wake of the crisis."

Chart 3.3

NPL ratios of Austrian banks

%, end of period

- Loans to domestic households
- Loans to domestic nonfinancial corporations
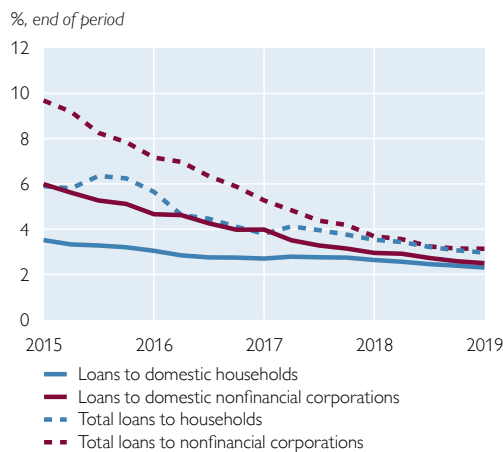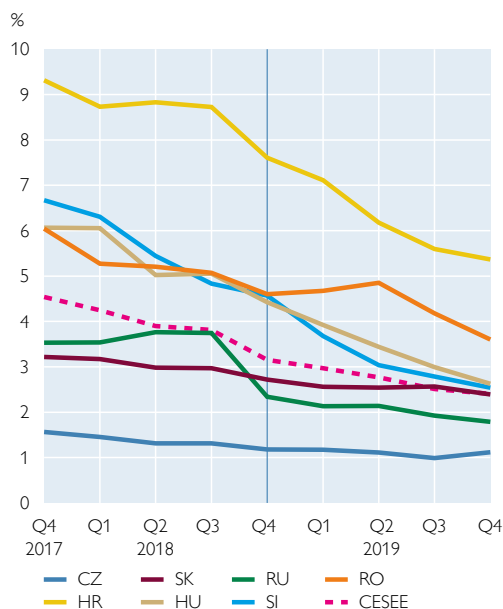- Total loans to households
- Total loans to nonfinancial corporations

Source: OeNB.

Chart 3.4

**NPL ratios of Austrian banks'
subsidiaries in selected CESEE
countries**

%

- CZ
- SK
- RU
- RO
- HR
- HU
- SI
- CESEE

Source: OeNB.

domestic and the foreign business continued their downward trend. The quality of the loan portfolio in Austria improved on a broad basis in 2019: The NPL ratio of loans to households and to nonfinancial corporations improved to 2.3% and 2.5%, respectively. The consolidated figures, which include cross-border business and activities of foreign subsidiaries, were approximately 65 basis points higher in both cases. Two-thirds of the improvement in the domestic and the consolidated NPL ratios came from a reduction in NPLs, while the remainder was due to loan growth.

Coverage ratios continue to be comfortable, despite modest provisioning in 2019. Besides low NPL ratios, Austrian banks also displayed comfortable coverage ratios, as more than 60% of all domestic NPLs are covered by provisions. However, due to modest provisioning in 2019, this ratio fell slightly compared to the previous year-end.

Loan quality at Austrian banking subsidiaries in CESEE continued to improve in 2019, but heterogeneity at the country level remains. In 2019, the overall NPL ratio of Austrian banking subsidiaries in CESEE dropped from 3.2% to 2.4%. Improvements were evident in all countries but strongest in Croatia and Slovenia, where progress was mainly due to NPL portfolio sales and positive market developments. Notwithstanding these improvements, loan quality remains very heterogenous across CESEE host countries. The NPL ratio continued to be very low, for instance, in the

Czech Republic (1.1%), but was still elevated – albeit improving – in Croatia and Romania (5.4% and 3.6%, respectively). On a positive note, the already healthy NPL coverage ratio of Austrian banking subsidiaries in CESEE increased to 67% in 2019, up from 64% at the end of 2018.[4]

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[4] *Defined as the ratio of risk provisions for NPLs to total gross NPLs.*
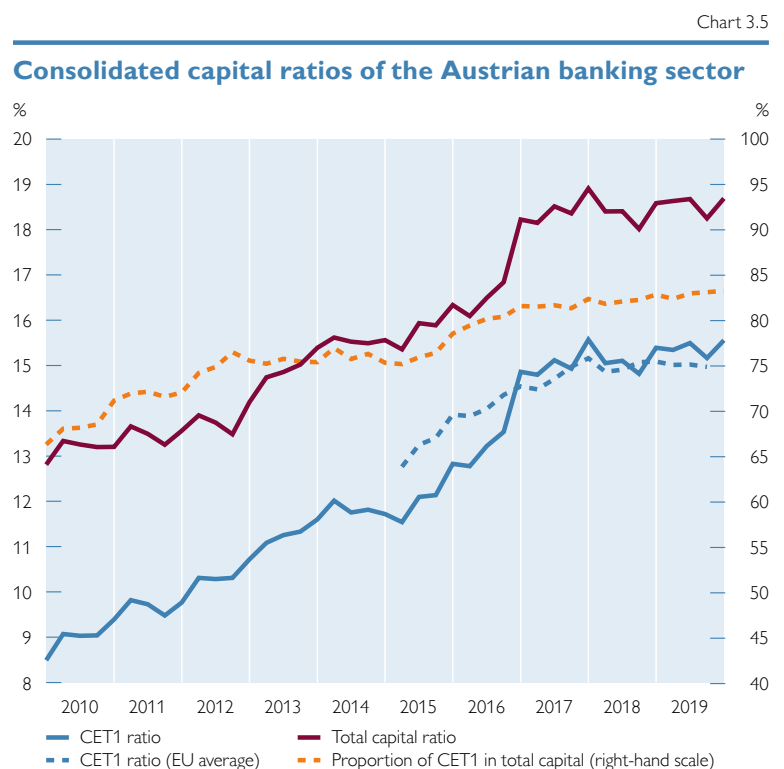
The quality of FX loans at Austrian banking subsidiaries in CESEE has improved significantly but continues to be weaker than the quality of local currency loans.[5] In 2019, the NPL ratio of FX loans dropped by 1.6 percentage points to 4.9%. The strongest decrease was observed for U.S. dollar-denominated loans, whose NPL ratio came down from 5.7% to 3.2%. Nonetheless, FX loans continue to be of weaker credit quality than local currency loans, whose NPL ratio was 3%.

Despite these positive developments, the improvement in loan quality at Austrian banks lost momentum in 2019, and the coming years will be challenging, as the COVID-19 crisis will be taking its toll. Even though massive fiscal measures, such as loan guarantees and support for short-time work, as well as loan repayment moratoria will be temporarily cushioning the worst effects of the COVID-19 crisis on borrowers' ability to pay, a deterioration of loan quality and rising provisioning needs are likely to put downward pressure on banks' profitability over the medium term, especially when support measures expire. Therefore, it remains paramount that banks monitor the credit quality of their portfolios and proactively detect potential signs of borrowers becoming unlikely to pay.

Austrian banks' capitalization rose only slightly in 2019

Austrian banks' common equity tier 1 (CET1) ratio reached 15.6 % at the end of 2019. This level represents a slight increase of 17 basis points year on year, but overall, it is fairly similar to the levels witnessed over the last two years and in line with developments in the EU banking sector (see chart 3.5). However, Austrian banks improved the quality of their capital, as the proportion of the highest quality capital (CET1) in total capital rose from two-thirds in 2009 to more than 80% by the end of 2019. The Austrian banking sector's leverage ratio (on a fully phased-in basis) stood at 7.6 % at end-2019, virtually unchanged from 2018.

When it comes to changes in CET1 capital and risk-weighted assets (RWAs), the past decade can be divided into two distinct periods. Until 2016, the RWAs in the Austrian banking system dropped substantially, while at the same time, banks

Chart 3.5

Consolidated capital ratios of the Austrian banking sector

Source: OeNB, ECB.

Note: The large jump in Q4 2016 was a one-off effect due to restructurings at UniCredit Bank Austria.

[5] Loans to households and nonfinancial corporates.

Chart 3.6

Loan-to-deposit ratio of Austrian banks' subsidiaries in CESEE

EUR billion   %

- ■ Loans to nonbanks (after provisioning)
- ■ Deposits by nonbanks
- ― Loan-to-deposit ratio (right-hand scale)
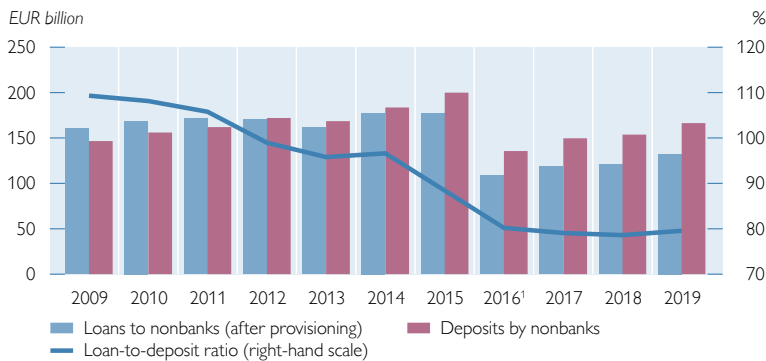
Source: OeNB.

Note: All data as of year-end.

[1] From 2016: excluding the subsidiaries of UniCredit Bank Austria.

were building up CET1. From 2017 onward, however, the buildup of capital went hand in hand with the expansion of RWAs,[6] with the CET1 ratio stabilizing around its current level. After several years of rising capitalization in the wake of the global financial crisis, the new trend points toward a sideways movement.

The funding structure of large Austrian banks' subsidiaries in CESEE remained sustainable in 2019. In line with the Austrian supervisory guidance on strengthening the sustainability of the business models of large internationally active Austrian banks ("Sustainability Package") adopted in 2012, the OeNB monitors the stock and flow loan-to-local stable funding ratios of Austria's largest banks' foreign subsidiaries.[7] As of end-2019, all 23 monitored subsidiaries of Erste Group Bank and Raiffeisen Bank International had a sustainable local refinancing structure, which will support financial stability during the COVID-19 crisis. The aggregate loan-to-deposit ratio of all Austrian banking subsidiaries in CESEE (see chart 3.6) reflects a similarly positive picture. Over the past decade, it declined from 109% at the end of 2009 to 80% by the end of 2016, where it remained until the end of 2019.

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[6] *Between end-2016 and end-2019, consolidated RWAs rose by 10%. This was caused by total assets rising by 9% over the same time period, as total loans (including leasing) expanded by 15%.*

[7] *For further details, see https://www.oenb.at/en/financial-market/financial-stability/sustainability-of-large-austrian-banks-business-models.html.*

Box 1

Key results of the IMF Financial Sector Assessment Program (FSAP) confirm risk resilience of Austria's banking sector

In 2019, the International Monetary Fund (IMF) conducted an in-depth analysis of the Austrian financial sector.[8] *It focused on key risks to macrofinancial stability, the legal and regulatory framework for financial stability, resources of national institutions to cope with a financial crisis as well as improvements in anti-money laundering and anti-terrorism financing (AML/CFT). In essence, Austria was given an excellent report as regards the stability of its financial system as well as the supervisory structure and measures in place.*[9]

According to the IMF-OeNB stress test, the Austrian banking sector is resilient to severe macrofinancial shocks, as banks have built up sizable capital buffers. Nonetheless, from a macroprudential perspective, structural systemic risks continue to exist due to the large size of the banking system and its complex ownership structures, high interconnectedness and some banks' strong reliance on profits from their subsidiaries in CESEE.

Austria's macroprudential authorities have proactively addressed financial stability risks based on a comprehensive analysis framework. Furthermore, the future addition of the systemic risk buffer (SyRB) and the other systemically important institutions buffer will enhance the effectiveness of these two complementary buffers. The IMF suggests that the high dependence on profits from CESEE could be considered more explicitly in calibrating the SyRB, and that the OeNB's role in the Austrian Financial Market Stability Board (FMSB) should be strengthened by increasing its voting power and entrusting it with the board's chair.

The IMF assessed that the systemic risk from residential real estate lending continued to increase.[10] The FMSB's guidance on sustainable real estate financing is key in addressing vulnerabilities.[11] But if the risk profile of banks' lending does not improve, further binding regulatory requirements should be considered in the near term, the IMF suggests. Furthermore, data gaps in (commercial) real estate lending should be closed to identify potential financial stability risks in a timely manner.

The IMF also recommends building additional supervisory resources and deepen analyses in several fields, such as financial stability (e.g. lending to nonfinancial corporations), stress testing (including second-round effects), insurance supervision and AML/CFT.[12]

Macroprudential supervisory activities in Austria

Systemic risks arising from real estate financing continued to increase in 2019. In 2019, growth in real estate lending accelerated noticeably as real estate prices continued to rise and interest rates remained low. This drove up the share of real estate finance and mortgage loans in the balance sheets of Austrian banks (to 15% and 29%, respectively) at a time when margins were dropping due to tighter

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[8] *The FSAP is a key instrument of the IMF's surveillance activities. In jurisdictions with financial sectors deemed by the IMF to be systemically important (e.g. Austria), financial stability assessments under the FSAP are a mandatory part of Article IV surveillance and are supposed to take place every five years. https://www.imf.org/external/np/fsap/fssa.aspx.*

[9] *See https://www.imf.org/en/News/Articles/2020/01/31/pr2027-austria-imf-executive-board-concludes-2019-financial-system-stability-assessment.*

[10] *See the subsection on macroprudential supervisory activities in Austria for further details on mortgage lending.*

[11] *See https://www.fmsg.at/en/publications/press-releases/2018/17th-meeting.html.*

[12] *In its Staff Concluding Statement of the 2020 Article IV mission (March 3, 2020), the IMF states that "some progress was already made on the FSSA recommendations in the areas of crisis management, banking supervision and macroprudential policy." See https://www.imf.org/en/News/Articles/2020/03/03/msc030320-Austria-Staff-Concluding-Statement-of-the-2020-Article-IV-Mission.*

competition. In addition, borrowers of new housing loans granted in Austria appear to exhibit high debt service-to-income and debt-to-income ratios. In line with its financial stability mandate, the OeNB will continue to carefully evaluate whether the conditions for an activation of macroprudential instruments are met and whether a recommendation to the FMSB for the preemptive activation of measures is warranted. However, it is expected that real estate lending activity will slow down in 2020 as a result of the COVID-19 outbreak. Nevertheless, the uncertainty regarding the impact of the COVID-19 pandemic on the Austrian financial system highlights the importance of banks' risk-bearing capacity and sustainable lending standards.

The systemic risk buffer (SyRB) and the other systemically important institutions (O-SII) buffer will become additive from end-2020. In April 2019, the European legislator adopted the banking package, which includes amended rules regarding the macroprudential toolkit that have to be implemented by the end of 2020 at the latest. The new rules will increase authorities' flexibility in the use of the SyRB and the O-SII buffer. Moreover, the amended framework delineates the scope of these two buffers. On the one hand, the application of the SyRB has been clarified. The SyRB should only address risks in the banking sector that do not include moral hazard related to too-big-to-fail problems at the global, domestic or EU levels. On the other hand, due to this clear-cut distinction, the two buffers will become additive.

Since the introduction of the O-SII buffer and SyRB, the OeNB has followed a complementary approach. The two buffers address different systemic risks and are calibrated with a view to avoiding potential overlaps. While the O-SII buffer addresses the risk a bank may pose to the system, the so-called too-big-to-fail problem, the SyRB addresses the risk the banking system may pose to a bank. In the FSAP assessment (see above), the IMF concluded that the complementarity of the O-SII buffer and the SyRB will become fully effective when the two buffers become additive. However, even though the buffers address different risks, their correlation would enable supervisors to reduce buffer rates while maintaining the level of effectiveness. Hence, the OeNB has developed two approaches to quantify the potential reduction in the O-SII buffer and SyRB rates. In its meeting in March 2020, the FMSB had already countered market uncertainty by ruling out significant increases in the combined buffer requirement as of 2021 by an adequate phase-in arrangement. The latter also contributes to mitigating the medium-term effects of the COVID-19 shock.

In a recent evaluation, the OeNB has found the Austrian SyRB to have been very effective in mitigating structural systemic risk in Austria since its implementation in 2016. Since 2015, the CET1 ratio of Austrian banks has risen by 2.3 percentage points, while lending in Austria and the core markets in CESEE has grown dynamically. The SyRB has improved the resilience of the Austrian banking system, resulting in a substantial improvement in international institutions' and rating agencies' risk assessment of the Austrian banking sector. In addition, macroprudential buffers put Austrian banks in a good position to cope with the negative consequences of the COVID-19 pandemic. Also, the SyRB is an important instrument for enhancing the credibility of resolution and for mitigating any potential negative side effects of resolution.

Box 2

The ECB's Targeted Review of Internal Models (TRIM): lessons learned and impact on Austria's large banks

TRIM enhanced the credibility and confirmed the appropriateness of internal risk models, which are of great importance for banks' risk management. Consuming almost 10% of the Single Supervisory Mechanism's (SSM) budget, TRIM has been the largest initiative of the SSM in cooperation with national competent authorities to date. The project, conducted between 2016 and 2020, marks an important milestone toward raising the quality and comparability of outcomes of approved Pillar I models on credit, market and counterparty credit risk in use at ECB-supervised significant institutions (SIs). It does so by harmonizing supervisory practices relating to these internal models in the SSM and ensuring their compliance with (consistently interpreted) regulations. Two of TRIM's main objectives are to reduce unwarranted (i.e. non-risk-based) variability of own funds requirements caused by previous inconsistent interpretations of the regulatory framework by both banks and supervisors and to create a level playing field among SIs in the use of their internal models.[13]

TRIM has eliminated differences in supervisory practices and confirmed the effectiveness of the on-site strategy to internal model supervision. TRIM involves 200 on-site model investigations across 65 SIs, covering all market and counterparty credit risk models and about 70% of credit risk exposures. Between 2017 and 2019, the OeNB conducted 13 of these investigations. One of the lessons learned from TRIM is that models that have not been subject to an on-site investigation over an extended time period tend to exhibit a higher number of shortcomings. To ensure SSM-wide consistency and transparency and support the execution of the aforementioned on-site investigations, the ECB published its "ECB Guide to Internal Models." It explains the ECB's supervisory understanding of existing regulation concerning topics within the assessment scope of TRIM and provides a common methodological assessment approach. Because of its model-related expertise and high-quality model supervision, the OeNB was closely involved in these activities will contribute to their consistent future progression.

Austrian SIs that use internal models are (on average) less affected by issues identified by TRIM. The on-site model investigations and harmonization efforts conducted under TRIM have resulted in a number of SIs being required to implement obligations and – in the majority of cases – immediate capital add-ons. At the overall SSM level, the increase in own funds requirements is moderate, but, as expected, the extent to which individual institutions are affected varies. Austrian SIs that apply internal models have clearly profited from the OeNB's well-established, intense and high-quality model supervision. Consequently, they have been (on average) less affected by supervisory measures as a result of TRIM to date.

Although both SIs and supervisors have already invested significant resources in TRIM, further efforts will be necessary to implement and address the findings of TRIM.

FX lending by Austrian banks

FX loans in Austria have continued to decline. Thanks to supervisory measures, FX loans do not currently present a systemic risk to the Austrian banking sector. In March 2020, the volume of outstanding FX loans to domestic households fell by 13% (exchange rate adjusted, year on year) to EUR 13.4 billion. The lion's share of these loans is denominated in Swiss francs, and their share in total outstanding loans to households dropped by 0.9 percentage points to 7.9% year on year. Despite their ongoing reduction, FX loans to households remain a risk, as

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[13] See https://www.bankingsupervision.europa.eu/banking/tasks/internal_models/trim.

about three-quarters are bullet loans linked to repayment vehicles. Such loans may face a funding shortfall at loan maturity in case of unfavorable exchange rate movements and/or underperforming repayment vehicles. However, there are also several mitigating factors. Typically, FX borrowers have higher income levels, and FX loans are usually secured by real estate. In order to monitor the changes in these loan segment, the OeNB − in cooperation with the FMA − conducts an annual survey among a representative sample of Austrian banks. The results of this year's survey are expected to be available in late summer 2020.

The appreciation of the Swiss franc is putting pressure on FX borrowers. Since September 2008,[14] the Swiss franc has appreciated by around 50% against the euro (as of March 2020). This implies that, for instance, a borrower who took out a Swiss franc bullet loan of EUR 200,000 in September 2008 would have to repay EUR 300,000 (in addition to the interest that also become due). Given recent market turbulences caused by COVID-19 and the oil price decline, the Swiss franc – a traditional safe haven currency – may appreciate even further. The OeNB therefore continues to recommend that banks and borrowers intensify bilateral negotiations to find tailor-made solutions in order to mitigate risks arising from these loans.

Austrian banking subsidiaries in CESEE have continued to reduce their outstanding FX loans to households. In 2019, the volume of FX loans to CESEE households fell by 4% (exchange rate adjusted) to EUR 10 billion, and their share in total loans to households dropped from 15% to 13%. Meanwhile, the volume of FX loans to nonfinancial corporations remained broadly unchanged at almost EUR 20 billion, and their share in the corporate loan segment dropped from 39% to 37%. The fact that FX loans continue to be important in the corporate segment can partially be explained by the natural hedge of many corporations that also earn income in foreign currency. The euro is the dominant loan currency by far, accounting for 83% of all FX loans to households and nonfinancial corporations. Loans denominated in Swiss francs and U.S dollars account for 9% and 8%, respectively. The risks stemming from Swiss franc loans have declined considerably and do not currently pose a major risk to financial stability. Nonetheless, legal and political uncertainties remain, especially in Poland.

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[14] *Shortly before the FMA strongly recommended that banks refrain from granting new FX loans to households in Austria.*

Box 3

FX loans of households in CESEE: do they still pose a risk?[15]

**FX lending to households in CESEE countries has declined since the global finan-
cial crisis but remains close to 50% of total loans in some countries.** *Recent exchange
rate fluctuations in several CESEE countries once again raise the question whether the remaining
FX loans of households increase financial vulnerability by exposing households to exchange
rate risk and by putting concentration risk on banks because otherwise heterogeneous house-
holds are subject to the same risk factor. Survey evidence from the OeNB Euro Survey[16] helps
to shed light on heterogeneities within countries that may render some households more
vulnerable to exchange rate fluctuations than others.*

**The latest two Euro Survey waves of fall 2018 and 2019 show that across
countries, an average 8% of individuals have an FX loan** *(chart 3.7). The percentage is
highest in Croatia[17], where 19% have FX debt. On the aggregate level, evidence on the purpose
of loans is limited. The OeNB Euro Survey reveals that in Romania and Serbia, consumption
loans are the most frequent form of loans to households – almost every second borrower has
a consumer loan. In Croatia and the Czech Republic, the percentage of borrowers with consumer
loans is close to that of borrowers with mortgages. While in Croatia, however, the vast majority
of both mortgages and consumer loans are denominated in FX or indexed to FX, in the Czech
Republic, the share of FX loans is negligible for both loan purposes. Serbia has an even higher
share of FX mortgages than Croatia, and its share of FX consumer loans is 49%. In Croatia
and in Serbia, the majority of mortgages are denominated in foreign currency. Survey evidence
also provides evidence on how loans are secured: Loan collateral is the most frequent form of
loan security, followed by loans secured by third-party guarantors. In all countries, the percentage
of collateralized loans is higher for FX loans than for local currency loans. Loans that are not
secured by collateral or a third-party guarantor are more frequently denominated in local*

Chart 3.7

Incidence of local and foreign currency loans among households

% of respondents
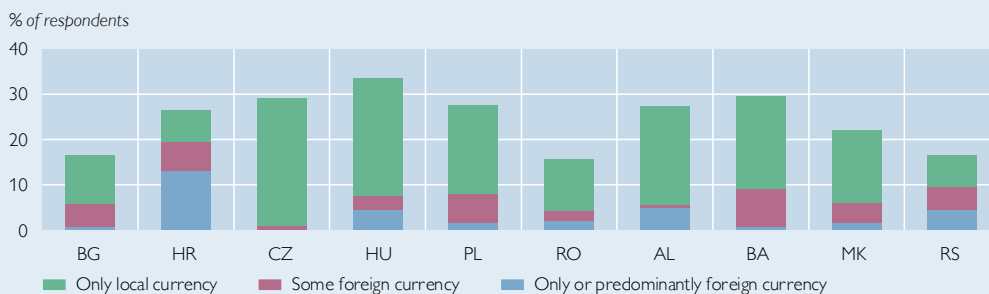
Source: OeNB Euro Survey, 2018-2019

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[15] For the full version of this analysis, see Konjunktur aktuell - Juli 2020 at https://www.oenb.at/Publikationen/
Volkswirtschaft/konjunktur-aktuell.html.

[16] For more information on the OeNB Euro Survey see: https://www.oenb.at/en/Monetary-Policy/Surveys/OeNB-
Euro-Survey.html. In this analysis, we use data from 2018 and 2019, drawing on a total of around 20,000
observations. However, not all respondents have loans and the share of respondents with FX loans is lower. For
some of the descriptive statistics presented, the underlying number of observations is therefore rather low. All
descriptive statistics are weighted. Weights are calibrated on Census population statistics for age, gender, region,
and, where available, on education and ethnicity. Weights are calibrated separately for each wave and country.
The OeNB Euro Survey collects information about all loans an individual currently holds as well as detailed
questions about the largest most important loan. It does not contain information on loan amounts or installments
for individual loans.

[17] Both Croatia and Bulgaria plan to join the ERM II, which would reduce the risk of exchange rate shocks for house-
holds with foreign currency debt.

Table 3.1

Are foreign currency borrowers hedged?

Borrowers with loan in	Household income, equivalence scale		Percentage of borrowers with regular income in EUR		Percentage of borrowers who regularly receive remittances		Percentage of borrowers with savings deposits in foreign currency		Percentage of borrowers with cash savings in foreign currency	
	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX
	PPP EUR		%							
Bulgaria	277	266	3	4	4	3	4	6	24	21
Croatia	390	403	5	5	1	3	21	22	46	48
Hungary	418	394	2	1	1	1	2	4	9	18
Poland	338	312	2	4	1	12	4	12	28	38
Romania	242	260	1	2	2	2	3	1	21	27
Albania	114	195	4	13	9	17	8	42	29	67
Bosnia and Herzegovina	224	260	5	3	3	2	3	3	18	17
North Macedonia	154	162	4	6	2	5	11	18	47	60
Serbia	197	238	4	5	2	5	6	15	36	42

Source: OeNB Euro Survey, 2018–2019.

Note: LC = local currency, FX = foreign currency.

currency. However, 23% of FX loans are secured by third-party guarantees granted by individuals.

Table 3.1 provides an indication to what extent FX borrowers[18] would be hedged in case of an exchange rate shock. It shows that FX borrowers' household income (in equivalence terms) is higher than that of local currency borrowers in 6 out of 9 countries.[19] In several CESEE countries that do not have the euro as a legal tender it is never-

Chart 3.8

Other sources of debt

% of borrowers with a foreign or local currency loan

Local currency loan holders
Foreign currency loan holders
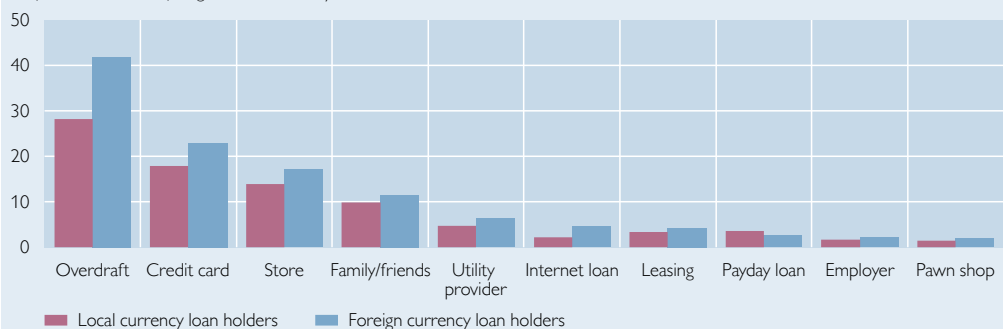
Source: OeNB Euro Survey, 2019.

[18] As the percentage of FX borrowers always has been negligible in the Czech Republic, the descriptive statistics in this section exclude the Czech Republic.

[19] The information on the income level alone is not informative as it needs to be put into perspective with the monthly debt service burden of the household. For an analysis of households' debt service-to-income ratio see Riedl, A. (2019). Household debt in CESEE economies: a joint look at macro- and micro-level data. In: Focus on European Economic Integration Q4/2019. OeNB. The analysis does not focus on FX loans but looks at all loans to households.

theless quite common that households receive income in euro. Table 1 shows that although FX borrowers on average have higher incomes, only a small percentage regularly receives FX income which could serve as a hedge against exchange rate shocks. The majority of FX borrowers do not have FX savings. Some FX borrowers regularly receive remittances from abroad, however, it is likely that these inflows could be affected by economic downturns in other countries.

Beyond FX hedging, borrowers may be hit particularly hard by exchange rate fluctuations if they must pay back more than the original amount taken out as an FX loan. *Chart 3.8 describes other sources of indebtedness. It shows that 40% of FX borrowers also have overdraft debt. The percentage is significantly lower for local currency borrowers. In addition, 23% of FX borrowers have credit card debt compared to 18% of local currency borrowers. In fact, compared to local currency borrowers, FX borrowers more frequently owe money in any of the possible forms listed in chart 3.8. The exceptions are payday loans, which, however, account for less than 5% for both FX and local currency borrowers. Also, some borrowers owe money to more than one of the possible sources and, again, the percentage of borrowers who owe money to two or more sources is higher for FX borrowers than for local currency borrowers.*

Experiencing an exchange rate shock increases the probability that FX borrowers fall into loan arrears. *The increase in the probability depends on the magnitude of the shock. During February and March 2020, exchange rate changes were moderate compared to earlier crisis periods. However, this may change as the COVID-19 crisis unfolds.*

Austrian nonbank financial intermediaries posted capital gains in 2019

Persistently low yields continue to be a challenge to the life insurance sector, but overall capitalization is still comfortable. Life insurance premiums have decreased sharply since their all-time high in 2010 (from EUR 7.4 billion to EUR 5.4 billion). Given that the maximum guaranteed rate on a traditional life insurance policy has been unchanged at 0.5% since 2017, some life insurers continue to shift their business mix toward products that are directly linked to market performance and whose investment risk is borne by policyholders. Nevertheless, the share of traditional life insurance policies in all life insurance premiums remains rather stable at about three-quarters. Despite the adversities the sector has been faced with, the investment return of Austrian life insurance companies is higher than the average guaranteed rate on the stock.

The sector's total premium volume of EUR 17.6 billion consists of EUR 9.8 billion revenues from property and casualty insurance policies, EUR 5.4 billion from life insurance policies and EUR 2.3 billion from health insurance policies. The underwriting result increased by 22% in 2019 compared with 2018, and the financial result rose by 23%. As a consequence, the result from ordinary business activities improved to EUR 1.7 billion. By the end of 2019, Austrian insurance companies were well capitalized, with a median solvency capital requirement ratio of 238%. Bonds accounted for almost a quarter of the Austrian insurance sector's total assets in 2019, followed by collective investment undertakings (nearly one-fifth) and holdings in related undertakings (also nearly one-fifth). Compared to 2018, changes in assets were reflected in collective investment undertakings and property, with both slightly increasing in importance while holdings in related undertakings and cash were reduced.

Austrian pension funds enjoyed high returns in 2019. Assets under management by Austrian pension funds increased by 13.6% (year on year) to EUR 24.3 billion, and the number of beneficiaries (prospective and current recipients) increased by 3.4% to 980,000. Currently, 111,000 beneficiaries receive a pension under an occupational pension scheme. The largest exposure of the sector are bonds (43% of the portfolio), followed by stocks (34%), and almost all assets are invested via investment funds. In 2019, the overall return on investment of Austrian pension funds was 11.6%, compared to an average 4.3% p.a. over the past ten years.

