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EUROSYSTEM

FINANCIAL STABILITY REPORT 38



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

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Editorial close: October 31, 2019

Opinions expressed by the authors of studies do not necessarily reflect the official viewpoint of the OeNB 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 South-eastern 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.

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.

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.

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.

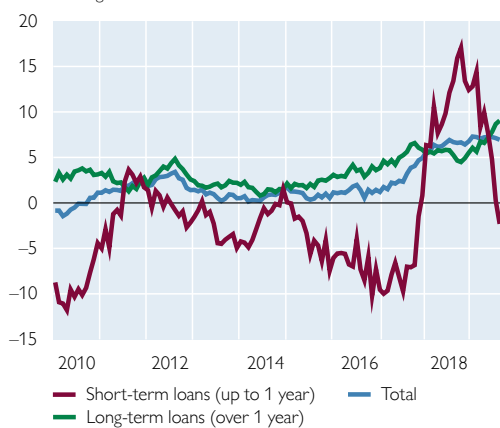
Credit conditions remained favorable and continued to support bank lending to the corporate sector. Bank lending rates remained low, reflecting the monetary policy stance and narrower interest rate margins for average loans. Margins on riskier loans, however, were largely left unchanged, which indicates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

Chart 1

Loans by Austrian banks to domestic nonfinancial corporations and households

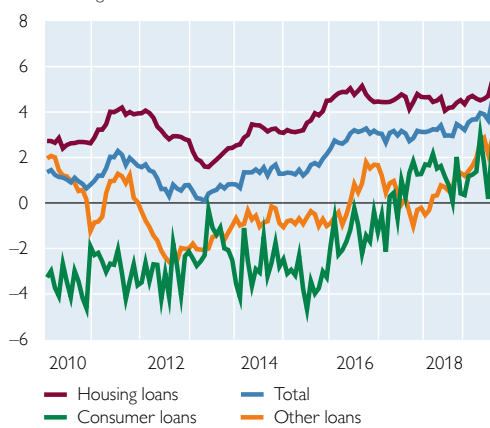
Loans to nonfinancial corporations

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

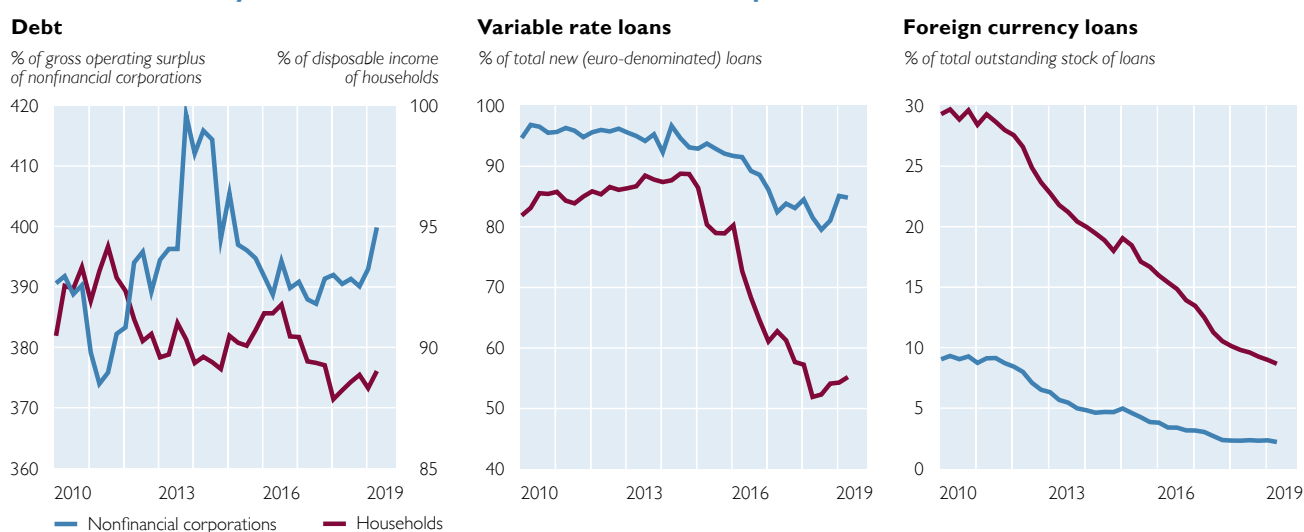
of up to one year), which had fallen considerably in the years before, went back up to 55% in the first half of 2019 (and to 45% in the case of housing loans). Thus, the share of variable rate loans remained quite high by international standards.

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

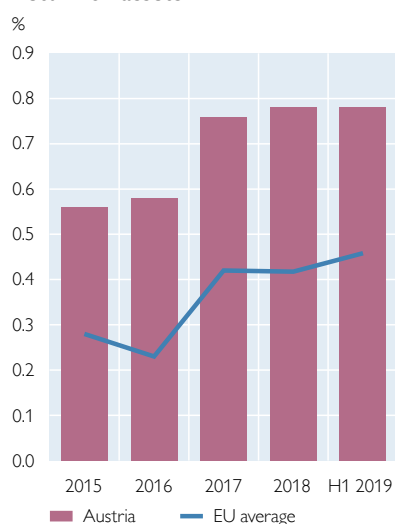
Consolidation of the Austrian banking sector lost momentum amid rising total assets. The number of banks in Austria declined further, namely to 592, in the first half of 2019. However, banks' consolidated total assets exceeded EUR 1 trillion again, after having fallen below this level in 2016 due to 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

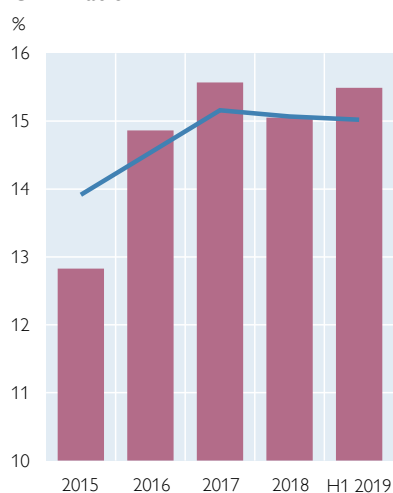
Chart 3

Profitability and capitalization of banks

Return on assets



CET1 ratio



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.

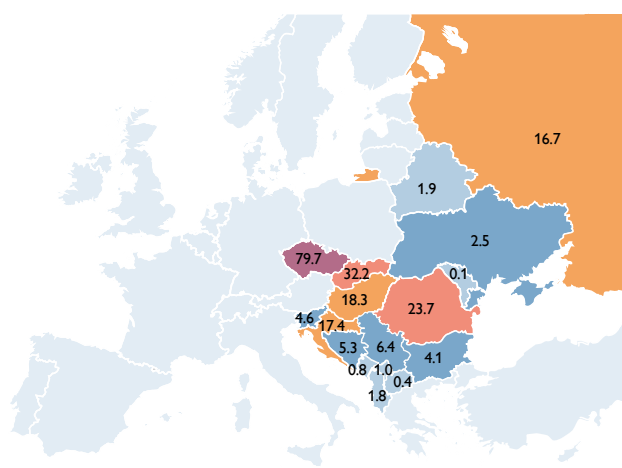
Austrian banking subsidiaries in CESEE earned EUR 1.3 billion in the first half of 2019, which translates into an annualized return on assets of 1.3%. This continues to substantially contribute to parent banks' overall profitability but is noticeably less year on year (first half of 2018: EUR 1.6 billion, 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

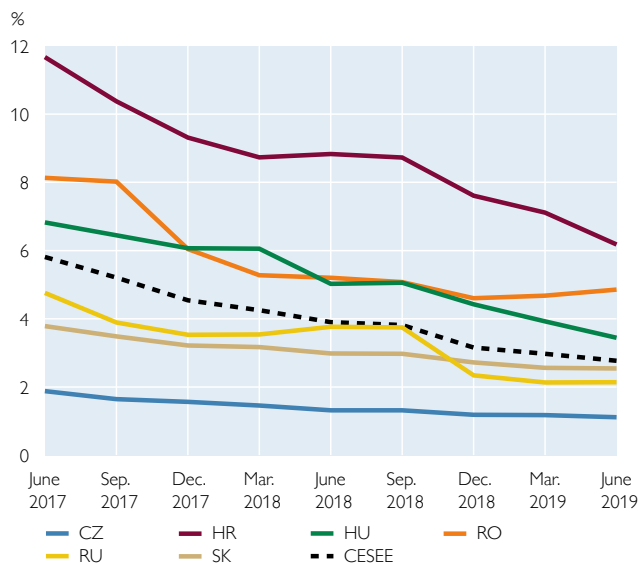
Total assets

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

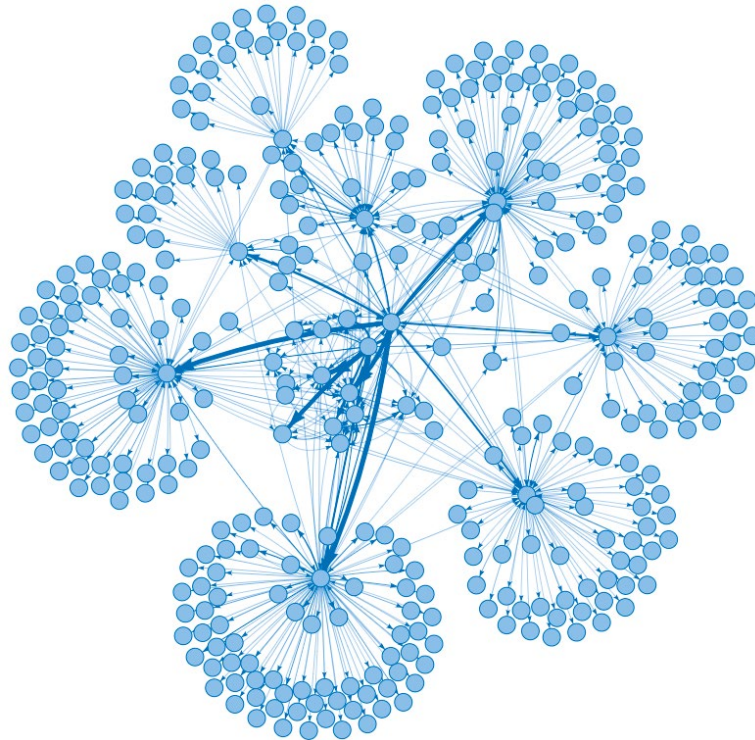
through the system, reducing the value of shareholders' equity stakes. It is highly relevant to consider such second-round effects to achieve comprehensive and realistic stress test results for the Austrian banking system. While banks generally benefit from mutual equity participations in economically 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 Pühr 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.

