

Recent developments

Financial risk indicators of nonfinancial corporations and households in Austria deteriorated slightly

Lending by Austrian banks to domestic nonfinancial corporations remained buoyant. In August 2019, its annual growth rate (adjusted for reclassifications, valuation changes and exchange rate effects) reached 6.9%. The strongest contribution to growth came from loans with longer maturities (more than five years), which account for the largest share in outstanding volumes. In contrast, short-term loans were reduced in recent months. Looking at industries, the dynamics of loans to the corporate sector in the twelve months to August 2019 was again strongly driven by real estate activities, which accounted for more than 40% of total credit expansion (= change in stocks).

Corporate loan demand fell slightly in 2019, after having increased for more than two years. This contraction was attributable to reduced funding requirements for fixed investment according to the Austrian results of the euro area bank lending survey (BLS). Such funding requirements had been a major driver of increasing loan demand in the years before. Internal financing of non-financial corporations, which banks had named as a diminishing factor, no longer dampened loan demand in the first three quarters of 2019. At the same time, Austrian banks continued their cautious lending policies. After competitive pressure, especially from other banks, had been cited most often as having caused banks to ease their credit standards in recent quarters, a more cautious risk perception as well as reduced risk tolerance contributed to a slightly more cautious stance.

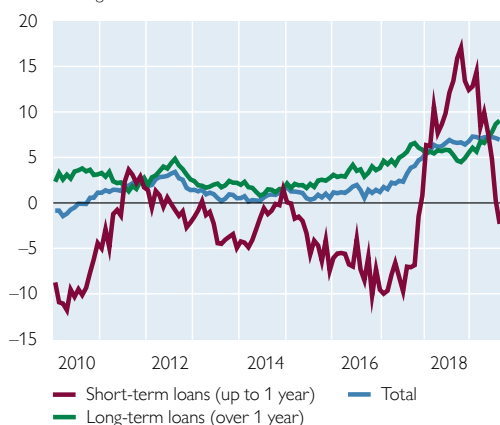
Credit conditions remained favorable and continued to support bank lending to the corporate sector. Bank lending rates remained low, reflecting the monetary policy stance and narrower interest rate margins for average loans. Margins on riskier loans, however, were largely left unchanged, which indicates differentiated risk pricing by banks.

Chart 1

Loans by Austrian banks to domestic nonfinancial corporations and households

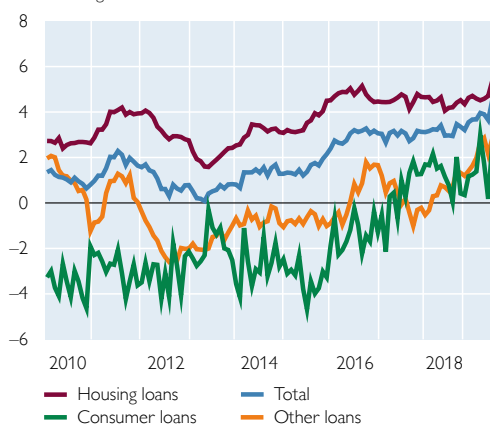
Loans to nonfinancial corporations

Annual change in %



Loans to households

Annual change in %



Source: OeNB.

Debt financing remained attractive amid low interest rates. In the first half of 2019, nonfinancial corporations' external financing was 20% higher year on year according to preliminary financial accounts data. Debt instruments dominated external financing also this year, slightly surpassing the already high volume recorded in the first half of 2018. Loans by domestic banks accounted for 40% of debt financing and net corporate bond issuance strongly increased, up from negative figures, in the first half of 2019 according to financial accounts data. In contrast, trade credit declined by more than one-quarter year on year in the first six months of 2019. At roughly 18%, equity financing made up only a comparatively small fraction of non-financial corporations' external financing.

Moreover, firms continued to have substantial liquidity at their disposal. The amount of undrawn credit lines available to enterprises, which had been reduced in the year before, started to grow again, increasing by EUR 2 billion in the first eight months of 2019. Firms' transferable deposits also continued to rise, although annual growth had slowed down to 2.9% in August 2019. Additionally, corporate profitability, measured by gross operating surplus, expanded, albeit at a slower pace, until the second quarter of 2019, which improved the corporate sector's internal financing potential.

The debt sustainability of Austrian nonfinancial corporations worsened slightly in the first half of 2019. Year on year, the corporate sector's debt-to-income ratio increased by 9 percentage points to 399%. At 5.1%, corporate sector financial debt (measured in terms of total loans raised and bonds issued) grew at a faster rate than gross operating surplus (+2.6%). The share of variable rate loans did not contract any further in the past twelve months. Although the low interest rate environment continued to support firms' current debt-servicing capacity, the ratio of interest payments on (domestic) bank loans to gross operating surplus edged up somewhat in the first half of 2019: at 2.9%, it reflected the sizable increase in outstanding loans.

Growth of lending to households accelerated slightly in recent months. In August 2019, bank loans to households (adjusted for reclassifications, valuation changes and exchange rate effects) rose by 4.3% year on year. While loans for all purposes showed positive year-on-year growth rates, with both consumer loans and other loans expanding by 2.5% p.a., the main contribution to loan growth came from housing loans. In August 2019, the growth rate of the latter, which account for almost two-thirds of the outstanding volume of loans to households, reached 5.2% year on year. According to the BLS, Austrian banks tightened their credit standards for housing loans to households in the first three quarters of 2019. During that same period, banks also reported a slight increase in household demand for housing loans.

The conditions for housing loans remained favorable. Interest rates for new bank loans fell further in the first eight months of this year. BLS results show that, due to stiff competition, banks' margins on average loans decreased further in the first three quarters of 2019, whereas the margins on riskier loans remained stable. Collateral requirements and other terms and conditions (such as noninterest charges, loan covenants, loan maturity and loan size) also remained broadly unchanged during that period.