Austrian investment funds realized capital gains in 2019. The net asset value of Austrian investment funds was EUR 195 billion by the end of 2019. Driven by capital gains, the funds' assets increased by 12.2% or EUR 21.2 billion compared to the previous year. Net inflows accounted for EUR 4.3 billion.

Austrian nonbank financial intermediaries are able to cope with the difficult financial situation. In the COVID-19 crisis, the nonbank financial sector is facing difficult conditions, both in terms of navigating challenging market conditions and maintaining operations. However, recent stress tests for the insurance sector have shown that the sector is well capitalized and able to withstand severe but plausible shocks to the system. In addition, increasing market volatility is expected to affect the sector substantially only if adverse developments persist over a longer period.

The impact of the COVID-19 crisis on financial stability in Austria – a first assessment

The COVID-19 outbreak hit Europe at the end of the first quarter of 2020 – quickly and with full force. In order to slow the spread of the virus, extensive lockdowns were enforced, not only in Europe but worldwide. At the peak of the shutdown in April, these limitations to the freedom of movement and economic activity affected about 4.5 billion people or half the world's population. Consequently, the global economy experienced a massive slump, as companies reduced their activities or even went into lockdown, and consumption plummeted.

The Austrian economy saw its sharpest downturn in the post-war period, which has amplified vulnerabilities especially in the corporate sector, where industries suffering the severest drop in demand already had below-average liquidity and solvency ratios before the crisis. To strengthen companies' liquidity, public measures were quickly implemented and supported lending growth. However, several of these measures could increase corporate indebtedness. Also, the strong V-shaped recovery on financial markets highlights that there is a disconnect between the situation in the real economy and investors' expectations.

For the household sector, indebtedness is less worrying, given that loans are more likely to be taken out by households with higher incomes, but income losses due to unemployment and short-time work are a cause for concern. At the moment, these issues are being addressed by policy measures targeted at upholding income levels. However, if the crisis were to last longer, it could also affect mortgage borrowers to a greater extent.

The COVID-19 crisis will also have a noticeable impact on the domestic real estate market. Due to its strong link to the general economy, the commercial real estate market will be more affected than the residential property market. In the latter, a sharp decline in demand for rental residential property has been reported by real estate agencies, while the reduction in demand for owner-occupied homes has been somewhat less significant. Mortgage lending in Austria, which was dynamic over the past few years, lost some of its momentum as the crisis set in.

As regards the banking sector, policymakers also reacted in a swift and decisive manner in order to support banks' capacity of lending to the real economy. Central banks provided liquidity relief for the financial system, and the ECB/the Single Supervisory Mechanism (SSM) allowed banks to fully use capital and liquidity buffers and brought forward relief in the composition of capital for Pillar 2 requirements, a measure that had initially been scheduled to come into effect in January 2021. Further, the ECB/SSM and the European Banking Authority (EBA) offered operational relief and clarified the application of prudential and supervisory measures. The European Commission adopted a temporary framework for state aid measures and proposed a package of targeted amendments to capital requirements. In Austria, banks entered the crisis with strong micro- and macroprudential capital buffers, which means that they are now more resilient than they were during the great financial crisis. The Austrian Financial Market Authority (FMA) and the OeNB have emphasized buffers' usability as automatic stabilizers, but have also issued recommendations to banks urging them to refrain from voluntary payouts in order to strengthen their risk-bearing capacity. This allows banks to contribute to the economic recovery after the lockdown. Importantly, Austrian financial market infrastructures and payment systems have remained operationally stable during the entire crisis.

The biggest negative impact of the COVID-19 crisis on financial stability is likely to come from a deterioration in banks' loan quality, especially after payment moratoria and government guarantees expire. Austrian banks' loan exposure to the most vulnerable corporations is relatively small, but the uncertainty related to provisioning scenarios remains high, and the effectiveness of public support measures will be crucial. In order to assess the impact of the COVID-19 crisis on Austrian banks, the OeNB ran a scenario analysis whose granular modeling of nonfinancial corporations' equity and liquidity position makes it possible to take complex mitigating measures into account. The results indicate a marked increase of firms' insolvency rates, while fully effective mitigating measures reduce COVID-19-induced insolvencies by about one-half. Most corporate defaults are caused by liquidity problems, while overindebtedness only plays a minor role. In the baseline scenario, banks' operating income before risk declines significantly and credit risk costs for the years 2020 and 2021 are elevated. Consequently, the aggregate common equity tier 1 (CET1) ratio of the Austrian banking sector would decline by 2 percentage points until end-2022.

As the Austrian banking system is strongly exposed to Central, Eastern and Southeastern Europe (CESEE), it is also vulnerable to adverse developments in this region. Therefore, the OeNB closely monitors the impact of the COVID-19 crisis on these countries. In general, CESEE countries entered the COVID-19 crisis with lower vulnerabilities than they had at the time of the great financial crisis, and containment measures have been largely effective in slowing the spread of the virus. Also, decision-makers passed a range of policy packages to mitigate the economic repercussions, and international organizations stepped up their support for the region.

To sum up, the COVID-19 crisis represents a significant challenge for financial stability in Austria, but it is currently not under threat. Financial market participants and their supervisors have learned their lessons from the great financial crisis and entered the current crisis better prepared, as banks had increased their capital buffers and supervisors had enlarged their toolbox. In contrast to the previous crisis, banks are now an important part of the solution, as they can support the real economy by providing much-needed liquidity. Still, many uncertainties are clouding the systemic risk assessment, and it is unlikely that the full picture will emerge before public support measures expire. Overall – also if we look beyond financial stability considerations – much depends on the duration of the crisis, the possible emergence of a second wave of infections and the shape of the global recovery. Hence, financial stability risks are likely to remain heightened as long as there is no effective drug or vaccine available to combat COVID-19.

1 Vulnerabilities of the real economy in Austria

Higher leverage of nonfinancial corporations might lead to a debt overhang

In the industries hit hardest by the shutdown, liquidity and solvency were below the corporate sector average already before the measures to contain COVID-19 started to kick in. An OeNB analysis (Schneider and Waschiczek, 2020) estimates the demand losses for individual sectors (based on NACE 2-digit level[1] aggregation) during the containment period in Austria. The analysis is based on a macroeconomic scenario and additionally takes into account the possibilities of catching up after the containment period. According to this analysis, the industries facing the strongest fall in demand were in the service sector, either due to the lockdown measures or because consumers suffered losses of income and confidence. Demand losses amounted to more than 40% in six

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[1] *The "nomenclature statistique des activités économiques dans la Communauté européenne" is a system for classifying economic activities by their nature, ranging from general (level 1) to granular (level 4). For more information see: http://www.statistik.at/KDBWeb/kdb.do?FAM=WZWEIG&&NAV=EN.*

industries, namely: travel agencies; air transport; creative, arts and entertainment activities; sports and amusement activities; accommodation and food service activities; and personal service activities; in four of these sectors, the demand losses amounted to even more than 80%. In order to assess the ability of individual sectors to cushion these economic shocks, the analysis also looked at solvency and liquidity indicators. As chart 1 shows, the financial situation in the industries most affected by the shutdown was in some respects quite unfavorable compared to industries that experienced less severe demand losses.

Industries that faced the severest demand losses had considerably lower liquidity levels already before the outbreak of COVID-19. This can be seen from the quick ratio, which measures firms' ability to meet current liabilities with their most liquid assets without needing additional financing. Based on data for 2017 from the BACH database (the most recent year for which data are currently available), the quick ratio was considerably lower for industries facing demand losses of more than 40% than for less-affected industries (see left-hand panel of chart 1). What was somewhat reassuring was the fact that the most-affected industries, on average, had a higher share of cash and bank deposits in their current assets, which might be easier to cash in than other short-term assets such as inventories or trade credit. As the cash flow reduction due to the shutdown put pressure on firms' liquidity, many firms had to access additional sources of finance in order to maintain their productive capacity. One important way of obtaining additional funds outside short-term financing is drawing on unused credit lines. However, here a similar picture emerges: At about 3% of gross value added, the unused credit lines of the industries facing the highest drop in demand were on average only half as high as for all other industries at the end of 2019, when measured against their respective gross value added (see middle panel of chart 1). Within the less-affected industries, the relation of unused credit lines to value added was highest for those in the middle of the distribution (which is dominated by construction and wholesale trade).

However, solvency was also weaker in the industries that were most affected by the shutdown. Even if the shutdown-induced fall in output turns out to have been (at least partly) temporary, the ensuing liquidity squeeze might have consequences for solvency. While there are a number of caveats in interpreting the equity ratio as a solvency measure, in general, a higher equity ratio points to a lower risk of bankruptcy, as equity can be used to cushion losses. By the end of 2017, industries facing the steepest decline in demand had an average equity ratio of 21% compared to 29% for all other industries, again based on data from the BACH database.

Chart 1

Liquidity and solvency of Austrian industries[1] by demand losses due to COVID-19

Quick ratio[2]

% of total assets
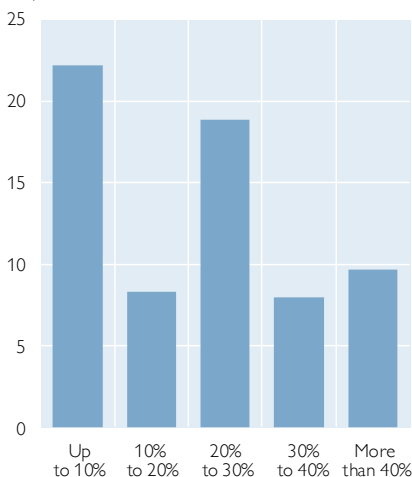
Unused credit lines[3]

% of total assets
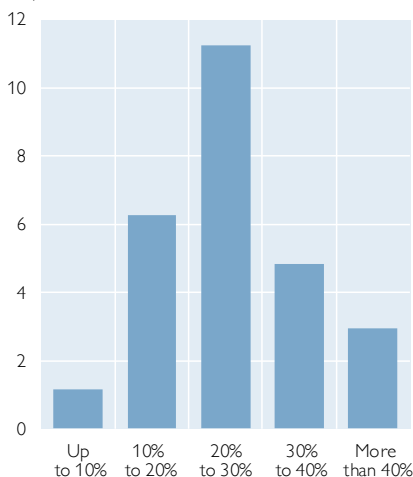
Equity ratio[4]

% of total assets
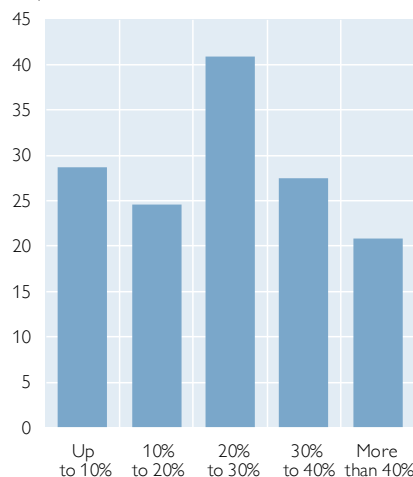
Source: OeNB, BACH database.

[1] *Industries at the 2-digit NACE level. NACE A-S without K and O.*
[2] *Current assets minus current liabilites, 2017. Branches are weighted with total assets.*
[3] *End of 2019. Branches are weighted with gross value added.*
[4] *Equity in % of total assets, 2017. Branches are weighted with total assets.*

A forceful monetary, fiscal and prudential policy response has upheld the flow of bank lending to the real economy. Fiscal policy measures aimed at securing bank loans included loan guarantees and loan moratoria, but tax relief measures as well as transfers (e.g. for short-time work) also served this purpose, in addition to contributing to maintaining employment, thereby mitigating potential output losses. Prudential authorities supported the banking system in maintaining the flow of credit to the economy through a number of capital and operational relief measures. In parallel, monetary policy measures by the Eurosystem aimed to keep financing conditions favorable and to support the flow of credit to the real economy. Recent evidence, such as survey results as well as the latest figures on loan growth, suggests that these measures supported the financing conditions of Austrian businesses.

By and large, banks have remained accommodating in loan negotiations. Each quarter, the Austrian Institute of Economic Research (WIFO) asks firms about their experiences with banks when negotiating a new bank loan. The May 2020 survey round provided first evidence on possible changes since the onset of COVID-19. Firms surveyed reported that, while their need for loans had risen sharply in the wake of the crisis, banks' behavior in loan negotiations was only slightly more restrictive compared to the previous survey round. Although significantly more companies applied for loans, the share of loan-seeking companies which received the entire applied-for loan amount decreased only a little. Likewise, the share of firms facing financing obstacles increased only slightly after the onset of the crisis. Firms in the service industries, which had been hit harder by the lockdown measures, were affected to a larger extent by credit restrictions than companies in the manufacturing and construction industries, and smaller companies more than

larger ones. As to credit standards, banks' responses in this year's first two bank lending survey rounds pointed into the same direction. In the first half of 2020, banks tightened their standards for loans to enterprises only slightly, while at the same time firms' demand for loans rose significantly.

The annual growth rate of loans by monetary financial institutions (MFIs) to nonfinancial corporations rose to 7.2% in April 2020.[2] Net transactions (i.e. changes in stocks adjusted for securitization as well as for reclassifications, valuation changes and exchange rate effects) amounted to EUR 3.9 billion in March and April 2020, the highest value in more than a decade and more than twice the average recorded in the period 2017 to 2019, when the growth of loans to nonfinancial corporations was buoyant. In contrast to net transactions, new (gross) loans were broadly in line with values seen in the past years. The different growth rates of gross and net new loans imply that the acceleration was less the result of brisk new lending than due to a marked reduction of repayments, reflecting loan moratoria. Moreover, new loans of up to EUR 1 million and a maturity between one and five years tripled in April compared to the averages of the past three years. Their share in total new loans to nonfinancial corporations is rather low and was a little over 2% in the years 2017–2019, but increased to more than 12% in April 2019. In terms of maturity, these loans correspond to the maturity band that is covered by loan guarantees and the loan size that is most likely to be within the range that is needed by firms affected by the crisis. For instance, in the April to September 2019 round of the survey on the access to finance of enterprises (SAFE), about 80% of the Austrian SMEs surveyed (without those that did not answer the question) stated that if they needed external financing to realize their growth ambitions the required amount would be less than EUR 1 million.

Servicing bank loans will become more difficult. While in the current situation, additional loans are indispensable to make up for lost revenues and to keep the economy afloat over the short term, they are bound to weaken corporate debt sustainability over the medium and long term. The drop in corporate profits that will result from the fall in economic activity will not only diminish the funds available for servicing outstanding debt but also impede the buildup of reserves through internal finance. Given that in the current situation, raising external equity is seriously hampered by the bleak economic outlook, debt will play a substantial role in the financing of the corporate sector – as it did in the past decade. In every single year since 2008, the share of equity in (net new) financing has been lower than its share in total liabilities at the onset of the great financial crisis (in 2009, it had even been negative). While low interest rates have improved firms' ability to cover current interest obligations from rising debt, they may have also been an incentive to use debt instead of equity financing. In any case, the vulnerabilities of nonfinancial firms are higher now than they were before the onset of the great financial crisis. Leverage is still higher compared to pre-2008 crisis levels, although nonfinancial corporations succeeded in reducing the debt-to-income ratio by 28 percentage points from its peak in 2013 until 2018; in 2019, the debt-to-income ratio increased again due to very slow income growth (see section

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[2] *In comparison, during the great financial crisis the annual growth rate of loans to nonfinancial corporations fell from a peak of 8.9% in December 2008 to −1.5% in December 2009 and remained in negative territory for several months (until September 2010). The same pattern could be observed in the euro area, where loans to nonfinancial corporations also contracted in 2009–2010, bottoming out at −2.6% year on year in April 2010.*

"Corporate and household sectors in Austria: mounting vulnerabilities in the wake of the crisis" in this publication). Even if debt remained constant in 2020, a fall in corporate profits in line with the expected contraction of the Austrian economy (−6% in nominal terms) would bring the debt-to-income ratio back to its level seen at the height of the great financial crisis (about 420%).

Higher leverage might subsequently lead to a debt overhang. The pressure of debt service could cause highly leveraged firms to cut back investment. Moreover, highly indebted firms might find themselves in a situation where they cannot take on additional debt to finance future projects, even if these projects could generate a positive net present value, because the expected profit would be used to service existing liabilities. The ensuing investment cuts might further dampen economic growth.

Income losses are currently the major financial stability concern in the household sector

After the onset of the COVID-19 crisis, the growth of bank loans to households remained moderate. In contrast to corporate loan growth, bank lending to households slowed down somewhat after the lockdown in April 2020, reflecting the different kinds of policy actions taken. While policy support for firms had been mainly channeled via the banking sector (e.g. by government-guaranteed loans and central bank measures to support lending), policy measures aimed at supporting the household sector consisted predominantly in direct fiscal support such as unemployment benefits or short-time work schemes.

Among households, self-employed persons have been hit particularly hard by the COVID-19 crisis. According to data from the 2017 Household Finance and Consumption Survey (HFCS), two-thirds of Austrian households have no debt at all, and those who have a loan tend to have higher incomes and wealth. In 2017, about 21% of the lowest income quintile had a loan compared to 46% of the highest income quintile. The average loan volume of the highest income quintile was more than five times as high as that of the lowest income quintile. Thus, a significant share of household debt is held by households that are more likely to have sufficient funds to service their loans. However, among the self-employed, who are affected particularly hard by the current crisis, the share of households with a loan is large (48.5%), and the average loan size is large as well. At the same time, these households have significantly above-average financial assets that could be used to cushion income shortfalls.

For the moment, government transfers have absorbed part of the income shock resulting from the lockdown measures. Microsimulations based on HFCS data (an extension of the models by Albacete and Fessler, 2010, and Albacete et al., 2014) give some indication of the degree to which households have been affected by the lockdown and the ensuing vulnerability of different household types. In about 44% of households with at least one employed person (or 29% of all households), at least one person became unemployed or was on short-time work, in addition to those that had already been unemployed before the crisis. Of those in paid work, people with lower incomes were more likely to be affected. Broken down by industry, the highest increase in unemployment was registered in accommodation and food service activities and in arts and entertainment, and the highest share of short-time workers was registered in construction and, again, in

arts and entertainment. Government transfers, which are available to a relatively similar extent across the whole income distribution, form an important part of total household income in the lower end of the income distribution. Thus, affected households currently lose only about 10% to 15% of their total income. Measures such as deferrals and possible extensions of loan repayments mitigate possible defaults in the debt of households at least in the short term.

According to simulations, 17.1% of indebted households (5.7% of all households) are vulnerable. The fixed costs of these households, such as rent and debt service as well as their basic consumption are higher than their disposable income (that is, they have a negative financial margin) and their liquid wealth (e.g. deposits or bonds) is not high enough to close this gap over a reasonable time period (ECB vulnerability definition: at least 25 months). Households living in rented accommodation and consumer loan debtors, who had lower income before the crisis, are more affected by the income shock than households with outstanding mortgage loans. Mortgage borrowers tend to have higher income and wealth and thus have higher income or capital buffers even in the event of a loss of income. However, there are self-employed people that also have unsecured loans taken out for their businesses. About 2.1% of total household debt is debt held by vulnerable households that cannot be covered by these households' assets (or 3.0%, if only liquid and collateralized assets are taken into account). This rate is considerably higher for nonmortgage debt than for mortgage debt. However, if the crisis lasts longer and short-time work is followed by unemployment, the situation could worsen and mortgage borrowers may be affected to a greater extent. The degree of vulnerability is not linear to the amount of income losses. While a loss of income up to a certain threshold is likely to be problematic for only a few, a loss of income that is only slightly higher than this threshold can suddenly become a problem for many.

Potential impact on the property market

The COVID-19 crisis and the measures taken by the federal government to contain the virus have had a noticeable impact on the domestic real estate market. However, how extensive the effects of the COVID-19 crisis on residential and commercial rent and property prices will be depends particularly on how long the crisis will last and how severe it will turn out to be.

Demand for rental residential property has plummeted (minus 60% to 70% compared to prepandemic levels), and demand for owner-occupied homes has also dropped, but somewhat less sharply, real estate agencies (EHL, 2020) report. Real estate agents also stated that no or fewer sales negotiations took place due to the containment measures in March/April 2020. In most cases, the general uncertainty and impossibility of face-to-face meetings were the reasons why contracts were not signed as originally planned; moreover, financial aspects also seem to have played a role, that is, the fear that buyers might not be able to afford future loan installments or that financing with external funds could become impossible.

Government measures made it possible to defer rent[3] and put a moratorium on evictions, and utility providers announced that they would maintain the supply of electricity and heating. These were important measures given that already prior to the crisis, low-income renting households were confronted with housing costs that amounted to 51% of net household income in the lowest income quartile (according to HFCS data). Moreover, members of these households often work in industries that were affected by the containment measures (temporary closings, etc.). As regards the fixed costs of companies, the government provided grants for up to three consecutive months,[4] with the individual amount depending on the amount of the decline in sales.

The proportion of subsidized housing in Austria is internationally unparalleled, amounting to more than half (54% in 2019) of residential rental contracts. Vienna's municipal housing provider Wiener Wohnen and the Association of Non-Profit Housing Providers decided already at the beginning of the COVID-19 crisis (prior to corresponding government regulations) to support households that had problems with paying their housing costs, which meant considerable relief to households in view of the dramatic rise in unemployment.

The residential property sector has proved to be more resilient to the COVID-19 crisis than the commercial property sector. In the long term, capital could be shifted to more robust asset classes such as residential property (CBRE/TPA, 2020). Households affected by unemployment or short-time work may contribute to an increase in the supply of properties on the one hand and an increase in the demand for rental properties on the other. Furthermore, real estate experts expect rents to decline or, at best, to remain unchanged due to the completion of many new rental apartments this year, especially in Austria's larger cities. In contrast to the trend in demand for owner-occupied homes, it is expected that the demand for apartments purchased as investments, which are often rented out, will remain stable.

The commercial real estate market will be more affected by the crisis than the residential property market due to its strong link to the general economy. It should be kept in mind that international investors play a bigger role in commercial real estate than in residential real estate. Companies directly affected by containment measures faced a drop in sales of up to 100%. Here, too, the government offered support measures and financial compensation (Hardship Fund, bridge loans, credit moratoria, etc.). Property owners were given the possibility to suspend loan repayments for three months if they were unable to service their debt due to the lack of income. In the case of commercial rental space, it can be expected that if the crisis lasts for longer, demand will decline and rental prices will drop, with all the consequences for property owners.

Banks and insurance companies are heavily exposed to the real estate sector, especially commercial real estate. Around half of banks' loans to the nonfinancial corporate sector in Austria are to companies active in the real estate sector (construction, real estate and housing). Insurance companies invest into property for income-generating purposes, mainly in commercial and private rental property. A fall in rents would have an impact on the rentability of

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[3] For the months March to June 2020. The rent must be paid by end-2020 plus 4% interest.

[4] From March 16 to September 15, 2020.

commercial real estate – valuation haircuts may be necessary. This could, in turn, jeopardize property owners.

While moderate effects are expected in the market for office space, the market for retail property has been hit particularly hard by the COVID-19 crisis. What is more, the latter had been affected by the increasing importance of online trading even before the COVID-19 crisis. Now companies may reconsider their expansion plans and postpone new leases or transactions that had been planned before the crisis broke out.[5] The number of retail stores may decrease in the future due to the advance of online shopping. As a result, vacancies in commercial real estate can be expected to increase. Demand from businesses in sectors that cannot easily move online, like services, restaurants or tourism, will hardly compensate for this decline in demand for property, not least because in these sectors, business owners often also own their property. Sectors that could benefit from more intensive online trading during the crisis are warehousing and logistics. Real estate agents see a possible incentive for sales and leasebacks for investors and owners with liquidity problems (CBRE/TPA, 2020).

2 Systemic risks in the banking sector and macroprudential measures

Exposure of Austrian banks to vulnerable corporate sectors

The OeNB analyzed the potential impact of the lockdown on Austrian banks' corporate loan portfolio and estimated loan loss provisioning scenarios. In order to estimate the impact on banks, we use Schneider and Waschiczek's (2020) categorization of nonfinancial corporate (NFC) sectors in

Chart 2

Breakdown of Austrian banks' loans and advances to nonfinancial corporations in ...

... Austria (as of Q1 20)
% of total loans (EUR 166 billion)
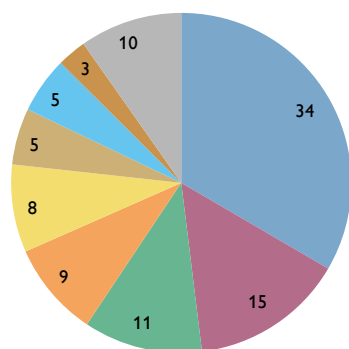
... CESEE (as of Q4 19)
% of total loans (EUR 76 billion[1])
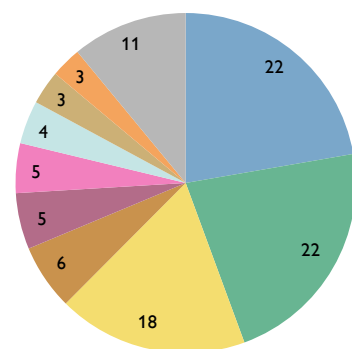
Real estate activities — Wholesale and retail trade — Manufacturing — Transporting and storage
Construction — Agriculture and forestry — Energy — Accommodation and food services
Professional activities — Financial and insurance activities — Other

Source: OeNB, NFC sector classification according to NACE.

[1] *The sample for CESEE covers only 85% of all loans.*

[5] *Whether, under certain circumstances, lessees are entitled to a total or partial waiver of the rent under the Austrian General Civil Code must be assessed on a case-by-case basis.*

terms of the lockdown's impact as well as NFCs' financial vulnerability.[6] We then assess the credit risk of banks' NFC loan portfolio and calculate back-of-the-envelope scenarios to estimate provisioning needs.[7]

Austrian banks' exposure to NFCs in Austria and CESEE is concentrated in a few sectors, but only 9% and 10%, respectively, of the total exposure are considered highly vulnerable. A sectoral breakdown of banks' NFC loans shows that almost half of all lending to Austrian NFCs went to real estate activities and construction, while close to two-thirds of all direct cross-border and subsidiaries' lending to NFCs in CESEE is concentrated on real estate activities, manufacturing and trade. Despite this concentration, only 9% and 10%, respectively, of all loans to Austrian and CESEE NFCs went to the most vulnerable sectors (see chart 2).

If credit risk only rises in highly vulnerable sectors, loan loss provisioning (LLP) appears manageable. But if all NFCs were to be stressed, the impact could be significant. The lockdown is likely to worsen banks' loan quality and thus to increase LLP, especially after government support measures expire. We perform a first-round scenario analysis on the basis that nonperforming loans (NPLs) rise and that these additional NPLs need to be provisioned for. Ceteris paribus, we assume further that Austrian banks maintain their coverage ratio for corporate loans in their domestic and CESEE subsidiaries' business (Q4 2019: 57% and 65%, respectively). Obviously, these are very conservative assumptions, as we do not take into account support measures (e.g. loan guarantees or moratoria) or accounting flexibility, nor do we allow for coverage ratios to dip. On the other hand, the chosen method is simple, transparent and allows an overview of the magnitude of potential credit risks for the banking sector.

A quadrupling of NPLs in the highly vulnerable sectors in Austria and CESEE would result in LLP of less than EUR 1.7 billion. This corresponds to about a quarter of the Austrian banking sector's consolidated
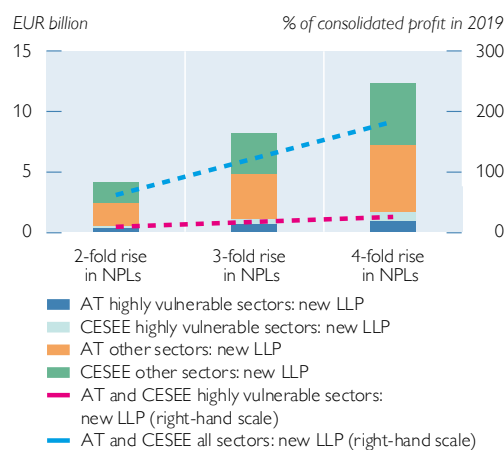
Chart 3

Various NPL scenarios and a tentative assessment of loan loss provisioning (LLP) needs[1]

EUR billion   *% of consolidated profit in 2019*

- AT highly vulnerable sectors: new LLP
- CESEE highly vulnerable sectors: new LLP
- AT other sectors: new LLP
- CESEE other sectors: new LLP
- AT and CESEE highly vulnerable sectors: new LLP (right-hand scale)
- AT and CESEE all sectors: new LLP (right-hand scale)

Source: OeNB.

Note: Data as of end-2019 (CESEE) and Q1 20 (Austria).

[1] *The ceteris paribus scenarios assume i.a. that banks maintain their coverage ratios.*

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[6] *We translate Schneider and Waschiczek's score for Austrian corporates into three categories: high impact on credit quality (with a score from 0.5 to 1), medium impact (0.25 to 0.5) and lower impact (0 to 0.25). The highly vulnerable sectors are accommodation and food services, transportation as well as arts and entertainment. Given the lack of alternatives and the general match with our expert judgment, we also use this sectoral assessment for corporations in CESEE.*

[7] *These simple scenarios are not meant to substitute fully-fledged and more complex scenario analyses (see section 4).*

total profit in 2019 (EUR 6.7 billion).[8] On the other hand, a mere doubling of all NPLs of NFCs in Austria and CESEE could cause LLP to rise to nearly two-thirds of 2019 profit (see chart 3 for several scenarios[9]). What our scenarios highlight is the wide spread in possible outcomes (before mitigating measures). If credit risks were only to rise in highly vulnerable NFC sectors, LLP appears manageable for the Austrian banking sector. Should, however, all NFCs become stressed, the impact on banks' LLP and thus profits could be significant, even if we do not take into account the resulting stress on these NFCs' employees. This shows how relevant it is for banks to retain profits in order to be able to meet future provisioning needs.

At the moment, a deterioration in banks' loan quality appears to be the biggest risk to financial stability. This risk will rise when payment moratoria and government guarantees expire. Therefore, it remains paramount that banks closely monitor the credit quality of their portfolios and proactively detect potential signs of borrowers becoming unlikely to pay. This close monitoring should ensure that banks start provisioning early on.

Systemic liquidity risk

While central bank measures quickly provided liquidity relief for the financial system, systemic liquidity challenges remain. This is especially true for unsecured borrowing in the near term and possible dependence on central bank funding in the medium to long term. The OeNB has introduced a high-frequency monitoring framework – including weekly reporting requirements for major Austrian banks – in order to be able to act promptly should the need arise. After an initial spike in funding costs observed until mid-March 2020, swift Eurosystem action led to a decline in spreads. By end-May, spreads in all categories of market funding in bank balance sheets had come down; nevertheless, they remained well above pre-COVID-19 levels. Thus, banks would have had to issue unsecured benchmark bonds at significantly higher rates than before the crisis, further wearing down already strained operational profitability. While delays in issuances may make it possible to avoid this immediate impact, they will increase systemic liquidity risk in the future. Austrian banks will have to roll over EUR 55 billion of unsecured bonds maturing between March 2020 and March 2021 and another EUR 8 billion maturing the following year. Banks with higher-quality balance sheets – i.e. higher capital ratios, higher operational profitability, higher asset quality and therefore better ratings – will be better placed to weather these challenges. They will enjoy lower funding costs than other banks and will be able to support the post-crisis recovery more effectively. Thus, maintaining a high degree of market confidence in the quality of Austrian banks' balance sheets is a priority. So far, the Austrian banking sector has maintained a strong liquidity

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[8] *If we consider all loans to NFCs in Austria, a fourfold increase in their NPLs would be enough to cause new loan loss provisioning that would nearly wipe out the entire consolidated net profit of 2019. It should be noted, however, that realizing all provisioning in a single year is a highly conservative assumption, as the impact is likely to be spread over time. On the other hand, banks' profits are likely to face downward pressures compared to 2019.*

[9] *According to a recent IMF Working Paper that analyzed the dynamics of NPLs during banking crises, peak NPL levels are more than double pre-crisis levels in almost half of analyzed crises, while they more than quadruple in 30% of cases (crisis cases include advanced, emerging and developing economies); see https://www.imf.org/~/me-dia/Files/Publications/WP/2019/wpiea2019272-print-pdf.ashx.*

position – thanks to deposit inflows and macroprudential policy measures that have contributed to high-quality ratings for Austrian banks.