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Special topics

Nontechnical summaries in English

Climate change as a risk to financial stability

Wolfgang Pointner, Doris Ritzberger-Grünwald

Climate change has a significant impact on the economy, thus creating additional risks to financial stability. Financial risks of climate change broadly fall into two categories, namely physical risks and transition risks. Physical risks arise from the increase in global temperatures and from the ensuing costly weather events, such as floods, droughts and wildfires, that are becoming more common. Indirectly, these physical effects may prompt firms and households to adjust their saving and investment behavior, which may also have an impact on financial stability. Transition risks, in turn, can occur when an economy strives to become less polluting and greener (“climate neutral”) and production moves away from fossil fuels to reduce the emission of CO₂ (“decarbonization”). Investors in carbon-intensive financial assets consequently face a loss of value. The transition to a low-carbon economy may be driven by legal and regulatory reforms, but it may also result from technological change or shifting consumer preferences. The consequences of physical and transition risks can be manifold and may include significant asset price changes, higher risk premiums, rising financial market volatility and considerable writedowns. Ultimately, these changes may jeopardize financial intermediaries’ liquidity and solvency.

Acknowledging the need to start monitoring climate-related financial risks, several institutions have been directing considerable efforts toward analyzing and managing these risks. The Task Force on Climate-related Financial Disclosures (TCFD) has published reports that detail methods for measuring and assessing such risks. Central banks and financial supervisors have joined forces in a Network for Greening the Financial System (NGFS) to draw up recommendations for managing the financial risks stemming from climate change more effectively. The European Commission and the Austrian government have likewise launched initiatives to this effect.

Survey data show that most financial intermediaries in Austria have not yet integrated climate change into their risk management framework. Some have yet to acknowledge that climate-related financial risks exist, and only a few have already started to use indicators for measuring such risks. Together with other public bodies, the Oesterreichische Nationalbank is committed to raising awareness of climate-related financial risks in the financial sector and to providing information about relevant risk management methods.

Small but buzzing: the Austrian fintech ecosystem

Michael Boss, Konrad Richter, Andreas Timel, Philipp Weiss

This study aims to enhance transparency on the Austrian fintech industry by analyzing selected key features of firms classified as belonging to the fintech sector. The latter consists of start-ups and small and medium-sized enterprises that are established and operating in Austria. To compile a comprehensive overview of the Austrian fintech ecosystem, the Oesterreichische Nationalbank and Fintech Austria, the largest fintech interest group in Austria, have joined forces, providing – to the authors’ knowledge – the first study of such kind.

The fintech industry currently represents around 0.025% of the Austrian economy. However, despite still being rather small in absolute terms, the fintech industry is highly dynamic, with annual growth rates (median: 16%, average: 60%) by far exceeding those of the financial industry as a whole. The median fintech has a balance sheet size of EUR 350,000, a turnover of EUR 650,000, a workforce of six staff members and was founded some five years ago. The predominant legal form for fintechs is the limited liability company (GmbH), which is best suited to limit the financial fallout for founders in case their business idea fails.

Three-quarters of the aggregated balance sheet of the Austrian fintech industry are held by Vienna-based firms. This underlines that – even among tech-savvy internet users – innovation happens in geographical clusters. Fintechs are typically founded by men in their late 30s who have already pursued a previous career. The sector with the highest number of firms – payments – represents one-fifth of Austria’s fintechs and is characterized by disproportionately large firms. However, the last years have seen a surge in more specialized business models.

Overall, domestic natural persons account for three-quarters of investors in Austrian fintechs. Foreign investors are located, one-third each, in Germany, in other EU countries and outside the EU. In terms of total assets, however, the majority of fintechs is owned by foreign investors, followed by domestic natural persons. Almost one-half of foreign investments stems from the U.K., about one-quarter from Germany and one-sixth from the U.S.A., while the rest comes predominantly from other EU Member States.

The analysis of balance sheet components and key indicators moreover reveals that Austrian fintechs typically have about ten times as many working assets as fixed assets, which indicates a lean and effective corporate structure. Despite operating with asset-light business models, one-quarter of Austria's fintechs records negative capital ratios, with some extreme outliers.

While the fintech industry is not yet of paramount importance to the Austrian economy, its underlying dynamics warrant close monitoring to identify potential financial stability implications early on. Therefore, regular assessments of, and frequent updates on, industry trends as well as extensions to other players (e.g. bigtechs) and countries would be desirable in future studies.

The recent upswing in corporate loan growth in Austria – a first risk assessment

Andreas Greiner, Katharina Steiner, Walter Waschiczek

Austrian banks significantly expanded their lending to domestic firms in 2017 and 2018. As a result, we are witnessing the fifth period of significant corporate loan growth since 1982. The current upswing in lending, which reflects the monetary policy stance of the ECB in recent years, was not hindered by the higher capital requirements resulting from the new macroprudential capital buffers. In terms of magnitude, the current upswing is broadly in line with past increases, but the year-to-year variation is much higher than in most other loan growth periods since 1982. This article gives a first assessment of potential systemic risks for the Austrian banking system. Developments in the real economy in 2017–2018 broadly followed those during past upswings in lending. Only investment growth was stronger than during previous upswings, but starting from a historically low level. Bank loans – whose role in the financing mix of firms and in bank balance sheets was diminishing as corporate indebtedness levels decreased from the early 1990s onward – have recently become more sought after again as a substitute for other forms of corporate debt financing. These increases start from historically low levels, though, and have also been more pronounced in certain banking sectors. A potential deterioration in loan quality would therefore hit above all banks with currently high lending rates that have structurally low margins and weaker risk-bearing capacity (measured via capitalization). The main borrowers in recent years were industries with high value-added growth, high profitability and low insolvency rates. As corporate indebtedness levels have not risen as fast as corporate loan growth, banks' credit risks have not mounted as much as the strong increase in loan growth would suggest. However, banks' new lending business has been heavily concentrated on real estate activities, which may pose risks given the buoyancy of the Austrian real estate market.

Nonbank financial intermediation in Austria – developments since 2008

Thomas Pöchel, Alexandra Schober-Rhomberg, Alexander Trachta, Matthias Wicho

Nonbank finance is an alternative to bank finance that fosters competition in the supply of financing and supports economic activity. Over the past decade, it has become an increasingly important funding source for the real economy. Although increased risk-sharing across the financial system is generally seen as beneficial, nonbank finance may also become a source of systemic risk – both directly and through its interconnectedness with the banking system – if it involves activities that are typically performed by banks, such as maturity or liquidity transformation and the creation of leverage. However, these developments may also go hand in hand with increased risk-taking in such potentially less regulated parts of the financial sector, which can possibly circumvent the prudential requirements applicable to banks, and can involve new forms of risks to financial stability.

While in the EU, the relative importance of nonbank finance vis-à-vis traditional banking has increased noticeably in the past decade, the Austrian financial system is still dominated by the bank finance model. The bulk of nonbank finance in Austria is provided mainly by open-end investment funds, followed by insurance corporations and pension funds. Overall, the relatively small growth of nonbank finance assets in Austria is not seen as a concern in itself, as the risks from nonbank financial intermediation seem contained and all actors with substantial activities are subject to financial regulation and supervision. Neither the structure nor the size of nonbank financial intermediation in Austria are currently considered to pose a threat to financial stability. On the other hand, this also means that the Austrian financial system remains largely dependent on traditional banks and, hence, the economy is not able to reap the potential benefits of diversification in funding sources. Overall, the increasing importance of nonbank financial activities requires close monitoring and scrutiny of any emerging systemic risks in order to foster the development of appropriate micro- and macroprudential policies to address such risks.

Key takeaways from the OeNB's Macroprudential Policy Conference on “Financial stability in 2030: Maintaining effectiveness while reducing complexity”

Michaela Posch, Stefan W. Schmitz

Today, national and international policymakers face conflicting goals as they have to reduce the regulatory framework's complexity while at the same time guaranteeing financial stability. Due to increasing political pressure to deregulate, this issue has recently gained in prominence. The Oesterreichische Nationalbank therefore dedicated its Macroprudential Policy Conference, which it hosted on May 9, 2019, to the future of financial stability in the European Union. The conference featuring three panel discussions and two keynote addresses aimed at developing a long-term vision for 2030. To this end, high-level experts from finance, politics and academia identified the drivers of complexity and discussed how to tackle them. Drawing on national and international experience with macroprudential policy, the experts explored what the future regulatory framework – one that also includes nonbank financial intermediaries – could and should look like.

The costs of the global financial crisis have been high in all major economies and particularly high in the euro area. Improvements to the financial stability regulatory framework have strengthened Economic and Monetary Union, but regulation has, at the same time, become ever more complex. In this context, the conference participants discussed proposals to overhaul incentive structures in the banking industry. The key takeaway was the call for a high-level expert group at the EU level. This group should examine the main reasons for regulatory complexity and promptly recommend measures to reduce it. Correcting flawed incentives for banks coupled with effective macroprudential supervision and a reliable resolution framework should enable supervisory authorities to better mitigate the effects of a failing bank's market exit on both the financial system and the real economy. By extension, less emphasis could be placed on keeping all banks in business. This would help reduce regulatory complexity without endangering financial stability.