Credit risk indicators for the household sector did not improve further in the first half of 2019. Households' debt-to-income ratio increased slightly. Moreover, the share of variable rate loans (loans with an initial rate fixation period

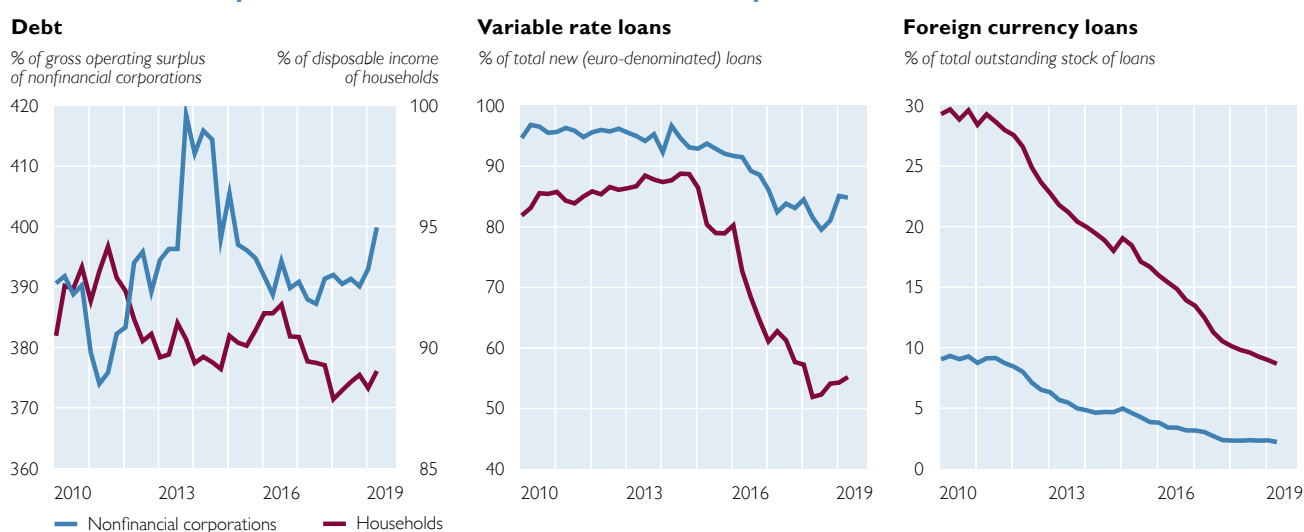
of up to one year), which had fallen considerably in the years before, went back up to 55% in the first half of 2019 (and to 45% in the case of housing loans). Thus, the share of variable rate loans remained quite high by international standards.

The volume of foreign currency loans (FCLs) remains a risk factor despite its continued decline. In the first half of 2019, the volume of outstanding FCLs to domestic households contracted to EUR 14 billion, down 3.2% (exchange rate adjusted). At mid-2019, less than 9% of all outstanding loans (and 11% of all housing loans) were FCLs. Yet, the risks for individual borrowers remain high, since three-quarters of these loans 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. At the end of 2018, the estimated total shortfall for households and corporations stood at EUR 4.2 billion or 30% of the outstanding volume. 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 households continued to preferably invest in liquid assets. Overall, households' financial investments shrank by 20% to EUR 7.4 billion in the first half of 2019. In the low nominal interest rate environment, households shifted EUR 6 billion, or more than 80% of total financial investments, into overnight deposits with domestic banks, which implies a considerable substitution of other financial assets. Net financial investments in capital market instruments amounted to slightly more than EUR 1 billion during that period. While reducing their direct holdings of debt securities, households continued to invest in mutual fund shares and also bought listed shares. Households' (unrealized) valuation gains in all three asset categories came to EUR 6.6 billion in the first half of 2019, which was equivalent to 5.8% of the amount outstanding in mid-2018. Capital market investments in general and stocks in particular are, however, very much concentrated in the portfolios of households with higher income, as evident from results of the Household Finance and Consumption Survey (HFCS) for Austria.

Chart 2

Debt sustainability indicators for Austrian nonfinancial corporations and households



Source: OeNB, Statistics Austria.

Residential property prices in Austria rose further in the first half of 2019. In the second quarter of 2019, prices increased by 7.3% year on year. The OeNB fundamentals indicator for residential property prices reached 14.1% in the second quarter of 2019, which suggested a continuation of the mounting overvaluation observed in recent years.

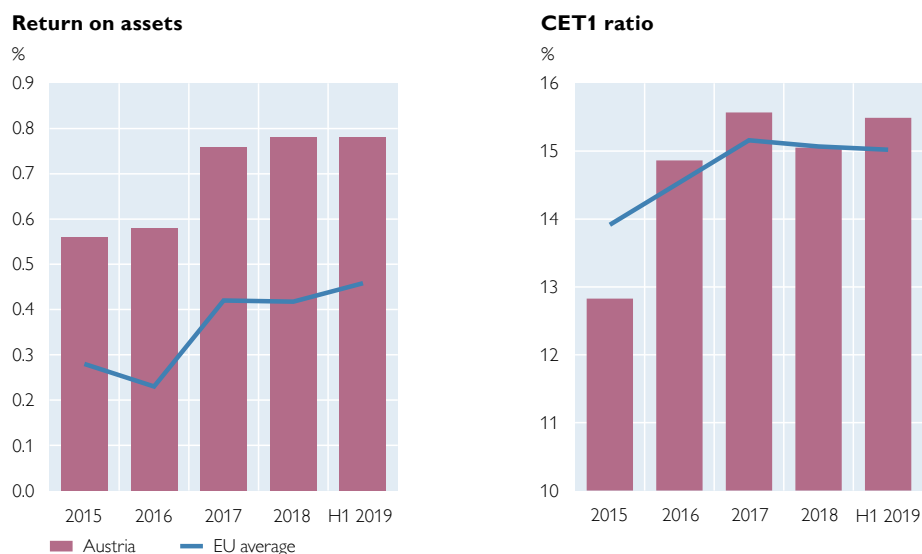
Dynamic lending activity fuels Austrian banks' profits, but sustainable lending standards are to be maintained

Consolidation of the Austrian banking sector lost momentum amid rising total assets. The number of banks in Austria declined further, namely to 592, in the first half of 2019. However, banks' consolidated total assets exceeded EUR 1 trillion again, after having fallen below this level in 2016 due to deleveraging and restructurings. Exposures to Central, Eastern and Southeastern Europe (CESEE)¹ had augmented perceptibly by mid-2019, reaching EUR 246 billion. The strongest absolute increases were registered for the Czech Republic, Russia and Slovakia, while reductions were, for instance, recorded for Turkey and Bulgaria. The overall increase in foreign exposure was not only driven by activities via local subsidiaries, but also by foreign branches (especially in the EU).