What are the risks for Austrian nonbank financial intermediaries?

The bulk of Austrian nonbank finance is provided by investment funds, followed by insurance corporations and pension funds. While the relative importance of nonbank finance has increased somewhat over the past decade, banks still account for three-quarters of the financial system's assets.

Although neither the structure nor the size of Austrian nonbank financial intermediation currently pose a risk to financial stability, the COVID-19 crisis severely aggravates several existing challenges. The persistently low level of interest rates, uncertain economic growth prospects and falling asset prices make it increasingly difficult to generate investment returns that make it possible to meet long-term financial obligations, especially for life insurers and pension funds. Similarly, the COVID-19 crisis affects the assets of investment funds, where concerns of underpricing risk in the context of the search for yield are in the forefront. Mitigating factors from a financial stability perspective include heightened resilience due to greater capital and liquidity buffers, compared to the banking sector, as well as the surplus coverage of classical life insurance products and the rather small quota of defined pension obligations by Austrian pension funds.

What are the implications for Austrian financial market infrastructures?

Despite challenges raised by COVID-19, Austrian financial market infrastructures and payment systems remained operationally stable. There were no reports of operational restrictions or outages. The impact in terms of transactions and volumes was substantial, with a marked decrease in card

Chart 4

TARGET2 payments by Austrian banks to German banks

Interbank payments in EUR billion
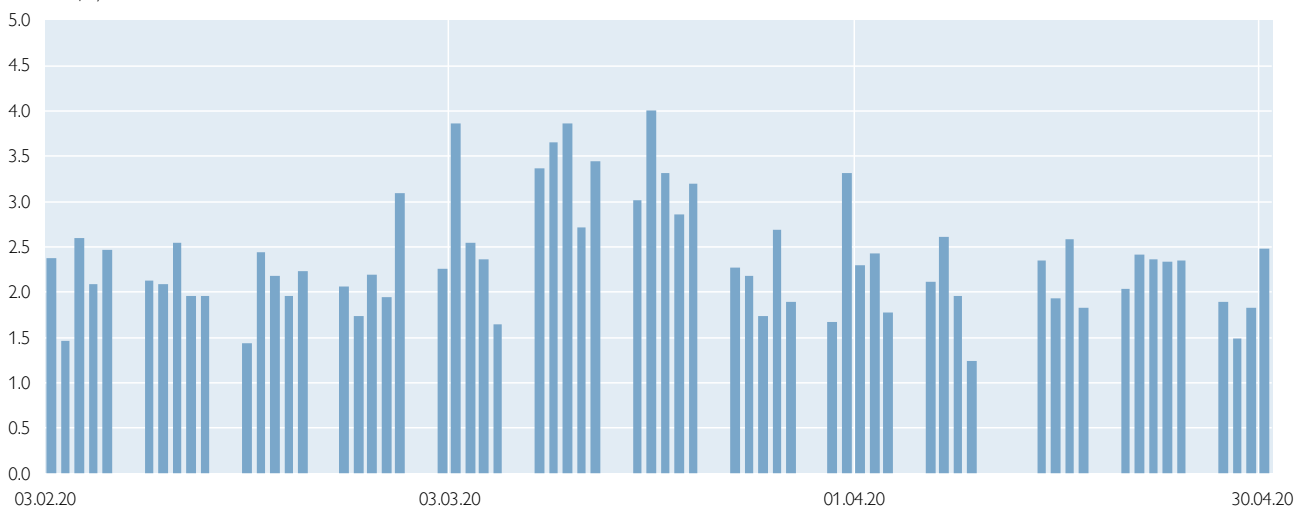
Source: OeNB.

Chart 5

Turnover at the Vienna stock exchange (ATX)

EUR million

- ATX turnover (market up)
- ATX turnover (market down)
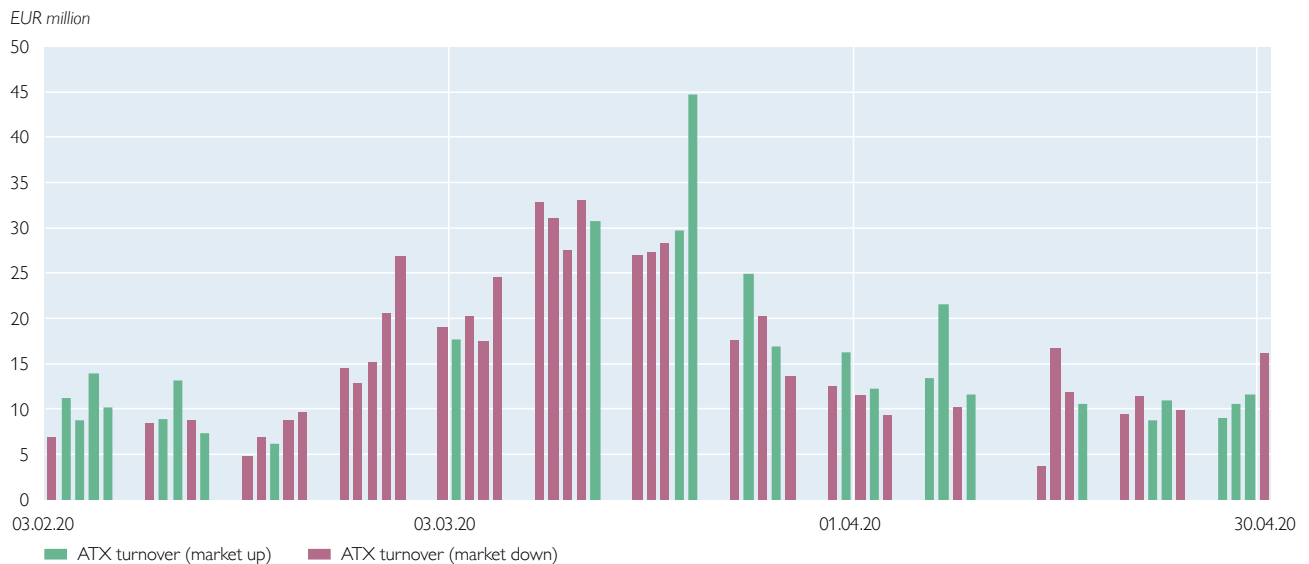
Source: Wiener Börse AG.

payments in the first quarter of 2020. The number of payment transactions involving Austrian card holders dropped to 180 million, after 196 million in the fourth quarter of 2019. However, contactless payments saw an increase, the transaction limit having been raised to EUR 50. At the height of the COVID-19 crisis, a significant correlation between market stress[10] and rising aggregate daily interbank payments by Austrian banks to banks in core countries (particularly to German banks) became evident in the euro area's TARGET2 system. This correlation is owed to margin calls or payments to broker banks related to client clearing activities by Austrian banks.

Macroprudential measures in Austria and Europe – an overview

The Austrian banking system entered the COVID-19 crisis with a solid level of capital buffers of around EUR 24 billion.[11] Of these, EUR 19 billion[12] (roughly 4% of risk-weighted assets) are accounted for by macroprudential buffers. At the onset of the crisis, the FMA and the OeNB emphasized that banks could use macroprudential capital buffers to maintain the credit supply to the real economy. They both proactively communicated buffer usability to avoid potential stigma effects if buffers were to be used as automatic stabilizers.

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[10] *Market stress is illustrated by an increase in turnover on the Austrian stock exchange. Given its strong weight on financials, the ATX (the leading index of the Vienna Stock Exchange) tends to reflect global financial stress levels well.*

[11] *OeNB estimate of March 23, 2020. Capital relief for significant and less significant institutions in Austria.*

[12] *The other systemically important institutions buffer (1% to 2%) applies to seven Austrian banks on a consolidated and unconsolidated basis. The systemic risk buffer (1% to 2%) applies to 13 Austrian banks on a consolidated and seven banks on an unconsolidated basis. For more information, please visit https://www.fmsg.at/en.*

Even during the pandemic, the Austrian banking system is showing a strong rating performance.[13] Maintaining buffer rates increases investor confidence in the future stability of the Austrian banking system. This is not only important to ensure that the system is able to support the real economy during the crisis, it is also a precondition for a swift recovery. Strong market confidence will enable banks to meet issuance targets at lower costs, which will become increasingly relevant in the second half of 2020 and in 2021.

To further increase risk-bearing capacity and strengthen market confidence, the FMA and OeNB issued recommendations calling on banks to refrain from voluntary payouts for 2019. In light of the high level of uncertainty with regard to further developments and expected challenges, the FMA and the OeNB recommend that banks refrain from share buybacks and consider the distribution of dividends, profits and bonuses for the past business year with particular care, at least until autumn 2020.[14] The ECB, the EBA, and the European Systemic Risk Board (ESRB) issued corresponding recommendations at the EU level.

Macroprudential authorities in the EU have taken several measures in response to the crisis. The majority of macroprudential authorities that had previously activated systemic risk buffers to address structural (country-specific) risks followed the Austrian approach of buffer usability rather than suggesting a release. However, several authorities released or lowered countercyclical capital buffers to address cyclical risks resulting from COVID-19 (as recommended by the ECB on March 12[15]). Additionally, a few Member States postponed the entry into force of previously announced macroprudential policies until after the crisis. Finally, the ESRB took a set of policy actions in five key areas to address the impact of the COVID-19 pandemic on financial stability in the EU.[16]

3 Microprudential measures in reaction to COVID-19

European banking regulators and supervisors showed timely reaction

The ECB has adopted several measures to ensure credit access for firms and households, increase banks' lending capacity and ease the administrative burden for banks. One of the key components of the ECB's capital relief measures was to encourage banks to use their capital and liquidity buffers. In addition, the ECB brought forward a change in regulation that had initially been scheduled for January 2021 under the Capital Requirements Directive V (CRD V): Following the change, banks are allowed to partially use capital instruments that do not qualify as common equity tier 1 (CET1) capital, i.e. additional tier 1 or tier 2 instruments, to meet their Pillar 2 requirement. Further, supervisors will exercise flexibility regarding the classification of debtors as "unlikely to pay" when banks call on public guarantees granted in the context of the COVID-19 crisis. In order to reduce the operational burden for banks, the ECB has adjusted timetables, e.g.

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[13] *See Moody's "Banking System Outlook Update – Austria" (April 16, 2020) and Standard & Poor's "Outlook Revisions On Several Austrian Banks On Deepening COVID-19 Downside Risks" (April 29, 2020).*

[14] *https://www.fma.gv.at/en/covid-19/.*

[15] *https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200312~45417d8643.en.html.*

[16] *https://www.esrb.europa.eu/home/coronavirus/html/index.en.html.*

for on-site inspections, and extended deadlines for certain noncritical supervisory measures and data requests. It has also announced that it will provide operational flexibility in the implementation of bank-specific supervisory measures. To ensure any funds freed up from the measures above are used to absorb losses or to grant loans to the real economy, the ECB has recommended that banks should not pay dividends until at least October 2020.

The EBA has provided further operational relief and clarified the application of prudential and supervisory measures in the current COVID-19 environment to support lending to the real economy. In particular, the EBA has postponed the EU-wide stress test to 2021, canceled the quantitative impact study (QIS) exercise based on June 2020 data, rescheduled public hearings and extended deadlines for consultations, supervisory reporting and Pillar 3 disclosures. The EBA has further clarified the classification of loans in default, the identification of forborne exposures and their accounting treatment in the light of legislative and nonlegislative moratoria. According to the related EBA guidelines, nonlegislative moratoria are treated equally to public moratoria under certain circumstances: e.g. they must not be borrower specific but rather address a broad range of product classes or customers in response to the COVID-19 pandemic. Moratoria in compliance with the EBA guidelines will interrupt day counting for the 90-days-past-due criterion of the definition of default. However, institutions are still obliged to assess the obligor's unlikeliness to pay on a case-by-case basis. Further, the EBA has clarified that loans under such moratoria do not have to be classified as "forborne" automatically. With respect to IFRS 9, existing flexibility is to be used and credit quality is to be assessed over the entire lifetime of the loan. In order to ensure the use of capital for continuous financing of the economy, the EBA urges banks to refrain from dividend distributions or share buybacks and to set variable remuneration portions at a conservative level. Further, the EBA has made statements relating to temporary relief for certain supervisory aspects of market risk, to a flexible and pragmatic supervisory approach regarding the supervisory review and evaluation process (SREP), to recovery planning and digital operational resilience and to the application of the Guidelines on payment moratoria to securitizations.

The Single Resolution Board (SRB) aims at ensuring that short-term MREL constraints do not prevent banks from lending. Hence, new MREL targets (i.e. minimum requirements for own funds and eligible liabilities) will be set in line with the Single Resolution Mechanism Regulation II transition period, reflecting changing capital requirements. The SRB has also been applying a pragmatic and flexible approach with regard to resolution planning and has postponed less urgent data requests accordingly.

The European Commission has adopted a framework temporarily allowing state aid to be granted to the real economy in order to mitigate economic impacts of the COVID-19 pandemic. These measures comprise direct grants, repayable advances or subsidized interest rates for loans, tax advances, guarantees on loans, subsidized interest rates for loans, guarantees and loans channeled through credit institutions or other financial institutions and short-term export credit insurance. The European Commission has also clarified that such state aid channeled to the real economy through banks as financial intermediaries would not be considered as public support to banks themselves, and hence such aid

would not trigger an assessment as failing or likely to fail according to the Bank Recovery and Resolution Directive (BRRD). Any precautionary recapitalization measures according to the rules set out in the BRRD in order to address problems directly linked to the COVID-19 pandemic would fall under a related exemption in the 2013 Banking Communication and hence would not require a burden sharing by shareholders and subordinated creditors.

The European Commission also proposed a package of targeted amendments to the Capital Requirements Regulation II to help facilitate bank lending to households and businesses throughout the EU. The banking package contains exceptional temporary measures to alleviate the immediate impact of COVID-19-related developments by adapting the timeline of the application of international accounting standards on banks' capital, by treating public guarantees granted during the COVID-19 crisis more favorably, by postponing the date of application of the leverage ratio buffer to global systemically important institutions (G-SIIs) and by modifying the way of excluding certain exposures from the calculation of the leverage ratio. The European Commission has also proposed to advance the date of application of several agreed measures that intend to incentivize banks to finance SMEs and infrastructure projects. In an interpretative communication, the European Commission has also confirmed the recent statements made by, among others, the Basel Committee on Banking Supervision (BCBS), the EBA and the ECB, on using flexibility within accounting and prudential rules. Following the BCBS's announcement that the implementation of the finalized Basel standards (finalization of Basel III) will be postponed, the European Commission will accordingly delay its legal proposal for the corresponding implementation until next year.

Austria has implemented measures to cope with the COVID-19 crisis in line with European requirements

The Austrian guarantee and liquidity measures to support the economy in the COVID-19 crisis were approved by the European Commission in April 2020 under its temporary framework for state aid. Public guarantees (up to a total amount of EUR 15 billion) securing 100% of credit amounts of up to EUR 500,000 (90% up to EUR 25 million) ensure a risk reduction for banks providing loans to SMEs. In June 2020, the approval was extended to large enterprises and the economic activities of not-for-profit associations. Furthermore, a EUR 8 billion package approved by the European Commission in May 2020 makes it possible to compensate businesses of all sectors for losses in connection with the COVID-19 crisis in the form of direct grants. Such grants can cover a maximum of 75% of fixed costs incurred during a limited period of three months, with a maximum amount of EUR 90 million per enterprise.

The FMA and the OeNB have closely collaborated with the EBA and the SSM in reaction to COVID-19, swiftly adjusting supervisory practices in line with the measures set out by the EBA and the SSM. The Austrian government adopted a legislative moratorium for credit and interest payments due between April 1 and October 31, 2020, deferring such payments by debtors suffering from losses in connection with the COVID-19 crisis for a period of seven months and extending loan tenors by the time of the moratorium. No interest may be charged in connection with the deferral of payments under the moratorium and

credit contracts may not be terminated during such payment deferral because of a deterioration of the debtor's financial situation resulting from losses in connection with the COVID-19 crisis. Until the end of the moratorium, creditors are not obliged to file for insolvency because of overindebtedness. The treatment of loan exposures under the Austrian moratorium in relation to the definition of default, forbearance and IFRS 9 is compliant with the relevant EBA guidelines (see above). Furthermore, and in accordance with the ECB's and the EBA's recommendations, the FMA has advised banks to refrain from share buybacks and consider dividend distribution and variable remuneration carefully. Banks are further advised to use the transitory provisions for IFRS 9 and assess payment delays from a through-the-cycle perspective, considering the public measures passed to mitigate the economic impacts of the COVID-19 pandemic.

Austrian banks are granting significantly more voluntary than legislative credit moratoria. They voluntarily report data on loan moratoria and government guarantees to the OeNB on a weekly basis. By the end of calendar week 26, Austrian banks had granted loan moratoria in the amount of around EUR 30 billion. Thereof, more than 70% were based on voluntary moratoria, which are more flexible; for example, they can be designed with longer maturities. At the same time, more than 14,600 state guarantees have been granted with an overall volume of EUR 3.8 billion.

In close interaction with the banking industry on the ongoing impact of COVID-19 on the banking system, the FMA and the OeNB have granted operational relief measures in areas not deemed critical in the response to COVID-19. These involved, among others, extending deadlines for supervisory reporting, reducing the SREP questionnaire and limiting recovery plans to key elements. Moreover, on-site inspections have been suspended.

4 A scenario analysis to assess the impact of COVID-19 on the Austrian banking system

To assess the impact of the COVID-19 crisis on the Austrian banking system, the OeNB has conducted a comprehensive scenario analysis. The unique nature of the current crisis also requires novel approaches for assessing the impact and effectiveness of countermeasures. The OeNB has developed a novel corporate insolvency model which makes it possible to simulate balance sheet, profit and loss, and cash flow data at the firm level to determine sectoral insolvency rates for Austrian firms. These insolvency rates, together with information on mitigating measures in Austria and other countries (cutoff date: May 31, 2020), are then used as input for the OeNB's stress testing framework ARNIE to assess the impact on the Austrian banking sector. The scenario analysis presented should be read neither as a stress test, because it is based on current economic projections, nor as a forecast, because the model employed still relies on generic assumptions across sectors and banks. Nevertheless, the results provide a plausible assessment of the structural strengths and weaknesses of both the real economy and the banking system in light of the COVID-19 crisis and the mitigating measures taken.

The impact assessment is based on the OeNB's current economic outlook.[17] For Austria, the scenario assumes negative GDP growth at a rate of −7.2% in 2020 and a rebound in 2021 and 2022, leading to growth of +4.9% and +2.7%, respectively. An input-output model maps the projections for 13 demand components to 74 NACE-2 sectors and captures intersectoral production linkages. For this analysis, results are aggregated to the NACE-1 level. Countries in the CESEE region are covered by the OeNB's most recent Outlook for selected CESEE countries; projections for other countries are based on the IMF's April 2020 World Economic Outlook[18].

Not surprisingly, arts, entertainment and sports (NACE R) and accommodation and food services (NACE I) are the sectors most impacted. Projected output losses are 46% and 43%, respectively, relative to the pre-crisis trend in 2020. NACE sectors covering manufacturing, trade, and other service activities are also significantly affected by output losses of about 12%. In 2021 and 2022, the Austrian economy is assumed to recover. However, in terms of GDP levels, a permanent output loss will remain. In 2022, GDP is forecast to remain below the pre-crisis trend, falling short by 3.9%.

The insolvency model – data and mechanics[19]

The OeNB has introduced a novel modeling approach to capture the impact from the COVID-19 crisis. The model builds on Austrian firm data from the BACH[20] and SABINA[21] databases, which are used to simulate firm-level balance sheet and profit and loss positions for firms across 17 NACE-1 sectors in a Monte Carlo simulation[22]. A joint multivariate distribution is constructed, which replicates the marginal distributions for each variable and the correlation structure between them. From this distribution 100,000 firms are generated for each sector, with individual balance sheets (8 items) and profit and loss statements (14 items). Also, each firm's operating, financing and investment cash flows are determined.

Sectoral shocks and individual characteristics determine how firms perform under a given scenario. Solvency and liquidity constraints trigger insolvency. The sectoral output losses, as defined by the scenario, determine the shock to a given firm's turnover. Empirically calibrated elasticities govern how each firm can adjust its expenses – the individual cost structure is an important determinant of a firm's future health. After-tax profits (or losses) increase (or reduce) a firm's equity in the next period. Likewise, the remaining cash flow (after debt service, investment and divestment decisions) increases (or reduces) each firm's net liquid assets. A firm is considered insolvent once either equity or net liquid assets drop below a certain threshold.

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[17] https://www.oenb.at/dam/jcr:039951a5-dfea-4dec-b3b6-6360f1acfb1f/prognose_Juni_2020.pdf (English translation forthcoming).

[18] https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020.

[19] A more detailed description of the model will be published in the OeNB's Financial Stability Report 40.

[20] The BACH database is compiled by the European Committee of Central Balance-Sheet Data Offices (ECCBSO) and contains aggregate balance sheet data based on more than 75,000 Austrian firms.

[21] The SABINA database is compiled by Bureau van Dijk and contains firm-level balance sheet data for more than 113,000 Austrian firms.

[22] As for some data only the moments of the distribution (average, first quartile, median and third quartile) were available, a simulation approach was chosen.

The granular modeling of each firm's equity and liquidity position makes it possible to take complex mitigating measures into account. Measures, especially government measures, to mitigate the COVID-19 impact, some of them sector specific, come with eligibility criteria and affect individual income, expense and cash flow positions at different points in time. For example, fixed-cost grants depend on the magnitude of turnover reductions and are paid out at specific points in time. Public sector credit guarantees, on the other hand, depend on individual firms' health prior to the COVID-19 crisis and are subject to the approval of banks eventually extending credit. Other measures covered include short-time work, deferment of tax payments, including social security contributions, public and private debt moratoria, sector-specific subsidies (in particular for accommodation and food services) and the temporary relaxation of Austrian insolvency law. Where applicable, individual measures are subject to the volume constraints introduced in the COVID-19 legislation. An important assumption is the full effectiveness of the measures.

Results

The model indicates a marked increase of insolvency rates, while mitigating measures reduce COVID-19-induced insolvencies by about one-half. Without mitigating measures, the insolvency rate would rise to 6.1% at end-2020, significantly above its 2019 level (1.0%).[23] With mitigating measures in place, the insolvency rate is significantly lower, reaching 3.8% by end-2020. Measures introduced until May 31, 2020, can thus reduce additional insolvencies from the impact of the COVID-19 crisis by one-half, if implemented efficiently. Not surprisingly, in both scenarios, liquidity constraints drive more than 90% of the modeled insolvency rates across sectors, as a company's ability to refinance critically depends on its equity position.

Mitigation measures can only ease the COVID-19-induced shock partially. Among the government measures, short-time work and debt moratoria appear to be most effective across all sectors, while fixed-cost grants play an important role in the hardest-hit sectors (arts, entertainment and sports, and accommodation and food services). Loans with state guarantees – while not covering many of the most-affected firms due to eligibility constraints – appear to be effective if fully and efficiently implemented, providing liquidity support for firms in the months where shocks are most pronounced. Survival rates of these firms turn out to be very high even in the most-affected sectors. Despite all support measures, many firms, though able to avoid bankruptcy in the model, will not be able to rebuild their capital reserves and survive with a weaker balance sheet. This will almost certainly prove a challenge once loans extended with state guarantees become due.

Results for the banking system are calculated at the consolidated level, including all 440 Austrian banks with the OeNB's stress testing model ARNIE[24], which uses the output of the insolvency model as input. For Austrian exposures, the monthly changes in sectoral insolvency rates

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[23] Based on data from the creditor protection agency KSV 1870.

[24] For more information see: ARNIE – Still in Action. In: Financial Stability Report 38. OeNB. December 2019. Box 1. 18−19.

are translated into quarterly sectoral shifts in probability of default (PD). To arrive at PD shifts for other countries, Austrian shifts are scaled based on two factors, one to account for the different impact the COVID-19 crisis has on those countries (proxied by the relative difference in GDP level deviations), the other to account for mitigating fiscal measures. Other risk factors are also based on current forecasts or calibrated based on expert judgment.

In the central scenario with mitigating measures, the aggregate CET1 ratio for the Austrian banking sector declines from 15.5% to 13.5% by 2022, a reduction by 2 percentage points. This result – in line with the EBA's static balance sheet assumption – does not account for bank reactions and is mostly driven by an annual decline in operating income before risk by about 20% and elevated credit risk costs for the years 2020 and 2021. The annual cost of risk grows to about 120 basis points in the first two years on average, before coming back down to about 30 basis points in 2022. It should be noted that this analysis covers a horizon of three years and therefore does not take into account the potential impact of the expiration of support measures after 2022. In a sensitivity analysis excluding mitigating measures, the CET1 ratio would decline by 4 percentage points to 11.1% by 2022. To serve as a reference point, pre-COVID-19 profitability and risk costs were projected into the future; in this "sensitivity analysis without COVID-19" the Austrian banking sector would have reached a CET1 ratio above 18% by 2020.

While the aggregate impact appears significant, no Austrian bank falls below a CET1 ratio of 5% in the baseline scenario with fully effective mitigating measures in place, and all but one small bank remain above a CET1 ratio of 7.5%. For more than 95% of the banking system (in terms of total assets, but also when looking at the number of banks), the CET1 ratio remains above 10%. This supports the conclusion that, having increased its capital position significantly over the last years, the Austrian banking system is well placed to weather the storm, if the COVID-19 crisis does not escalate further. The results also show that government measures taken to support the real economy play an important role in mitigating the impact of COVID-19 on banks' balance sheets.

Chart 6

Scenario analysis: aggregate CET1 ratio for the Austrian banking system

%

Source: OeNB.

Sensitivity analysis without COVID-19
COVID-19 scenario analysis with mitigating measures
Sensitivity analysis without mitigating measures

5 The impact of the COVID-19 crisis on CESEE

The CESEE region[25] entered the current slump from a state of moderating, though still broadly robust economic growth amid often slowly rising price pressures. Compared to 2008, general macrofinancial risks remained broadly contained at the onset of the downturn (for details see OeNB, 2020). CESEE governments largely responded fast to the spread of COVID-19 and imposed containment measures that succeeded in slowing the spread of the virus. In the second half of April, several CESEE countries already started the gradual easing of containment measures. At the time of writing, only Russia was still reporting substantial numbers of new COVID-19 infections each day and containment measures in Russia had therefore been lifted very selectively.

To mitigate the large economic costs of containment measures, governments and central banks have passed a diverse set of policy measures. Central banks have used their full toolkit, including policy rate cuts and/or foreign exchange interventions, short- and long-term liquidity provision to commercial banks, and some central banks have started buying local government bonds (e.g. in Croatia, Hungary, Poland, Romania and Turkey). Regulatory measures have also been eased, including revisions to (planned) capital buffer rates (e.g. in Bulgaria and the Czech Republic). Governments in CESEE have implemented fiscal support measures, such as deferring taxes and social security contributions for affected enterprises, taking over part of the salary payments to employees and extending paid sick leave. In most countries, governments have taken measures to avoid liquidity shortages in the real sector, often jointly with commercial banks and development banks and in many cases including state guarantees, moratoria on loan repayments and freezes on loan enforcement practices. It is likely that further policy stimulus will be required to support the recovery from the expected severe economic downturn in the region.

International institutions such as the IMF, the European Commission and the ECB have provided additional support to the CESEE region. The Zagreb Declaration of May 2020[26] reaffirms the EU's unequivocal support for the Western Balkans' EU perspective amid the COVID-19 crisis, calling for unity and solidarity. The EU has mobilized a package of over EUR 3.3 billion[27] to the benefit of the Western Balkans.[28] Cooperation will continue, including throughout the exit and recovery phase.

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[25] We strive for a very broad coverage of the CESEE region in this note, including eight EU countries (Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia), six Western Balkan countries (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia) as well as Russia, Turkey and Ukraine. However, in some sections the analyses cover only subsets of the broad region for reasons of data availability and scope.

[26] European Council, press release, May 6, 2020, see: https://www.consilium.europa.eu//media/43776/zagreb-declaration-en-06052020.pdf?utm_source=dsms-auto&utm_medium=email&utm_campaign=Zagreb+Declaration%2c+6+May+2020.

[27] Including immediate support for the health sector as well a EUR 750 million package of macro-financial assistance and a EUR 1.7 billion package of assistance from the European Investment Bank.

[28] European Commission, press release, April 29, 2020, see: https://ec.europa.eu/commission/presscorner/detail/en/IP_20_777.

EU macro-financial assistance is now possible in tandem with IMF programs to fight the crisis.[29] The EU's macro-financial assistance (MFA), with an overall maximum capacity limited by the EU budget, has only been granted together with a full IMF program so far. Due to the urgent need for financial assistance, the European Commission recently suggested[30] for the first time that MFA should be available to partners that also benefit from emergency funding from the IMF, without prior actions and/or conditionality, such as the Rapid Financing Instrument (RFI). The IMF has allocated USD 40 billion to the RFI for 65 emerging market countries, which include some CESEE countries, and raised access limits from 50% to 100% of the respective IMF quotas. The RFI is already set for four Western Balkan countries (Albania: EUR 174.29 million; Bosnia and Herzegovina: EUR 331.50 million; Kosovo: EUR 51.63 million; North Macedonia: EUR 175.54 million[31]). Serbia has so far not applied for EU or IMF support.[32] The crisis MFA is designed differently; it is shorter in duration than usual and demands only limited reforms to be recorded in a memorandum of understanding. The loans with a maximum average duration of 15 years will be available for twelve months and disbursed in only two installments. It was decided to apply the urgent procedure for this dossier at the end of April and, after informal contacts between the European Parliament and the Council, an agreement in the form of the original Commission proposal was found. The crisis MFA package comprises the following CESEE countries: Albania (EUR 180 million), Bosnia and Herzegovina (EUR 250 million), Kosovo (EUR 100 million), Montenegro (EUR 60 million), North Macedonia (EUR 160 million) in the enlargement region, as well as Georgia (EUR 150 million), the Republic of Moldova (EUR 100 million) and Ukraine (EUR 1,200 million). The amount of granted MFA funds is based on a preliminary estimate of each partner's residual external financing needs. Given financial needs well above the resources provided by the IMF and other institutions, MFA is considered an appropriate response to partners' requests to support financial stabilization. For Western Balkan countries, MFA funds cover about one-half of the remaining financial gap.

The ECB has decided to provide euro liquidity to EU Member States outside the euro area. In April 2020, the ECB set up bilateral swap lines with two EU central banks, i.e. the Croatian National Bank[33] and the Bulgarian National Bank[34], for up to EUR 2 billion each to provide euro liquidity to financial institutions, addressing possible market dysfunction. The maximum maturity for each drawing of euro against kuna or lev will be three months, and both swap lines

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[29] *European Council, press release, May 20, 2020, see: https://www.consilium.europa.eu/en/press/press-releases/2020/05/20/COVID-19-council-adopts-3-billion-assistance-package-to-support-neighbouring-partners/.*

[30] *European Commission, Proposal COM(2020) 163 final, April 22, 2020, see: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020PC0163&from=EN.*

[31] *Source: IMF. EUR/SDR exchange rate of April 7, 2020.*

[32] *https://emerging-europe.com/news/serbias-president-proud-of-countrys-absence-from-eu-financial-assistance-package/.*

[33] *ECB press release, April 15, 2020, see: https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200415_1~92fe0267b1.en.html.*

[34] *ECB press release, April 22, 2020, see: https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200422~962a743486.en.html.*

will remain in place until the end of 2020 but can be prolonged for as long as needed.