Nontechnical summaries in German

Klimawandel als Risiko für die Finanzmarktstabilität

Wolfgang Pointner, Doris Ritzberger-Grünwald

Der Klimawandel hat erhebliche wirtschaftliche Auswirkungen, die sich auch in zusätzlichen Risiken für die Finanzstabilität niederschlagen. Wir unterscheiden zwischen physischen und Transitionsrisiken des Klimawandels. Physische Risiken ergeben sich einerseits aus dem globalen Temperaturanstieg und häufiger auftretenden extremen Wetterereignissen (z. B. Überschwemmungen, Dürren, Waldbrände). Andererseits können auch indirekte Effekte auftreten, wenn Firmen und private Haushalte auf den Klimawandel und seine Folgen reagieren und ihre Spar- bzw. Investitionsentscheidungen anpassen. Transitionsrisiken werden schlagend, wenn die Produktionsweise einer Volkswirtschaft klimaneutral gemacht wird (Stichwort Dekarbonisierung, also Verringerung des Kohlendioxidausstoßes), wodurch Investitionen in klimaschädliche Anlagen an Wert verlieren. Dieser Übergang zu einer kohlenstoffarmen Wirtschaft kann das Ergebnis gesetzlicher oder regulatorischer Neuerungen sein, er kann sich aber auch aus dem technologischen Wandel oder aus geänderten Konsumentenpräferenzen ergeben. Sowohl physische Risiken als auch Transitionsrisiken können zu signifikanten Änderungen von Vermögenspreisen, höheren Risikoprämien, steigender Volatilität an den Finanzmärkten oder erheblichem Abschreibungsbedarf führen und damit die Liquidität und die Solvenz von Finanzintermediären gefährden.

Einige Institutionen beschäftigen sich bereits intensiv mit den finanziellen Risiken des Klimawandels und deren Management. Die Task Force on Climate-related Financial Disclosures (TCFD) hat in mehreren Berichten Methoden zur Messung und Bewertung dieser Risiken veröffentlicht. Notenbanken und Finanzaufsichtsbehörden haben sich in einem Network for Greening the Financial System (NGFS) zusammengeschlossen, um Empfehlungen für verbessertes Risikomanagement zu erarbeiten. Auch die Europäische Kommission und die österreichische Bundesregierung haben Initiativen in diesem Bereich gesetzt.

Umfragedaten legen nahe, dass die Finanzintermediäre in Österreich den Klimawandel noch nicht mehrheitlich in ihr Risikomanagement integriert haben. Einige haben das damit verbundene Risiko noch nicht erkannt und nur wenige setzen bereits Indikatoren zur Risikomessung ein. Die OeNB ist gemeinsam mit anderen öffentlichen Einrichtungen aktiv darum bemüht, das Bewusstsein für diese Risiken im Finanzsektor zu stärken und Methoden zum Risikomanagement zu verbreiten.

Klein, aber dynamisch: Österreichs Fintech-Ökosystem

Michael Boss, Konrad Richter, Andreas Timel, Philipp Weiss

Ziel des vorliegenden Beitrags ist es, mehr Transparenz hinsichtlich der österreichischen Fintech-Branche zu schaffen, indem zentrale Merkmale von Unternehmen, die dem Fintech-Sektor zuzuordnen sind, analysiert werden. Letzterer umfasst in Österreich ansässige und tätige Start-ups sowie Klein- und Mittelbetriebe. Um einen umfassenden Überblick über dieses Ökosystem liefern zu können, wurde die vorliegende Studie von der Oesterreichischen Nationalbank in Zusammenarbeit mit Fintech Austria, der größten Interessenvertretung der heimischen Fintech-Branche, verfasst. Nach Wissen der Autoren handelt es sich um die erste Studie dieser Art für Österreich.

Derzeit entfallen rund 0,025 % der österreichischen Wirtschaft auf die Fintech-Branche. Trotz dieser in absoluten Zahlen sehr geringen Größe zeigt sich der inländische Fintech-Sektor mit Jahreswachstumsraten, die weit über jenen der Finanzbranche insgesamt liegen (Median: 16 %, Mittelwert: 60 %), als äußerst dynamisch. Gemessen an den Medianwerten weisen Fintechs eine Bilanzsumme von 350.000 EUR, einen Umsatz von 650.000 EUR und einen Personalbestand von sechs Beschäftigten auf. Gegründet wurde das typische Fintech vor rund fünf Jahren. Die häufigste Rechtsform der Fintechs ist die Gesellschaft mit beschränkter Haftung (GmbH), die – im Falle des Scheiterns der Geschäftsidee – am besten zur Minimierung des finanziellen Risikos der Gründer geeignet ist.

Drei Viertel der aggregierten Bilanz des österreichischen Fintech-Sektors entfallen auf in Wien ansässige Unternehmen. Dies verdeutlicht, dass Innovationen – selbst unter technisch versierten Internet-Nutzern – in regionalen Clustern erfolgen. Gegründet werden Fintechs typischerweise von Männern in ihren späten Dreißigern, die bereits auf eine berufliche Laufbahn zurückblicken können. Der Zahlungsverkehr stellt mit einem Fünftel aller österreichischen Fintechs den unternehmensstärksten Sektor dar, der sich zudem durch überdurchschnittlich große Unternehmen auszeichnet. Gleichzeitig war in den vergangenen Jahren ein deutlicher Anstieg von zunehmend spezialisierten Geschäftsmodellen zu beobachten.

Natürliche Personen im Inland machen drei Viertel der Investoren in heimische Fintechs aus. Ausländische Investoren sind zu je einem Drittel in Deutschland, in anderen EU-Ländern bzw. außerhalb der EU angesiedelt. Gemessen an der Bilanzsumme befindet sich der österreichische Fintech-Sektor allerdings mehrheitlich im Besitz von ausländischen Investoren, gefolgt von inländischen natürlichen Personen. Rund die Hälfte ausländischer Investitionen stammt aus dem Vereinigten Königreich, rund ein Viertel aus Deutschland und ein Sechstel aus den Vereinigten Staaten. Die verbleibenden Investitionsanteile werden vorrangig von anderen EU-Ländern aufgebracht.

Aus der Analyse der Bilanzkomponenten und Schlüsselindikatoren geht außerdem hervor, dass österreichische Fintechs rund zehnmal so viel Umlaufvermögen wie Anlagevermögen aufweisen, was auf schlanke und effektive Unternehmensstrukturen hindeutet. Trotz der auf ein relativ geringes Anlagevermögen ausgerichteten Geschäftsmodelle verzeichnet ein Viertel aller heimischen Fintechs negative Eigenmittelquoten, darunter einige massive Ausreißer.

Wenngleich der Fintech-Sektor für Österreichs Wirtschaft derzeit noch eine untergeordnete Rolle spielt, so erfordern die dem Sektor zugrunde liegenden Entwicklungen dennoch eine genaue Beobachtung, um etwaige Auswirkungen auf die Finanzmarktstabilität frühzeitig zu identifizieren. Regelmäßige Bewertungen sowie aktuelle Informationen über jüngste Entwicklungen wie auch eine Ausweitung der Analyse auf andere Akteure (z. B. Bigtechs) und Länder wären daher in künftigen Studien wünschenswert.

Die jüngste Beschleunigung des Unternehmenskreditwachstums in Österreich – eine erste Risikoanalyse

Andreas Greiner, Katharina Steiner, Walter Waschiczek

Die österreichischen Banken haben 2017 und 2018 deutlich mehr Kredite an heimische Unternehmen vergeben als in den Vorjahren. Damit hat die Unternehmenskreditvergabe in Österreich zum fünften Mal seit 1982 stark angezogen. Hinsichtlich der Größenordnung bewegt sich der jüngste Kreditaufschwung – der auch auf den geldpolitischen Kurs der EZB in den letzten Jahren zurückzuführen ist und zustande kam, obwohl die Banken aus Finanzstabilitätsüberlegungen zusätzliche Kapitalpuffer aufbauen mussten – durchaus im Rahmen der meisten früheren Aufschwungphasen. Die Kreditvergabedynamik, d. h. die jährliche Veränderungsrate, liegt allerdings deutlich über den meisten Vergleichswerten seit 1982. Daher werden in dieser Studie die potenziellen Systemrisiken für das österreichische Bankensystem einer ersten Analyse unterzogen. So lässt sich sagen, dass die realwirtschaftliche Entwicklung weitgehend analog zur Entwicklung in den Vergleichsphasen verlaufen ist. Nur das Investitionswachstum lag über den Vergleichswerten, allerdings bei einem vergleichsweise niedrigen Ausgangsniveau. Nachdem Bankkredite im Finanzierungsmix der Firmen und in der Bankbilanzstruktur generell seit den frühen 1990er-Jahren an Bedeutung verloren hatten, ist die Nachfrage nach Krediten als eine Alternative zu anderen Unternehmensfinanzierungsformen zuletzt wieder gestiegen. Dabei steigt die Nachfrage ausgehend von einem niedrigen Niveau. Zwischen den einzelnen Bankensektoren fiel das Kreditwachstum heterogen aus. Demnach würde eine potenzielle Verschlechterung der Kreditqualität vor allem jene Banken mit derzeit hohen Kreditvergabequoten treffen, deren Margen strukturell niedrig sind und die gemessen an ihrer Kapitalausstattung vergleichsweise wenig krisenfest sind. In den letzten beiden Jahren wurden neue Kredite verstärkt an Branchen mit einem hohen Wertschöpfungswachstum, hohen Gewinnspannen und niedrigen Insolvenzzraten vergeben. Das Verschuldungsniveau der Unternehmen ist nicht im selben Ausmaß wie die Inanspruchnahme von Unternehmenskrediten gestiegen. Daher ist das Kreditrisiko der Banken nicht so stark gestiegen, wie der Kreditaufschwung vermuten lassen würde. Da das zusätzliche Kreditengagement der Banken aber stark auf die Immobilienbranche konzentriert war, sind angesichts des dynamischen Anstiegs der Immobilienpreise in Österreich gewisse Risiken gegeben.