In the first half of 2019, net profits of Austrian banks reached EUR 3.5 billion, down by 2% year on year due to a shift in total risk provisioning. Austrian banks' operating profit improved further, as operating income was propelled by higher interest income and a reduction in trading losses compared with the same period of the previous year. Operating expenses increased because of higher depreciations. As a result, the cost-income ratio improved slightly, but, at 65%, remained elevated. In contrast to the first half of 2018, when risk provisions had been released, Austrian banks started to modestly step up risk provisioning again, which, overall, led to a slight decrease in net profits. The return on average assets

Chart 3

Profitability and capitalization of banks



Source: OeNB, ECB.

¹ Based on ultimate exposures.

of the Austrian banking system came in at 0.8%, roughly matching the results of the last two years. However, banks must continue to improve structural efficiency to ensure sustainable profitability. After all, the economy is forecast to slow down, which might translate into further provisioning needs and reduced lending.

The credit quality of Austrian banks' loan portfolio continued to improve, while restrained risk provisioning weighed on the coverage of nonperforming loans. Austrian banks further reduced their volumes of nonperforming loans (NPLs) in the first two quarters of 2019. Half of this decline was attributable to the improved credit quality of corporate loans, especially of commercial real estate loans. Consequently, the consolidated NPL ratio of Austrian banks fell to 2.3%, and for Austrian corporate loans to 1.9%. The consolidated coverage ratio decreased slightly, however, to 50%, as new risk provisioning continued to be low and better provisioned loans were reduced.

Amid strong loan growth, Austrian banks managed to improve their capitalization somewhat. The common equity tier 1 (CET1) capital ratio of Austrian banks rose to 15.5% by mid-2019. Although banks increased their capital by more than 3%, continued strong loan growth in both Austria and CESEE drove up risk-weighted assets markedly, which is why regulatory capital ratios did not rise more strongly.

In mid-2019, total assets of Austrian banks' subsidiaries in CESEE continued to be concentrated in just a few markets with a focus on EU countries. Of total assets worth EUR 217 billion, more than one-third is located in the Czech Republic. The Czech Republic, Slovakia and Romania together account for nearly two-thirds of this sum (see the left panel of chart 4). However, the strongest relative growth in the first half of the year was posted in the Eastern European countries Russia, Belarus and Ukraine. The subsidiaries' outstanding volume of foreign currency loans to corporations and households remained flat at EUR 30 billion during the first half of 2019, while the share of these loans in total loans continued to amount to almost one-quarter (with regional heterogeneity remaining high). In terms of the geographical distribution of profits in the first six months of the year, the Czech Republic has maintained its top spot with a share of 37%, followed by Russia (19%) and Slovakia (11%). Both assets and profits are therefore concentrated in just a few markets, while several smaller exposures add little to the bottom line. Overall, Austrian banks' CESEE exposures continue to be strongly focused on EU Member States.

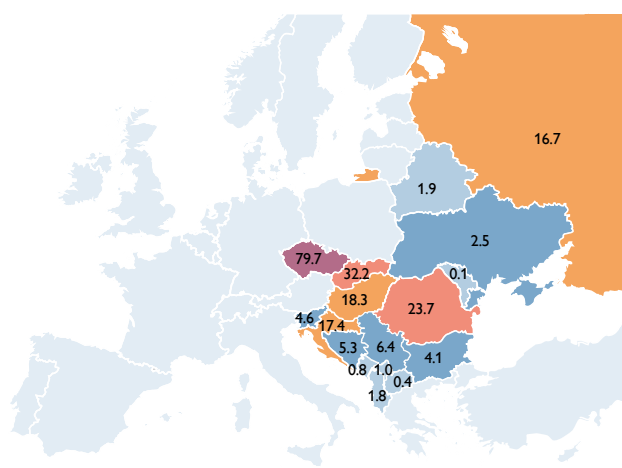
Austrian banking subsidiaries in CESEE earned EUR 1.3 billion in the first half of 2019, which translates into an annualized return on assets of 1.3%. This continues to substantially contribute to parent banks' overall profitability but is noticeably less year on year (first half of 2018: EUR 1.6 billion, excluding Poland²). Driven solely by dynamic asset growth, net interest income grew by 8% year on year, while the net interest margin remained flat at 2.7%. Other noticeable changes in income (i.e. trading and valuation results) canceled each other out, so that operating income rose by 7%. Given that the cost-income ratio remained unchanged at slightly above 50%, operating profits grew by 8%. Profits dipped, however, by 14% compared with the first half of 2018, as credit risk costs turned from provision

² After the 2018 sale of Raiffeisen Bank International's subsidiary in Poland, no Austrian banking subsidiaries are active in the country.

Austrian banks' subsidiaries in CESEE: regional concentration of assets and heterogeneous credit quality

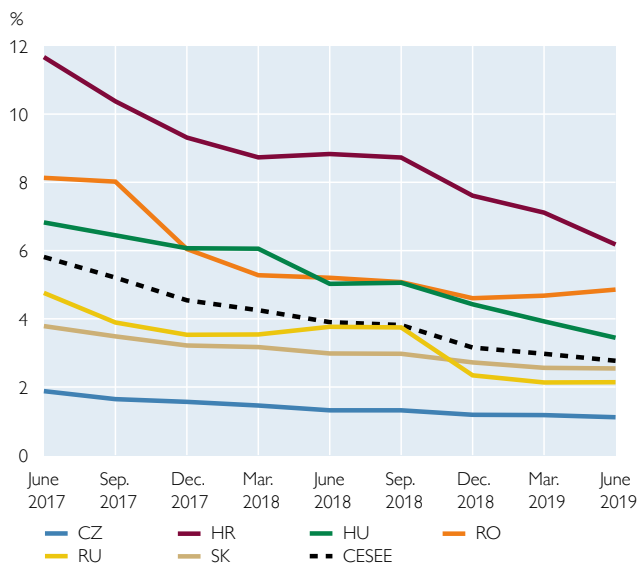
Total assets

EUR billion



Source: OeNB. Data as of mid-2019.