Financial vulnerabilities of indebted households in CESEE

Households will be affected by the economic downturn to different extents, depending, among other things, on their pre-crisis financial vulnerabilities.[35] Based on aggregate data, household debt as a percentage of GDP is quite heterogenous across the CESEE-10[36] region, ranging from 11% in Albania to 34% in Poland in 2019. In general, this is very much in line with the countries' levels of economic development – household debt is higher in countries with higher GDP per capita. Yet, as aggregate data have their limitations, we draw on unique and recent information stemming from the OeNB Euro Survey to shed some light on the distribution of debt across households in the region (see also Riedl, 2019).

Chart 7

Debt service to net income (2017–2019, median)
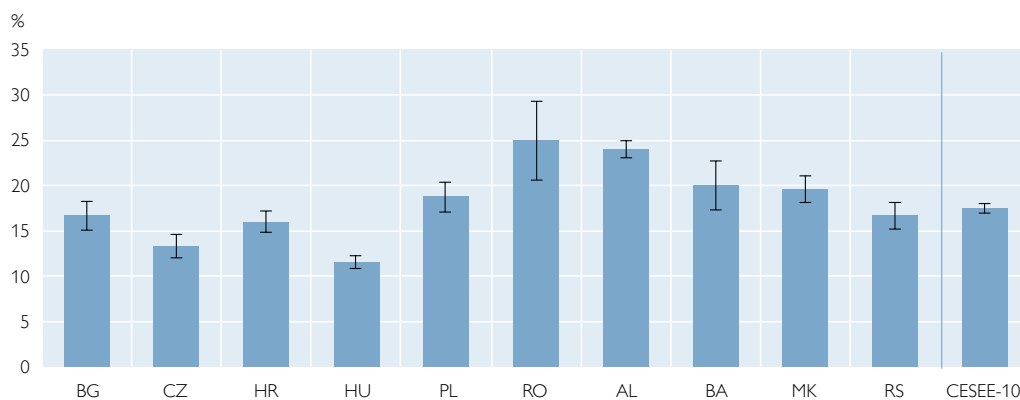
Source: OeNB Euro Survey 2017–2019.

Note: 95% confidence intervals.

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[35] See also the box in this Financial Stability Report entitled "FX loans of households in CESEE: do they still pose a risk?".

[36] The CESEE-10 region refers to the countries included in the OeNB Euro Survey. According to data from national central banks, household debt-to-GDP levels in 2019 amounted to 20% in Bulgaria (BG), 31% in the Czech Republic (CZ), 33% in Croatia (HR), 15% in Hungary (HU), 34% in Poland (PL), 14% in Romania (RO), 11% in Albania (AL), 28% in Bosnia and Herzegovina (BA), 25% in Macedonia (MK) and 21% in Serbia (RS).

Chart 8

Share of vulnerable households (2017–2019)

% of indebted households with debt service payments

Source: OeNB Euro Survey 2017–2019.
Note: 95% confidence intervals.

■ Households with net DSTIs >40% (vulnerable households)   ■ Vulnerable households with income below the median
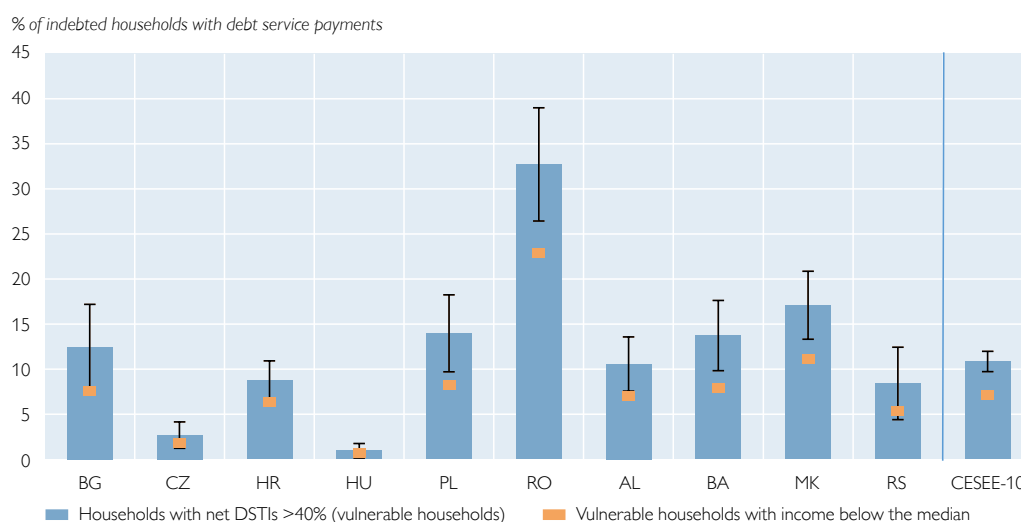
A relevant vulnerability indicator is the debt service-to-income ratio (DSTI), which relates a household's monthly loan installment payments to its monthly net income. According to this measure, in the period from 2017 to 2019, the median DSTI is highest in Romania and Albania (chart 7) – notably those two countries with the lowest debt levels according to aggregate figures. One-half of Romanian and Albanian households spend at least one-quarter of their net income to service their debt. Hence, in these countries, the median household is more likely to be exposed to income shocks as it has much less room for maneuver. As the distribution of DSTI values above the median can look very different across countries, we spot potentially vulnerable households by calculating the share of households spending more than 40% of their net income on debt service payments (chart 8). Again, Romania stands out: every third household has loan installment payments of at least 40% of net income. Macedonia is the country with the second-largest share of vulnerable households (17%), while Hungary (1%) and the Czech Republic (3%) again range at the bottom of the scale. Among vulnerable households, a significant fraction earns less than the median income in their countries. For example, in Romania, 23% of households are vulnerable (net DSTI>40%) and earn below median income. These households are even more constrained as they have less capacity to save.

Corporate debt in CESEE EU Member States

For nonfinancial corporations (NFCs) the levels of unconsolidated sectoral debt (including trade credit) vary across countries. Among the CESEE EU countries, Bulgaria and Croatia record the by far highest levels as a percentage of GDP (chart 9).[37] Broken down by components, loans make up the

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[37] *The analysis is based on macrodata and allows no assessment of the distribution of NFCs' debt or debt-servicing capacity.*

Chart 9

Unconsolidated debt by components

% of GDP at end-2018[1]

Legend: Short-term loans · Long-term loans · Debt securities · Trade credit
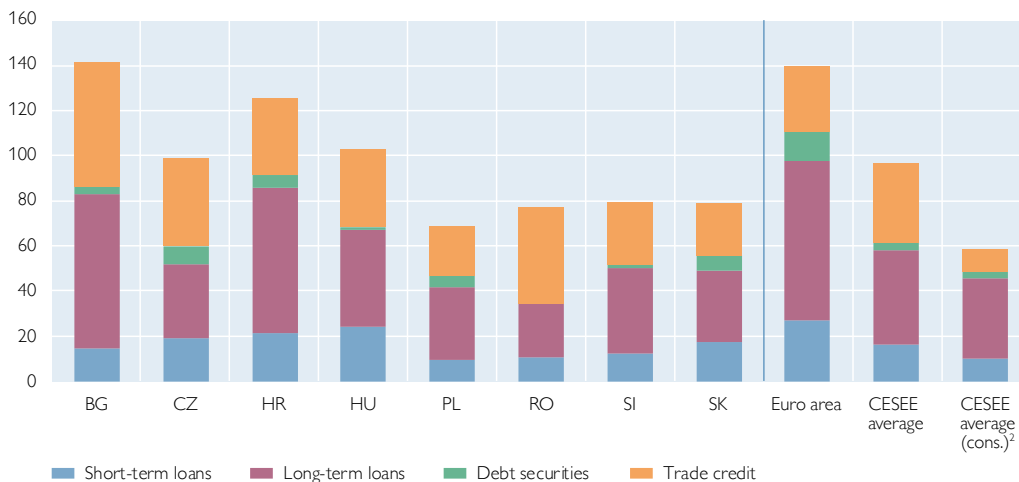
Source: Eurostat, authors' calculations.

[1] *As data on consolidated debt are available only on an annual basis.*
[2] *Consolidated debt for comparison.*

highest share of NFC debt in all CESEE EU countries except Romania (on average 60%). Half of the loan volume is composed of loans from domestic banks, the rest from other sources. Moratoria imposed in many countries in response to the COVID-19 crisis often apply only to domestic bank loans and thus a moderate share of NFC debt.

Trade credit volumes make up 35% of NFC debt in CESEE EU on average. Potential support measures in case of frictions in the trade credit market are thus vital for NFCs. In terms of creditors, domestic intra-NFC-sector debt makes up the highest share on average (37%); other important sources of credit are domestic MFIs (25%) and external debt (20%). A large part of the residual is likely external intracompany lending.

Besides financials, there are other important factors that need to be considered when assessing the vulnerabilities of NFCs to the COVID-19 shock. These, for example, include sectoral and regional differences, which, however, are beyond the scope of this note.

How could the crisis affect the CESEE banking sector?

At the current stage it is difficult to assess how the banking sectors in CESEE will be affected by the COVID-19 crisis[38] in the medium term. This depends on the damage to the real economy, which in turn will depend on the ability of governments and central banks to mitigate negative effects and support economic recovery. Loan growth will likely fall as the crisis progresses due to lower domestic and foreign demand, deleveraging needs in the private sector and lower creditworthiness of borrowers. However, initially, short-term liquidity

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[38] *For details on banking sector developments in CESEE in 2019, please see the section on the international macro-economic environment in this issue of the Financial Stability Report and OeNB (2020).*

needs arising from the need to finance current expenditures boosted loan demand. Compared to the first two months of 2020, corporate loan growth accelerated noticeably (exchange rate-adjusted) in March 2020 in most CESEE countries, while growth of lending to households was already decelerating in most countries. The impact of the crisis on deposits is ambiguous as some NFCs and households will draw down accumulated savings to finance expenditures, while others may increase savings, postponing consumption and investment in an uncertain environment.

The profitability of the CESEE banking sector could deteriorate markedly in 2020. Loan loss provisions will probably increase strongly in response to the COVID-19 crisis and will likely be the main driver of lower profitability. Some of this impact will be mitigated or at least postponed by eased regulatory requirements and moratoria on loan repayments and/or loan enforcements. The details of moratoria have important consequences for CESEE banks and borrowers; e.g. in Hungary, Serbia and Kosovo, moratoria are applied by default and borrowers can opt out, which has led to a much higher use as of end-April than in the "opt-in" countries.[39] Moratoria will affect the timing of banks' interest income and the net present value of loans in countries where no interest can be charged on deferred payments. Lower loan growth will weigh on operating income, and central bank rate cuts could put additional pressure on net interest margins.

Deteriorating profitability coupled with rising NPLs will likely weigh on banks' capital ratios. Most CESEE banking sectors reported substantial buffers at end-2019. Compared to the CESEE EU countries, tier 1 capital ratios were low in Russia (9.2% at end-2019), Turkey (13.8%) and Ukraine (13.5%), which are also the countries that face comparatively high risks in the banking sector for differing reasons.

References

Albacete, N. and P. Fessler. 2010. Stress Testing Austrian Households. In: Financial Stability Report 19. OeNB. 72–91.

Albacete, N., J. Eidenberger, G. Krenn, P. Lindner and M. Sigmund. 2014. Risk-Bearing Capacity of Households – Linking Micro-Level Data to the Macroprudential Toolkit. In: Financial Stability Report 27. OeNB. 95–110.

CBRE/TPA. 2020. COVID-19 Auswirkungen auf den Immobilienmarkt. April 24, 2020, TPA Webcast.

EHL. 2020. Auswirkungen der Coronakrise auf die Immobilienmärkte. Press release on March 25, 2020 (only available in German language).

OeNB. 2020. Recent economic developments and outlook. In: Focus on European Economic Integration Q2/2020. OeNB. 5−62.

Riedl, A. 2019. Household debt in CESEE economies: a joint look at macro- and micro-level data. In: Focus on European Economic Integration Q1/19. OeNB. 6−28.

Schneider, M. and W. Waschiczek. 2020. Betroffenheit der österreichischen Unternehmen durch die COVID-19 Pandemie nach Branchen. Konjunktur aktuell – Sonderheft. April (only available in German).

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[39] *Based on very limited information on banking markets and presentations of Q1 results by some large CESEE banking groups.*

Special topics

Nontechnical summaries in English

Mapping financial vulnerability in CESEE: understanding risk-bearing capacities of private households is key in times of crisis

Nicolás Albacete, Pirmin Fessler, Maximilian Propst

A crisis of the real economy – like the current crisis caused by the COVID-19 pandemic – can have dramatic consequences for the financial sector if debtors become unable to pay back their debt. Since Austria's banks are heavily exposed to Central, Eastern and Southeastern Europe (CESEE), potential loan defaults in the region may affect financial stability in Austria.

The Household Finance and Consumption Survey (HFCS), whose third wave was published in March 2020, enables us to estimate at the microlevel the potential loss given default (LGD) of financially vulnerable households for Austria and eight CESEE countries. We show that the risk of CESEE households with collateralized debt defaulting on their loans is fairly small even though homeownership in the region is more common than in Austria. However, we see that the structure of uncollateralized debt varies strongly across CESEE.

LGD is lower in Slovakia, Poland and Estonia than in Slovenia and Hungary. This finding also holds when we consider differences in household composition across countries.

Since the COVID-19 crisis only started to unfold as we finished this study, we were unable to include simulations of income losses caused by the crisis and their impact on potential LGDs. Still, we show that the increase in the share of potentially vulnerable households is nonlinear across countries. The share of households that may run into difficulties repaying their debt does not rise proportionately with potential income losses, with the increase in critical values differing from country to country.

Austrian banks' lending risk appetite in times of expansive monetary policy and tightening capital regulation

Stefan Kerbl, Katharina Steiner

The past decade was marked by historically low interest rates and favorable economic conditions. Against such a backdrop, concern was mounting worldwide that banks might be overly willing to lend to borrowers whose ability to repay their debt is doubtful. Together with rising indebtedness, worsening credit quality can be a threat to financial stability. We therefore evaluate how the credit quality of Austrian banks' loans was shaped by low interest rates, tightening capital regulation for banks and the benign economic environment. We cover the period from 2008 to 2019. We use data from the Austrian credit register that provide loan-by-loan information on banks' own estimates of credit quality, in particular the probability of default, expected loss and the share of risky customers receiving additional funds. We combine this large dataset with data on banks that granted the individual loans with a view to assessing which factors drive banks' risk appetite in lending. Banks' risk appetite captures how much risk banks actively take on in their loan portfolio given their strategic objectives.

The results indicate a profound and, to our knowledge, as yet unreported decrease in bank-assessed riskiness of loans until 2019. We explore to what extent this development was attributable to borrowers' improved financial performance. Our tentative analysis shows that firms' financial statements did not improve to the same extent as did banks' credit risk estimates. The improvement in banks' estimates of credit quality rather went hand in hand with the generally improved economic conditions. Concerning risky customers' ability to access additional funding, we find that expansive monetary policy encourages risk taking by banks via a "search for yield." We confirm that, compared with large banks, this effect is stronger for deposit-financed banks that are particularly confronted with squeezed profit margins. We relate the overall decrease in bank-estimated credit risk to improved economic conditions but also to capital requirements that were tightened over the same period. This way, we corroborate research that indicates that better capitalized banks have reduced risk-taking incentives and tighter capital regulation can encourage banks to shift to less risky customers.

In light of the COVID-19 pandemic and the related economic shutdown, we zoom in on the credit risk developments over the past decade of service industries hit particularly hard by the coronavirus fallout (see annex 2). Research has shown that the situation at the beginning of a crisis is one key factor in how severely financial stability and the real economy are hit. For the industries currently most affected, we find that the credit quality as assessed by banks had

improved markedly over the past years. As a result, banks have assigned lower risk weights and have entered the crisis with lower loan provisions. Importantly, the macroprudential capital buffers applicable to banks in Austria will help absorb the shock. Such buffers, which are intended to cushion severe shocks, will need to be replenished after the crisis in order to rebuild financial stability. This is to safeguard that banks will have renewed absorbing capacity for future shocks.

Nontechnical summaries in German

Zur Risikotragfähigkeit der privaten Haushalte in CESEE in Krisenzeiten

Nicolás Albacete, Pirmin Fessler und Maximilian Propst

Eine Krise der Realwirtschaft, wie die aktuelle, durch COVID-19 ausgelöste, kann drastische Auswirkungen auf den Finanzsektor haben, wenn Schuldner ihre laufenden Kredite nicht mehr bedienen können. Durch das starke Engagement österreichischer Banken in Zentral-, Ost- und Südosteuropa (CESEE) können potenzielle Kreditausfälle in dieser Region Auswirkungen auf die österreichische Finanzmarktstabilität haben.

Mit der im März 2020 veröffentlichten dritten Welle des Household Finance and Consumption Survey (HFCS) lassen sich die potenziellen Verluste im Falle einer Zahlungsunfähigkeit (loss given default – LGD) der – finanziell vulnerablen – privaten Haushalte für Österreich und acht CESEE-Länder auf Mikroebene schätzen. Es zeigt sich, dass in CESEE ein eher geringes Risiko der Zahlungsunfähigkeit vorliegt, trotz der im Vergleich zu Österreich höheren Wohneigentumsquoten im Bereich der besicherten Verschuldung. Gleichzeitig variiert die Struktur von unbesicherter Verschuldung zwischen den Ländern der CESEE-Region stark.

In der Slowakei, Polen und Estland sind die Verluste bei Zahlungsunfähigkeit geringer als in Slowenien oder Ungarn. Das gilt auch, wenn Unterschiede in der Zusammensetzung der Haushalte zwischen den Ländern berücksichtigt werden.

Da die durch COVID-19 ausgelöste Krise in der Endphase der Erstellung der Studie ausbrach, konnten Simulationen von Einkommensverlusten und ihr Einfluss auf potenzielle Zahlungsausfälle noch nicht berücksichtigt werden. Allerdings kann gezeigt werden, dass die Anteile von potenziell vulnerablen Haushalten in den verschiedenen Ländern nicht-linear ansteigen. Der Anteil der Haushalte, die in Zahlungsschwierigkeiten geraten, steigt nicht proportional zu möglichen Einkommensverlusten, und die für den Anstieg kritischen Werte sind dabei von Land zu Land unterschiedlich.

Kreditvergabe österreichischer Banken: Risikobereitschaft in Zeiten niedriger Zinsen und verschärfter Kapitalvorschriften

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Angesichts der im letzten Jahrzehnt anhaltenden Niedrigzinsphase und günstigen Wirtschaftsentwicklung wuchs weltweit die Besorgnis, dass die Banken vermehrt Kredite an Kunden mit zweifelhafter Kreditwürdigkeit vergeben könnten. Verringert sich die Kreditqualität – also die Wahrscheinlichkeit, dass Schulden auch tatsächlich zurückgezahlt werden können – und steigt gleichzeitig die Verschuldung, so stellt dies eine potenzielle Gefahr für die Finanzstabilität dar. Vor diesem Hintergrund wird in der vorliegenden Studie für den Zeitraum von Anfang 2008 bis Ende 2019 untersucht, wie sich die niedrigen Zinsen, härtere Kapitalvorschriften für Banken und die günstige Wirtschaftslage auf die Kreditqualität der Banken in Österreich ausgewirkt haben. Die Analyse stützt sich auf Daten aus dem österreichischen Kreditregister. Diese Daten geben auf Einzelkreditebene Aufschluss über die bankeigenen Schätzungen der Kreditqualität – insbesondere anhand von Kennzahlen wie der Ausfallwahrscheinlichkeit, des erwarteten Kreditverlusts und des Anteils von Schuldnern mit geringerer Kreditwürdigkeit, die eine Kreditaufstockung von den Banken erhielten. Um feststellen zu können, welche Faktoren für die Risikobereitschaft von Banken in der Kreditvergabe an Unternehmen ausschlaggebend sind, wird dieser umfangreiche Datensatz mit Daten zu den Banken, die die jeweiligen Einzelkredite vergaben, verknüpft. Die Risikobereitschaft zeigt an, welches Ausmaß an Risiko Banken in ihrem Kreditportfolio bewusst und im Einklang mit ihren strategischen Zielen in Kauf nehmen.

Die Ergebnisse der Untersuchung deuten auf eine beträchtliche und unseres Wissens bisher in der Literatur noch nicht aufgezeigte Abnahme des von Banken geschätzten Risikogehalts von Einzelkrediten bis zum Jahr 2019 hin. Daher wird in unserer Studie weiters analysiert, inwieweit diese Entwicklung auf verbesserte Finanzkennzahlen der untersuchten Schuldner zurückzuführen ist. Unseren vorläufigen Erkenntnissen zufolge verbesserten sich die Finanzkennzahlen der Firmen nicht in demselben Ausmaß wie die Einschätzung des jeweiligen Kreditrisikos durch die Banken. Die verbesserte Einstufung der Kreditqualität ging eher mit der sich aufhellenden allgemeinen Wirtschaftslage einher. Die Vergabe zusätzlicher Kredite an Kunden mit geringerer Kreditwürdigkeit zeigt, dass Banken in einem Niedrigzinsumfeld auf der Suche nach höheren Renditen mehr Risikobereitschaft an den Tag legen. Dieser Effekt ist bei einlagenfinanzierten Banken, die besonders stark mit abnehmenden Gewinnspannen konfrontiert sind, deutlicher

ausgeprägt als bei großen Banken. Der Rückgang des vonseiten der Banken insgesamt geschätzten Kreditrisikos ist gemäß den Ergebnissen dieser Studie nicht nur auf die verbesserte Wirtschaftslage zurückzuführen, sondern auch auf die Kapitalvorschriften, die im vergangenen Jahrzehnt verschärft wurden. Diese Erkenntnisse stimmen mit Forschungsergebnissen überein, denen zufolge Banken mit höherem Eigenkapitalanteil weniger Anreiz zur Risikoübernahme haben und strengere Kapitalvorschriften dazu führen können, dass Banken ihre Kreditvergabe auf weniger risikobehaftete Kunden verlagern.

Angesichts des von der COVID-19-Pandemie verursachten wirtschaftlichen Stillstands wird in einem Anhang die Entwicklung des Kreditrisikos über die letzten zehn Jahre für die von der derzeitigen Krise besonders betroffenen Dienstleistungsbranchen beleuchtet. Untersuchungen belegen, dass die zu Beginn einer Krise herrschenden Ausgangsbedingungen großen Einfluss darauf haben, wie schwer letztlich Finanzstabilität und Realwirtschaft in Mitleidenschaft gezogen werden. Für die derzeit besonders betroffenen Branchen lässt sich für das vergangene Jahrzehnt eine deutliche Verbesserung der von den Banken attestierten Kreditqualität feststellen. Folglich hatten die Banken die Risikogewichte und Risikovorsorgen für Kredite in diesen Bereichen reduziert. Dies impliziert jedoch, dass bei einer starken Verschlechterung der Kreditqualität in bzw. nach der Krise höhere Risikovorsorgen notwendig sein werden. Die für Banken in Österreich geltenden makroprudenziellen Kapitalpuffer können hierbei einen wesentlichen Beitrag zur Schockabsorption und zum Aufbau von Risikovorsorgen leisten. Sie sind dafür gedacht, die Auswirkungen schwerer Schocks abzufedern und müssen nach der Krise zum Zweck der Sicherung der Finanzstabilität wieder aufgestockt werden. Das stellt sicher, dass die Banken auch für künftige Schocks gewappnet sind.

Mapping financial vulnerability in CESEE: understanding risk-bearing capacities of households is key in times of crisis

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A crisis of the real economy – like the current crisis caused by the coronavirus pandemic – and the countermeasures taken by countries worldwide can lead to a severe financial crisis if debtors turn out to be unable to pay back their debt. The support debtors need and the costs involved in providing it directly depends on the financial buffer households have and their general risk-bearing capacity. It is crucial to understand both aspects to be able to anticipate potential problems and prepare for mitigating their impact. Policies designed to mitigate the effects of income losses could benefit greatly from better knowledge of the exact nature of the nonlinearities involved. We analyze newly available microdata on households' balance sheets to examine financial vulnerability in Central, Eastern and Southeastern European (CESEE) countries and Austria. As Austrian banks have a high and increasing exposure in the region, households' risk-bearing capacities in CESEE are an important factor in determining credit risks of the banking sector in Austria. The Household Finance and Consumption Survey (HFCS) allows us to study the general indebtedness of households as well as borrower-level vulnerability in eight CESEE countries and compare them to Austria. While the share of households owning their homes is comparably large in these countries, the share of households holding mortgage debt is not particularly large. Uncollateralized debt levels, by contrast, vary greatly across the region, and some of the countries show rather high levels of loan-to-value ratios, which point to more generous credit standards in mortgage lending. The debt service-to-income ratio >40% vulnerability measure points toward households in Croatia, Lithuania, Slovenia and Hungary being particularly vulnerable. Subtracting the assets of vulnerable households from their debt reveals that the levels of potential losses for banks are generally low. The highest loss given default estimates are obtained for Slovenia, Hungary and Lithuania. Furthermore, we use a machine learning approach to reweight the data, thereby decomposing the observed differences between CESEE and Austria into one part that can be explained by observable household characteristics and a remainder, which might be linked to banks' different treatment of similar clients in different countries. The different directions of the effects of the reweighting approach across countries indicate that there is no typical household structure that suggests a high level of vulnerability as different types of households are vulnerable across countries. One important lesson from this crisis is to make sure that better data are available to policymakers (e.g. registers covering the loans of households to the necessary degree) so that research does not have to rely on survey data alone to analyze households' risk-bearing capacities and, hence, we are better prepared for the next crisis.

Since the financial crisis of 2008-09, household indebtedness has been a major concern among researchers that try to understand the role of households in financial stability on the one hand and policymakers and central bankers that seek to regulate

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or steer mortgage markets in order to prevent potential future turmoil on the other. Especially the role of low interest rates, mortgage markets, household indebtedness and rising real estate prices are of great interest. The impact of the current COVID-19 crisis on the real economy has also rekindled concerns about nonperforming loans and credit risk in general.

These concerns stand in sharp contrast to the limited amount of data we have to analyze these important relationships. At the beginning of the crisis of 2008−09, for most countries, including Austria, there was neither a credit register for loans to households nor any type of survey data covering the information necessary to analyze the topic with the rigor and scrutiny it deserves. Unfortunately, even now, ten years later at the beginning of the COVID-19 crisis, we still do not have credit registers covering, to the necessary degree, the loans of households. What we do have is the Household Finance and Consumption Survey (HFCS), which gathers information on the balance sheets of households in the euro area and some other European countries. It is still the only dataset which allows us the comparative cross-country analysis of household indebtedness.

The Austrian banking sector is very exposed to economies in Central, Eastern and Southeastern Europe (CESEE). At end-2019, the exposure[2] of domestically controlled banks to CESEE amounted to some EUR 250,000 million, which is 8% higher than at end-2017. Taken together, the eight CESEE economies analyzed in this study (Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia) account for an exposure of over EUR 92,000 million; the exposure is highest in Slovakia (EUR 36,427 million), followed by Hungary (EUR 19,677 million) and Croatia (EUR 19,234 million), see also chart 1.

We employ recently available data of the third wave of the HFCS and focus on household indebtedness in Austria compared to eight CESEE countries, namely

Chart 1

Exposure of Austrian banks in CESEE

Measured by the ultimate risk of all banks

EUR million   *EUR million*

■ End-2017   ■ End-2019
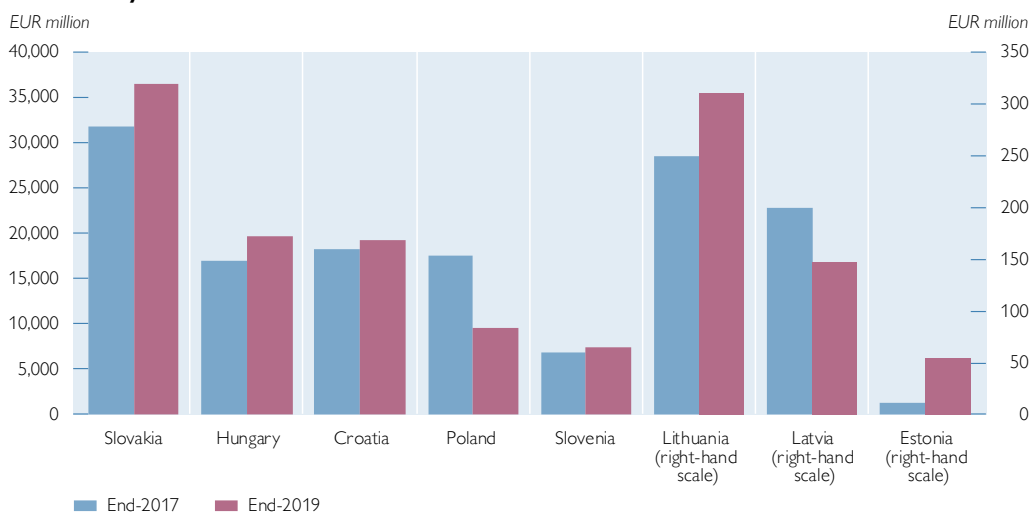
Source: OeNB.

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[2] *The exposure is measured by the ultimate risk of the domestically controlled banks.*

Estonia, Croatia, Hungary, Lithuania, Latvia, Poland, Slovakia and Slovenia,[3] to achieve our threefold objective: First, we describe indebtedness by looking at the extensive and intensive margins of different forms of debt across countries. Second, we calculate measures of risk-bearing capacities and identify vulnerable households in the countries we analyze. We calculate how much debt – before and after deducting different assets – is held by such potentially vulnerable households. Third, we ask to what degree the observed cross-country differences might be due to differences in household characteristics across countries. Or put differently, we compare apples with apples, that is, households with similar households, and have a look at the remaining differences.

As most major Austrian banks are very active in CESEE, households' risk-bearing capacities in the region are an important factor in determining credit risks of the Austrian banking sector.

We are aware of two studies presenting a comparable cross-country vulnerability analysis for the CESEE region: Fessler, List and Messner (2017) used the second wave of the HFCS, which included neither Croatia nor Lithuania, and Riedl (2019) examines household vulnerability for ten CESEE countries using the OeNB Euro Survey by focusing on the debt service-to-income ratio. However, due to data limitations, Riedl (2019) does not consider the value of households' assets in this analysis.

The remainder of the paper is structured as follows: As the COVID-19 crisis was unfolding just as we were finishing this paper, we added a box which follows this introduction and provides additional statistics on households' risk-bearing capacities that we consider especially relevant in the crisis. In section 1, we introduce the data. Section 2 provides an overview of household indebtedness. In section 3, we calculate and compare different measures of households' risk-bearing capacities and identify vulnerable households and their debt. In section 4, we apply a reweighting technique to decompose the results in a way that allows us to filter out cross-country differences due to different household compositions.

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[3] *For Croatia and Lithuania, this is the first HFCS wave that allows such an analysis.*

Box 1

COVID-19 and household vulnerability in CESEE

The COVID-19 crisis started as a health crisis, and the measures taken to fight the pandemic have turned it into a crisis of the real economy. A large part of the economy is in shutdown and will only restart very slowly. In this situation, it may be helpful to know more about the ability of households to serve their debt with less income and how this ability differs across countries. We can use HFCS data to, first, calculate the ratio of liquid assets (deposits + mutual funds + bonds + value of non-self-employed business + shares + managed accounts) divided by the monthly debt service of indebted households. This gives an indication of how many months households could serve their debt by only using their liquid assets. Second, we assume income shocks of 10%, 20%, 30%, 40% and 50% and examine how many households would have a debt service-to-income ratio higher than 40% given these new income figures. Both ad hoc calculations should give an indication of how the ability of households to serve their debt differs between countries. It is rather obvious that these are neither the ideal data nor the ideal tools to answer such questions. However, unfortunately, the necessary data and tools (such as up-to-date credit registers including the universe of credits as well as information on households) have not been set up since the last crisis hit in 2008.