Finanzintermediation durch Nichtbanken in Österreich – Entwicklungen seit 2008

Thomas Pöchel, Alexandra Schober-Rhomberg, Alexander Trachta, Matthias Wicho

Die Finanzierung durch Nichtbanken stellt eine Alternative zur Bankfinanzierung dar, die sowohl den Wettbewerb in der Mittelbereitstellung als auch die wirtschaftliche Entwicklung fördert. In der Tat hat für die Realwirtschaft die Finanzierung durch Nichtbanken in den vergangenen zehn Jahren zusehends an Bedeutung gewonnen. Auch wenn die verstärkte Verteilung von Risiken innerhalb des Finanzsystems grundsätzlich für positiv erachtet wird, so kann die Finanzierung über Nichtbanken durchaus auch zu einer Quelle systemischer Risiken werden (sowohl direkt als auch indirekt über Verflechtungen mit dem Bankensystem), wenn sich Nichtbanken Methoden bedienen, die typischerweise von Banken angewendet werden, z. B. Fristen- und Liquiditätstransformation und Hebelfinanzierungen. All diese

Entwicklungen können aber auch mit einer vermehrten Risikoübernahme in solchen potenziell weniger stark regulierten Teilen des Finanzsektors einhergehen, wobei prudenzielle Vorgaben, die für Banken gelten, möglicherweise umgangen werden; und so können auch neuartige Risiken für die Finanzstabilität entstehen.

Während in der EU die relative Bedeutung der Finanzierung durch Nichtbanken gegenüber der traditionellen Bankenintermediation in den letzten zehn Jahren deutlich zugenommen hat, dominiert im österreichischen Finanzsystem noch immer die Finanzierung über Banken. Die Mittelbereitstellung durch Nichtbanken erfolgt in Österreich in erster Linie durch offene Investmentfonds, gefolgt von Versicherungen und Pensionsfonds. Die Risiken aus der Finanzintermediation durch Nichtbanken scheinen im heimischen Finanzsystem begrenzt zu sein, und alle Akteure, die in substanziellem Umfang Geschäfte tätigen, unterliegen der Finanzmarktregulierung und -aufsicht. Aus diesem Grund gilt das hierzulande sehr geringe Wachstum der Finanzierungsvolumina im Nichtbankensektor für sich allein genommen grundsätzlich nicht als besorgniserregend. Auch die Struktur und das Ausmaß der Nichtbanken-Finanzintermediation in Österreich stellen derzeit keine Bedrohung für die Finanzstabilität dar. Dies alles bedeutet aber auch, dass das österreichische Finanzsystem weiterhin in hohem Ausmaß von den Banken abhängig ist und die Wirtschaft folglich nicht in den Genuss der potenziellen Vorteile einer Diversifizierung in der Finanzierung kommt. Insgesamt erfordert die zunehmende Bedeutung der Nichtbanken-Finanzintermediäre jedenfalls die genaue Beobachtung und Analyse der systemischen Risiken, die sie potenziell verursachen, damit in weiterer Folge angemessene mikro- und makroprudenzielle Maßnahmen zu deren Bekämpfung ausgearbeitet werden können.

Kernergebnisse der Makroprudenziellen Konferenz der OeNB „Financial stability in 2030: Maintaining effectiveness while reducing complexity”

Michaela Posch, Stefan W. Schmitz

Nationale und internationale politische Entscheidungsträger stehen vor dem Zielkonflikt, die Komplexität des Regulierungsrahmens reduzieren zu müssen und gleichzeitig die Wahrung der Finanzmarktstabilität zu garantieren. Die Bedeutung dieses Zielkonflikts ist in jüngster Zeit gestiegen, da der politische Deregulierungsdruck zunimmt. Vor diesem Hintergrund widmete die Oesterreichische Nationalbank die Makroprudenzielle Konferenz, die am 9. Mai 2019 zum Thema „Finanzmarktstabilität im Jahr 2030: Effektivität erhalten, Komplexität reduzieren“ stattfand, der Zukunft der Finanzstabilität in der EU. Bei der Konferenz sollte eine langfristige Vision für das Jahr 2030 entwickelt werden. Hochrangige Experten und Expertinnen aus Finanz, Politik und Wissenschaft identifizierten Treiber für die wachsende Komplexität und diskutierten, wie diesen begegnet werden könnte. In drei Podiumsdiskussionen thematisierten die Rednerinnen und Redner basierend auf ihren nationalen und internationalen Erfahrungen mit makroprudenzieller Politik, wie der künftige regulatorische Rahmen, der neben Banken auch andere Finanzintermediäre einschließt, aussehen könnte und sollte.

Die Kosten der Finanzkrise waren in allen größeren Volkswirtschaften hoch, besonders aber im Euroraum. Durch eine Verbesserung des Rahmenwerks für die Finanzmarktstabilität konnte die Wirtschafts- und Währungsunion in den letzten Jahren zwar gefestigt werden, zugleich trat aber das Problem der regulatorischen Komplexität verstärkt in den Vordergrund. Im Fokus der Konferenz standen in diesem Zusammenhang Vorschläge für eine Neuordnung der Anreizstruktur für Banken im Finanzsystem. Die wichtigste Schlussfolgerung der Konferenz war die Notwendigkeit, eine hochrangige Expertengruppe auf EU-Ebene einzurichten, die die Hauptursachen für die Komplexität der Rechtsvorschriften untersucht und zeitnah Maßnahmen zu deren Reduktion vorschlägt. Mit weniger Fehlanreizen für Banken, einer effektiven makroprudenziellen Aufsicht und einem verlässlichen Abwicklungsrahmen sollten die Aufsichtsbehörden künftig besser in der Lage sein, die Auswirkungen des Marktaustritts einer scheidenden Bank auf das Finanzsystem und die Realwirtschaft deutlich zu mindern. Gleichzeitig könnte weniger Gewicht darauf gelegt werden, alle Banken am Leben zu halten. Dadurch ließe sich die regulatorische Komplexität verringern, ohne die Finanzstabilität zu gefährden.

Climate change as a risk to financial stability

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Refereed by: Sarah Breeden, Bank of England

In this study, we give an overview of risks to financial stability that result from climate change. We classify them according to their sources and show how they affect traditional categories of financial risk. Most financial institutions have yet to acknowledge these types of risk, with only a few having to date recognized climate change as a market opportunity. Over the past few years, both private and public institutions have, however, started to find better ways to identify, assess and manage climate-related risks, especially since the Paris Climate Agreement. Which data and indicators are needed to implement effective risk management in this area? While metrics and methods are available to financial intermediaries for this purpose, they are not yet widely used in practice. In the latter part of our study, we explore the awareness of Austrian financial intermediaries of climate-related financial risks empirically. Based on survey data, we find that some institutions have already integrated climate change into their business strategy and risk management systems, while a large share of institutions has not yet identified climate change as a financial risk at all. The fact that a majority of financial intermediaries had cited regulations and norms as effective motives for better adapting to the risks of climate change calls for future action by policymakers and regulatory authorities.

JEL classification: G18, G32, Q54

Keywords: climate change, financial risk, risk management

Awareness of the economic and financial consequences of climate change has been rising over the past years. By signing the Paris Agreement in 2015, which aims at keeping the global temperature increase well below 2°C by the end of this century, national governments committed to acting responsibly. That same year, Mark Carney, Governor of the Bank of England, outlined the negative effects of climate change for financial markets in a seminal speech in London. In 2017, a Network of Central Banks and Supervisors for Greening the Financial System (NGFS) was founded in Paris, which the OeNB joined in 2018. The NGFS is a voluntary forum for sharing best practices in identifying, managing and supervising climate-related risks in the financial sector and mobilizes funds for the transition toward a sustainable economy. Recent speeches by ECB board members attest to the relevance of climate change in the euro area (see Cœuré, 2018, and Mersch, 2018). It is important to bear in mind that climate change is one of several sources of risk to financial stability, next to issues of cybersecurity, rising inequality or geopolitical tensions.

Identifying climate change as a source of financial risks is essential for pricing assets. The expected payoff of any investment should compensate the investor for the risks taken. Therefore, higher risks lead to higher risk premiums. If investors are unaware of climate-related risks or if these risks are not disclosed appropriately, market prices cannot, and will not, reflect the appropriate risk-return tradeoff. Only if these risks are identified and assessed correctly, can they be monitored adequately and managed efficiently; and only then can financial markets allocate capital efficiently. By reflecting these risks properly, market prices will also convey a strong signal to foster the transition toward a low-carbon economy.

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This article gives an overview of the climate-related risks to financial markets and is structured as follows: section 1 defines these risks according to their sources and indicates how they affect economic and financial variables. Section 2 describes public and private initiatives that aim at improving both the assessment and management of these risks. Section 3 presents findings from a survey among Austrian financial intermediaries on their assessment of climate-related risks and section 4, among other things, briefly touches on the OeNB's role in raising awareness of climate-related risk to financial stability.

1 The financial risks of climate change

While the future is always unknown, we speak of risk if the probability distribution of possible future outcomes is known, and of uncertainty if it is not. In this sense, many consequences of climate change are rather subject to uncertainty as the current atmospheric concentration of CO₂ and other greenhouse gases (GHGs) has been unprecedented in the last 800,000 years (IPCC², 2014). A further increase in global average temperatures by 5°C would constitute a unique environment never experienced before by humankind. Hence, we can only guess whether any subsequent damage would increase linearly or exponentially, or how such damage would be distributed across regions. Nordhaus (2016) explicitly addresses the uncertainty about future policy actions and technology developments and finds that it will be extremely difficult to achieve the 2°C target of the Paris Agreement even if drastic policy action is taken very soon.

In defining climate-related financial risks according to their origins, we follow the NGFS (2019): we cluster them into physical risks and transition risks that have distinctive economic and financial implications. While physical risks are direct effects of climate change, transition risks stem from the process of decarbonization that is aimed at preventing or mitigating global warming. Both categories are correlated because the more transition policies enter into force, the fewer physical risks are likely to materialize. On the other hand, the harder the economy is hit by physical risks, the stronger will be the demand for effective transition measures.

1.1 Physical risks

Physical risks encompass the effects of rising temperatures and of an increasing number of extreme weather events like droughts and floods or rising sea levels caused by climate change. According to the Task Force on Climate-Related Financial Disclosures (TCFD, 2017), these risks can be distinguished with respect to the term structure of the hazards that cause them. Acute hazards are severe, short-term events with a significant negative impact on the economy like droughts, floods and storms, and chronic hazards are continuous shifts in climate patterns such as increasing temperatures, rising sea levels and changes in precipitation. If acute hazards become more frequent due to climate change, their impact might eventually resemble that of chronic hazards. If, for example, a river becomes more prone to floods, its banks will be considered less habitable over time.