NPL ratios



Source: OeNB.

releases to renewed buildups and activities in Romania were affected by a large negative one-off effect.³

Credit quality at Austrian banking subsidiaries in CESEE continued to improve, and capitalization rose. By mid-2019, the ratio of nonperforming loans had dropped to 2.8% (from 3.9% in mid-2018), with improvements evident in all borrower segments. Moreover, the coverage ratio was at a healthy 65%. Croatia, Russia and Hungary, which are among the most important host markets, registered particularly marked year-on-year improvements (see the right panel of chart 4). The subsidiaries' aggregated CET1 ratio increased from 15% to 16% year on year.

Intra-group liquidity transfers to CESEE credit institutions rose substantially in the first quarter of 2019, while local funding positions remained sustainable. Liquidity transfers amounted to EUR 21 billion at the end of the first quarter of 2019. The Czech Republic continued to be the dominant destination (receiving two-thirds of total liquidity transfers), as the positive yield differential to the euro area continued to attract intra-group funds. Altogether, the local funding situation of all foreign subsidiaries of Erste Group Bank and Raiffeisen Bank International was considered sustainable in mid-2019 (in accordance with the Austrian supervisory Sustainability Package⁴).

The OeNB's approach to macroprudential capital buffers further strengthens financial stability in Austria. Having re-evaluated the systemic importance of individual banks, the Austrian Financial Market Stability Board

³ See <https://www.erstegroup.com/en/investors/news/investorinformation/2019/07/31/irnews-H12019-results-for-Erste-Group's-other-operating-result-in-the-first-half-of-2019>.

⁴ For more information, see <https://www.oenb.at/en/financial-market/financial-stability/sustainability-of-large-austrian-banks-business-models.html>.

(FMSB) recommended – in line with the OeNB’s opinion – that both the list of identified institutions and the buffer level for other systemically important banks remain unchanged.⁵ Domestic credit growth remained robust, but not excessive. Therefore, the FMSB followed the OeNB’s recommendation to keep the counter-cyclical buffer at 0% also from January 1, 2020.

In September 2019, the FMSB evaluated banks’ compliance with its quantitative guidance regarding sustainable lending standards. The FMSB acknowledged banks’ efforts to lower the ratio of loan volumes to the collateral’s value (reflecting an increase in borrowers’ down payments) and to curb loan maturities at origination. However, the FMSB also concluded that the share of new lending with high debt service in relation to borrowers’ income remained elevated. The FMSB will therefore continue to monitor systemic risks from real estate financing, and the OeNB’s and the FMA’s ongoing supervisory work will continue to focus on sustainable lending standards. The OeNB is concerned that the strong dynamics of the Austrian real estate market could fuel a self-reinforcing credit-price spiral. The likelihood of such an adverse scenario has increased amid continuously rising real estate prices and elevated debt service levels. In line with its financial stability mandate, the OeNB will continue to carefully evaluate whether the conditions for an activation of macroprudential instruments – as laid down in Article 22b of the Austrian Banking Act – are met and whether a recommendation to the FMSB for the pre-emptive activation of measures is warranted.

In 2019, the OeNB also intensified its monitoring of real estate-related lending to nonfinancial corporations. It supports the FMSB’s call to improve data availability, especially for commercial real estate lending.

Banks’ business outlook starts to be mixed, as accommodative monetary policy supports both credit demand and borrowers’ ability to pay, while continued trade tensions and geopolitical uncertainties lead to a slowdown of the euro area economy. Credit risk indicators have reached very low levels and loan growth has been dynamic over the last years. But the international slowdown of economic activity and concerns about a buildup of asset price bubbles clearly warrant attention. In light of this, the OeNB recommends that banks ensure that they have enough room for maneuver in the case of a potential downturn and take the following measures to strengthen financial stability:

- Apply sustainable lending standards (especially in real estate lending), both in Austria and in CESEE, and comply with the quantitative guidance issued by the Financial Market Stability Board.
- Improve the cost-income ratio to safeguard the sustainability of profits in a potential downturn.
- Sustainably ensure adequate capitalization, especially by appropriately balancing dividend payouts and internal capital generation, to offset potential risks from strong credit growth (especially in CESEE).
- Develop and apply adequate strategies to deal with challenges linked to new information technologies (e.g. new business models and cybersecurity strategies).

⁵ See <https://fmsg.at/en>.

Results of the 2019 OeNB system stress tests

The OeNB conducts annual stress tests for all Austrian banks⁶ under its dual mandate for banking supervision and financial stability assessment.⁷ In other words, the OeNB's stress tests do not only provide bank-by-bank risk analyses but also a system-wide perspective on the whole Austrian banking sector. The tests follow a top-down approach and are based on the OeNB's stress testing framework ARNIE (see Feldkircher et al., 2013). They include all exposures at the highest level of consolidation and cover the solvency, liquidity and contagion perspectives. In 2019, the OeNB also performed a sensitivity analysis of the interaction between banks' liquidity and solvency positions. The reference date for all analyses is the fourth quarter of 2018.