Table 1 shows the ratio of liquid assets to the monthly debt service of indebted households. The first column shows the ratio of the totals, while the second column shows the median of the household level ratios. As the distribution of liquid assets is very skewed, the two figures are very different. The median ratio is about 13 in Austria, which means that the median indebted household could serve its debt for 13 months if all liquid assets could be used. This figure is substantially lower in all other countries. In Poland and Slovakia, it is about six months, in Croatia, Lithuania and Slovenia, it is below one month. In these countries, a large part of indebted households hardly hold any liquid assets at all. Aggregate statistics look very different. In all countries, total liquid assets of indebted household cover several years of debt service. This mirrors the fact that it is mostly households with lower debt service that also have lower amounts of liquid assets.

Chart 1 shows the share of vulnerable households defined by a debt service-to-income ratio higher than 40% – a common measure in the analysis of household vulnerability. Note that the HFCS only included

Table 1

Indebted households: liquid assets to monthly debt service

	Ratio of totals (aggregate level)	Median ratio (household level)
Austria	298.5	11.3
Estonia	118.9	2.1
Croatia	70.2	0.0
Hungary	207.2	1.3
Lithuania	93.9	0.3
Latvia	32.0	1.7
Poland	105.6	6.2
Slovenia	119.7	0.5
Slovakia	84.0	5.3

Source: Eurosystem HFCS 2017.

Note: Ratio of totals (aggregate level): defined as the sum of all liquid assets of indebted households divided by the monthly debt service total of these households. Median ratio (household level): the ratio of liquid assets to monthly debt service is first calculated at the household level. Then the median of these ratios is taken. The numbers can therefore be interpreted as liquid assets in months of debt service.

Chart 2

Financially vulnerable households conditional on different income shocks in CESEE

Share of indebted households with DSTI ≥ 40% in %
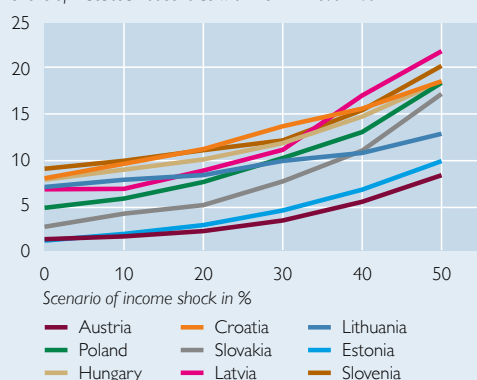
Source: Eurosystem HFCS 2017.

Note: Income is measured as gross income.

comparable measures of gross income. This is not a problem in this exercise as we are only interested in how patterns differ across countries if we decrease gross income. We only want to stress a point we deem very important in designing policies to mitigate the current crisis: One can clearly see the nonlinearities involved. The share of vulnerable households increases in a nonlinear way assuming a shock on income. Policies designed to mitigate the effects of income losses could benefit greatly from a better knowledge of the exact nature of such nonlinearities. There might be hardly any problems for households up to a certain degree but from then nonperforming loans might suddenly increase dramatically.

1 Data

We use data of the third wave of the HFCS, which gathers household balance sheet data, or, in other words, data on the assets and liabilities of households in the euro area as well as in Croatia, Hungary and Poland. The third wave was released in March 2020. The HFCS includes population weights based on design, nonresponse and poststratification weights. We use population weights for all calculations in this paper. Additionally, the HFCS uses a multiple imputation procedure based on chained equations to correct for partial response refusal. We use all five imputations and apply Rubin's Rule for all calculations in this paper (Little and Rubin, 2019). As we are only concerned with Austria and eight CESEE countries, we show some basic information about the different HFCS surveys in these countries in table 2.

Table 2 shows that the fieldwork in selected countries took place from 2016 to 2018. The net sample size ranges from 1,249 in Latvia, which represent about 840,000 households, to 5,890 households in Poland, which represent over 13 million households. Response rates differ substantially between countries, from 31.4% in Hungary to 77.2% in Estonia. The common survey mode is a computer-assisted personal interview (CAPI). Some countries additionally use other survey modes. In Poland, all interviews take place as paper and pencil interviews. More detailed information about the data can be found in the methodological notes (see HFCN,

Table 2

Survey information: HFCS – third wave

	Fieldwork	Net sample size	Response rate (%)	Number of households	Mode
Austria	2016/2017	3,072	49.8	3,933,967	CAPI
Estonia	2017	2,679	77.2	590,739	CAPI
Croatia	2016	1,357	35.8	1,495,082	CAPI
Hungary	2017	4,233	31.4	4,004,215	CAPI
Lithuania	2017/2018	1,730	47.1	1,286,924	CAPI (97.3%), PAPI (0.9%)
Latvia	2017	1,249	45.3	836,810	CAPI (95.4%), CATI (4.4%), PAPI (0.2%)
Poland	2016	5,890	52.8	13,374,992	PAPI
Slovenia	2017	2,035	38.1	824,618	CAPI
Slovakia	2017	2,181	56.2	1,852,059	CAPI

Source: Eurosystem HFCS 2017.

Note: CAPI = computer-assisted personal interview
CATI = computer-assisted telephone interview
PAPI = paper and pencil interview

2020). As already mentioned above, the HFCS is still the only dataset which allows a comparative cross-country analysis of household indebtedness. For measurement issues such as coverage and underreporting problems of wealth surveys, see Fessler et al. (2016).

2 What does household debt in CESEE look like?

Households hold debt for many different reasons. The largest amounts of debt are usually connected to homeownership. This is usually collateralized debt, with the home serving as collateral. Less common are other collateralized loans used for business purposes of the self-employed or loans to finance other real estate. Besides such collateralized loans, households also have uncollateralized forms of debt. Often, these are loans to finance furniture or a car. Sometimes they are also used for debt consolidation and covering living expenses. Overdrafts on current accounts is another form of uncollateralized debt that is quite common in some European countries, such as Austria. Unlike in the U.S.A., only few households in Europe use credit cards to hold debt. By contrast, a very common form of holding debt are private loans provided by family members or friends, which, however, pose no direct threat to the banking system.

Household indebtedness can be problematic for both, the indebted households and the banking sector providing the loans. As we will see, uncollateralized debt is more common among lower income and lower wealth households, while collateralized debt is more common among higher income and higher wealth households. Also, the sum of collateralized debt is by far larger than the sum of uncollateralized debt, which makes the former much more important for financial stability.

Table 3

Assets and liabilities: extensive margins

	Austria	Estonia	Croatia	Hungary	Lithuania	Latvia	Poland	Slovenia	Slovakia
	% of households								
Real assets	**86.2**	**87.4**	**94.0**	**92.3**	**96.7**	**84.3**	**91.2**	**94.0**	**95.6**
Household main residence	45.9	75.3	85.3	84.0	93.2	72.7	79.3	76.3	88.8
Other real estate	13.0	32.6	22.7	22.0	21.9	36.6	24.0	28.1	28.0
Financial assets	**99.7**	**99.6**	**81.9**	**82.1**	**90.7**	**89.1**	**89.1**	**95.2**	**92.1**
Deposits	99.7	99.6	80.9	81.0	90.4	87.7	84.9	94.8	91.6
Funds, stocks, bonds	13.5	6.7	6.4	8.4	3.0	0.9	5.8	11.2	6.5
Other financial assets	1.1	0.8	0.5	0.0	0.5	0.0	0.7	0.8	0.2
Debt	**32.7**	**48.0**	**40.7**	**31.6**	**26.1**	**39.6**	**40.5**	**32.2**	**36.6**
Collateralized debt	*16.5*	*20.9*	*9.0*	*17.4*	*11.7*	*13.8*	*15.0*	*9.1*	*20.7*
Household main residence	15.6	18.1	8.6	15.8	10.4	11.5	13.2	8.2	19.6
Other real estate	1.4	3.7	0.4	2.1	2.0	3.0	2.2	1.4	1.4
Uncollateralized debt	*20.3*	*40.3*	*35.8*	*20.1*	*18.5*	*32.9*	*32.1*	*26.9*	*21.4*
Overdraft	11.8	7.2	27.0	7.2	11.1	2.8	0.0	13.1	4.0
Credit card	0.7	23.7	5.8	4.3	4.0	2.1	15.6	6.2	3.3
Other uncollateralized loans	7.4	24.2	10.2	9.7	4.3	28.9	21.3	14.1	14.5
Private loans	4.1	2.8	2.8	4.3	3.0	4.1	0.0	2.2	4.7
Net wealth	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Net sample size	3,072	2,679	1,357	4,233	1,730	1,249	5,890	2,035	2,181
Households represented	3,933,967	590,739	1,495,082	4,004,215	1,286,924	836,810	13,374,992	824,618	1,852,059

Source: Eurosystem HFCS 2017.

Uncollateralized household debt often is a problem for the households that hold it, as it is sometimes a substitute for missing income – especially in the case of overdrafts and credit card debt. But it is hardly a threat to financial stability mainly because of its relatively low volume. Household debt can become a problem for banks and financial stability if the share of debt held by households potentially vulnerable to economic shocks is large. Additional problems may occur if the collateral is likely to be overvalued and loss given default might be higher than anticipated because the realized value of collateral was lower than expected. Especially in times of potential housing bubbles this phenomenon can be of substantial importance: if a crisis hits, it is quite likely that housing supply increases rapidly – due to foreclosures – while housing demand tends to be rather low.

Table 3 shows extensive margins for assets and liabilities in Austria and the CESEE countries under review. With regard to assets, we distinguish between real assets and financial assets. On the other side of the household balance sheet, we subdivide debt into collateralized debt and uncollateralized debt. In Austria, 86.2% of households hold real assets, which is a rather low share compared to CESEE countries, where between 84.3% (Latvia) and 95.6% (Slovakia) of households hold real assets. This is partially due to the relatively low shares of households who own their main residence in Austria (45.9% compared to over 75% in all CESEE countries) and households who additionally own other real estate (13% in Austria compared to over 20% in all CESEE countries). The share of households owning financial assets also differs across countries, from 81.9% in Croatia to 99.7% in Austria. However, deposits are the most common form of financial asset in every country. The differences in owning other financial assets, such as mutual funds, stocks or bonds, are rather large. In Latvia, 0.9% of households hold these kinds of assets compared to 13.5% of households in Austria.

Looking at households' liabilities, we see that extensive debt margins range from 26.1% in Lithuania to 48.0% in Estonia. In Austria, about one-third of households are in debt. More precisely, 16.5% of Austrian households hold collateralized debt and 20.3% hold uncollateralized debt. The former lies between the lowest value in CESEE (9.0% in Croatia) and the highest one (20.9% in Estonia). Furthermore, using their main residence as collateral is the usual framework for households that hold that kind of debt. Using other real estate as a collateral is rather unusual: less than 4% of households do that in these countries, albeit in CESEE countries, more than 20% of households have that kind of collateral. The occurrence of uncollateralized debt differs notably across countries, from 18.5% in Lithuania to over 40% in Estonia (Austria: 20.3%). Moreover, we see a heterogenous pattern of uncollateralized debt in these countries. In Croatia, for example, overdrafts are the most common type of uncollateralized debt (27% of household hold overdraft debt), followed by other uncollateralized loans (i.e. consumer credits, at 10.2%) and credit card debt (5.8%). In Latvia and Estonia, on the other hand, other uncollateralized loans are the most common type, with 28.9% and 24.2%, respectively, of households holding such debt. More than 20% of Estonian households also hold credit card debt, which is the highest figure for this type of debt in CESEE. Private loans range from 0% in Poland to 2.2% in Slovenia and 4.7% in Slovakia.

Table 4

Assets and liabilities: intensive margins

	Austria	Estonia	Croatia	Hungary	Lithuania	Latvia	Poland	Slovenia	Slovakia
	Conditional medians in EUR thousand								
Real assets	**120.8**	**60.0**	**69.8**	**39.4**	**48.4**	**29.9**	**67.3**	**97.4**	**73.9**
Household main residence	250.0	55.5	66.2	36.5	40.0	25.5	61.0	98.0	70.0
Other real estate	123.7	30.0	20.0	22.7	20.7	15.0	27.6	38.4	16.6
Financial assets	**15.5**	**2.8**	**0.5**	**1.1**	**1.0**	**0.4**	**3.7**	**1.4**	**2.8**
Deposits	12.8	1.9	0.3	0.9	0.6	0.2	2.8	1.0	2.0
Funds, stocks, bonds	15.0	3.8	2.2	8.0	4.6	0.9	2.6	4.3	4.6
Other financial assets	10.0	1.2	18.7	0.0	11.0	0.0	0.9	5.0	1.2
Debt	**17.1**	**4.9**	**2.2**	**5.5**	**5.7**	**3.0**	**2.3**	**5.9**	**11.4**
Collateralized debt	*64.6*	*29.9*	*20.0*	*11.4*	*23.4*	*22.1*	*25.3*	*36.4*	*31.7*
Household main residence	64.8	28.2	20.0	11.3	26.7	23.7	24.8	35.6	30.8
Other real estate	50.8	29.2	16.4	13.0	9.7	21.5	22.6	30.0	29.2
Uncollateralized debt	*2.3*	*1.3*	*1.6*	*1.0*	*1.0*	*1.3*	*0.6*	*2.2*	*2.0*
Overdraft	0.8	0.0	0.8	0.5	0.6	1.0	0.0	0.9	0.3
Credit card	0.4	0.5	0.4	0.5	0.5	0.5	0.2	0.3	0.3
Other uncollateralized loans	8.6	2.1	4.5	1.3	1.7	1.3	1.1	5.4	2.4
Private loans	4.0	1.3	2.6	1.6	6.1	1.5	0.0	4.6	3.0
Net wealth	**82.7**	**47.7**	**61.5**	**35.9**	**45.9**	**20.5**	**60.5**	**91.6**	**70.3**

Source: Eurosystem HFCS 2017.

Table 4 shows intensive margins of households' assets and liabilities in the form of conditional medians. From extensive margins (table 3) we know that uncollateralized debt is more common than collateralized debt in the countries analyzed. However, with regard to financial stability, the absolute values of collateralized debt are usually much higher than those of uncollateralized debt. This is also the case in these countries. Whereas conditional medians of debt in general range from EUR 2,200 in Croatia to EUR 17,100 in Austria, conditional medians of collateralized debt are much higher than conditional medians of uncollateralized debt. More precisely, the factor ranges from 12 (Hungary) to 41 (Poland). Since the most common collateral is the household main residence (HMR), one should compare conditional medians of HMRs and the collateralized debt secured with it. In Latvia, these intensive margins are closest to each other (HMR conditional median: EUR 25,500, debt collateralized by HMR conditional median: EUR 23,700). In every other country, however, the conditional medians of debt collateralized by HMR are about half or less compared to the conditional medians of HMR. This might be an indicator that household debt in these countries is fairly well secured. However, these two medians do not necessarily represent the same household. We can get more precise results by looking at the joint distribution of assets and liabilities, which is what we do in the next section.

3 How vulnerable are indebted households?

There are several measures to identify potentially financially vulnerable households (see e.g. Albacete and Fessler, 2010; Albacete and Lindner, 2013; Albacete et al., 2014; Ampudia et al., 2016; or Bankowska et al., 2017). The debt-to-asset ratio indicates the amount of debt a household can pay back with its assets. Since these assets are typically households' main residences, which are not easily transferable,

the debt-to-asset ratio considers the household's need to deleverage in the medium and long run. We define it as:

$$DA_i = \frac{D_i}{A_i} \ ,$$

where D_i is the household's total debt and A_i are the household's total gross assets (excluding public and occupational pension plans).

The debt-to-income ratio indicates the amount of debt a household can pay back in terms of its annual income. It does not consider loan maturities. We define the debt-to-income ratio as:

$$DTI_i = \frac{D_i}{I_i},$$

where I_i is the household's total gross income.

The debt service-to-income ratio, on the other hand gives the relation between annual debt payments and income. We define it as

$$DSTI_i = \frac{DS_i}{I_i} \ ,$$

where DS_i is the debt service of an indebted household per month and I_i is the household's total gross income per month (total gross income per year divided by 12). This ratio reflects short-term debt commitments and considers loan maturities and interest rate levels as well. Furthermore, we calculate the debt service-to-income ratio excluding those households that have only credit card or credit line/ overdraft debt, as repayment is not collected in the data for these two types of debt. Lastly, the loan-to-value ratio (LTV), which is similar to the debt-to-asset ratio, gives the relation between the value of a household's main residence-backed mortgages $DHMR_i$ (a type of debt) and the current value of the household's main residence $VHMR_i$. Note that this ratio is of interest particularly in CESEE, where the rate of homeownership is relatively high, especially in comparison to Austria. We define it as:

$$LTV_i = \frac{DHMR_i}{VHMR_i}$$

Table 5

Potentially vulnerable households according to different measures

	Austria	Estonia	Croatia	Hungary	Lithuania	Latvia	Poland	Slovenia	Slovakia
	% of indebted households								
Debt-to-asset ratio ≥ 0.75	15.8	13.8	11.0	13.9	10.1	17.3	9.6	11.2	12.8
Debt-to-income ratio ≥ 3	7.5	5.4	12.5	7.4	19.0	5.6	6.1	9.8	10.8
Debt service-to-income ratio ≥ 0.4	1.6	1.4	8.1	8.0	7.2	6.9	5.0	9.1	2.9
Debt service-to-income ratio ≥ 0.4 *(households with debt payments)*	2.3	1.9	17.7	10.2	13.1	7.4	6.0	13.3	3.3
Loan-to-value ratio ≥ 0.75 *(households with mortgage on HMR)*	7.2	17.4	13.6	14.6	19.6	15.4	14.6	9.3	21.4
DTA ≥ 0.75 & DTI ≥ 3 & DSTI ≥ 0.4	0.3	0.1	1.2	2.0	1.0	1.0	0.4	0.9	0.6
Expenditure higher than income	17.6	11.3	28.8	17.1	12.0	13.8	22.6	11.3	23.4
Bills not paid *(households with expenditure > income)*	1.3	0.8	5.7	5.6	4.0	3.5	1.7	3.0	2.8

Source: Eurosystem HFCS 2017.

Table 5 shows the share of indebted households that surpass certain critical thresholds for these ratios and are therefore classified as potentially financially vulnerable. In Austria, 15.8% of households are potentially financially vulnerable according to the debt-to-asset ratio ≥ 0.75 measure, which is the second largest share among all countries under review, after Latvia (17.3%). The share of households that have a loan-to-value ratio greater than 0.75, on the other hand, is lowest in Austria (7.2%). This might also be due to lower homeownership rates in Austria compared to CESEE. We observe the highest share of households with a loan-to-value ratio above 0.75 in Slovakia at 21.4%. Some of these households might be forced to deleverage in the medium and long term. In the short term, the debt service-to-income ratio of households with debt payments is of more interest in terms of financial vulnerability; here, we observe the highest value in Croatia, where the share of households that use more than 40% of their income for debt service is 17.7%. Row 6 shows the share of indebted households that simultaneously surpass the vulnerability thresholds for the debt-to-assets (DTA) ratio, the debt-to-income (DTI) ratio and the debt service-to-income (DSTI) ratio. This number aims at taking into account all time horizons (short, medium and long term). The ratios are correlated by definition and play a part in banks' risk assessment. A bank might grant credit to a household with a relatively high value for one of these ratios, for example, a high DTA ratio, if the other two ratios, in this case the DTI and the DSTI, are relatively low (Albacete et.al., 2018). In Austria, only 0.3% of indebted households exceed all three ratios, which is the second-lowest share after Estonia. For other CESEE countries, the shares range from 0.4% in Poland to 2% in Hungary.

Another way of identifying potentially financially vulnerable households is to use subjective measures. In the HFCS, respondents are asked "Within the last 12 months, were your expenditures higher, lower, or about the same as your income?". If they state that their expenditures exceeded their income, they are asked how they covered this difference, either by using savings, selling assets, getting into new debt, getting help from friends, using a credit card or not paying their bills. Multiple responses are allowed. However, we assume that if a vulnerable

household[4] states that they do not pay their bills after considering all other options, it is very close to default. Table 5 (7th row) shows the share of indebted households that stated that their expenses surpassed their income in the last 12 months. The values range from 11.3% in Estonia and Slovenia to 28.8% in Croatia. In Austria, this share is 17.6%. The share of households that additionally stated that they did not pay their bills is 1.3%. This is the second-lowest value among the selected countries after Estonia. The highest shares are observed in Hungary and Croatia.

Chart 3 depicts the shares of vulnerable[5] indebted households' answers to the question how they covered their excess expenses. We observe the highest share of indebted households that did not pay their bills in Hungary, followed by Latvia and Lithuania. Furthermore, we observe differences between countries with regard to how households react to financial shortages. In Poland, for instance, getting into new debt is more common than in other countries, whereas in Croatia, credit cards are a common tool for financing. Selling assets is an uncommon reaction to shortages, households prefer to ask friends for help or to use savings; the latter is especially true for Austria and Slovakia.

Whether there are risks to financial stability stemming from potentially financially vulnerable households depends on how much debt these vulnerable households have and how much of each vulnerable household's debt is not covered by their assets. Loss given default (LGD) is a common measure that takes these considerations into account (see references at the beginning of section 3). We define it as:

$$LGD = \frac{\sum_{i=1}^{N} PD_i \times (D_i - A_i) \times NW_i}{\sum_{i=1}^{N} D_i} \times 100,$$

where NW_i is an indicator variable, which is 1 if the household has negative net wealth ($D_i - A_i > 0$). PD_i indicates the probability of default for a household with negative net wealth. For non-subjective LGDs, this indicator is 1 if the debt service-to-income-ratio is greater than 0.4. For subjective LGDs, on the other hand, it is 1 if the household states they did not pay bills in order to finance financial shortages in the last 12 months. Table 6 shows the results for these two LGDs as well as the share of households with debt exceeding several kinds of assets with their respective share in total debt. It illustrates the path from all indebted households to those whose net wealth is negative and that are financially vulnerable. These

Chart 3

How indebted households cover financial shortages

Share of vulnerable[1] indebted households
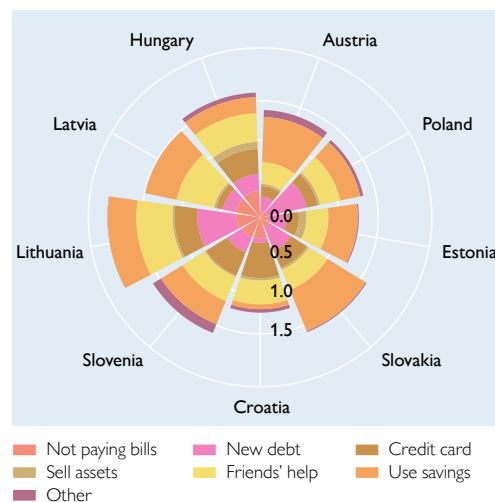
Source: Eurosystem HFCS 2017.

[1] "Vulnerable" according to the subjective "expenses above income" vulnerability measure.

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[4] *Expenditures above income.*

[5] *"Vulnerable" according to the subjective "expenses above income" vulnerability measure.*

households' debt, which is not backed by assets, is a potential loss for banks in the case of default.

In the first row of table 6, we see table 3's extensive margins on debt holding (column 1 for each country). These households hold 100% of total debt (column 2 for each country). After deducting deposits, there is a notable decrease, both in the share of households with debt exceeding deposits as well as their uncovered share in total debt. In Austria, for example, these 19.4% of total households hold 75.3% of total debt after deducting deposits. Both are the lowest shares among the countries under review. Deducting further financial assets as well as other real estate property does not reduce the shares notably. This is because these kinds of assets are held by a lower number of households (remember table 3). After subtracting the household main residence, however, there is another notable decrease to less than 8% in all countries in terms of being in debt and less than 13% in terms of the respective share of total debt that these households hold. This indicates that the household main residence is the main collateral for indebted households. In row 6 of table 6, there are the respective shares for households with negative net wealth, followed by nonsubjective LGDs. In all selected countries, the share of households with negative net wealth and a debt-to-income ratio above 0.4 is below 0.5%. The share of those households' uncovered debt in total debt (=LGD) is a crucial measure for the risk to the banking sector, and ranges from 0.03% in Estonia to 3.9% in Slovenia. In Austria, nonsubjective LGD is relatively low at 0.39%. Slovenia, Hungary and Lithuania are the countries with the highest nonsubjective LGDs, amounting to 3.9%, 2.9% and 2.1% of aggregate household debt, respectively. Changing the probability of default's defining characteristic to "not paying bills" from "having a debt-service-to-income ratio above 0.4" lowers the amount of potential losses in all countries. This is especially the case in Hungary (from 2.9% to 0.6%) and Slovenia (from 3.9% to 0.2%). The share of households

Table 6

Debt covered by different asset classes

	Austria		Estonia		Croatia		Hungary		Lithuania		Latvia		Poland		Slovenia		Slovakia	
	HH	Debt	HH	Debt	HH	Debt	HH	Debt	HH	Debt	HH	Debt	HH	Debt	HH	Debt	HH	Debt
	%																	
Debt	32.7	100.0	48.0	100.0	40.7	100.0	31.6	100.0	26.1	100.0	39.6	100.0	40.5	100.0	32.2	100.0	36.6	100.0
minus deposits	19.4	75.3	35.8	86.2	32.7	90.3	25.1	82.2	20.7	93.3	33.7	91.1	24.8	81.1	25.9	88.1	29.6	87.5
minus financial assets	17.8	68.3	32.8	77.3	30.5	85.2	23.7	76.8	19.1	84.6	31.9	86.6	22.1	75.7	22.9	81.3	27.5	82.1
minus financial assets and other real estate	16.1	57.1	25.2	48.5	25.7	73.5	20.0	61.5	15.3	61.4	23.0	55.2	17.7	55.6	17.6	58.3	23.5	66.7
minus financial assets, other real estate and household main residence	5.8	7.5	5.9	2.3	5.0	9.4	3.9	7.0	2.2	7.1	7.4	5.1	3.4	2.9	4.6	12.5	2.8	3.1
minus gross wealth	3.9	6.0	4.5	1.9	3.5	4.3	3.0	5.7	1.7	5.6	5.4	3.6	2.6	2.0	2.8	8.2	2.4	2.3
minus gross wealth & DSTI ratio ≥ 0.4 (LGD)	0.1	0.4	0.1	0.0	0.2	0.4	0.5	2.9	0.3	2.1	0.4	1.3	0.2	0.5	0.2	3.9	0.1	0.3
minus gross wealth & bills not paid (subjective LGD)	0.2	0.1	0.1	0.0	0.4	0.1	0.3	0.6	0.3	0.3	0.0	0.0	0.1	0.0	0.1	0.2	0.4	0.2

Source: Eurosystem HFCS 2017.

Note: This table shows the percentage share of households holding positive debt after deducting certain assets (HH) as well as the uncollateralized share of this debt in total debt (debt).

which are classified as potentially defaulting, on the other hand, may increase (e.g. in Austria from 0.1% to 0.2%) or decrease (e.g. in Poland from 0.2% to 0.1%) if we change the definition.

4 Comparing apples with apples: decomposition of differences

In this section we apply a machine learning approach to decompose differences of vulnerability measures between Austria and the selected CESEE countries into two groups – one group in which the differences can be explained with a number of observed household characteristics and a remainder – in order to answer the basic question of how much of the observed differences might be just due to different household compositions across countries. Household composition differs across countries for many reasons. Some differences also might have to do with the indebtedness or potential indebtedness of households and might therefore be endogenous in the sense that the availability of collateralized and uncollateralized loans might actually shape household composition itself. If loan-to-value ratio policies of banks or regulators differ across countries, households in some countries may be able to form new households by buying homes sooner than households in countries with stricter standards. Likewise, rent control and other housing policies might affect household formation and therefore household composition. However, we do not analyze the endogeneity of household formation and composition in this paper; we are merely interested in filtering out differences between financial vulnerability measures between countries which are attributable to differences in household composition. In other words, we want to compare apples with apples and see how much of the observed differences remain differences between similar households across countries. These remaining differences are those which actually stem from the different behavior of similar households or from the different behavior of banks toward similar households across different countries. Note that we use Austria as a benchmark. That means we reweight all other countries in a way that their household composition fits the Austrian household composition, so that we can compare the differences observed in Austria which are not due to differences in household composition. Results would likely differ if we used another country as a benchmark.

To reweight the data we use a reweighting method which is based on a gradient boosted model with a bernoulli loss function.[6] We perform 10, 50, 100, 500 and 1,000 iterations of an equation consisting of a dependent dummy variable, which is 1 if the observation was an Austrian household and 0 if it belongs to one other country. Based on this model (modeling the probability being an Austrian household given household characteristics), the weights are recalculated for all households in the country we want to compare to Austria. The reweighting procedure needs to be done separately for each country. The independent variables are the household heads' age, education, employment status and gender as well as the number of household members, which we consider of particular relevance to the lending process.

Chart 4 shows the results before and after reweighting. On the x-axis, there is the share of indebted households that are financially vulnerable and have negative net wealth. The dark blue dots and their respective sizes show LGDs for selected

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[6] *All calculations are done using R's gbm package. See the annex for more methodological details.*

Chart 4

LGD and subjective LGD before and after reweighting
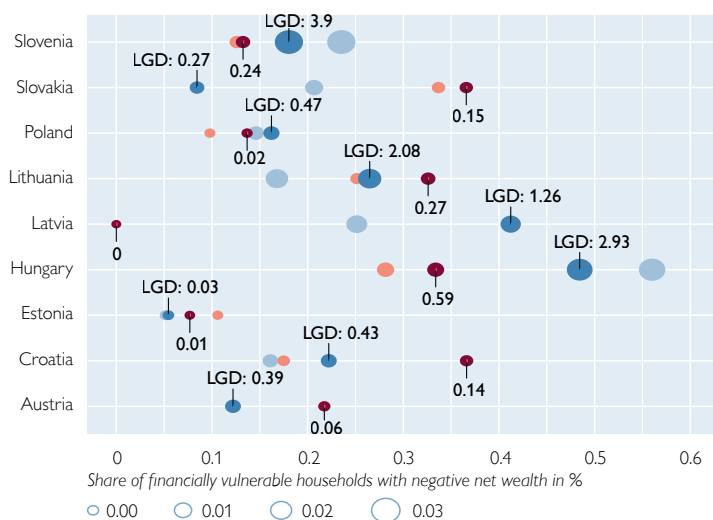
Source: Eurosystem HFCS 2017.

Note: All figures are percentages. Blue is nonsubjective (dark before reweighting, light after reweighting), red is subjective (dark before reweighting, light after reweighting).

countries, the dark red dots and their respective sizes show subjective LGDs for selected countries (see table 6 as well). The light blue dots and the light red dots and their respective sizes show the results for (subjective) LGDs after reweighting. We see that dot sizes, i.e. LGD, do not differ substantially after reweighting. On the other hand, the share of financially vulnerable households with negative net wealth might change. Both directions are possible, as we see that in Latvia the share of financially vulnerable households with negative net wealth decreases from over 0.41% to 0.25% after reweighting in the standard LGD definition. On the other hand, this share increases from 0.48% to over 0.55% in Hungary. For subjective LGDs, the share of financially vulnerable households with negative net wealth increases after reweighting in Estonia only. In all other countries, the reweighted shares are below the shares before reweighting.

5 Summary and conclusions

In this paper we employ recently available data of the third wave of the HFCS and focus on indebtedness and financial vulnerability in Austria compared to eight CESEE countries, namely Estonia, Croatia, Hungary, Lithuania, Latvia, Poland, Slovakia and Slovenia. For Croatia and Lithuania, this is the first available HFCS wave that allows such an analysis. The extensive and intensive margins of all measures considered revealed that homeownership is markedly higher in the CESEE countries than in Austria, but the value of real estate property is significantly lower. Given these low values of real estate property and the relatively high levels of debt, loan-to-value ratios above 40% are more frequent in the CESEE countries than in Austria.