Physical risks can affect both the supply and the demand side of the economy. Global warming will have an impact on labor supply in many countries because

² The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.

higher temperatures can erode public health and labor productivity. An increased frequency of extreme weather events can have a similar effect. Climate change may also lead to a faster corrosion of machines and buildings, speeding up the depreciation of the capital stock. As climate change proceeds, the combined negative effects on labor and capital are set to reduce future output.

In addition to the impact on output levels, physical risks also produce a negative effect on output growth, as emphasized by Bowen and Dietz (2016). The damages to the capital stock will redirect more capital investment into repair and replacement, and proportionally fewer funds can be allocated to research and innovation, the drivers of productivity. Future lower capital productivity would imply a lower equilibrium interest rate.

The regional distribution of these effects is rather uncertain. Ciscar et al. (2014) estimate the biophysical impacts of climate change in five large EU regions, with the effects differing significantly. The melting of Alpine glaciers is expected to have a severe impact on the energy mix in Austria³. As more than half of the glacier surface is projected to disappear by 2050 (compared with the beginning of the century), the hydropower potential will decrease irreversibly in the long run.

On the demand side, increasing expenditures for repair and replacement will, *ceteris paribus*, reduce investment on and consumption demand for other goods. Uncertainty will probably cause subdued or delayed investment spending by firms. Households confronted with more frequent extreme weather events might increase precautionary saving, which would depress private consumption in general. If the likelihood of insured events increases due to climate change, the rising insurance risk will be reflected in higher premiums. Materializing physical (and potentially also transition) risks⁴ will drive up insurance companies' liability risks as they are faced with increasing numbers of claims. If the polluter-pays principle were to be extended to climate change-induced damage, the liability risks of other companies (e.g. large emitters of GHGs) might also rise, but it would be difficult to attribute a specific consequence of climate change to a specific emitter.

1.2 Transition risks

Transition risks materialize when changes in regulation and taxation, technological innovations or shifts in consumer preferences alter the expected future cash flows from productive assets, which can turn the latter into stranded assets. In a widely cited paper, McGlade and Ekins (2015) estimate that, by keeping global temperatures within the Paris target range, approximately one-third of the current oil reserves, half the gas reserves and almost 90% of the coal reserves would become stranded assets. The NGFS (2019) provides a range of estimates for the value of stranded assets caused by the energy transition, and it presents some transmission channels of transition risks to the balance sheets of financial corporations. All studies emphasize that an early and smooth transition results in much fewer risks; according to Breeden and Hauser (2019), too rapid an adjustment of asset prices due to a late transition might eventually bring about a climate Minsky moment.

³ It should be noted that the 2°C objective of the Paris Agreement is a global target; its accomplishment would most likely translate into a temperature increase of 4°C in Austria.

⁴ Whereas materializing physical risks affect insurance companies mostly on the liability side of their balance sheet via an increasing number of claims, transition risks affect them (and other financial intermediaries) on the asset side.

The limit to global warming of below 2°C agreed at the 2015 Paris climate change conference defines clear boundaries for future emissions. This implies that the transition from the current economic system to a decarbonized economy is inevitable as well as risky. Decarbonization requires some major changes in the modes of production. Therefore, the sooner the transition starts, the more gradual can it be implemented. It will then also be less disruptive, even though some disruption is most likely to occur. The disruptions will differ from industry to industry depending on the pre-transition levels of GHG emissions, and, as Schoenmaker (2019) shows, even intra-industry differences in the exposure to transition risks are quite significant.

The negative externalities of CO₂ emissions prevent the functioning of a market solution for decarbonization, which is why effective policy actions are needed. Regulation and taxation can incentivize firms to divest from carbon-intensive assets and thereby change the emission path of the economy. If this divestment happens abruptly and system-wide, financial stability might suffer. However, political considerations might delay necessary up-front policy action, as the burden of such policies is felt immediately by current voters while their benefits might manifest themselves only decades later. Kotlikoff et al. (2019) show in a large-scale OLG climate-change model that even by taking selfish behavior of different generations into account, a carbon tax combined with appropriate intergenerational redistribution can make all current and future generations better off. The later policy changes are implemented, the greater must be their impact so that they can trigger a sufficient resource allocation away from fossil assets. A stronger impact is often more disruptive and poses a greater risk to financial stability.

When regulatory reforms or new taxes change relative prices in favor of green assets, firms are not only incentivized to divest from brown, i.e. carbon-intensive, assets, they are also more likely to fund research in carbon-free innovations. If these innovations yield marketable products or processes, incumbent technologies will be replaced. According to the NGFS (2018), it might be rather difficult for some industries (e.g. aviation) to find carbon-free technologies and, therefore, their production is likely to be scaled down significantly, which might create more financial distress for owners and creditors alike.

While technological innovations are almost by definition hard to foresee, we have some ideas which regulatory changes are warranted; they cover policy areas from market regulation to fiscal policy. To change the relative prices of carbon-intensive and carbon-free assets, governments could either charge a carbon tax, impose a mechanism for emission trading, subsidize green investment or indirectly change the cost structure via command-and-control regulation. Acemoglu et al. (2012) find that the optimal policy response to climate change combines a carbon tax with a mission-oriented innovation policy (i.e. subsidies for promoting research in clean technologies). In January 2019, an initiative by U.S. economists⁵ proposed the introduction of a carbon tax which should be raised each year until emission reduction goals are met. The revenues from this tax should be returned directly to U.S. citizens so they would benefit from a “carbon dividend,” which should improve public acceptance of the new tax. The initiative also proposes the establishment of

⁵ The initiative was published by the Climate Leadership Council (<https://www.clcouncil.org/economists-statement/>) and its signatories include all living former chairs of the Federal Reserve System and 27 Nobel Laureate economists.

a border carbon adjustment system which works like a tariff on carbon-intensive imports and would trigger some transition risks in other countries. It should be noted that a border carbon adjustment system would be consistent with WTO rules as it would not unfairly favor domestic producers over foreign firms, but instead provide a level playing field in the market. The unilateral implementation of a border carbon adjustment system by one or several major economies might, however, cause distortions in international trade and disrupt global value chains.

As more and more market participants recognize the potential impact of climate change on their own business, firms that do not contribute sufficiently to decarbonization might be shunned by both consumers and investors. Financial intermediaries might not only end up with stranded assets on their balance sheets but could also face the reputational risk of being perceived as ignorant of concerns of great social importance because they are financing GHG emitters.

Companies are also prone to increasing liability risk if they do not manage transition risks well. In accordance with the polluter-pays principle, entities negatively affected by unmitigated climate change could seek compensation from those who had caused or allowed the damage and thereby at least partially internalize the

Table 1

Climate-related financial risks for banks: physical risks

Financial risk category	Physical risk	Impact on banks
Credit risk	<ul style="list-style-type: none"> Erosion of the value of capital due to natural disasters Reduction of debt service capability due to natural disasters Reduction of productivity and earnings due to rising temperatures Devastation of entire regions by floods and storms 	<p>Higher loss given default</p> <p>Higher probability of default, increase in nonperforming loans (NPLs)</p> <p>Higher probability of default, increase in NPLs</p> <p>Regional lenders face concentration risk</p>
Market risk	<ul style="list-style-type: none"> Increase in price volatility due to natural disasters Rising uncertainty about natural disasters Sudden capital outflows due to natural disasters Increase in country risk due to rising sea levels 	<p>Increased volatility of real interest rates</p> <p>Higher risk premiums</p> <p>Higher exchange rate volatility</p> <p>Decline of sovereign bond prices, fewer risk-free assets</p>
Liquidity risk	<ul style="list-style-type: none"> Sudden withdrawals in case of natural disasters High demand for emergency loans in case of natural disasters 	<p>Risk of maturity mismatch, regional bank runs</p> <p>Risk of maturity mismatch</p>
Operational risk	<ul style="list-style-type: none"> Destruction of banking infrastructure due to natural disasters Rising insurance costs More expenditures for climate-change adaptation 	<p>Revenue losses, repair costs</p> <p>Reduced profits</p> <p>Reduced profits</p>
Reputation risk	<ul style="list-style-type: none"> Contagion through proximity to affected sector or region 	<p>Rising risk premiums</p>
Systemic risk	<ul style="list-style-type: none"> Widespread underestimation of natural disasters in risk models Rising correlation of defaults when the economy is hit by more natural disasters 	<p>Capital depletion, "too big to fail"</p> <p>Higher correlation risk</p>

Source: Authors' compilation.

negative externalities⁶. Firms that issue “green bonds” or other climate-friendly financial products may face legal action if their claims cannot be substantiated, i.e. if they engage in “green washing.”

Whereas an active policy stance on decarbonization might give rise to transition risks, a lack of adequate ambition can create negative confidence effects. If firms and consumers realize that policy inaction precipitates the economy to stay behind agreed targets of decarbonization, they might fear negative consequences in the form of more disruptive policy measures in the future to make up for the lost ground or sanctions by supranational (e.g. European) authorities. This negative sentiment could have a negative impact on investment or consumption.