Solvency stress test

The solvency stress test assesses how resilient Austrian banks and the banking sector as a whole are to an adverse macroeconomic shock. To this end, two scenarios are examined: (1) a baseline scenario that is equivalent to the World Economic Outlook of July 2019 of the International Monetary Fund (IMF) and (2) a hypothetical adverse scenario, in which a severe economic downturn is assumed. Over the three-year horizon (2019–2021), Austrian GDP grows by a cumulative –1.9% in the adverse scenario, or by 7.2 percentage points less compared with the baseline scenario (+5.3%).⁸ The adverse scenario was designed jointly by the OeNB and the IMF within the context of the 2019 Financial Sector Assessment Program (FSAP). The scenarios were used by both the OeNB and the IMF to calculate their respective stress test results.^{9,10}

At the center of the adverse scenario is a severe economic downturn in the euro area and emerging Europe. The interaction between sovereign and banking sector stress leads to heightened risk aversion, confidence losses and reduced government spending. In particular, the increased stress levels are reflected by rising long-term interest rates (from 0.9% to 1.8% for Austria), and spillovers to the financial sector cause short-term interest rates to increase (from –0.3% to 0.5% for Austria). Additionally, the spread between the two rates – the term premium – increases worldwide over the stress horizon. This global slowdown in investment is also associated with tumbling equity prices (Austria: –22% relative to end-2018 values), a housing market downturn (Austria: –20%), safe haven capital flows to Switzerland and foreign capital outflows from Europe, which causes sharp movements in exchange rates. The euro is assumed to depreciate by

⁶ As from end-2018, 440 CRR credit institutions are included: 6 Austrian significant institutions (SIs), 1 material foreign SI subsidiary and 433 less significant institutions (LSIs).

⁷ Austrian banking supervision is based on a dual approach. The Austrian Financial Market Authority (FMA) is the designated public authority for banking supervision and monitors compliance with the relevant rules. The OeNB is in charge of fact finding, carrying out on-site inspections and analyzing the compiled information.

⁸ The adverse scenario specifically models shocks for Central, Eastern and Southeastern European (CESEE) countries given Austrian banks' significant exposure in this region. Central and Eastern Europe (CEE: Bulgaria, the Czech Republic, Hungary, Poland, Romania and Slovakia), Southeastern Europe (SEE: approximated by Croatia) and the Commonwealth of Independent States (CIS: approximated by Russia) experience a GDP shock of 10.0, 11.5 and 14.3 percentage points, respectively.

⁹ The IMF's Technical Note on the FSAP stress test will be published in January 2020.

¹⁰ The OeNB provides an interactive tool highlighting the main results of the stress test at <https://www.oenb.at/en/financial-market/banking-supervision/stress-tests.html>.

17% vis-à-vis the U.S. dollar and by 35% vis-à-vis the Swiss franc, and CESEE exchange rates will generally depreciate vis-à-vis the euro.

Overall, compared with the adverse scenario of last year's OeNB stress test, which was aligned with the scenario of the 2018 stress testing exercise of the European Banking Authority (EBA), the 2019 adverse scenario is partly more severe. As a case in point, the GDP of the SEE and CIS countries contracts more strongly. By contrast, the GDP shocks for Austria and the CEE region are slightly milder due to the better economic outlook. Then again, the exchange rate shocks and interest rate movements are considerably more pronounced, which is in line with the scenario narrative. Real estate shocks, on the other hand, are somewhat milder.

The Austrian banking sector has again improved its starting capital position, albeit at a slower pace. The aggregate starting CET1 ratio of the Austrian banking system stood at 15.5% at end-2018¹¹, up 0.4 percentage points against end-2017. This increase had been mainly driven by historically low credit risk costs in a benign economic environment, which supported a buildup of CET1 capital, while the risk exposure amount (REA) edged up only moderately.

For stress testing purposes, starting positions of flow variables are not directly based on profit and loss figures as reported; instead, a process is in place to (1) identify, (2) correct (model-based), and (3) quality assure for one-time effects in order to generate the best basis for scenario calculations. At end-2018, net interest income (NII), the main source of income, contributed roughly two-thirds of total operating income, while net fee and commission income (NFCI) accounted for slightly more than one-quarter. At a share of 2%, net trading income (NTI) was only a minor profit component. While the proportions, just like the cost drivers including staff expenses, remained stable compared with end-2017, the aggregate operating result had improved by roughly 10%. At the same time, expected credit risk costs remained stable. This broadly reflected the benign economic environment of 2018.

The severe shock of the adverse scenario notwithstanding, aggregate capitalization remains satisfactory at above pre-crisis levels. In the baseline scenario, the aggregate CET1 ratio of the Austrian banking system improves to 17.8% by end-2021, while in the adverse scenario, it decreases to 11.1%, down by 4.4 percentage points versus the starting point. In this year's exercise, the adverse scenario features are more severe, calibration is more conservative and there is a stronger macroprudential focus. Despite an improved starting position, the impact is therefore more pronounced than last year (−3.1 percentage points).

The following waterfall charts show the different drivers that contribute to the change of the CET1 ratio over the three-year stress horizon.

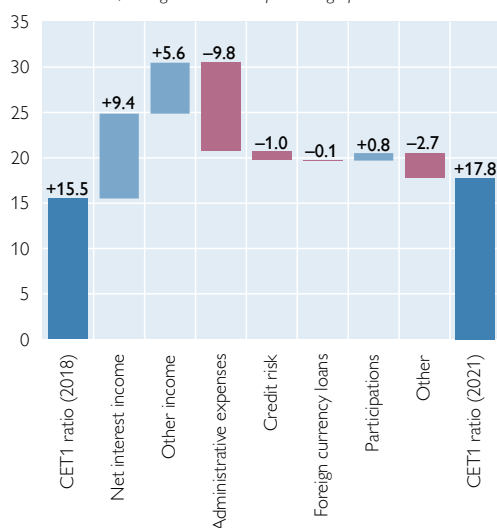
In the adverse scenario, credit risk remains the most important risk at the system level. Compared with the baseline scenario, it drives down the CET1 ratio by 3.9 percentage points more in the adverse scenario. The impact is more than twice as high as that of the second and third most important effects. NII's contribution to the CET1 ratio is 1.4 percentage points less in the adverse scenario, and equity participations, a positive contributor in the baseline scenario, cause the CET1 ratio to drop by 1.0 percentage point. Finally, foreign currency loans drive

¹¹ The difference compared with the CET1 ratio cited in the "Recent developments" section in this issue is explained by the fact that the stress test sample only includes CRR credit institutions, while the other sample is larger as it covers credit institutions as defined in the Austrian Banking Act.