Our analysis focuses on both subjective vulnerability measures, such as households' self-assessment, and nonsubjective measures, i.e. debt-to-assets (DTA), debt-to-income (DTI), debt service-to-income (DSTI) and loan-to-value (LTV) ratios, and the identification of those households that exceed certain vulnerability thresholds. The DSTI>40% vulnerability measure points toward households in Croatia, Lithuania, Slovenia and Hungary being particularly vulnerable. Slovenia, Hungary and Lithuania also have the highest loss given default, which is crucial to the Austrian banking sector.

Furthermore, we employ a procedure that decomposes the differences in the level of household financial vulnerability into two groups: differences that are due to household characteristics on the one hand and differences that result from other external factors on the other. In the first group, we find that a household head's

education was the main driver of the differences in household vulnerability when comparing Austrian households to CESEE households, followed by the number of household members, the household head's age, employment status and gender. What is most interesting is that the direction of the effects stemming from differences in household characteristics varies across countries: When we look at the share of financially vulnerable households (DSTI> 40%) with negative net wealth, differences in household composition increase overall vulnerability in Slovenia, Slovakia and Hungary and decrease overall vulnerability in the rest of the countries under review. The different directions of the effects indicate that there is no typical household structure that suggests a high level of vulnerability as different types of households are vulnerable across countries. When we consider debt coverage (loss given default), household structure has no significant effect.

The implications for the Austrian banking sector are as follows: We find that household debt in the CESEE countries in our sample is rather small compared to Austria. The financial position of households in Slovakia, Poland and Estonia seems to be quite good, whereas households in Croatia, Lithuania, Slovenia and Hungary are, financially, the most fragile according to the DSTI>40% vulnerability measure. For Austrian banks, the risk stemming from Croatian households would be small, while that stemming from Slovenian, Hungarian and Lithuanian households would be somewhat more pronounced.

In times like these it is extremely difficult to draw any conclusions, therefore we only want to point out this particularly important aspect: This time we should learn from this crisis and make sure that we have better data available to be prepared for the next one. Monitoring the indebtedness and risk-bearing capacities of households is extremely important in times of crisis. The fact that we still have to rely on survey data alone to analyze households' risk-bearing capacities should motivate policymakers to change this situation.

References

Albacete, N. and P. Fessler. 2010. Stress Testing Austrian Households. In: Financial Stability Report 19. OeNB. 72–91.

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. OeNB. 57–73.

Albacete, N., P. Lindner and P. Fessler. 2018. One policy to rule them all? On the effectiveness of LTV, DTI and DSTI ratio limits as macroprudential policy tools. In: Financial Stability Report 35. OeNB. 67–83.

Albacete, N., J. Eidenberger, G. Krenn, P. Lindner and M. Sigmund. 2014. Risk-Bearing Capacity of Households – Linking Micro-Level Data to the Macroprudential Toolkit. In: Financial Stability Report 27. OeNB. 95–110.

Ampudia, M., H. van Vlokhoven and D. Żochowski. 2016. Financial fragility of euro area households. In: Journal of Financial Stability. Elsevier. Vol. 27(C). 250–262.

Bankowska, K., J. Honkkila, S. Perez-Duarte and Lise Reynaert. 2017. Household vulnerability in the euro area. In: Data needs and statistics compilation for macroprudential analysis. Bank for International Settlements (eds). Vol. 46.

Fessler, P., P. Lindner and M. Schürz. 2016. Eurosystem Household Finance and Consumption Survey 2014 – first results for Austria (second wave), In: Monetary Policy & the Economy Q2/16. OeNB. 34–95.

Fessler, P., E. List and T. Messner. 2017. How financially vulnerable are CESEE households? An Austrian perspective on its neighbors. In: Focus on European Economic Integration Q2/17. 58–79.

Household Finance and Consumption Network (HFCN). 2020. The Household Finance and Consumption Survey: methodological report for the second wave. ECB Statistics Paper Series No 35. March.

Little, R. J. A. and D. B. Rubin. 2019. Statistical analysis with missing data. Wiley. London.

Natekin, A. and A. Knoll. 2013. Gradient boosting machines, a tutorial. Frontiers in Neuro-robotics. Vol. 7. 1–21.

Riedl, A. 2019. Household debt in CESEE economies: a joint look at macro- and micro-level data. In: Focus on European Economic Integration Q1/19. OeNB. 6–28.

Annex

In this section, we describe our calibrations for R's gbm package and our interpretation of the results.

For shrinkage, also called the learning rate, we chose 0.1, and the interaction depth, the maximum number of allowed interactions between independent variables, was set to 2. To consider overfitting, we compared the results for cross-validation and out-of-bag sample set (OOB). The number of folds we set was 2. Depending on the method, we found differences in how many trees were optimal. However, a household head's education was the main factor for reweighting when comparing

Table A1

Household weights summary statistics before and after reweighting

	Min	Q1	Median	Mean	Q3	Max
HFCS (CESEE)	10.48	287.06	645.77	1,056.49	1,383.86	12,362.04
50 trees (CESEE)	1.57	375.73	778.31	1,281.27	1,502.34	36,008.87
100 trees (CESEE)	0.98	344.57	739.12	1,306.18	1,483.90	72,531.68
500 trees (CESEE)	0.87	345.03	739.17	1,308.48	1,489.98	72,432.87
1000 trees (CESEE)	0.91	344.76	739.39	1,312.68	1,491.03	82,109.61

Source: Eurosystem HFCS 2017.

Table A2

Relative importance in the reweighting process for different interaction sets

Variable	Relative influence (%) for 10 trees	50 trees	100 trees	500 trees	1,000 trees
Education (household head)	46.61	40.95	39.07	33.97	33.14
Household size	44.85	35.34	31.49	25.39	24.83
Employment status (household head)	8.54	12.69	13.33	13.54	12.87
Age (household head)	0	4.31	9.04	17.66	20.32
Gender (household head)	0	6.71	7.07	9.44	8.84
Optimal number of trees (cross-validation)	10	50	close to but below 100	close to but below 500	close to but below 1,000
Optimal number of trees (out of bag sample set)	10	50	100	close or equal to 500	about 400-500

Source: Eurosystem HFCS 2017.

Austrian households to CESEE households in all five estimations, followed by the number of household members (see table A2). For the purpose of reweighting and the point we want to make when accounting for differences in household characteristics when comparing results between countries, we found that allowing for 100 trees was sufficient given the method's complexity compared to its usage. We want to show this in table A1.

The first row shows summary statistics for our HFCS sample's weights in Austria, the second row shows the same for the CESEE countries. When reweighting with 50 trees, there are notable changes for the CESEE countries, the same goes for 100. However, there are few to no differences in weights when increasing the number of trees to 500 or 1,000. We performed reweighting for each country's five implicates using Rubin's Rules (Little and Rubin, 2019).

Table A2 shows the estimations for the relative influence of independent variables for reweighting. The relative influence measures the importance of an explanatory variable by measuring the percentage reduction of the loss function (see Natekin and Knoll, 2013). One can see that a household head's education has the highest relative influence no matter what the number of trees is, followed by household size. Employment status and the household head's age are factors for reweighing if the number of trees increases. The latter rises to over 20% when the number of trees is set to 1,000. To find the optimal number of trees, we increased the number of trees step by step. When set to 10, cross-validation and OBB suggested that the maximum was optimal, the same goes for 50. This might be an indicator in favor of increasing the number of trees. When the number of tress was 100, cross-validation did not hit the maximum anymore, for neither 500 nor 1,000. OBB, however, suggested the optimal number of trees to be 400 to 500 when the number of tress was set to 1,000. Nevertheless, for the purpose of reweighting and the point we want to make when accounting for differences in household characteristics between countries, we found that allowing for 100 trees was sufficient.

Austrian banks' lending risk appetite in times of expansive monetary policy and tightening capital regulation

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Refereed by: Christine Ott, Deutsche Bundesbank

In the past decade, the Austrian credit market was shaped by expansive monetary policy, favorable economic conditions and tightening regulatory capital requirements. Analyzing the impact of these three factors on Austrian banks' credit risk, we focus on credit risk of new nonfinancial corporate borrowers and banks' willingness to fund customers with a high risk of default. To this end, we examine borrower-by-borrower data available in the Austrian credit register. Using data from 2008 to 2019, we find evidence for a strong improvement in credit quality as estimated by banks. We relate this overall credit quality improvement to the favorable economic environment as corporate financial statements did not improve in tandem. Applying fixed effects panel regressions, we find that expansive monetary policy induces risk taking. Banks subject to tightening capital requirements reduced the probability of default and expected loss of their customers more strongly. Smaller, regional deposit-financed banks, which are to a greater extent affected by decreasing interest rates due to margin pressure, show stronger signs of risk taking.

COVID-19 update: Austrian banks' credit quality will severely worsen as a result of the ongoing coronavirus pandemic and the related economic shutdown. Past crises showed that economies and financial stability are hit the more, the higher the levels of private sector debt and the worse the credit quality are. In our analysis, we find that the credit quality of banks' loan portfolios was good according to their own estimates when banks entered the coronavirus crisis. Low estimates of credit risk, however, also imply lower risk-weighted assets and thus lower capital requirements for a given loan portfolio. In annex 2, we depict the development of credit quality until year-end 2019 in selected service industries which were immediately hit by the policy measures taken in Austria to contain the pandemic. The overall trend, evident in recent years, toward improved credit quality according to banks' estimates holds for all those – albeit heterogenous – industries, even though credit risk parameters are worse than for the cross-industry average, especially for accommodation, food and beverage service activities.

During the past years, there has been mounting concern among policymakers and market analysts worldwide that amid historically low interest rates credit might have been excessively allocated to borrowers with a higher probability of default, potentially jeopardizing financial stability in the medium to long run (IMF, 2018). While greater risk taking can be part of healthy economic developments, excessive risk taking may amplify vulnerabilities in times of crisis. To identify changes in banks' credit quality, we look at disaggregated data on credit extended by Austrian banks to nonfinancial firms from 2008 to 2019.

In the wake of the financial crisis up to year-end 2019, the Austrian credit market was directly shaped by three key developments. First, economic conditions were relatively favorable, with GDP growth in Austria exceeding that of the euro area by about 0.2 percentage points per year. Second, banking regulation was tightened. Third, monetary policymakers lowered interest rates, crossed the zero lower bound and applied unconventional policies in the euro area and elsewhere.

In this study, we evaluate how these developments affected credit risk taking by Austrian banks. We put special emphasis on lending to risky borrowers as this has been shown to be a cause of, and to have amplified, the financial crisis (Financial Crisis Inquiry Commission, 2010). We define "risky" in line with the OeNB rating master scale, which deems customers with a probability of default (PD) above 2.73% to be "highly speculative."[2] Particularly, we address the following research questions:

- How did the probability of default and other risk measures of new borrowers evolve over the period in question? Are there signs of excessive risk taking in new lending by Austrian banks?
- How much of this development can be attributed to firms' improved financial statements?
- Did banks increasingly extend credit to existing risky borrowers?
- Which factors explain different developments across banks? Did deposit-financed banks and banks affected more strongly by toughening capital regulation behave differently?

To answer these questions, we build an extensive dataset by merging three data sources: (1) balance sheet and profit and loss (P&L) data on all Austrian banks operating from 2008 to 2019; (2) average balance sheet and P&L data on borrowers by NACE sector taken from the BACH database; and (3) data on the entire loan book of Austrian banks on a borrower-by-borrower basis for outstanding amounts that exceed EUR 350,000. As we do not have financial statements data on a firm-by-firm basis, much of the paper rests on PDs as estimated and reported by banks. The validity of these estimates, especially their evolution vis-à-vis financial fundamentals is assessed in section 2.3. For the remainder of the paper, it is important to understand the implications of relying on banks' estimates. First, banks' model estimates follow the cycle (see e.g. Kerbl and Sigmund, 2009), i.e. estimates of PDs are optimistic in benign times, but PDs increase when the economic environment worsens. We therefore stress that our measure of riskiness must be understood as banks' snapshots reflecting specific points in time. Second, some banks (i.e. banks using the internal ratings-based (IRB) approach to establish minimum regulatory capital requirements – IRB banks) use these estimates of PDs and collateral for calculating their required level of own funds and thus have an incentive to use low estimates (see e.g. Behn et al., 2016). Given this incentive, banking supervisors review the accuracy and conservatism of banks' IRB models on an ongoing basis or in dedicated exercises like the euro area-wide TRIM[3] project. According to these findings, there is no indication that banks have increasingly used downward-biased estimates in their credit risk models over time.

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[2] *We excluded borrowers with a PD ≥ 100%, i.e. borrowers in default.*

[3] *TRIM refers to the targeted review of internal models; see https://www.bankingsupervision.europa.eu/about/ssm-explained/html/trim.en.html.*

Our results show (1) a profound and, to our knowledge, as yet unreported decrease in bank-assessed riskiness of loans until 2019. While it is difficult to assess the underlying reasons, a tentative analysis suggests that firms' financial statements did not improve accordingly over the same time. We find that (2) deposit-financed banks tend to take greater risks than larger banks; the former are affected by monetary policy to a greater extent than larger banks and less by capital regulation. For large banks, by contrast, the effects work in the opposite direction (for related research, see Kerbl and Sigmund, 2016). To assess risky borrowers' ability to receive additional funds, we employ fixed effects panel regressions, where (3) we find that expansionary monetary policy induces risk taking by banks; (4) we confirm that this effect is stronger for deposit-financed banks and (5) we relate the overall decrease in credit risk as estimated by banks to improved economic conditions but also to the fact that capital requirements increased over the same period.

The paper proceeds as follows: in section 1, we review the literature on the link between capital regulation and banks' risk appetite and the risk-taking channel of monetary policy. We then present stylized facts about Austrian banks' credit portfolio allocation and the main variables of interest (section 2). Section 2.3 presents a simple empirical model that relates the changes in PDs to corporate fundamentals. Section 3 introduces a panel model that exploits bank heterogeneity in regulatory capital requirements, exposure to interest rates and other controlling variables to understand what drives banks' risk appetite. Section 4 concludes.

1 Literature review

Our research is particularly related to two strands of literature: (1) the link between capital regulation and banks' risk appetite and (2) the relationship between monetary policy and banks' risk taking in lending.

1.1 Regulatory capital requirements and banks' risk appetite in lending

Regulatory capital requirements affect banks' risk-taking behavior due to their risk-sensitive nature, which has been a goal of capital regulation at least since Basel II (Kerbl and Sigmund, 2009).[4] To comply with increasing regulatory capital requirements, banks may raise the numerator of the capital adequacy ratio, e.g. by retaining earnings, and/or reduce the denominator, e.g. by reducing the volume or the risk intensity of their assets. In fact, what banks mainly do is increase their capital, and only as a second-best option do they adapt their asset portfolio by decreasing lending, as shown by the observation of mere balance sheet changes and by bank surveys. Banks reducing their risk-weighted assets focus primarily on liquid non-core assets given the latter's typically high risk weights. As to banks' deleveraging priorities, Eidenberger et al. (2014), for instance, provide post-crisis evidence for Austrian banks, the Basel Committee on Banking Supervision (BCBS, 2019) for global systemically important banks, and a survey of the Bank of Finland (2019) for Finnish banks. The transmission mechanism of (higher) capital requirements to banks' portfolio allocation is as follows. Banks simultaneously plan their asset and

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[4] *Capital requirements became more risk sensitive once Basel II was implemented in the EU in 2007 via the Capital Requirements Directive I. With the financial crisis etched in everybody's mind, capital requirements were further strengthened following the EU's 2014 implementation of Basel III via the Capital Requirements Regulation and Capital Requirements Directive IV, which also introduced macroprudential policy. See also Borio and Zhu (2008) and Kerbl and Sigmund (2009).*

liability structure (Cadamagnani et al., 2015). As banks shift to a higher share of equity funding, the opportunity cost of funding, i.e. their weighted average cost of capital, increases. Internal pricing mechanisms are responsible for how this cost is passed on – in view of banks' internal return targets, other strategic objectives, regulatory constraints and other external factors (e.g. competition with both banks and nonbank sources of financing, or the interest rate environment[5]). In turn, banks partly pass through this additional cost to new borrowers via higher credit spreads or fees. De-Ramon and Straughan (2017) present empirical evidence on short-term increases in banks' lending spreads to nonfinancial firms in the U.K. following shifts in banks' funding structures toward a higher share of equity financing. The implementation of higher (macroprudential) capital requirements might also have an impact on banks' asset composition. For example, Cappelletti et al. (2019) examine banks under the ECB's direct supervision (Single Supervisory Mechanism – SSM) in 19 euro area countries including Austria. They found that the implementation of the macroprudential buffer for other systemically important institutions (O-SII buffer) had led to a positive disciplining effect. Banks shifted their lending to less risky nonfinancial firms and households between 2014 and 2017. Overall, the relative change in banks' asset portfolio composition depends on how much equity borrowers consume (i.e. their risk weights) and on the risk-adjusted margins banks are able to generate.

The transmission mechanism is also influenced by bank health, e.g. in terms of banks' initial capitalization, their liquidity position and share of nonperforming loans (NPLs) in the credit portfolio. According to research, better capitalized banks show reduced risk-taking incentives and have more conservative loan pricing practices in the euro area (see Cappelletti et al.,2019, for SSM banks including Austria; Hirtle et al., 2016, for similar evidence on the U.S.A.). Various papers construct different measures of bank health and analyze its impact on credit quality. Andrews and Petroulakis (2019), for example, show for 11 European countries including Austria that, compared with healthy banks, weak banks were more likely to be connected to weak nonfinancial firms between 2001 and 2014.[6] Storz et al. (2017) link balance sheet data of nonfinancial firms to banks' characteristics. They show that "risky firms" are tied to stressed banks. According to their results, an increase in bank stress by one standard deviation was related to a 1% increase in the indebtedness of risky firms in euro area periphery countries from 2010 to 2014.[7]

From a financial stability perspective, it is important that banks set loan terms reflecting operating costs, expected credit losses as well as capital and funding cost. If risks are underestimated, credit growth may become excessive and credit

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[5] *Changes in interest rates affect banks' cash flows, net interest margins, earnings and valuations of assets and thereby banks' capital. The interest rate environment also has an indirect impact on the balance sheets of borrowers and the overall economic situation. The strength of the link between changes in interest rates and capital varies depending on financial and economic conditions as well as on banks' specific balance sheet characteristics. The impact may be asymmetric between increases and decreases (Borio and Zhu, 2008).*

[6] *There is a 13% to 19% difference in lending to non-viable firms ("zombie firms") between healthy and weak banks. The measure of bank health used by Andrews and Petroulakis (2019) is based on a combination of several indicators (e.g. capitalization, NPL ratio, return on assets, maturity mismatch) to which the authors apply a principal component analysis. "Zombie firms" are defined as elderly firms with weak debt-servicing capacity.*

[7] *Cappelletti et al. (2019) construct an index of bank stress based on principal component analysis of five indicators (nonperforming loans, return on assets, capitalization, z-score and maturity mismatch).*

quality may deteriorate (e.g. Schularick and Taylor, 2009; Jordà et al., 2014).[8] Also, the cost of risk might surge in case of macroeconomic shocks. In sections 2 and 3, we investigate the link between capital requirements and Austrian banks' risk appetite in lending to the real economy and test whether the credit quality in banks' loan portfolios improved as regulatory capital requirements increased, which would be in line with the literature.

1.2 Monetary policy and banks' risk appetite in lending

Expansive monetary policy affects banks' asset and liability management via (1) "search for yield" triggered by squeezed profit margins and (2) an improvement in borrowers' balance sheets and asset valuations – especially during favorable economic conditions.

First, changes in short-term policy interest rates impact banks' pricing policies for loans and deposits.[9] But the pass-through of policy rates on deposits – the "retail deposit channel" – is incomplete with low or even negative interest rates. Banks become increasingly reluctant to pass on these short-term funding rates to retail deposits (Eggertsson et al., 2019). In turn, interest margins are compressed as assets are sequentially repriced, but the interest on deposits cannot go any lower. Kerbl and Sigmund (2016) show that the net interest income of small banks which are highly dependent on deposit financing is hit hardest by the low interest rate environment. Banks might compensate for the loss in interest margins in several ways, e.g. by increasing the non-interest component of banking services and/or lending to higher-yielding customers. As a case in point, banks in Italy with a higher deposit base responded to negative policy rates by raising their fees and commissions on loans more strongly than banks with a different funding structure (Bottero et al., 2019). Such an increase in fees on lending might also lead to a selection bias of borrowers as better rated customers might be offered more favorable terms and conditions by other banks.

Banks will also "search for yield" and increase their risk tolerance by lending to higher-yielding, riskier borrowers. From a bank's point of view, loans with the highest risk-adjusted margins are the most profitable, possibly enabling banks to achieve nominal returns similar to those when interest rates were higher (Gambacorta, 2009). From a financial stability perspective, such lending is justified if credit risk – and other cost components – are adequately priced in. The monetary policy rate level, the macroeconomic environment and bank-specific characteristics, e.g. capital and liquidity position, impact the intensity of the search for yield.[10]

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[8] Credit risks were mispriced in the run-up to the financial crisis, i.e. lending was made available at interest rates too low to cover risk costs. Parts of these funds went into lending for projects that only appeared to be profitable or were used for consumption. Consequently, high lending growth at low interest rates did not contribute to sustainable economic growth. Such loans placed a significant burden on the balance sheets of borrowers and banks alike (European Commission, 2019).

[9] Besides deposits, changes in policy interest rates also directly impact other bank funding sources, such as interbank loans and other nonbank debt financing sources (e.g. bonds) via relative changes in funding costs.

[10] Changes in monetary policy rates have an asymmetric impact on banks' behavior: the extent to which risk taking is encouraged by rate cuts is higher than the curtailing effect on risk taking triggered by an equivalent rate increase (Borio and Zhu, 2008). Dell'Ariccia et al. (2013) find for the U.S.A. from 1997 to 2011 that an increase in short-term policy interest rates is related to a reduction in banks' risk appetite in lending. The relationship is more pronounced for banks with high capital levels and less so during periods when banks' capital erodes.

We may summarize empirical evidence as follows: Gaggl and Valderrama (2014) analyze the link between the short-term interest rate and the risk composition of banks' loan portfolios in Austria between 2003 and 2005. Their results suggest that banks allow more (expected) default risk in their loan portfolios if interest rates are sufficiently and persistently low and economic activity is improving significantly at the same time (Gaggl and Valderrama, 2014). Jiminez et al. (2008) show for Spain that low interest rates at loan origination are positively linked to the probability of extending loans to existing risky borrowers with a bad credit history. Following the introduction of negative interest rates by the ECB in mid-2014, banks in Italy rebalanced their asset portfolios by reducing liquid assets, namely interbank loans, and expanding credit supply (Bottero et al., 2019). Banks with higher ex ante net short-term interbank positions expanded credit especially to smaller and riskier firms and cut interest rates on loans (Bottero et al., 2019). Also, interest rate risk may rise as banks increasingly issue fixed rate loans. Kerbl et al. (2019) provide evidence that interest rate risks of Austrian banks have risen markedly during the phase of negative interest rates and relate this to the search for yield in times of margin compression.

Moreover, accommodative monetary policy aims at increasing aggregate demand and stimulating the business cycle, thereby reducing the frequency of defaults. Additionally, it can lead to increased collateral values. It also improves borrowers' debt-servicing capacity (e.g. Jordà et al., 2014). All these channels may lead to reduced credit risk in times of a (ceteris paribus) more expansive monetary policy stance.

However, these developments may also alter banks' risk perception, e.g. as the volatility of asset prices decreases. As a result, banks may take on more risk in their loan portfolio and may loosen their credit standards (Gambacorta, 2009). Existing riskier borrowers might find it easier to receive additional funds from banks. Also, banks might extend lending to existing borrowers with a view to preventing their default. In the extreme case, banks may keep existing insolvent borrowers alive, which is referred to as "evergreening" (Andrews and Petroulakis, 2019; Banerjee and Hofmann, 2018; McGowan et al., 2017). Clearly, evergreening is a variant of risk taking: instead of writing off a loan, the bank increases its stacks in hopes of a turnaround. Both the potential loss and gain increase as a result.

Maddaloni and Peydro (2011) find for the euro area and the U.S.A. that banks loosen credit standards when interest rates are lowered. In the U.S.A., loan pricing of riskier corporate borrowers was more favorable (relative to safer borrowers) during periods of expansive monetary policy as shown by Paligorova and Santos (2012). These results suggest that the price of loans did not adequately reflect the cost of risk.

More risk taking does not necessarily reduce financial stability if, for instance, risks are adequately priced and asset valuations are in line with fundamentals. However, if higher risk taking turns into excessive risk taking combined with asset overvaluations, financial imbalances are built up which can be particularly harmful to financial stability in times of crises. In section 3, we investigate whether expansive monetary policy encouraged risk taking in the past decade and whether deposit-financed banks are more inclined to risk taking compared to large banks.

2 Banks' lending risk appetite: data and stylized facts

We first describe the indicators and underlying data used to measure banks' risk taking before presenting stylized facts on Austrian banks' risk profile in lending to nonfinancial firms.

2.1 Defining risk appetite and related data applied in the analysis

Banks' risk appetite captures how much risk banks actively take on in their loan portfolio given their strategic objectives.[11] We specifically analyze PDs and the expected loss (EL) for both outstanding loans and new loans, as estimated by banks. We specifically focus on the existing risky part of banks' loan portfolios, exploring whether banks increasingly extended credit to existing risky borrowers over the past decade.

We use the Austrian credit register which contains data on a borrower-by-borrower basis of nonfinancial corporate borrowers whose exposure exceeds EUR 350,000 per bank. Among other items, each observation supplies us with the time-invariant ID of the borrower, the exposure, the borrower's rating, the PD and the collateral value.[12] Our sample covers all Austrian banks[13] from year-end 2008 to year-end 2019. We aggregate the individual loan data per bank to assess banks' risk profile in lending to the real economy and to exploit the variation across banks and time. The following risk parameters are calculated on a bank-by-bank basis for both outstanding and new loans.

First, the *borrower's PD* is the bank's internal estimate of a given customer's one-year default probability. In case of IRB banks,[14] the reported PDs correspond to those used by the banks to calculate their own funds requirements. In case of non-IRB banks, the PDs correspond to bank-internal estimates used for risk management. When we compare PDs that IRB banks and non-IRB banks use for identical customers, we find that non-IRB PDs tend to be higher, namely by 0.07 percentage points on average across the entire sample (whose weighted average is 1.58 percentage points). While this difference is no cause for concern, we will nevertheless control for this factor in our panel estimation in section 3.

Our data lack the second important risk parameter, the *loss given default (LGD)*, which is why we approximate LGD values as follows: *LGD = 1 − collateral values/ exposure*. Here, we only use the collateral values of eligible assets. This approximation is rather crude: workout of collateral values comes at a cost and realized values are typically below market values, while even unsecured parts of the exposure have recovery rates well above zero.[15]

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[11] *For more information on the supervisory view on banks' risk appetite framework, see Nouy (2018).*

[12] *Changes in banks' pricing policies cannot be considered in the analysis as interest rates on a client-by-client basis are not available for the entire period of observation. Price information is only available for the newest time points that are based on the new supervisory data collection framework capturing individual loan information, which is harmonized across euro area countries (AnaCredit).*

[13] *"Austrian" refers to banks with a bank license issued in Austria.*

[14] *IRB is short for the internal ratings-based approach under which banks use these PDs for calculating their required level of own funds.*

[15] *We ran the analysis below, assuming a 50% recovery rate on unsecured exposures (approximately in line with regulatory parameters in IRB) and a 10% haircut on collateral values. Our results are valid under this alternative LGD proxy.*

The *expected loss (EL)* is calculated as follows: $EL = PD \times LGD \times EAD^*$ where the reported PD and LGD per borrower as well as a proxy for the exposure at default (EAD^*) are approximated by the total exposure.[16] While the EL of a portfolio varies through time, our dataset allows us to filter for new customers only and thus gain insight in banks' risk taking. For each bank, we look at the mean of the EL of new customers ($EL\_mean_{i,t}$). According to the literature reviewed in section 1, a search for yield might particularly affect the high-risk parts of the portfolio. Apart from the mean, we thus also look at the 95% quantile of the EL of new customers per bank and time ($EL\_q95_{i,t}$). To disentangle the effect on PD and LGD, we also look at the trajectory of the PDs separately ($PD\_mean_{i,t}$, $PD\_q95_{i,t}$).

Most importantly, we also calculate the *share of risky customers receiving additional funds* in outstanding loans: this measure sheds light on existing risky customers' access to additional bank credit. We define "risky" in line with the OeNB rating master scale which denotes customers with a PD > 2.73% as "highly speculative."[17] For those customers, we calculate the share of risky customers that received additional funds compared to all customers with a PD above that threshold[18], i.e.

$$Share\ of\ risky\ customers\ receiving\ additional\ funds_{i,t} =$$

$$= \frac{number\ of\ risky\ borrowers_{i,t,additional=TRUE}}{number\ of\ risky\ borrowers_{i,t}}.$$

We further limit our cases to those where banks deliberately took on risk. To this end, we use a variation of this indicator by applying a restricted version of the numerator: banks that increased their lending to risky customers which at the same time showed increases in PD, LGD or both.

With these indicators we try to measure the risk-taking effect of easy money. A risky customer is expected to receive further funds only if the bank has abundant access to cheap money and if it is not constrained by tighter regulatory capital requirements, especially if the customer is not able to back the additional funds with additional collateral (and consequently the LGD increases). These indicators and their variations will serve to assess banks' risk taking and thus form the cornerstone of our analysis.

In section 3, we try to explain the cross-time and cross-section variance of these indicators by means of explanatory variables consisting of (1) macro variables, importantly the short-term policy interest rate, and (2) bank-specific characteristics. We derive data on bank-specific characteristics from the OeNB's regulatory reporting system. The data on banks include total assets, net interest margins, liquidity situation and – crucially – regulatory capital requirements. To capture the overall level of capital requirements and the amount of free capital per bank, i.e. the capital in excess of regulatory capital, we account for the regulatory changes

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[16] *We did not use the unexpected loss (UL) as the UL is highly dependent on correlation coefficients which are hard to estimate.*

[17] *We excluded borrowers with a PD ≥ 100%, i.e. borrowers in default.*

[18] *Note that to qualify as a risky customer PD > 2.73% must hold for both the time point before and after the extension of additional funds.*

of the post-crisis era: the entry into force of Pillar II capital requirements[19] in 2009, as well as the implementation, in 2016, of the capital conservation buffer (CCoB) and of macroprudential capital buffers, such as the buffer for other systemically important institutions (O-SII buffer) and the systemic risk buffer (SyRB). We consider all phase-in arrangements for the buffer sizes and any changes in the levels of the buffers over time.[20] As banks anticipate changes in capital requirements ahead of the effective implementation date, we antedate changes in capital requirements by one year. Table A1 in annex 1 provides detailed definitions on the explanatory variables, and table A2 in annex 1 provides summary statistics.

2.2 Aggregate statistics on banks' risk taking in lending

Chart 1 depicts the main variables of interest. Panel (a) shows the general decline in interest rates, proxied by the 6-month EURIBOR, which characterized the period under investigation. Panel (b) highlights another fundamental change: increasing regulatory capital requirements. The panel differentiates between Austrian banks which are deposit financed (share of deposits exceeds 80% of total liabilities[21]) and large Austrian banks (total assets exceed EUR 30 billion). Deposit-financed banks tend to be smaller regional banks. While they too were impacted by general changes in regulation (e.g. the introduction of the CCoB), they were initially not charged with a capital add-on in Pillar II and are not subject to macroprudential buffers like the SyRB in Austria. Thus, we see a marked difference in the levels for the two groups of banks and a lagged pickup of capital requirements for deposit-financed banks.