According to Article 39 of the Austrian Banking Act (Bankwesengesetz – BWG) banks are obliged to apply due diligence in the assessment, management and monitoring of all risks relevant to their business. The law lists several risk categories that should be considered in banks’ risk management procedures. In table 1 and 2, we illustrate how climate-related financial risks play into traditional categories of banks’ risk management. Table 1 maps the risk management categories into physical risks and gives examples of how banks are affected when specific physical risks materialize; table 2 does the same for transition risks. The presentation is by no

Table 2

Climate-related financial risks for banks: transition risks

Financial risk category	Transition risk	Impact on banks
Credit risk	<ul style="list-style-type: none"> Severe devaluation of carbon-based assets Depressed revenues of debtors due to new carbon taxes More investment in new, inherently riskier technologies 	<p>Higher probability of default, more write-offs</p> <p>Higher probability of default</p> <p>Higher probability of default</p>
Market risk	<ul style="list-style-type: none"> Changing customer behavior Missing the tipping point toward climate-neutral assets Rising inflation expectations due to carbon taxes Severe devaluation of carbon-producing industries/countries Rising uncertainty about future technologies or regulations 	<p>Demand shifts, price volatility</p> <p>Stranded assets, more write-offs</p> <p>Greater uncertainty about real interest rates</p> <p>Stranded assets, higher risk premiums</p> <p>Higher risk premiums</p>
Liquidity risk	<ul style="list-style-type: none"> Stranded assets can no longer be traded in markets 	More write-offs, capital depletion
Operational risk	<ul style="list-style-type: none"> Rising prices of carbon-based technologies More emission-reporting obligations 	<p>Higher operating cost</p> <p>Higher operating cost</p>
Reputation risk	<ul style="list-style-type: none"> Missing awareness of climate-related financial risks Stigmatization of firms 	<p>Downgrade in ratings, higher risk premiums</p> <p>Loss of clients, less employee attraction</p>
Systemic risk	<ul style="list-style-type: none"> Simultaneous divestment from potential stranded assets Lock-in effects due to wrong or delayed policy decisions 	<p>Higher asset price volatility, more write-offs</p> <p>Higher risk premiums, higher probability of default</p>

Source: Authors’ compilation.

⁶ In 2018, the Hague Court of Appeal upheld a ruling by a district court that the Dutch government’s inadequate action on climate change violated a duty to protect its citizens under the European Court of Human Rights (ECHR).

means complete and does not cover all the risk categories listed in the Austrian Banking Act, but it is meant to give an idea of how climate change affects banks' financial risk and of which indicators to use in risk assessments.

2 Initiatives to manage climate-related financial risks

The NGFS (2019) recommends the integration of climate-related risks into the prudential supervision framework. A precondition for assessing exposure to climate-related risks is the transparent and reliable disclosure of relevant information. For the time being, both private initiatives and official regulatory proposals aim at making climate-related financial risks more transparent. Despite these efforts, barriers to better management of climate-related financial risks remain. In many instances, climate-related risks do not crystallize within the planning horizon of financial corporations and are therefore ignored. Moreover, some of the risks cannot be processed in traditional risk models for lack of sufficient comparable data or long-enough time series. Also, some of the metrics used by the financial industry suffer from methodological shortcomings (see box below).

2.1 Task Force on Climate-related Financial Disclosures

In 2015, the Financial Stability Board established the Task Force on Climate-related Financial Disclosures (TCFD), which is chaired by Michael Bloomberg. It was tasked with developing voluntary and consistent climate-related financial risk disclosures for well-informed investment, lending and insurance decisions. The TCFD created a framework for companies to disclose their risks in existing reports more effectively. Published in 2017, this framework refers to the application of metrics and targets the measurement of climate-related risks, their incorporation in firms' risk management systems, strategic control of these risks and firm-specific governance around climate-related risks. As the TCFD is a voluntary initiative, its recommendations are not binding. In its 2018 status report, the TCFD presented the results of a review of disclosure practices among more than 1,700 firms worldwide. Only few companies had incorporated climate-related risks in their governance or their risk management processes, but more had already developed or applied metrics to identify such risks and tackled related strategic issues. The 2019 status report finds that disclosure of climate-related financial information has increased since 2016. However, it is still insufficient for investors and more clarity is needed about the potential financial impact of climate-related issues on companies. During Climate Week in September 2019, a Handbook (TCFD, 2019) was published which covers best practices across governance, strategy, risk management, and metrics and targets in different sectors, including financial oil firms and banks.

Box 1

Indicators for assessing the current exposure⁷ to climate-related risks

Financial intermediaries are exposed to climate-related risks less through their own operations than through linkages to firms that issue debt or equity instruments. The assessment of financial intermediaries' exposure relies on the disclosure of risks by these companies. The TCFD (2017) has recommended several metrics for measuring and assessing climate-related risks, two of which will be presented in this box.

Many climate-related risks are linked to the emission of CO₂ and other GHGs. These emissions are usually categorized by three scopes according to their generation in the production process. Scope 1 refers to all direct emissions resulting from the operations of a reporting company. Scope 2 refers to indirect emissions from consumption of purchased energy. Finally, scope 3 refers to other indirect emissions not covered in scope 2 that occur in the value chain of the reporting company, including both upstream and downstream emissions. As it is rather difficult to compile such information, scope 3 data are often not available.

The **weighted average carbon intensity** (WACI) indicator measures the exposure of a portfolio to carbon-intensive firms, expressed in tons of CO₂ per revenue, and is calculated according to the formula:

$$\sum_{i=1}^n \left(\frac{\text{investment in firm}_i}{\text{total value of portfolio}} \times \frac{\text{scope 1 and 2 emissions of firm}_i}{\text{revenue of firm}_i} \right)$$

The calculation is fairly straightforward, and the results are easy to communicate to market participants. On the downside, the revenues of a firm depend on its market power, therefore firms with similar technologies and similar emission profiles may differ in their contribution to the weighted average carbon intensity of a portfolio, although their exposure to transition risks is the same. Hence, the WACI is an imperfect measure for these risks.

The **carbon footprint** is defined as total emissions for a portfolio normalized by its market value and is given by:

$$\frac{\sum_{i=1}^n \left(\frac{\text{investment in firm}_i}{\text{market capitalization of firm}_i} \times \text{scope 1 and 2 emissions of firm}_i \right)}{\text{total value of portfolio}}$$

The carbon footprint can be used to compare portfolios with one another or with benchmarks, but it is sensitive to changes in the market value which are not related to climate-related risks. Monnin (2018) finds that “carbon footprints are currently the main indicators used by financial market participants to integrate climate change in their valuation models.”

2.2 Regulatory proposals

The EU's Non-financial Information Directive (Directive 2014/95/EU) and the Austrian Sustainability and Diversity Improvement Act (Nachhaltigkeits- und Diversitätsverbesserungsgesetz, NaDiVeG) oblige certain Austrian companies, depending on their size and sector, to report on nonfinancial aspects and diversity-related information in their annual reports. This nonfinancial reporting duty also refers to information on environmental concerns. The scope and depth of these reports differ quite significantly from firm to firm and, hence, they do not allow for a comprehensive assessment of climate-related risks. Nevertheless, the directive is likely to have raised awareness of sustainability and climate change.

⁷ It should be noted that these indicators are useful for assessing the current exposure to transition risks, but do not cover the exposure to physical risks, the management of which also poses a severe challenge.

In March 2018, the European Commission (2018) adopted an action plan to make financial risks stemming from climate change more manageable. The plan contains ten actions, the first of which was to establish an EU classification system for sustainable economic activities. The classification system, or taxonomy, which was compiled by a technical expert group on sustainable finance, identifies activities which contribute positively to climate change mitigation and adaptation. This should allow financial market participants to reorient their investments toward a more sustainable economy and this way help reduce climate-related risks. However, from a risk management perspective, it would be useful to pay greater attention to those economic activities which are more prone to climate-related risks as described in section 1. Later in 2018, the Commission put forth three legislative proposals (1) on the framework to create a unified taxonomy, (2) on the disclosure requirements on how institutional investors and asset managers integrate environmental, social and governance (ESG) factors in their risk processes, and (3) an amendment to the benchmark regulation which will create a new category of low carbon and positive carbon impact benchmarks. In the meantime, the regulations on disclosures and on benchmarks have been adopted by the European Council and the European Parliament.

The EU action plan (European Commission, 2018) also asked for reflecting climate-related risks in prudential regulation in a way that would not endanger the EU's current prudential framework and its purpose. The Commission announced it would explore the feasibility of the inclusion of climate-related risks in institutions' risk management policies and the potential calibration of capital requirements of banks as part of the Capital Requirement Regulation (CRR) and Capital Requirement Directive (CRD). The latter refers to the "green supporting factor," a factor in support of bank lending to green finance and that is analogous to the existing SME supporting factor introduced by the CRR. Whereas the integration of climate-related risks into risk management practices would be aligned with recommendations by the TCFD and the NGFS, a recalibration of capital requirements to foster investments in sustainable assets seems inappropriate. On the one hand, there is no empirical evidence supporting the conjecture that current capital requirements reduce the funding of sustainable investment projects. Generally, there seems to be a lack of appropriate climate-friendly investment projects rather than a lack of funds to be invested in such projects. As a case in point, green bond issuances are often heavily oversubscribed. On the other hand, investments in, or credits to, climate-friendly projects do not automatically carry less risk. Funding innovative technologies, e.g. those needed to transform energy generation or currently fossil-fueled production processes, is an inherently risky business. Allowing banks to hold less capital because they assume such risks on their balance sheets would send wrong signals to the markets.

In accordance with its national climate strategy, the Austrian government has, in 2019, established an expert focal group on green finance, which aims at improving the regulatory framework of financial markets in favor of climate-friendly investments. The focal group is coordinated by the Austrian Ministry of Finance and the Ministry for Sustainability and Tourism. As an active member of the focal group, the OeNB has emphasized the importance of integrating climate-related risks into the risk management of financial institutions. The activities of the focal group are work in progress and should produce a green finance agenda by the end of 2019.

2.3 Central banks' risk assessments

Some central banks have already assessed climate-related risks to financial stability and issued guidance for financial firms. In April 2019, the Bank of England published a Supervisory Statement on enhancing banks' and insurers' approaches to managing the financial risks from climate change, which set out expectations about the integration of climate-related risks into the risk management of financial intermediaries.

Vermeulen et al. (2018) analyzed the potential impacts of disruptive transition risks on the Netherlands. The analysis focused on four severe, but plausible scenarios with a view to assessing tail risks of the transition process. The scenarios included a technology shock (increase of renewable resources in the energy mix by 100%), a policy shock (increase in the price of CO₂ by USD 100 per ton), a double shock that combined these two and a confidence shock resulting from uncertainty about future policies and technologies. Whereas the impact of the policy shock is dampening GDP growth and accelerating inflation over the projection horizon, the technology shock yields more positive results. The combined shock results in a temporary decline of GDP growth and a more permanent rise of the inflation rate. Finally, the confidence shock has a dampening effect on GDP growth and inflation rates. The analysis shows that the transition vulnerability is attributable to the sectoral composition of the economy, which reflects the emissions embodied in production. In a similar vein, the Bank of England (2019) announced that in its 2021 biennial exploratory scenario, it will stress test the U.K. financial system's resilience to the physical and transition risks of climate change by integrating climate scenarios with macroeconomic and financial system models.