Drivers of the aggregate Austrian CET1 ratio under the baseline and the adverse scenario

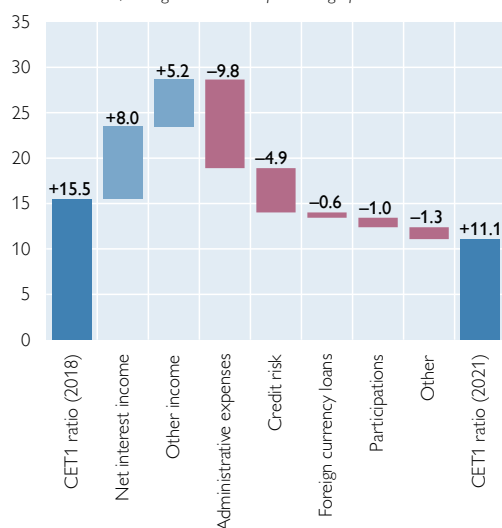
Baseline CET1 ratio of the Austrian banking system

CET1 ratio in %, change in drivers in percentage points



Adverse CET1 ratio of the Austrian banking system

CET1 ratio in %, change in drivers in percentage points



Source: OeNB.

down the CET1 ratio by 0.6 percentage points. Administrative expenses are assumed to remain stable, while other factors reduce the CET1 ratio by another 1.3 percentage points in the adverse scenario.

Credit risk remains the single most important driver despite the improved starting position. Credit losses are slightly higher than in the 2018 OeNB stress test and reflect the more differentiated macroeconomic scenario. Of the credit losses, close to one-half is related to CESEE exposures, which account for roughly one-quarter of total credit exposures. About 40% are attributable to Austrian exposures, and the remainder to exposures that originated predominantly in western Europe.

Net interest income is affected by the adverse interest rate scenario and increased credit risk-induced defaults. In the adverse scenario, NII decreases by about 20% over the three-year stress test horizon. This impact is in line with the severity of the interest rate scenario explained in the above description of the adverse scenario. In line with the static balance sheet assumption, defaulted exposures are not replaced and reduce the capacity to generate income.

Other income and expenses have a subordinate impact on the result. In the adverse scenario, other net income items increase by 0.4 percentage points less than in the baseline scenario: NFCI declines by 13% over the three-year stress test horizon and NTI is reduced by 15%. Following the stress test methodology of the EBA (2018), all other income and expenses components remain unchanged at their initial starting value for both the baseline and the adverse scenario.

Losses from equity participations in other banks are a significant transmission channel. The Austrian banking system is characterized by a relatively high degree of interconnectedness, which results inter alia from banks' equity stakes in other banks. Losses incurred by an individual bank therefore propagate

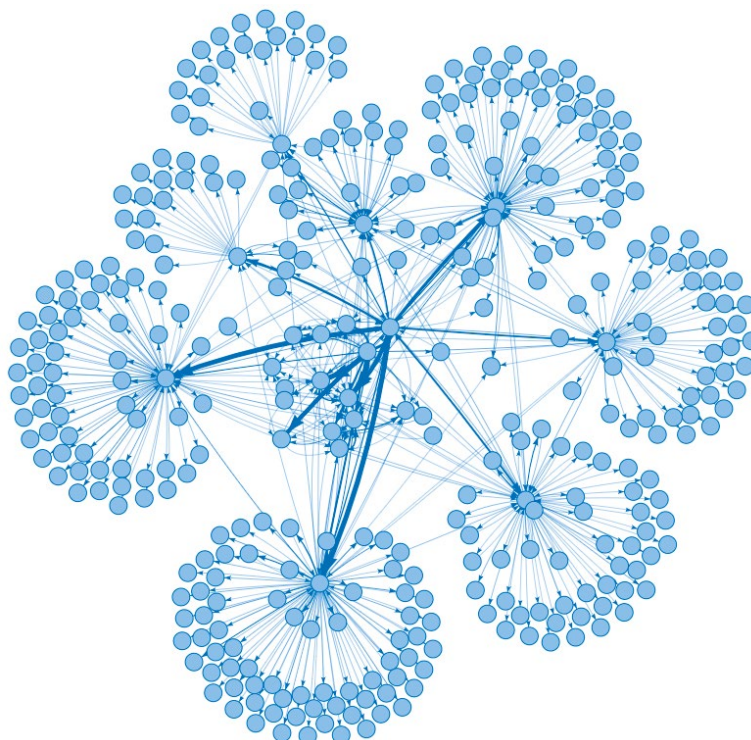
through the system, reducing the value of shareholders' equity stakes. It is highly relevant to consider such second-round effects to achieve comprehensive and realistic stress test results for the Austrian banking system. While banks generally benefit from mutual equity participations in economically good times, they also face spillovers in bad times. Overall, the aggregate impact of participations on capital ratios is substantially more pronounced for banks in the decentralized sector.

Resulting scenario losses from foreign currency loans appear manageable because of supervisory measures that have been put in place. The exposure to foreign currency loans has been reduced considerably since the introduction of these measures. Projected losses on foreign currency loans (including repayment vehicles) result in CET1 capital depletion of 0.6 percentage points. About three-quarters of these losses stem from exposures in the CESEE region, which also reflects the severity of the exchange rate shocks described above.

Other contributors to the final CET1 ratio include taxes, dividends, minority interests, the change in the REA and a business risk component. In the baseline scenario, these components contribute to the reduction of the CET1 ratio by 2.7 percentage points. As the banking sector is profitable, this impact is driven to a large extent by tax, dividend and minority interest payments resulting from these profits. In the adverse scenario, such payments are greatly reduced, by contrast, as the banking sector on aggregate is assumed to make losses. The resulting depletion amounts to 1.3 percentage points, which is largely due to an increase in the REA of 0.5 percentage points and a business risk shock of 0.5 percentage points.

A contagion analysis complements the solvency stress test. While the stress test examines the resilience of individual banks and the aggregate banking sector to adverse economic conditions, the contagion analysis simulates the sequential default of each bank, detached from economic developments. This analysis aims to quantify the risk from another important source of interconnectedness, interbank lending. Chart 6 depicts the Austrian interbank network, showing only exposures above EUR 25 million; in the calculations all exposures are considered, however. Contagion effects, which reflect the structure of the banking sector, have declined over the last years due to a slight contraction of interbank lending and, more importantly, improved capitalization. This analysis underlines the importance of well-capitalized banks acting as stabilizers to prevent contagion, while also confirming the role of the decentralized sector shown in the calculations related to the impact of equity participations.