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[19] *As the results for individual banks' Pillar II requirement are not available for the period up to 2018, we assume a 2% Pillar II capital requirement for any bank subject to the Pillar II process until the point in time when exact data are available. Given the low variation across time where data are available and across banks, we think this proxy is well justified. Before 2016, only large banks were subject to binding Pillar II requirements and these banks show a particularly stable distribution around 2%.*

[20] *The countercyclical capital buffer (CCyB) has been at 0% since its introduction in 2016, but foreign CCyB rates are relevant for Austrian banks with cross-border exposures.*

[21] *An 80% deposit share is a high threshold, so "deposit financed" might rather be thought of as "deposit focused." At year-end 2019, 336 deposit-financed banks had aggregated total assets of EUR 197 billion and six large banks had aggregated total assets of EUR 338 billion on an unconsolidated basis. The conditions for falling into either category are applied at each moment in time, which allows for in- and outward migration.*

Chart 1

Main variables of interest and measures of Austrian banks' risk taking in lending to nonfinancial firms

(a) 6-month EURIBOR

%

EURIBOR

(b) Total capital requirements

%
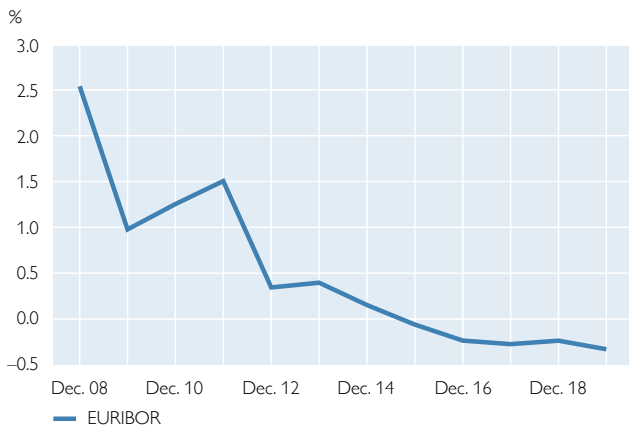
Deposit-focused banks   Large banks

(c) EL and PD for outstanding loans over time
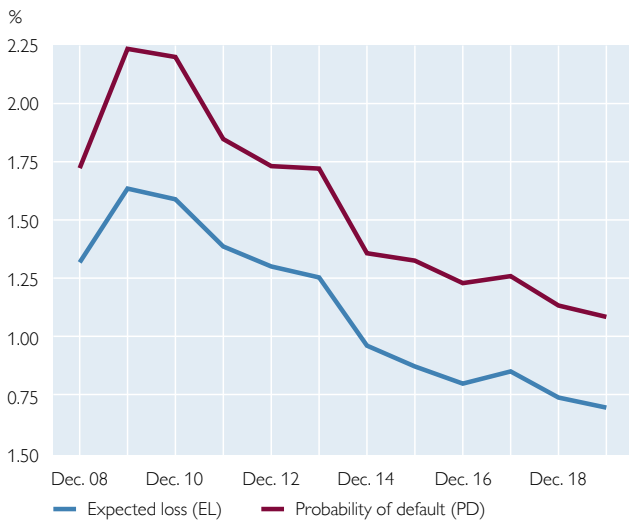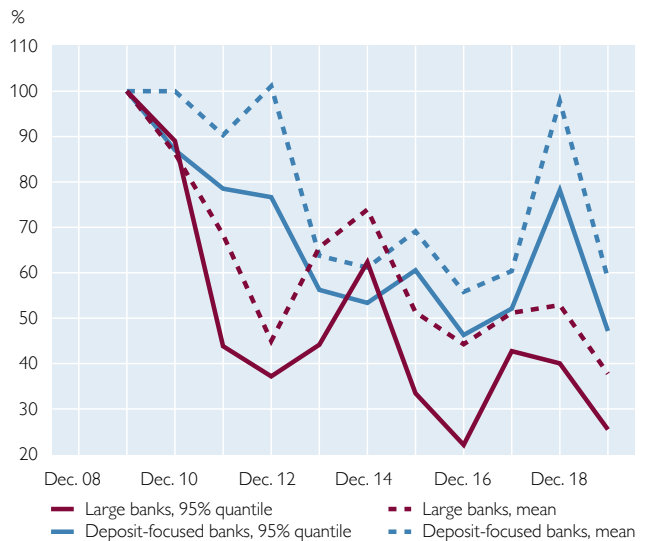
%

Expected loss (EL)   Probability of default (PD)

(d) EL for new customers

%

Large banks, 95% quantile   Large banks, mean
Deposit-focused banks, 95% quantile   Deposit-focused banks, mean

(e) Share of risky customers receiving additional funds

%

Deposit-focused banks   Large banks

(f) Share of risky customers receiving additional funds while…

%

…LGD increases   …PD and LGD increase   …PD increases
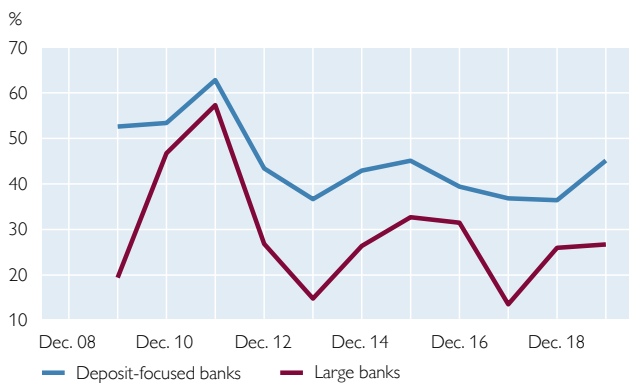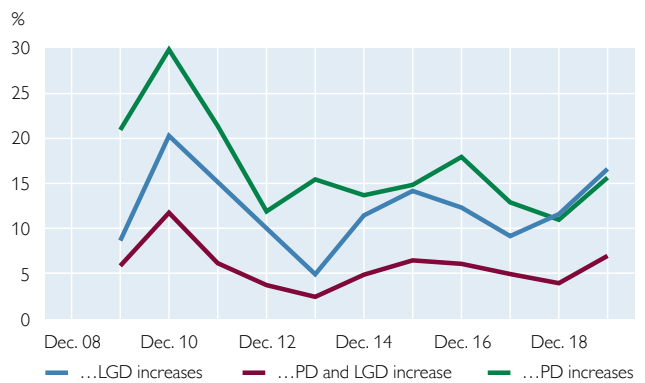
Source: OeNB: regulatoray reporting system, authors' calculations.

Panel (c) shows aggregate results for Austrian banks' estimates of credit risk. We restrict the sample to existing loans, i.e. filter out new customers for each point in time, in order to observe risk metrics of outstanding loans over time. The panel shows a substantial reduction of both the expected loss and probability of default of existing borrowers from 2010 onward. Risks in the loan book increased between 2009 and 2010, before dropping slightly between 2010 and 2011. Around that time, the turmoil of the financial crisis began to fade and the quality of loans as assessed by banks steadily increased, with EL and PD reaching values that were about half as high as the starting points. The financial crisis may have increased risk aversion among lenders. As our findings in sections 2.3 and 3 will show, this positive evolution of risk metrics relates to the favorable economic conditions in Austria, the increase in asset/collateral valuations (at least for EL) and the persistently low interest rate environment during the period under review. These developments may have also altered banks' risk perception as outlined in section 2.1.

Shedding light on banks' risk taking, panel (d) shows the expected loss for *new* customers only. Here we provide a breakdown of large banks versus deposit-financed banks and also show the mean of the EL of new customers and the 95% quantile[22]. Again, we observe a strong decrease in banks' PDs and ELs over the period under investigation. For both risk measures, we diagnose a stronger decline for larger banks vis-à-vis deposit-financed banks. This finding is in line with our expectations that deposit-financed banks are affected less by tightening regulatory capital requirements than by decreasing policy rates (Kerbl and Sigmund, 2016).

Panels (e) and (f) explore whether existing risky borrowers find it easy to receive additional funding, illustrating the share of risky customers receiving additional funds in all risky customers. In the past decade of monetary easing and tightening regulation (see panels (a) and (b)), this share decreased considerably, starting from initially high values. However, after this initial drop, the share of risky customers receiving additional funds hovered around the same level for the remainder of the period, with increases in the most recent observations (see panel (e)). Most recently, around 40% of existing risky customers received additional funds from deposit-focused banks (about 30% from large banks). Again, the split between deposit-financed and large banks in panel (e) indicates a higher risk appetite for deposit-financed banks, which supports the hypothesis that deposit-financed banks face greater margin pressure. Panel (f) indicates that only a relatively small share of risky customers whose PD (and/or LGD) worsened received additional funds. Since 2014, there has, however, been an increase in cases of additional funds being extended to risky customers whose LGD worsened at the same time, which suggests that these borrowers cannot provide additional collateral. There has also been a slight rise in cases where both LGD and PD increased.

To study the drivers of this development, we approach the dataset from two perspectives. First, we examine whether the marked PD and EL improvement evident in panels (c) and (d) is supported by stronger corporate financial statements (see section 2.3). Second, we exploit bank heterogeneity in section 3 to understand which bank characteristics determine banks' differing risk appetite.

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[22] *For each bank and time point, we calculate the exposure-weighted distribution of EL across new customers. We first take the mean and the 95% quantile of this distribution for each individual bank and then for each time point average across banks (again exposure weighted).*

2.3 Decrease in credit risk attributable to stronger corporate financials?

Corporate financials ("hard facts") are a key input for banks' rating models. Lower PDs in banks' books can thus be traceable to three sources: (1) banks' customers have become healthier and show stronger financials (hard facts) in their financial statements, (2) economic conditions have reduced the general probability of default for a given level of hard facts, (3) banks' model-based PDs have not moved in line with the physical, true probabilities. In other words, lower PDs are not attributable to hard facts or better economic conditions but to changes in banks' rating models. From a financial stability perspective, (1) means that objective fundamentals back the reduced risk measured by the banks and is therefore the least worrisome of the three possible sources, (2) means that there is a strong cyclical component to credit risk in banks' books, and (3) means that either current risk metrics are too optimistic (alarming for supervisors) or earlier ones were too pessimistic.

We lack firm-by-firm accounting data that match our credit data, which would be necessary for a detailed distinction of the three sources. However, we can supplement our credit dataset with balance sheet and P&L data that provide average financials per industry and time (Bank for the Accounts of Companies Harmonized (BACH) database; see BACH-ESD Database, 2020). As in the BACH database financials are currently only available until year-end 2017, we must restrict our sample accordingly. In a simple regression, we regress industry-averaged PDs coming from our credit data on the financials of the BACH database. We add time-fixed effects, which should be zero under the hypothesis that the improvement in PDs can be solely attributed to improved financials (source (1) above). In this case, the relation of PDs and financials would be constant over time.

$$\overline{PD}_{i,t} = \alpha + \mu_i + \theta_t + \beta_1 Debt\ Ratio_{i,t} + \beta_2 EBITA_{i,t} + \beta_3 Turnover_{i,t} + \varepsilon_{it}$$

Where $\overline{PD}_{i,t}$ is the average PD per two-digit NACE sector i and time t, $Debt\ Ratio_{i,t}$ and $Turnover_{i,t}$ are the corresponding average hard facts[23], μ_i are sector-specific, time-invariant effects and θ_t are time-fixed effects. If we set μ_i to zero, we obtain a pooled regression whose results are listed in the first columns of table 1. The hard facts are significant and meaningful, i.e. a higher debt ratio increases PDs, a higher EBITA lowers them. Once we allow for sector-fixed effects (right columns of table 1), these dominate the hard facts, which become insignificant.

Table 1

A simple rating model

Variable	Pooled		Fixed effects	
	Estimate	Standard error	Estimate	Standard error
(Intercept)	0.002	0.249		
Debt ratio	0.028	0.004***	−0.001	0.006
EBITA to turnover	−0.008	0.002***	−0.000	0.003
Turnover mean	−0.002	0.001**	0.000	0.0001***
Time2009-12	0.484	0.172***	0.460	0.102***
Time2010-12	0.409	0.203**	0.423	0.122***
Time2011-12	0.236	0.182	0.130	0.098
Time2012-12	0.129	0.165	0.014	0.074
Time2013-12	0.105	0.143	−0.013	0.085
Time2014-12	−0.163	0.125	−0.342	0.09***
Time2015-12	−0.215	0.127*	−0.373	0.080***
Time2016-12	−0.251	0.121**	−0.445	0.074***
Time2017-12	−0.142	0.139	−0.418	0.105***
R^2	0.46		0.4	
Number of observations	782		782	

Source: OeNB, authors' calculations.
Note: Codes denoting statistical significance: *** p < 0.01; ** p < 0.05; * p < 0.1. We use HAC robust standard errors.

[23] *These key financial variables typically feature in standard rating models. Robustness checks by adding other financial variables (especially lags of those) did not produce any reason to deviate from our conclusion.*

Irrespective of whether we include sector-fixed effects, we see that the time dummies start with a positive sign in 2009, become smaller over time and turn negative around 2014. After that, the models disagree on the size of the coefficients, whose statistical significance likewise varies. However, if we ignore the methodological issues discussed below, this means that a part of the reduction in PDs cannot be explained by better financials; otherwise, the time dummies would be zero. As a case in point, the fixed effects regression in table 1 shows that PDs in 2017 are estimated to be 0.41 percentage points lower than those in 2008 for the same fundamentals. Chart 2 updates panel (c) of chart 1 accordingly and adds the

Chart 2

Adjusted PD for outstanding loans over time

Source: Authors' calculations.

Note: Adjustment of PDs according to time dummies of pooled regression and fixed effects regression (with 95% confidence bands) of table 1. Confidence bands for the pooled regression are omitted to avoid overplotting.

estimated time-fixed effects to the evolution of the average PDs. Whereas under the pooled regression model the decline in PDs is still visible and strong, it is almost flat for the fixed effects model. This strong disagreement with regard to the size of the adjustment (33% vs. nearly 100%) shows the high level of uncertainty in the estimations.

A part of the improvement in PDs thus either results from a changed macro-economic environment that produces fewer defaults for the same financials (source (2) above), or from a shift in the relation between banks' PD estimates and true PDs (either toward greater alignment, or away from it; source (3) above).

This is difficult to ascertain for lack of better data linking financials to credit on a firm-by-firm basis. Also, we must emphasize the limitations of the simple model of table 1 and warn against overemphasizing these results for the following reasons. As the BACH database provides only industry aggregates and no microdata, we cannot establish a link to a specific bank. In technical terms, there is an identification problem: perhaps gross industry financials have not improved while those parts that banks lend to have. For instance, advances in risk management, especially in the loan granting and customer selection process, could have improved banks' credit risk ratings. More research with microdata is needed to tackle this shortcoming.

In the next section, we exploit bank heterogeneity to try to disentangle different developments across the banking sector.

3 Bank heterogeneity

To better understand the drivers of banks' risk appetite in lending, especially with regard to the interest environment and capital regulation, we set up a panel model to control for bank characteristics. Do banks which are more affected by the low interest rate environment and/or tougher banking regulation act differently?

The specification regresses our metrics of credit risk ($EL_{i,t}$, $PD_{i,t}$ and *Share of risky customers receiving additional funds$_{i,t}$*; see section 2.1) on the change of the
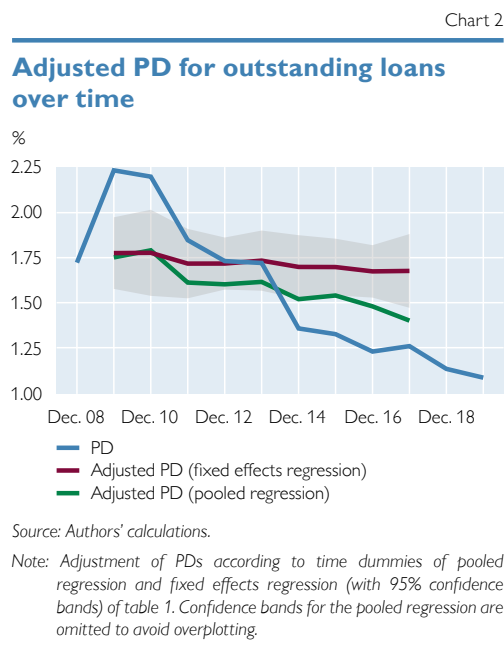
interest rate, a dummy indicating whether the bank is classified as deposit financed and not a large bank (>80% deposit share of liabilities and total assets of < EUR 30 billion), on an interaction term of these two variables to elicit whether deposit-financed banks are affected differently, on the level of capital requirements the bank is exposed to and on further control variables. These control variables comprise bank-specific variables, such as liquidity position and net interest margin, as well as macroeconomic variables like growth of house prices and GDP. To further account for the favorable economic situation, we add the economy-wide improvement in PDs of outstanding loans. We add fixed effects for banks and time and differentiate those variables for which the augmented Dickey-Fuller test does not reject the null hypothesis of non-stationarity (interest rates, house prices and total capital requirements).

The general specification looks as follows:

$$credit\ risk\ metric_{i,t}$$
$$= \alpha + \mu_i + \theta_t + \beta_1 intr_t + \beta_2 deposit\ focused_{i,t}$$
$$+ \beta_3 deposit\ focused_{i,t}\ x\ intr_t + \beta_2 capital\ requirement_{i,t}$$
$$+ \beta_3\ further\ control\ variables_{i,t} + \varepsilon_{it}$$

where $i=1,...,N$ is the bank index and $t=1,...,T$ is the time index, βs represent the parameters, μ_i the bank-fixed effects, Θ_i the time-fixed effects and $\varepsilon_{i,t}$ is the disturbance term.

The results are shown in table 1, with asterisks marking statistical significance using HAC robust standard errors. Controlling for the general macroeconomic environment, a reduction in the interest rate is associated with increased risk taking. This is in line with previous research (e.g. Gaggl and Valderrama, 2014). By our estimate, a 1- percentage-point reduction in interest rates increases the EL of new customers by 2 percentage points and the share of risky customers receiving additional funds by 20 percentage points. Deposit-focused banks tend to be less prepared to extend additional funding to risky customers, but the effect is small and insignificant with regard to the EL and PD of loans to new customers. Importantly, a reduction in interest rates affects deposit-focused banks more strongly as shown by the interaction term of such banks and the interest rate. This is in line with the assumption that deposit-focused banks come under stronger margin pressure and therefore react more strongly to rate cuts by extending funding to risky customers.

Capital requirements, the second major focus of the study, reduces risk taking across all metrics. Surprisingly, even when controlled for overall capital requirements and the amount of a bank's free capital, the SyRB further reduces lending to risky customers if they cannot provide additional collateral (see columns with LGD increases in table 2). Also, together with free capital and the change in total capital requirements, the introduction of a 1% SyRB reduces the EL of new customers by around 30 basis points, which is a modest but not negligible effect. Concerning the share of risky customers receiving additional funds, the coefficients of these three variables add up to an approximate 4-percentage-point reduction given a 1-percentage-point increase in capital requirements.

Table 2

Explaining bank heterogeneity regression results

Variable	Share of risky customers receiving additional funds	…while PD increases	…while LGD increases	…while PD and LGD increase	EL for new loans	PD for new loans
(Intercept)	0.047	−0.193***	0.128***	0.021	0.06***	0.062***
d EURIBOR	−22.617***	−19.043***	−2.906*	−0.271	−2.255***	−2.279***
Deposit focused	−0.016*	−0.028***	−0.019***	−0.014***	0	−0.001
Interact Deposit focused × d EURIBOR	−5.005***	−3.105***	−2.43***	−0.749*	0.133	0.16
d Total capital requirement	−2.188***	−3.046***	−0.38**	−0.864***	−0.102**	−0.134**
SyRB	−1.515***	0.552	−0.812**	−0.564**	−0.254***	−0.334***
Total capital free	0.598***	−0.023	−0.171***	−0.071***	−0.025***	−0.021***
Liquidity to total assets	−0.285***	−0.206***	−0.045**	0.022*	0.016***	0.017***
Macro effect	−63.84***	−41.677***	−19.028***	−1.991	−5.533***	−5.595***
d House prices	−0.009**	−0.008**	−0.005**	−0.002	−0.001*	−0.001**
GDP growth	2.045**	7.621***	−1.589***	0.859**	1.063***	0.951***
IRB yes	−0.074***	−0.074***	−0.052***	−0.049***	−0.002	−0.004**
Interact Total capital free × d EURIBOR	23.608***	−1.906	−6.651***	−2.316**	−4.605***	−4.603***
R^2	48	38	49	36	35	36
Number of observations	5,508	5,508	5,508	5,508	6,229	6,229

Source: OeNB, authors' calculations.

*Note: Codes denoting statistical significance: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. We use HAC robust standard errors.*

Across the various specifications, there are mixed results for the amount of free capital: more capital in excess of regulatory requirements increases banks' willingness to extend additional funds to risky customers, except when borrowers' credit standing deteriorates. At the same time, more free capital tends to reduce the EL and PD of new customers, but the effect on the expected loss of new customers is small (a 1-percentage-point increase in free capital decreases the EL of new customers by 2 to 3 basis points). However, we caution against over-interpreting these coefficients as they must be seen in tandem with total capital requirements and the SyRB. The same holds true for the macro effect, house prices and GDP growth, i.e. our indicators meant to capture the economic environment. The macro effect, i.e. whether the PDs of all outstanding loans increase or decrease, has a low scale, with a maximum value of around 0.004, thus giving rise to a large coefficient. For all three indicators, favorable economic conditions reduce the metrics of risks banks take on in their balance sheets, although the coefficient for GDP in isolation indicates the opposite. During the period under investigation, economic conditions tended to be favorable and capital requirements tended to increase. Still, due to cross-time and cross-section variance in these trends, i.e. not all years exhibit benign conditions and for some banks the increase in capital requirements came sooner and more strongly, the model is able to disentangle the causes.

IRB banks tend to be more cautious in lending to risky customers, which may relate to the higher risk sensitivity of their capital requirements. Over time, IRB banks reduced their PDs of new customers more strongly than non-IRB banks, but the economic significance of this effect is small, with the EL being neither economically nor statistically significant.

On the question whether banks with high levels of free capital are affected more, or less, by changing monetary policy, the results for the interaction term of

free capital with the interest rate indicate that such banks take on higher risks with regard to new customers when policy rates drop (in line with Dell'Ariccia et al., 2013), while the results are mixed as to lending to risky customers.

4 Summary and conclusions

To learn more about Austrian banks' lending risk appetite over the past decade, we created and examined an extensive dataset comprising individual corporate loans exceeding EUR 350,000 that were granted by Austrian banks between 2008 and 2019. The data revealed a profound improvement in banks' estimates of loan quality, as measured by (1) banks' estimated expected loss (EL) per loan, banks' probability of default (PD) per borrower and (2) the share of existing risky customers receiving additional funds. We found, however, that firms' financials did not improve in tandem with the PDs (see section 2.3). This suggests that macroeconomic factors directly affect the relation between such hard facts and banks' PDs. Also, banks subject to tightening capital requirements reduced their PDs and ELs more markedly. Easing monetary policy – after controlling for the macroeconomic environment – increased banks' risk taking. The latter effect, though smaller than the effect triggered by economic conditions and tightening regulation, was particularly pronounced for banks relying on customer deposits in their funding structure. We explain the difference in banks' behavior by the fact that as interest rates go to zero and beyond, deposit-financed banks come under an ever-stronger margin pressure, which they compensate by taking more risks in lending. While our findings relate to overall credit developments, specific banks and specific portfolios might show a different development. From 2019 onward, the situation needs to be reassessed. Already before the COVID-19 crisis, economic forecasts predicted growth to slow in 2020. Since the outbreak of the coronavirus pandemic, the economic situation – which we found to be particularly important for overall credit quality – has worsened substantially. For this reason, we zoomed in on the credit risk development of industries hardest hit by the pandemic and the related shutdown of most parts of the economy (see annex 2). In times of crisis, loan quality will deteriorate at a pace and in size corresponding to the effectiveness of policy measures. But for the severity of a crisis, the starting point matters, too. Basing our analysis on banks' estimates, we concluded that at least on this issue no alarm bells need to be sounded. On a cautious note, improving asset quality in the past implies lower risk-weighted assets. Importantly, the macroprudential capital buffers applicable in Austria will help absorb the shock. Such buffers, which are intended to cushion severe shocks, will need to be replenished after the crisis in order to rebuild financial stability. This is to safeguard that banks will have renewed absorbing capacity for future shocks.

References

Andrews, D. and F. Petroulakis. 2019. Breaking the shackles: zombie firms, weak banks and depressed restructuring in Europe. ECB Working Paper 2240.

Arcand, J.L., E. Berkes and U. Panizza. 2012. Too much finance? IMF Working Paper 12/161.

BACH-ESD Database. 2020. Available at https://www.bach.banque-france.fr/?lang=en.

Banerjee, R. and B. Hofmann. 2018. The rise of zombie firms: causes and consequences. BIS Quarterly Review. September.

Bank of Finland. 2019. Survey on bank capital requirements: preliminary results.

BCBS. 2019. Survey on the interaction of regulatory instruments: results and analysis. BCBS Working Paper 35.

Behn, M., R. Haselmann and V. Vig. 2016. The limits of model-based regulation. ECB Working Paper Series 1928.

Borio, C. and H. Zhu. 2008. Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?. BIS Working Paper 268.

Bottero, M., C. Minoiu, J.-L. Peydro, A. Polo, A.F. Presbitero and E. Sette. 2019. Negative monetary policy rates and portfolio rebalancing: evidence from credit register data. IMF Working Papter 19/44.

Cadamagnani, F., R. Harimohan and K. Tangri. 2015. A bank within a bank: how a commercial bank's treasury function affects the interest rates set for loans and deposits. Bank of England Quarterly Bulletin 2015Q2.

Cappelletti, G., A. Ponte Marques, P. Varraso, Z. Budrys and J. Peeters. 2019. Impact of higher capital buffers on banks' lending and risk-taking: evidence from the euro area experiments. ECB Working Paper 2292.

Dell'Ariccia, G., L. Laeven and G. Suarez. 2013. Bank leverage and monetary policy's risk-taking channel: evidence from the United States. IMF Working Paper 13/143.

De-Ramon, S. and M. Straughan. 2017. The economic cost of capital: a VECM approach for estimating and testing the banking sector's response to changes in capital ratios. Bank of England Staff Working Paper 663.

Eggertsson, G., R. Juelsrud, L. Summers and E. Wold. 2019. Negative nominal interest rates and the bank lending channel. NBER Working Paper 25416.

Eidenberger, J., S.W. Schmitz and K. Steiner. 2014. The priorities of deleveraging in the euro area and Austria and its implications for CESEE. In: Financial Stability Report 27. OeNB. 50–63.

European Commission. 2019. Fourth Progress Report on the reduction of non-performing loans and further risk reduction in the Banking Union. COM(2019) 278 final.

Financial Crisis Inquiry Commission. 2010. The financial crisis inquiry report: final report of the National Commission on the Causes of the Financial and Economic Crisis in the United States.

Gaggl, P. and M. Valderrama. 2014. Do banks take excessive risks when interest rates are "too low for too long"? University of North Carolina at Charlotte Working Paper 2014-001.

Gambacorta, L. 2009. Monetary policy and the risk-taking channel. BIS Quarterly Review. December.

Hirtle, B., A. Kovner and M. Plosser. 2016. The impact of supervision on bank performance. Federal Reserve Bank of New York Staff Report 768.

IMF. 2018. The riskiness of credit allocation: a source of financial vulnerability?. IMF Global Financial Stability Report: a bumpy road ahead. April.

Jiminez, G., S. Ongena, J. Peydro and J. Saurina. 2008. Hazardous times for monetary policy: what do twenty-three million bank loans say about the effects of monetary poilcy on credit risk-taking? Banco de Espana Working Paper 0833.

Jordà, O., M. Schularick and A. Taylor. 2014. Betting the house. NBER Working Paper 20771.

Kerbl, S. and M. Sigmund. 2009. Cyclicality of regulatory capital requirements: first evidence from Austria. In: Financial Stability Report 18. OeNB. 97–106.

Kerbl, S. and M. Sigmund. 2016. From low to negative rates: an asymmetric dilemma. In: Financial Stability Report 32. OeNB. 120–137.

Kerbl, S., B. Simunovic and A. Wolf. 2019. Quantifying interest rate risk and the effect of model assumptions behind sight deposits. In: Financial Stability Report 37. OeNB. 73–85.

Maddaloni, A. and J.-L. Peydro. 2011. Bank risk-taking, securitization, supervision and low interest rates: Evidence from the euro area and the US lending standards. ECB Working Paper 1248.

McGowan, M.A., D. Andrews and V. Millot. 2017. The walking dead? Zombie firms and productivity performance in OECD countries. OECD Economic Department Working Paper 1372.

Nouy, D. 2018. Risk appetite frameworks: good progress but still room for improvement. Speech at the International Conference on Banks' Risk Appetite Frameworks in Ljubljana on April 10, 2018.

Paligorova, T. and J. Santos. 2012. Monetary policy and bank risk-taking: evidence from the corporate loan market. https://www.frbsf.org/economic-research/events/2013/january/federal-reserve-day-ahead-financial-markets-institutions/files/Session_3_Paper_2_Paligorova_Santos_risk_taking.pdf.

Schularick, M. and A. Taylor. 2009. Credit booms gone bust: monetary policy, leverage cycles and financial crises, 1870-2008. NBER Working Paper 155512.

Storz, M., M. Koetter, R. Setzer and A. Westphal. 2017. Do we want these two to tango? On zombie firms and stressed banks in Europe. ECB Working Paper 2104.

Annex 1: Definitions and summary statistics

Description of main variables of regression table 2 (bank heterogeneity estimates)

Abbreviation used in regression table	Variable description	Source
Share of risky customers receiving additional funds	Share of risky customers receiving additional funds, see section 2.1	OeNB
…while PD increases	Share of risky customers receiving additional funds while PD increases, see section 2.1	OeNB
…while LGD increases	Share of risky customers receiving additional funds while LGD increases, see section 2.1	OeNB
…while PD and LGD increase	Share of risky customers receiving additional funds while PD and LGD increase, see section 2.1	OeNB
EL for new loans	EL for new customers, see section 2.1	OeNB
PD for new loans	PD for new customers, see section 2.1	OeNB
d EURIBOR	Year-on-year change in 6-month EURIBOR	OeNB
Deposit focused	Deposit-focused bank, dummy variable (1 = if bank has a share of total deposits/total assets at the unconsolidated level > 80% and has total assets of > EUR 30 billion)	OeNB
d Total capital requirement	Year-on-year change in total regulatory capital requirements consisting of: 8% Pillar I + 2% Pillar II approximation + 2.5% CCoB (with phase-in period) + 2% max. O-SII and SyRB buffer (with phase-in period) + 0% CCyB	OeNB
SyRB	Regulatory capital requirement of the systemic risk buffer of 2% max. (with phase-in period)	OeNB
Total capital free	Excess capital (or deficit) in % of risk-weighted assets, at the consolidated banking level	OeNB
Liquidity to total assets	Liquid assets in % of total assets, at the unconsolidated banking level	OeNB
Macro effect	Year-on-year change in the weighted mean of PDs of loans outstanding to all banks	OeNB
d House prices	Year-on-year change in nominal house prices, Austria (index 2015=100)	ECB
GDP growth	Year-on-year change in real GDP, Austria	ECB
IRB yes	Dummy variable (1 if bank applies IRB approach; 0 otherwise)	OeNB

Source: Authors' compilation.