An analysis of the potential impact of physical risks on the loan book of Italian banks was conducted by Faiella and Natoli (2018). They identified floods as the most prevalent hydrogeological events in Italy for the period 1950 until 2011. To develop a risk indicator for these events, they used data of the Italian Institute for Environmental Protection and Research to calculate the share of local business units in every Italian municipality that is located in an area faced with an elevated risk of flooding. Their analysis implies a negative correlation between the exposure to flooding risk and the availability of credit. Faiella and Natoli (2018) also find low insurance penetration for these risks among Italian firms, especially among small firms and in southern Italy.

The effects of climate change on a central bank's balance sheet were studied by Battiston and Monasterolo (2018). They carried out a carbon risk assessment of the OeNB's nonmonetary portfolio by pricing climate transition risk in individual contracts (i.e. equities, sovereign bonds, corporate bonds). All assets were benchmarked according to their contribution to GHG emissions, and then the transition to a 2°C scenario was modeled as a negative shock to the future value added of the carbon-intensive sectors. As a result, each asset was attached with a positive or negative risk spread that would inform investors about the likely impact of transition risks on their portfolio. Given the probable transition risks of climate change, such an assessment is a valuable instrument for institutional investors. From a systemic viewpoint, it would be desirable to have a model for the aggregate financial sector that allows analyzing the feedback loops from climate change to financial intermediaries and the latter's reactions to each other because the correlated response of many intermediaries to the same shock might aggravate the adversity. The forthcoming climate biennial exploratory scenario of the Bank of England (2019) will be designed to model exactly these risks.

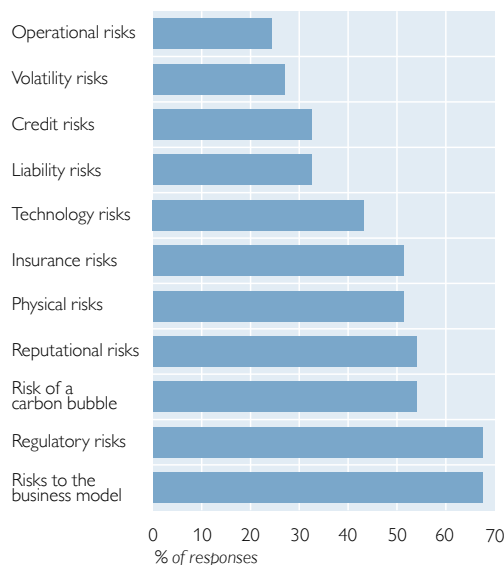
3 The Austrian financial sector's awareness of climate-related risks

In 2017, the Environment Agency Austria (Umweltbundesamt) started a multi-annual research project to analyze the Austrian financial sector with a view to mitigating climate change by curbing greenhouse gas emissions. Part of this project was a survey on the financial market implications of climate change, which was conducted online among banks, insurers, asset managers, regulators, social partners and researchers between July and September 2018 (see Environment Agency Austria, 2019). The agency kindly shared their survey data with us, and, in the following, we present results, focusing on the responses by financial intermediaries⁸.

From the 148 respondents of the survey, 37 were identified as representatives of financial intermediaries, of which 21 were bankers, 11 asset managers and 5 insurers. Their occupational tasks varied from board members to risk managers, sustainability officers and treasurers. Two-thirds of them agreed that the importance of climate-related risks had increased since the signing of the Paris Agreement in 2015, and, according to 86%, climate-related business opportunities had risen over the same period. 73% of those surveyed did not think that the current system of asset pricing leads to the consideration of climate-related risks. 62% claimed to consider climate-related risks in their corporate or business strategies, but only 24% said that they systematically identify, analyze and assess climate-related risks and opportunities. A report by the Bank of England's Prudential Regulation Authority (2018) based on a similar survey conducted in 2017 concluded that "many banks have some way to go to identify and measure the financial risks from climate change comprehensively."

Chart 1

Perceptions of climate-related risks in the financial sector



Source: Environment Agency Austria.

Survey participants were also asked what sources of climate-related risks to the financial sector they had identified (see chart 1). Less than one-third of the respondents considered operational risks, increasing price volatility, credit risks or liability risks to be affected by climate change. Among the bankers, at least 52% perceived climate change as a source of increasing credit defaults, but the remaining 48% did not agree that climate change might have an impact on their credit risk. 43% of the surveyed financial intermediaries considered the replacement of traditional fossil fuel-based technologies by new innovative technologies a financial risk.

Insurance risks were said to be on the increase due to climate change according to 51% of the

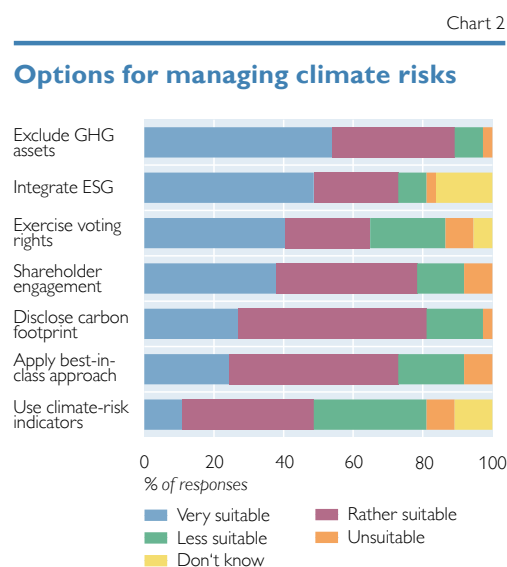
⁸ Bourtembourg et al. (2019) report the findings of a survey on climate-related risks and sustainable finance among Belgian financial intermediaries.

financial intermediaries. Interestingly, one out of five the surveyed insurers did not consider climate change a driver for rising insurance risks. 51% of the respondents also acknowledged that climate change can cause physical risks which endanger financial institutions' operations. Even more (54%) regarded climate change and the process of decarbonization as a source of rising reputational risks in their industry. Just as many respondents agreed that investments in assets that rely on carbon or other GHG-intensive technologies encompass the risk of sudden revaluations ("carbon bubble").

The two main risk categories identified by financial intermediaries in this survey were regulatory risks and physical risks related to the business model of entire industries. Regulatory risks to financial stability have been described in section 1.2. The risk that climate change and global warming might disrupt certain sectors so severely that many or most companies no longer have a business case in Austria was exemplified in the survey by tourism and agriculture. This problem might not affect whole industries but is relevant for subsectors within them. Global warming might render skiing impossible in many of the existing ski resorts in Austria. Agriculture may be affected by climate change in many ways. Extreme weather events may destroy entire harvests and melting Alpine glaciers could lead to water stress and lower agricultural productivity. If those risks materialize, banks that have been lending to ski hotel owners or farmers as well as companies that have provided insurance to them might be affected.

The survey also asked which options are best suited to manage climate-related risks. Most respondents considered it best to exclude GHG-intensive assets (e.g. investments in producing or processing fossil fuels) from their portfolios (see chart 2). If the sample in the survey is representative of the financial sector in Austria, this response implies that companies causing severe GHG emissions might face difficulties to fund their operations in the future. 49% of the respondents also found that an integrated ESG approach would be a solid option. Such an integrated approach refers to the systematic inclusion of "environment, social and governance" criteria in market analysis and portfolio management. Clearly, the ESG focus is broader and not only concentrated on climate-related risks, but climate change does have social consequences, too, and the governance structure of a firm is critical to its managing climate-related risks. About 40% of the respondents also regarded exercising voting rights in shareholder meetings and shareholder engagement in general as very suitable. Such a stance implies pursuing an active dialogue on climate risks with both board members and managers.

The last three options shown in chart 2 require comprehensive access to firm-specific information and a

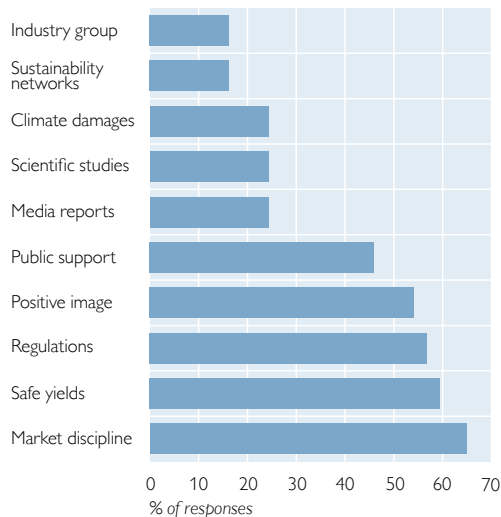


Source: Environment Agency Austria.

Note: GHG stands for greenhouse gas and ESG for environment, social and governance.

Chart 3

Motives for acting in a climate-friendly way



Source: Environment Agency Austria.

good understanding of innovative concepts of risk management. Chances are that, because of this, not many firms considered them very suitable. Calculating and disclosing the carbon footprint of a portfolio (for more information on this indicator, see the box above) was considered by less than one-quarter of the respondents to be very suitable. Despite the activities of the TCFD, only 59% of the surveyed intermediaries had already concerned themselves with the idea of disclosing climate-specific information in any form. The best-in-class approach is an investment strategy that promotes the selection of stocks and bonds of companies with the lowest carbon footprint in each sector. Here, the availability of reliable firm-specific emission

data is likewise crucial but often wanting. Finally, the computation of climate risk indicators like the climate value at risk (VaR), which gives the maximum loss due to climate change for any portfolio, was considered less suitable or unsuitable by 40% of the respondents and was unknown to 11% of them.