The Austrian interbank network



Source: OeNB.

Box 1

ARNIE – still in action

The OeNB runs its stress tests with ARNIE, a MATLAB-based stress testing software the OeNB implemented for the 2013 FSAP that built on earlier tools such as the Systemic Risk Monitor (Boss et al., 2006) and has continuously been improved and expanded. This includes a biennial update to the stress test methodology developed by the EBA for the EU-wide stress test.¹² In addition, the OeNB tailors its stress tests to account for specificities of the Austrian banking sector. Such adjustments include, for instance, increased coverage of risks stemming from foreign currency loans and risks from participations in other banks.

ARNIE's credit risk module follows an expected loss approach. In analogy to the EBA methodology, ARNIE considers three partly offsetting effects: losses on newly defaulted assets, the release of provisions from cured assets and additional losses on previously defaulted assets. The sum of these items equals net credit risk impairments. Cures are accounted for in the baseline scenario only; in the adverse scenario, no cures are assumed for defaulted assets.

ARNIE's NII projections draw on data on banks' individual balance sheet structures. This is broadly in line with the EBA methodology. Interest-bearing assets and liabilities are broken down into different categories. For each category, an average effective interest rate is calculated using economic considerations with a view to realistically capturing the main drivers of the evolution of interest income and expenses.

¹² Currently, ARNIE is based on the methodology for the 2018 EU-wide stress test of the EBA (2018).

The effective interest rate is split into a reference component and a margin component. Interest rate floors on assets and liabilities are explicitly accounted for, which in turn bears on future margins. Maturing instruments are replaced by instruments with identical characteristics but at current rates. This, for example, accounts for a decline in interest income triggered by maturing long-dated higher yield fixed rate assets. Another feature of the NII calculation is the stickiness of customer deposits, i.e. the empirically observed tendency of deposit rates to grow at a slower pace than reference rates. Here, conservatively calibrated parameters are applied. An important driver of interest expenses included in the NII module is the development of banks' credit spreads along with the pass-through of credit spread increases to the margins of assets and liabilities.

Net trading income and net fee and commission income are shocked using the EBA's haircut approach, i.e. instant shocks of 25% and 20%, respectively, are applied and the impact is distributed over the scenario horizon. In addition, both the NTI and NFI are adjusted proportionally for the change in the performing exposure to reflect the reduced income generation capacity. **Expenses**, such as staff or other administrative expenses, are assumed to remain flat over the stress horizon even under the adverse scenario. This is in line with the EBA's static balance sheet assumption and implicitly prevents banks from taking any mitigating action.

ARNIE's foreign currency loan module covers all material domestic and foreign household and corporate exposures for all material currencies¹³. The domestic exposures comprise all repayment vehicle loans including those denominated in euro. The methodology considers differences between domestic and CESEE exposures as regards loan characteristics (foreign currency loans are mainly bullet loans in Austria and instalment loans in CESEE). ARNIE quantifies the loss potential arising from an appreciation of the currencies loans are denominated in and the underperformance of repayment vehicles attached to bullet loans. It covers the indirect credit risk triggered by an increase in (home currency) debt and/or a decrease of funds set aside to repay debt at maturity. This indirect credit risk is an add-on to the common macroeconomic credit risk covered in the credit risk module of the solvency stress test.

ARNIE's participation risk module was designed to appropriately reflect the profits and losses stemming from participations in other banks. It also covers material participations in nonbanks. For participations in other banks, profits and losses made by an individual bank are proportionally passed on to the respective shareholders in line with their participation share. This approach assumes that participations are revalued, with losses capped at book values. To address multiple levels of participations, an "end-to-end view" is applied, i.e. all participations are examined at the highest level of consolidation. For nonbank participations, a country-specific equity price shock is applied to the market value of the respective participation. Hidden reserves are taken into account in the calculation of the aggregate impact.

ARNIE models general business risk driven by the historical volatility of the profit and loss account, deviating from the EBA methodology with its focus on conduct risk. **Taxes and dividends** are treated following EBA constraints (30% each, in case banks are profitable). Minority interests are considered in accordance with the actual ownership structure on the basis of the data reported to the OeNB.

The shock to the risk exposure amount focuses on credit risk-weighted assets. Internal ratings-based (IRB) portfolios are subject to the stressed credit risk parameters following the Basel formulas, while portfolios under the standardized approach are subject to the floor from the EBA methodology, which corresponds to their initial value. Regarding the securitization positions, the calculations in ARNIE stress risk weights in line with the EBA methodology. All other positions of the total risk exposure amount remain constant in the OeNB stress test.

¹³ CHF and JPY for domestic exposures and EUR, CHF and USD for foreign exposures.

Liquidity stress test

The OeNB's liquidity stress test is now also fully integrated into ARNIE. The OeNB follows international best practices by employing a cash flow-based approach to stress test the liquidity position of Austrian banks, covering the entire Austrian banking system. Banks organized in the decentralized sector are stressed individually but the results are reported at the level of their respective liquidity subgroup.¹⁴

The stress test covers two scenarios: (1) a five-week idiosyncratic scenario focusing on deposit outflows caused by an assumed individual rating downgrade and a loss of market access; and (2) a twelve-month macroeconomic scenario assuming a systemic stress event that impacts the entire financial sector, where funding conditions deteriorate and a downturn in the macroeconomic environment results in declining asset prices, drawdowns on provided facilities and additional collateral needs. The scenario assumptions (run-off factors, stressed inflow rates and haircuts) are applied to banks' cash inflows and cash outflows as well as to the liquidity buffer across 21 maturity buckets.

A bank fails in a stress scenario if it is unable to cover a potential funding gap (i.e. outflows > inflows) with its liquidity buffer (the counterbalancing capacity, CBC) within the scenario horizon; in other words, when its net liquidity position (NLP) turns negative. The survival period measures how long a bank remains liquid in a scenario.