Summary statistics of the main variables of interest of regression table 2 (bank heterogeneity estimates)

Variable	Minimum	Median	Mean	Maximum	Standard deviation
Share of risky customers receiving additional funds	0.00	0.33	0.37	1.00	0.28
…while PD increases	0.00	0.11	0.19	1.00	0.25
…while LGD increases	0.00	0.05	0.13	1.00	0.19
…while PD and LGD increase	0.00	0.00	0.07	1.00	0.15
EL for new loans	0.00	0.01	0.02	1.00	0.04
PD for new loans	0.00	0.02	0.03	1.00	0.04
d EURIBOR	−0.02	−0.00	−0.00	0.00	0.01
d Total capital requirement	−0.06	0.00	0.00	0.09	0.01
SyRB	0.00	0.00	0.00	0.02	0.00
Total capital free	−0.06	0.07	0.13	40.54	0.78
Liquidity to total assets	0.00	0.15	0.18	1.00	0.16
Macro effect	−0.00	0.00	0.00	0.00	0.00
d House prices	2.68	4.14	4.93	9.77	2.18
GDP growth	−0.04	0.02	0.01	0.03	0.02
IRB yes	0.00	0.00	0.07	1.00	0.26

Source: Authors' calculations.

Note: The sample covers year-end data from 2008 to 2019 (last data point: Q4 2019).

Annex 2: COVID-19: Zoom-in on selected industries immediately hit by the pandemic-induced economic crisis

This short section was written with a view to better understand the starting position of Austrian banks vis-à-vis the pandemic-induced economic crisis. Research has shown that the starting point to enter a crisis determines how severely financial stability and the real economy are hit (e.g. Arcand et al., 2012). In order to limit the spread of the coronavirus, Austrian authorities implemented, and continuously tightened, containment measures, such as travel bans, prohibiting large gatherings in public spaces, school closures and full lockdown of several regions in Austria. International supply and value chains became disrupted due to the international dimension of the crisis, with many countries taking containment measures. While nearly all economic industries will be affected by a supply and/or a demand shock, it is generally agreed that the following NACE industries are hit particularly hard:

   (1) Air transport (H51),
   (2) Accommodation (I55), food and beverage service activities (I56),
   (3) Arts, entertainment and recreation (R)
   (4) Other services activities (S)

Below, we show the development of important credit risk metrics for these industries. First, we show the exposure-weighted probability of default (PD); second, the exposure-weighted expected loss (EL), which takes collateral into account. The EL equals PD x loss given default (LGD), where the latter needs to be proxied in our dataset. We use a crude estimation for the LGD, *1 − eligible collateral / exposure*. See section 2.1 of the paper for details and panel (c) of chart 1 for total credit.

We see that the credit metric in all four industries is diverse (see table B1 and chart B1 of annex 2). Airline exposure at the beginning of the time series was marked by extraordinarily high PDs, so high actually that we checked data accuracy line by line and did backup research on the cases. The data are correct, and the high average PDs in those times resulted from foreign airlines hit by aircraft failure and corporate mismanagement. These exposures were stripped down and the credit quality subsequently improved around 2014 and stayed around this level. The small difference between PD and EL is due to little eligible collateral in this industry. At 0.3%, its year-end 2019 share in Austrian banks' loan exposure is very small.

Also, for the other industries, which exhibit a higher exposure, a downward trend can be diagnosed. Accommodation, food and beverage service activities, which account for a share of 5% in total outstanding loans, rank among the industries that are generally riskier, with higher-than-average PDs and a high share of risky exposures (see table B1 of annex 2). In the same vein, arts, entertainment and recreation showed above-average PDs in the past, but credit indicators converged to average values of total corporate loans outstanding. At about 0.5%, its share in outstanding loans is small. Credit risk parameters of other services activities, which include e.g. cosmetic and repair services, broadly mirrored the developments seen for overall outstanding loans. Therefore, exposure to customers with a high PD is very low compared to the other industries shown in table B1 of annex 2.

From a financial stability perspective, the improvement in credit quality as assessed by banks over the past years is reassuring. Less comforting are the higher PD and EL levels evident in particular for accommodation, food and beverage service activities, compared to average credit risk in outstanding loans. Authorities in Austria have introduced a variety of measures to support the economy to prevent

firms from suffering from undue liquidity shortages. For banks, the improved asset quality in the past implies a good starting point, while also implying lower risk weights for these assets. Importantly, the buildup of macroprudential capital buffers in the past was worth the effort, as the buffers now help cushion the shock. This cushion is intended to be used in times of crisis, implying no supervisory consequences other than payout restrictions concerning dividends, bonuses and additional tier 1 (AT1) coupons. When the crisis is over, the buffers will need to be replenished.

Table B1

Credit risk metrics of industries immediately hit by the ongoing coronavirus pandemic and the related economic shutdown (at year-end 2019)

Industry	Exposure	Expected weighted PD	Share of exposure with PD > 2.7%
	EUR million	%	
Air transport (H51)	935	1.6	8.7
Accommodation (I55); food and beverage service activities (I56)	10,365	3.2	20.4
Arts, entertainment and recreation (R)	1,159	1.7	16.4
Other services activities (S)	2,304	1.0	5.7
All sectors	300,929	1.1	8.0

Source: OeNB (central credit register).

Note: Codes in parentheses indicate the NACE (2008) industry codes. For information on exposures, see section 2.1.

Chart B1

PD and EL for loans outstanding to service industries immediately hit by the coronavirus crisis
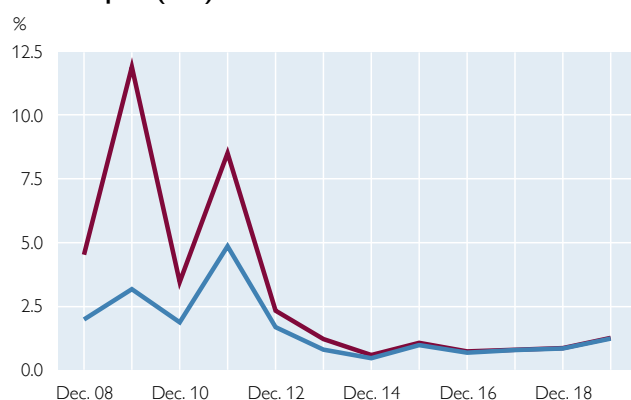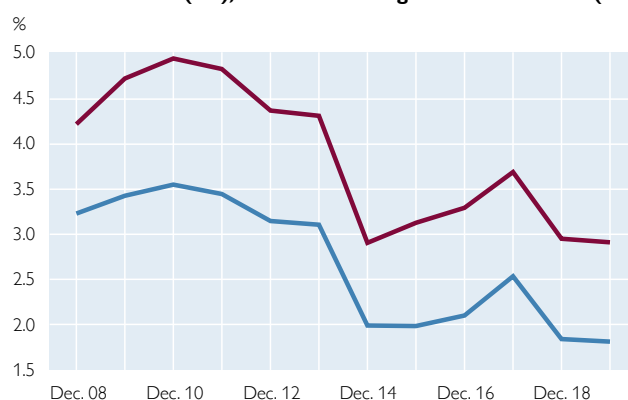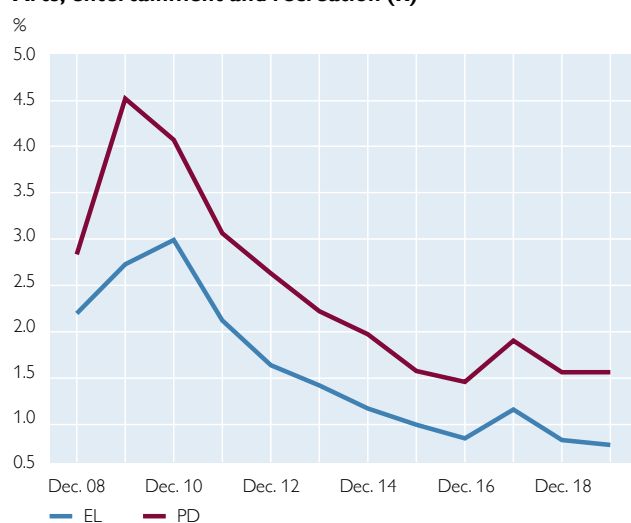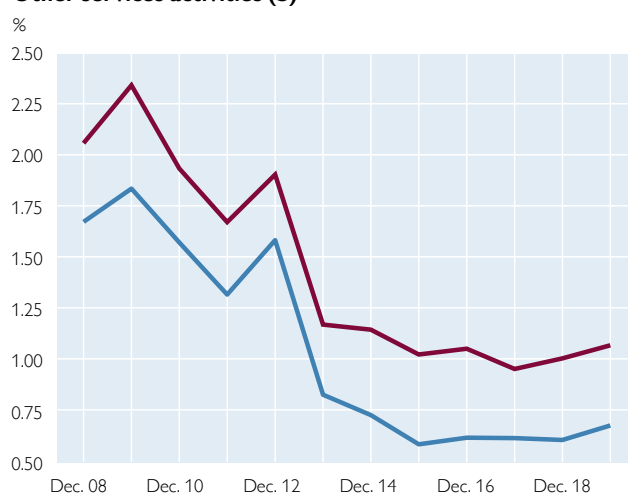
Source: OeNB.

Annex of tables

Annex of tables

Cutoff date for data: June 2, 2020

Conventions used:

x = 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.

International financial market indicators

Short-term interest rates[1]

	2012	2013	2014	2015	2016	2017	2018	2019
Three-month rate, period average, %								
Euro area	0.57	0.22	0.21	−0.02	−0.26	−0.33	−0.32	−0.36
U.S.A.	0.43	0.27	0.23	0.32	0.74	1.26	2.31	2.33
Japan	0.33	0.24	0.21	0.17	0.08	0.06	0.07	0.07
United Kingdom	0.83	0.51	0.54	0.57	0.50	0.36	0.72	0.81
Switzerland	0.07	0.02	0.01	−0.75	−0.75	−0.73	−0.73	−0.74
Czech Republic	1.00	0.46	0.36	0.31	0.29	0.41	1.27	2.12
Hungary	6.98	4.31	2.41	1.61	0.99	0.14	0.12	0.19
Poland	4.91	3.02	2.52	1.75	1.70	1.73	1.71	1.72

Source: Bloomberg, Eurostat, Macrobond.

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

Long-term interest rates[1]

	2012	2013	2014	2015	2016	2017	2018	2019
Ten-year rates, period average, %								
Euro area	3.05	3.01	2.28	1.27	0.93	1.17	1.27	0.59
U.S.A.	1.82	2.16	2.63	2.14	1.83	2.32	2.81	2.33
Japan	0.87	0.72	0.58	0.37	−0.01	0.04	0.06	−0.08
United Kingdom	1.74	2.03	2.14	1.79	1.22	1.18	1.41	0.88
Switzerland	0.68	0.84	0.85	0.05	−0.36	−0.09	0.03	−0.43
Austria	2.37	2.01	1.49	0.75	0.38	0.58	0.69	0.06
Czech Republic	2.78	2.11	1.58	0.58	0.43	0.98	1.98	1.55
Hungary	7.89	5.92	4.81	3.43	3.14	2.96	3.06	2.47
Poland	5.00	4.03	3.52	2.70	3.04	3.42	3.20	2.35

Source: ECB, Eurostat, Macrobond.

[1] Yields of long-term government bonds.

Stock indices

	2012	2013	2014	2015	2016	2017	2018	2019
Annual change in %, period average								
Euro area: EURO STOXX	−6.36	17.53	13.07	11.76	−9.67	17.16	−0.48	−0.37
U.S.A.: S&P 500	8.81	19.17	17.49	6.71	1.63	16.92	12.13	6.09
Japan: Nikkei 225	−3.43	49.20	13.84	24.21	−11.90	19.41	10.44	−2.77
United Kingdom: FTSE100	1.09	12.69	3.23	−1.38	−1.74	13.96	−0.21	−1.17
Switzerland: SMI	4.88	24.14	9.28	4.23	−10.12	10.91	−0.16	9.56
Austria: ATX	−14.79	16.94	−2.36	1.28	−5.42	34.83	7.56	−8.95
Czech Republic: PX 50	−14.56	2.53	1.62	0.81	−11.49	14.29	7.88	−2.91
Hungary: BUX	−12.01	3.26	−3.89	17.28	28.94	31.55	5.55	10.10
Poland: WIG	−6.65	16.05	8.07	−0.31	−9.83	30.01	−2.67	−1.25

Source: Macrobond.

Corporate bond spreads[1]

	2012	2013	2014	2015	2016	2017	2018	2019
	Percentage points, period average							
	Euro area							
AA	1.46	0.89	0.63	0.73	0.80	0.73	0.70	0.79
BBB	3.55	2.25	1.75	1.91	2.11	1.70	1.78	1.85
	U.S.A.							
AA	1.50	1.12	0.88	1.04	0.93	0.74	0.76	0.72
BBB	2.59	2.17	1.76	2.13	2.21	1.54	1.59	1.73

Source: Macrobond.

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

Financial indicators of the Austrian corporate and household sectors

Financial investment of households[1]

	2012	2013	2014	2015	2016	2017	2018	2019
	EUR billion, four-quarter moving sum							
Currency	0.6	1.2	0.9	0.9	0.6	0.6	0.8	0.7
Deposits	3.8	1.9	3.2	6.5	10.3	8.8	11.4	11.5
Debt securities[2]	0.2	−1.8	−4.2	−3.5	−2.7	−2.7	−1.8	−1.1
Shares and other equity[3]	1.1	−0.1	1.9	−0.3	1.1	−0.3	0.5	1.2
Mutual fund shares	0.9	2.7	3.5	4.1	3.1	3.8	2.2	2.6
Insurance technical reserves	3.7	3.4	3.3	1.3	1.0	0.6	0.4	0.5
Other accounts receivable	0.0	0.0	1.7	1.1	−0.4	1.5	0.8	0.5
Total financial investment	10.3	7.3	10.3	10.1	13.0	12.3	14.3	15.9

Source: OeNB (financial accounts).

[1] *Including nonprofit institutions serving households.*
[2] *Including financial derivatives.*
[3] *Other than mutual fund shares.*

Household[1] income and savings

	2012	2013	2014	2015	2016	2017	2018	2019
	EUR billion, four-quarter moving sum							
Net disposable income	185.4	185.6	190.7	193.1	201.0	207.3	214.6	223.0
Savings	16.6	13.3	14.0	13.1	15.6	15.3	16.6	18.7
Saving ratio in %[2]	8.9	7.1	7.3	6.7	7.7	7.3	7.7	8.3

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

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

Financing of nonfinancial corporations

	2012	2013	2014	2015	2016	2017	2018	2019
	EUR billion, four-quarter moving sum							
Debt securities[1]	2.8	1.7	−0.7	0.0	0.7	−1.9	−1.2	−1.2
Loans	0.6	7.0	3.3	5.7	14.2	15.2	13.4	14.0
Shares and other equity	2.4	4.4	4.1	2.5	3.7	12.4	−0.9	1.9
Other accounts payable	0.9	3.1	2.9	4.5	5.6	0.8	7.5	3.7
Total external financing	6.7	16.2	9.6	12.7	24.2	26.5	18.8	18.4

Source: OeNB (financial accounts).

[1] *Including financial derivatives.*

Insolvency indicators

	2012	2013	2014	2015	2016	2017	2018	2019
Estimated default liabilities (opened insolvency proceedings, EUR million)	3,206	6,255	2,899	2,430	2,867	1,863	2,071	1,697
Opened insolvency proceedings (number)	3,505	3,266	3,275	3,115	3,163	3,025	2,985	3,044
Dismissed applications for insolvency proceedings (number)	2,536	2,193	2,148	2,035	2,063	2,054	1,995	1,974
Total insolvencies (number)	6,041	5,459	5,423	5,150	5,226	5,079	4,980	5,018

Source: Kreditschutzverband von 1870.

Note: Estimated default liabilities for 2013 include one large insolvency.

Housing market indicators

	2012	2013	2014	2015	2016	2017	2018	2019
Residential property price index	*(2000=100)*							
Vienna	180.7	196.3	204.6	209.2	217.2	220.4	232.0	243.2
Austria	149.1	156.0	161.4	168.1	180.4	187.2	200.1	208.0
Austria excluding Vienna	137.4	141.1	145.4	152.9	166.7	174.9	189.8	194.8
Rent prices[1]	*(2015=100)*							
Rents of apartments excluding utilities, according to the CPI	89.4	92.2	95.8	100.0	103.1	107.4	111.4	114.7
OeNB fundamentals indicator for residential property prices[2]								
Vienna	10.5	14.4	15.1	15.2	16.2	18.0	20.3	21.7
Austria	−0.6	−1.7	−1.9	0.1	4.3	8.5	12.0	12.6

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

[1] *Free and regulated rents.*
[2] *Deviation from fundamental price in %.*

Austrian financial intermediaries[1]

Structual indicators

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period							
Number of banks in Austria	809	790	764	738	672	628	597	573
Number of bank branches	4,468	4,359	4,255	4,096	3,926	3,775	3,639	3,521
Number of foreign subsidiaries	101	93	85	83	60	58	55	53
Number of branches abroad	146	151	200	207	209	215	219	229
Number of employees[1]	79,110	77,712	75,714	75,034	74,543	73,712	73,508	73,203

Source: OeNB.

[1] Number of persons, including part-time employees, employees on leave or military service, excluding blue-collar workers.

Total assets

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Total assets on an unconsolidated basis	982,114	927,155	896,424	859,165	832,267	815,275	854,582	884,964
Total assets on a consolidated basis	1,163,595	1,089,713	1,078,155	1,056,705	946,342	948,861	985,981	1,032,285
Total assets of CESEE subsidiaries[1]	280,629	264,998	285,675	295,557	184,966	205,532	206,582	222,947

Source: OeNB.

[1] The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as from end-2016.

Sectoral distribution of domestic loans to nonbanks

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
	All currencies combined							
Nonbanks	330,385	326,820	328,324	333,844	335,880	341,178	356,701	371,801
of which: nonfinancial corporations	*140,384*	*140,329*	*136,600*	*137,151*	*135,569*	*143,758*	*153,028*	*162,905*
households[1]	*139,056*	*139,052*	*140,944*	*146,444*	*152,516*	*156,386*	*161,947*	*168,824*
general government	*27,972*	*25,970*	*28,108*	*28,034*	*27,681*	*24,443*	*24,562*	*23,576*
other financial intermediaries	*22,806*	*21,244*	*22,578*	*22,114*	*19,878*	*16,562*	*16,332*	*16,485*
	Foreign currency							
Nonbanks	47,652	40,108	36,289	33,950	30,089	22,182	20,563	19,619
of which: nonfinancial corporations	*9,156*	*6,985*	*6,379*	*5,291*	*4,296*	*3,397*	*3,538*	*3,321*
households[1]	*32,905*	*28,385*	*25,374*	*24,423*	*21,224*	*16,486*	*14,993*	*13,590*
general government	*2,827*	*2,478*	*2,777*	*2,861*	*2,623*	*943*	*517*	*471*
other financial intermediaries	*2,761*	*2,257*	*1,759*	*1,373*	*1,945*	*1,356*	*1,516*	*2,236*

Source: OeNB.

[1] Including nonprofit institutions serving households.

Note: Figures are based on monetary statistics.

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

Table A13

Loan quality[1]

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, %							
Nonperforming loans in % of total loans (Austria[2])	4.7	4.1	4.4	4.0	3.2	2.5	2.0	1.7
Nonperforming loans in % of total loans (consolidated)	8.7	8.6	7.0	6.5	5.2	3.4	2.6	2.2
Nonperforming loans in % of total loans (Austrian banks' CESEE subsidiaries)	13.9	14.0	11.8	11.5	8.6	4.5	3.2	2.4
Coverage ratio[3] (Austria[2])	×	×	×	47	59	60	62	61
Coverage ratio[4] (consolidated)	×	×	×	54	53	52	51	49
Coverage ratio[4] (Austrian banks' CESEE subsidiaries)	48	53	57	59	67	61	64	67

Source: OeNB.

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

Table A14

Exposure to CESEE

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Total exposure according to the BIS[1]	209,818	201,768	184,768	186,397	193,273	210,616	217,078	233,275
Total indirect lending to nonbanks[2,3]	171,117	161,439	177,389	176,728	108,738	118,268	120,816	133,169
Total direct lending[4]	51,539	52,926	43,144	40,866	32,976	28,507	27,526	23,992
Foreign currency loans of Austrian banks' CESEE subsidiaries[3]	85,382	79,047	76,736	69,317	32,576	31,027	29,836	29,766

Source: OeNB.

[1] As from mid-2017, comparability of data with earlier figures is limited due to several methodological adjustments in data collection.
[2] Lending (net lending after risk provisions) to nonbanks by all fully consolidated bank subsidiaries in CESEE.
[3] The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as from end-2016.
[4] Cross-border lending to nonbanks and nonfinancial institutions in CESEE according to monetary statistics.

Table A15

Profitability on a consolidated basis[1]

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Operating income	37,673	35,271	28,717	28,064	22,408	22,837	24,023	24,997
of which: net interest income	*19,259*	*18,598*	*19,345*	*18,336*	*14,604*	*14,536*	*15,210*	*15,589*
fee and commission income	*7,260*	*7,590*	*7,741*	*7,730*	*6,562*	*6,885*	*7,097*	*7,226*
trading income	*1,137*	*670*	*426*	*−50*	*110*	*95*	*−628*	*−292*
Operating expenses	25,582	27,318	19,833	17,612	16,687	14,752	15,661	16,732
of which: staff costs	*10,391*	*10,378*	*9,543*	*8,959*	*8,774*	*8,415*	*8,602*	*8,740*
other administrative expenses	*6,410*	*6,628*	*6,569*	*6,830*	*5,820*	*5,571*	*5,630*	*5,673*
Operating profit/loss	12,090	7,953	8,884	10,452	5,723	8,087	8,361	8,264
Net profit after taxes	2,966	−1,035	685	5,244	4,979	6,577	6,916	6,713
%								
Return on average (total) assets[2]	0.3	0.0	0.0	0.5	0.6	0.8	0.8	0.7
Return on average equity (tier 1 capital)[2]	5.1	−0.7	0.7	8.5	8.3	10.5	10.3	9.4
Net interest income to operating income	51	53	67	65	65	64	63	62
Cost-to-income ratio	68	77	69	63	74	65	65	67
Risk provisioning to operating profit	53	88	77	45	21	13	5	12

Source: OeNB.

[1] The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as from end-2016.
[2] Based on profits after tax, but before minority interests.

Table A16

Profitability of Austrian banks' CESEE subsidiaries[1]

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Operating income	12,685	12,544	12,159	12,261	7,753	7,914	7,926	8,442
of which: net interest income	*8,780*	*8,414*	*9,068*	*8,431*	*5,135*	*5,304*	*5,467*	*5,827*
fee and commission income	*2,992*	*3,164*	*3,477*	*3,358*	*2,184*	*2,315*	*2,241*	*2,393*
trading income	*739*	*736*	*−251*	*642*	*681*	*381*	*145*	*−37*
Operating expenses	6,363	6,253	6,413	6,264	4,084	4,216	4,081	4,390
of which: staff costs	*2,992*	*2,922*	*2,978*	*2,896*	*1,956*	*2,052*	*2,004*	*2,126*
other administrative expenses	*2,641*	*2,599*	*2,762*	*2,752*	*1,726*	*1,753*	*1,672*	*1,652*
Operating profit/loss	6,321	6,291	5,746	5,998	3,668	3,698	3,845	4,053
Net profit after taxes	1,999	2,201	672	2,050	2,354	2,627	2,913	2,837
%								
Return on average (total) assets[2]	0.7	0.8	0.2	0.7	1.3	1.3	1.4	1.3
Net interest income to operating income	69	67	75	69	66	67	69	69
Cost-to-income ratio	50	50	53	51	53	53	51	52
Risk provisioning to operating profit	56	53	70	50	20	9	6	12

Source: OeNB.

[1] The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as from end-2016.
[2] Based on profits after tax.

Table A17

Solvency on a consolidated basis[1]

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Own funds	88,204	88,994	87,584	87,793	80,699	84,983	86,529	90,928
Total risk exposure (i.e. risk-weighted assets)	621,926	578,429	562,790	537,447	442,870	449,451	465,623	486,507
	%							
Total capital adequacy ratio	14.2	15.4	15.6	16.3	18.2	18.9	18.6	18.7
Tier 1 capital ratio	11.0	11.9	11.8	12.9	14.9	15.9	16.0	16.3
Core tier 1 capital ratio (common equity tier 1 as from 2014)	10.7	11.6	11.7	12.8	14.9	15.6	15.4	15.6
Leverage ratio[2]	6.1	6.5	6.1	6.3	7.6	7.7	7.7	7.6

Source: OeNB.

[1] The transfer in ownership of UniCredit Bank Austria AG's CESEE subsidiaries to the Italian UniCredit Group limits the comparability of figures as from end-2016.

[2] Definition up to 2013: tier 1 capital after deductions in % of total assets. Definition as from 2014 according to Basel III (fully phased-in).

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 institutions

	2012	2013	2014	2015	2016	2017	2018	2019
Share prices	*% of end-2012 prices, end of period*							
Erste Group Bank	100	106	80	121	116	151	126	145
Raiffeisen Bank International	100	81	42	45	58	100	74	74
EURO STOXX Banks Net Total Return	100	130	127	124	118	134	93	108
Uniqa	100	98	82	80	76	93	83	96
Vienna Insurance Group	100	90	92	63	53	64	50	63
EURO STOXX Insurance Net Total Return	100	137	146	174	171	193	182	233
Relative valuation: share price-to-book value ratio	*%, end of period*							
Erste Group Bank	70	93	80	108	95	115	89	97
Raiffeisen Bank International	60	51	48	50	59	100	69	62
EURO STOXX Banks	58	81	77	74	70	82	56	61
Uniqa	105	103	78	74	69	86	81	82
Vienna Insurance Group	107	102	98	79	62	71	57	64
EURO STOXX Insurance	75	107	93	102	89	105	92	101

Source: Bloomberg, Macrobond.

Key indicators of Austrian insurance companies

	2012	2013	2014	2015	2016	2017	2018	2019
Business and profitability	*End of period, EUR million*							
Premiums	16,341	16,608	17,077	17,342	16,920	16,975	17,178	17,555
Expenses for claims and insurance benefits	12,973	13,150	14,157	15,514	14,751	14,727	14,088	15,016
Underwriting results	455	592	477	475	560	581	507	618
Profit from investments	3,391	3,354	3,211	3,216	3,051	2,815	2,528	3,118
Profit from ordinary activities	1,395	1,524	1,421	1,354	1,414	1,244	1,168	1,695
Acquisition and administrative expenses	3,499	3,528	3,573	3,697	3,818	3,728	3,800	3,926
Total assets	108,374	110,391	113,662	114,495	114,707	137,280	133,082	138,071
Investments								
Total investments	103,272	105,496	107,442	107,933	108,897	109,235	108,522	108,864
of which: debt securities	*37,614*	*39,560*	*41,667*	*41,517*	*43,241*	*44,030*	*43,529*	*42,845*
stocks and other equity securities[1]	*12,505*	*12,464*	*12,619*	*12,522*	*12,534*	*11,862*	*11,850*	*12,299*
real estate	*5,371*	*5,689*	*5,858*	*5,912*	*6,022*	*6,149*	*6,472*	*6,714*
Investments for unit-linked and index-linked life insurance	18,330	19,127	20,179	19,776	20,142	20,587	19,123	18,499
Claims on domestic banks	16,872	16,687	15,800	15,492	13,793	10,313	9,728	9,236
Reinsurance receivables	1,933	824	918	971	1,027	1,036	1,116	1,114
Risk capacity[2] (median solvency capital requirement), %	350	368	380	375	×	276	255	238

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

Assets held by Austrian mutual funds

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Domestic securities	50,963	49,757	52,116	52,970	54,382	54,824	52,480	54,114
of which: debt securities	*17,527*	*16,203*	*15,467*	*13,609*	*13,278*	*11,879*	*11,313*	*10,759*
stocks and other equity securities	*3,637*	*3,610*	*3,345*	*3,530*	*4,283*	*4,678*	*3,607*	*4,108*
Foreign securities	96,854	99,647	110,397	114,833	120,330	128,836	121,038	140,616
of which: debt securities	*63,661*	*62,972*	*69,642*	*70,326*	*69,911*	*70,353*	*67,956*	*72,949*
stocks and other equity securities	*14,208*	*16,278*	*17,910*	*18,521*	*20,145*	*22,924*	*20,747*	*27,983*
Net asset value	147,817	149,404	162,513	167,802	174,712	183,661	173,518	194,730
of which: retail funds	*84,158*	*83,238*	*89,163*	*91,626*	*94,113*	*97,095*	*89,923*	*101,464*
institutional funds	*63,659*	*66,167*	*73,350*	*76,177*	*80,599*	*86,572*	*83,600*	*93,266*
Consolidated net asset value	126,831	128,444	138,642	143,249	148,682	156,173	154,235	168,013

Source: OeNB.

Structure and profitability of Austrian fund management companies

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Total assets	644	670	725	745	691	674	655	716
Operating profit	111	131	158	184	157	177	177	192
Net commissions and fees earned	283	310	368	411	402	407	407	433
Administrative expenses[1]	205	219	246	266	284	267	251	260
Number of fund management companies	29	29	29	29	29	30	24	21
Number of reported funds	2,168	2,161	2,118	2,077	2,029	2,020	2,017	1,935

Source: OeNB.

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

Assets held by Austrian pension funds

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Total assets	16,335	17,385	19,011	19,646	20,839	22,323	21,494	24,341
of which: direct investment	1,139	1,640	1,065	990	835	848	863	769
mutual funds	15,278	15,745	17,946	18,656	20,004	21,475	20,631	23,572
foreign currency (without derivatives)	5,714	5,964	7,578	7,279	9,169	x	9,149	7,694
stocks	4,805	5,472	6,250	6,200	6,972	7,867	7,034	8,317
debt	8,464	7,650	9,163	9,552	9,521	9,054	9,724	10,540
real estate	567	583	576	690	754	1,165	978	1,142
cash and deposits	1,488	2,033	1,598	1,850	1,863	2,192	1,632	1,711

Source: OeNB, FMA.

Assets held by Austrian severance funds

	2012	2013	2014	2015	2016	2017	2018	2019
	End of period, EUR million							
Total direct investment	1,442	1,528	1,415	1,565	1,682	1,893	2,416	2,621
of which: euro-denominated	1,415	1,507	1,299	1,502	1,647	1,847	2,348	2,549
foreign currency-denominated	27	21	x	63	35	46	68	72
accrued income claims from direct investment	22	21	15	14	15	13	12	9
Total indirect investment	3,834	4,701	5,912	6,741	7,745	8,720	9,674	10,686
of which: total of euro-denominated investment in mutual fund shares	3,540	4,220	5,190	5,790	6,743	7,429	7,989	8,724
total of foreign currency-denominated investment in mutual fund shares	294	481	722	951	1,002	1,291	1,685	1,962
Total assets assigned to investment groups	5,254	6,218	7,306	8,294	9,412	10,597	12,052	13,288

Source: OeNB.

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

Transactions and system disturbances in payment and securities settlement systems

	2012	2013	2014	2015	2016	2017	2018	2019
Large-value payment system (domestic, operated by the OeNB)	*Number of transactions in million, value of transactions in EUR billion*							
Number	1	1	1	1	1	1	1	1
Value	9,974	5,906	7,438	6,381	4,316	3,690	1,536[1]	1,412
System disturbances	1	3	0	1	4	0	3	0
Securities settlement systems								
Number	2	2	2	2	2	2	2	2
Value	418	369	377	315	335	701[2]	658	639
System disturbances	1	5	2	3	3	0	3	1
Card payment systems								
Number	633	673	856[3]	901	963	1,061	1,178	1,299
Value	48	72	91[3]	97	101	108	116	125
System disturbances	4	2	0	2	4	1	2	1
Participation in international payment systems								
Number	41	53	113	144	166	191	217	242
Value	1,820	1,643	2,463	2,420	3,029	3,242	3,831	3,304
System disturbances	0	0	0	0	0	0	0	0

Source: OeNB.

[1] Liquidity transfers from a participant's domestic account to their own TARGET2 account are no longer included under domestic transactions.
[2] Free-of-payment (FOP) transactions were first included in the value in 2017.
[3] On-us ATM transactions were first included in 2014.