The liquidity stress test confirms that the aggregate liquidity risk-bearing capacity of the Austrian banking sector is adequate. Austrian banks are generally more affected by the shorter-term idiosyncratic stress event than by a longer-term macroeconomic downturn. Within the macroeconomic scenario, the aggregated system NLP stands at 10.7% of total assets, the harsher five-week idiosyncratic scenario results in an NLP of 2.3% relative to total assets, still well in positive territory.

Liquidity-solvency sensitivity analysis

The aim of the liquidity-solvency sensitivity analysis is to quantify the mutually reinforcing effects of weak solvency and weak liquidity positions. The analysis broadly follows the work of Puhr and Schmitz (2014), who first introduced a framework for investigating the interdependencies between solvency and liquidity stress. Starting point for the sensitivity analysis are the bank-by-bank results of the twelve-month macroeconomic scenario of the OeNB liquidity stress test and the bank-by-bank results of the first year of the adverse scenario of the OeNB solvency stress test. The following sheds light on transmission channels in both directions: solvency impacting liquidity, and liquidity impacting solvency.

The aggregate impact of solvency stress on the liquidity stress test is measured as the aggregate impact on the NLP ratio (net liquidity position / total assets) of the consolidated Austrian banking system. After the one-year scenario, but before additional effects from the solvency stress test are considered, the NLP ratio stands at 10.7%. This ratio is affected further via the following transmission channels:

¹⁴ While this approach slightly deviates from the solvency stress test, the sample covers the same 440 CRR credit institutions that are aggregated to 48 individual institutions and 8 liquidity subgroups pursuant to Article 27a Austrian Banking Act.

- Scenario-driven rating downgrades of bonds deposited at the central bank result in higher haircuts, which reduces the counterbalancing capacity. Compared with the stand-alone liquidity stress test, this transmission channel reduces the NLP ratio by 0.5 percentage points.
- Scenario-driven defaults reduce expected interest and principal payments from exposures to the private sector, which results in lower cash inflows. Compared with the stand-alone liquidity stress test, this transmission channel leads to a decrease of the NLP ratio of 0.1 percentage points.

Two additional transmission channels were considered, which do not, however, result in any additional impact: (3) The one-year scenario would also negatively affect credit claims held by the central bank, with higher haircuts reducing the counterbalancing capacity. (4) Market concerns about the solvency of individual banks would limit the latter's access to interbank funding and debt markets, which would reduce inflows. As credit claims are already excluded from the counterbalancing capacity in the stand-alone liquidity stress test (which contributes to the decrease of the NLP ratio by 1.2 percentage points), the marginal impact of this transmission channel is zero. Moreover, market access for banks is already severely constrained in the stand-alone liquidity stress test, while capital ratios remain satisfactory/adequate after 12 months so that banks do not face additional restrictions on market access.

The combined effect from these transmission channels reduces the NLP ratio by 0.6 percentage points to 10.1%. This benign result, however, must be considered in light of the very positive starting position of banks given the point in the credit cycle, and the subsequent limits of a solvency stress test with a one-year horizon.

The aggregate impact of liquidity stress on the solvency stress test is measured as the aggregate impact on the CET1 ratio via profit and loss effects. Here, two transmission channels identified by Puhr and Schmitz (2014) are examined: (1) higher credit spreads would drive up funding costs and (2) asset sales carried out to close a funding gap could result in additional losses.

Given the importance of the first transmission channel, it has been endogenized in the solvency stress test and, as a consequence, no longer produces an additional impact in this sensitivity analysis. The second transmission channel appears to be significant as well but much harder to account for. To close a funding gap, banks would have to either sell or collateralize assets from their counterbalancing capacity, with a potential impact on capital and the risk exposure amount. Forced sales could depress prices and expose all banks in the sample to mark-to-market losses in line with the applicable accounting regime. While the aggregate noncash liquidity stress impact amounts to 8.0% of total assets, depending on the mitigation strategy, this impact is not in its entirety relevant for the solvency stress test. Integrating models that capture banks' behavior under stress to better quantify these effects is part of the OeNB's research agenda but is still at an experimental stage.

Conclusions

The 2019 stress test results confirm that banks should be in a much better position to withstand a crisis compared with that experienced a decade ago. Since the financial crisis, Austrian banks have continuously built up risk buffers at both the individual and the system level. Credit risk remains the most significant driver, especially with regard to the CESEE region. Due to banks' high

degree of interconnectedness, losses from equity participations in other banks likewise represent a significant transmission channel.

However, in light of the favorable economic environment (e.g. historically low credit risk provisions), the OeNB's stress test results have to be interpreted with caution. The good times will not last forever, and while banks have come a long way, some buffers and risk mitigants have yet to be tested in a real crisis. Moreover, ARNIE, the OeNB's stress testing framework, does not yet fully capture mutually reinforcing spillover effects observable in a crisis, which is why it might underestimate crisis-induced contagion. Hence, both the Austrian banks and the OeNB should not fall prey to a false sense of security. Instead, banks should continue building up risk buffers and improving their forward-looking analyses of risks, particularly those idiosyncratic to the Austrian banking system.

References

- Boss, M., G. Krenn, C. Puhr and M. Summer. 2006.** Systemic Risk Monitor: A model for systemic risk analysis and stress testing for Austria. In: Financial Stability Report 11. Vienna: OeNB. 83–95.
- EBA. 2018.** 2018 EU-Wide Stress Test – Methodological Note.
- Feldkircher, M., G. Fenz, R. Ferstl, G. Krenn, B. Neudorfer, C. Puhr, T. Reininger, S. W. Schmitz, M. Schneider, C. Siebenbrunner, M. Sigmund and R. Spitzer. 2013.** ARNIE in Action: The 2013 FSAP Stress Tests for the Austrian Banking System. In: Financial Stability Report 26. Vienna: OeNB. 100–118.
- Puhr, C. and S. W. Schmitz. 2014.** A view from the top – the interaction between solvency and liquidity stress. In: Journal of Risk Management in Financial Institutions 7(4). 38–51.