The survey also explored options for the financial sector to contribute to a more climate-friendly economy. The respondents were asked about factors that could motivate financial market participants to act in a more climate-friendly way (see chart 3). 16% of the responding financial intermediaries considered support by industry groups or membership in sustainability networks effective drivers. About as many named a further increase in damage due to extreme weather events, scientific studies that show the negative impacts of climate change or more media reports about these issues. Almost half of those surveyed thought that new public support programs focusing on climate change might work; after all, who would decline public subsidies or government guarantees when they are offered?

54% of the respondents said that a more positive, modern image for their organization would motivate managers to act in a more climate-friendly way. This corresponds to the anecdotal evidence that some banks in Austria deal with climate-related issues under the corporate social responsibility agenda of their public affairs divisions. Regulations and norms like laws, directives or standards were considered effective by 57%. As some of these norms are legally binding, it might be surprising that not more respondents see them as potent drivers. 59% said that safe long-term yields for investments in climate-friendly firms would motivate them to act in a climate-friendly way. And most respondents (65%) said that demands by clients, business partners and authorities (labeled “market discipline” in chart 3) would motivate them to adopt more climate-friendly strategies.

In light of these survey results and the financial stability risks outlined above, we find that awareness of climate-related financial risks could be improved further in the Austrian financial sector, particularly with respect to the potential negative

impacts on banks. On average, more than half of the respondents representing financial intermediaries denied the existence of climate-related risks to their industry. Mostly, they see such risks for other sectors like agriculture. Compiling indicators to assess climate-related risks is not standard practice in the financial industry, although some institutions have already put some effort into this task. While many respondents regard market forces as an effective motivator, they seem to have experienced little demand from clients or authorities for integrating climate-related risks into their risk management. For policymakers, it is worth noting that financial intermediaries consider regulations and laws to be strong motives to act in a more climate-friendly way. Also, financial intermediaries appreciate stable returns on their investments, which corresponds to a predictable and steady regulatory environment without too many discrete policy changes.

4 Concluding remarks

Climate change poses significant risks to financial stability. The sources of these risks are physical hazards that stem from global warming and the consequential increase in extreme weather events, rising sea levels and melting glaciers as well as the transition processes from current modes of production to a decarbonized economy. Decarbonization relies on technological innovation, shifting preferences and regulatory changes, of which at least the latter can be shaped by policymakers.

Most policymakers and market participants have indeed recognized the importance of climate change. On the one hand, market-based initiatives like the Task Force on Climate-related Financial Disclosures (TCFD) advocate for the improved disclosure of climate-related risks by corporations. On the other, several policy initiatives currently tackle the financial stability dimension of climate change. At the European level, the Commission has put forth legislative proposals to make climate-related risks more transparent and to identify climate-friendly economic activities. In Austria, the government has initiated an expert focal group on green finance. This group strives to improve the framework for investments in climate-friendly activities and to integrate climate-related risks in the risk management of financial institutions. Grasping the importance of climate change for financial stability, central banks have established a Network of Central Banks and Supervisors for Greening the Financial System (NGFS) to learn from each other and to conduct further research in this area.

Among Austrian financial intermediaries, awareness of the financial stability implications of climate change is not as widespread as it could be, given the amount of available information and the legal obligation to address sustainability issues in nonfinancial reporting. Whereas some institutions are well prepared and have developed climate-related risk indicators for their investment portfolios, others fail to understand that climate change could cause credit defaults to go up. Additional activities are warranted to raise awareness in the financial sector and disseminate information about business practices that support financial intermediaries in identifying and assessing climate-related risks by financial intermediaries. The OeNB contributes to these activities by conducting research, publishing reports and hosting events to facilitate the exchange of ideas and foster the diffusion of innovative tools for risk monitoring, assessment and management. In this respect, the OeNB

follows the recommendations of the NGFS to build awareness and intellectual capacity as well as encourage technical assistance and knowledge sharing.

Survey data compiled by the Environment Agency Austria show that only one-quarter of the respondents representing Austrian financial intermediaries have started to systematically manage their climate-related risks. Most of the respondents are, however, aware that such risks exist. Survey results from other central banks indicate that this is an attitude that is quite common among financial intermediaries even though rules on due diligence require them to identify and assess all relevant risks. It seems clear that more information on climate change will probably not change that attitude much. Instead, regulatory reforms and shifts in clients' demands are more likely to cause financial intermediaries to integrate climate change into their risk management.

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Small but buzzing: the Austrian fintech ecosystem

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Refereed by: Sebastian Schich, OECD

This study aims to enhance transparency on the Austrian fintech industry by collecting first-hand industry data provided by Fintech Austria – the country’s largest fintech interest group – and subjecting the data to statistical analysis conducted by the Oesterreichische Nationalbank (OeNB). The analysis of key features of Austrian fintechs across various dimensions reveals that the domestic fintech industry is a small but rapidly growing industry. While being based on a diverse – and increasingly specialized – range of business models, most fintechs still operate in the payments sector. Typically, fintechs are established in larger cities by men who have already pursued a previous career. As a rule, their ownership structures are divided between a broad domestic shareholder base and a more concentrated investor base abroad.

The dynamics in the fintech industry need to be closely monitored. If not identified in a timely manner, strong growth and the tendency of online industries to form oligopolies or monopolies may lead to systemic implications and financial stability risks. Moreover, increasing cooperation between incumbent banks and fintechs as third-party providers may impose outsourcing risks. Should the latter fail, this may have negative spillover effects on the financial sector as a whole. Therefore, it is all the more important that policymakers and market participants alike keep track of the fintech industry’s structure and trends. With this in mind, the analysis presented in this study was largely automated to allow for periodic updates and thus continuous monitoring of the Austrian fintech industry in the future.

JEL classification: G23, Q55, L81, O31, O32, O33

Keywords: nonbank financial institutions, technological innovation, e-commerce, innovation and invention, technological innovation management, technological change

Fintech² might change the functioning of the financial sector and is therefore relevant from a financial stability perspective. By analyzing key quantitative and structural indicators of the fintech industry, we can track its importance and developments, identify emerging trends early on and assess potential medium- to long-term implications for the financial services industry³.

Fintech is global in nature. However, it is the national authorities that are responsible for setting up a general framework in their respective jurisdiction for nurturing and overseeing the fintech landscape. Initiatives in this regard include incubators and accelerators that offer vital support, fintech advisory boards that are set up by governments and regulatory sandboxes that are established by supervisory bodies. To tailor these initiatives to maximum effect, it is essential to monitor and track

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² In this study, the term is used to describe both technological innovations (“fintech”) as well as firms that use these innovations (“fintechs”).

³ It would go beyond the scope of this paper to assess potential societal implications arising from new technologies such as artificial intelligence or crypto assets.

national fintech ecosystems in as much detail as possible. This is what the present study sets out to do.

The paper is structured as follows: In section 1, we outline the aim of the study in more detail. Section 2 describes the data and methodology used, before section 3 discusses the main findings obtained from the data. Finally, section 4 concludes and suggests possible routes for future studies in this field.

1 Objectives of the study

Our study focuses on the Austrian fintech ecosystem which consists of start-ups and small and medium-sized enterprises (SMEs) established and operating in Austria. Our study excludes (1) fintechs that are established in other countries but operate in Austria, (2) incumbent banks⁴ that launch fintech and digitalization initiatives and (3) large technology firms, which are often referred to as bigtechs, such as Apple, Google, Amazon or their Asian equivalents. While numerous papers describe selected individual features of the fintech industry, we know of only a few studies that provide quantitative analyses across multiple dimensions. A notable example in this respect is the study by Dorfleitner et al. (2016), who investigate the German fintech market. As far as Austria is concerned, the present study is – to our knowledge – the first to look at the national fintech landscape from a quantitative perspective.

With this aim in mind, the Oesterreichische Nationalbank (OeNB) joined forces with Fintech Austria – the country’s largest fintech interest group – to produce this study. While Fintech Austria provides in-depth knowledge of the industry and its participants, the OeNB’s access to several statistical systems as well as its analysis and data manipulation capabilities allow for the investigation of key firm characteristics. Moreover, given its broader financial stability mandate, the OeNB has a keen interest in monitoring current developments in the financial sector. Therefore, this study also aims to provide a common ground for better understanding the Austrian fintech ecosystem.

To be able to consistently track the development of Austria’s fintech industry over time, we put great effort into ensuring that the analysis presented in this study can be updated with a minimum of effort. We expect this high degree of automation to pay off in future iterations of this analysis.

2 Selection of data sources and firms

The term fintech is not clearly defined. What all definitions have in common, however, is that fintech has to do with technology and finance. Yet, whether or not a specific firm may be classified as a fintech is sometimes arguable. NACE codes⁵ and other existing classification systems are of little help in this regard since they do not consider the underlying technology used by firms or other more specialized indicators to adequately distinguish between fintechs and non-fintechs. Even though there are efforts to refine existing classification systems in upcoming

⁴ The term “incumbent” refers to traditional financial service providers, mostly banks. Incumbents may also offer fintech services and products. Firms that base most or all of their business on fintech, by contrast, are referred to as fintechs. These are mostly small start-ups, even though some firms have already matured and exited the start-up phase.

⁵ NACE (Nomenclature statistique des activités économiques dans la Communauté européenne) is the statistical classification of economic activities in the EU. NACE groups organizations according to their business activities.

revisions⁶, we decided to base our definition of the Austrian fintech ecosystem on a different data source, namely on the FinTech Directory Austria (FDA)⁷.

The FDA, which is compiled and periodically updated by Fintech Austria, lists all Austrian start-ups and SMEs that qualify as fintechs and classifies them according to their business models. Such a classification is, of course, always somewhat qualitative and blurry. However, we consider this qualitative assessment to be a strength as the main features differentiating fintechs from non-fintechs can only be identified by an in-depth understanding of the individual firm. The main features include the innovativeness and technology proneness of the firm's business model as well as the firm's corporate culture and the mindset of its staff members and management. Based on similar reasoning, we took over the classification of the fintechs' business models as proposed by the FDA as it provides a more stringent delineation of the fintech subsectors than that proposed by the NACE codes.

Based on the FDA's classification, we gathered data on the respective firms from different databases to identify the firms' key characteristics. Most of the data were drawn from Austria's Commercial Register. We then enriched the data with information on individual balance sheet items drawn directly from the firms' balance sheet statements in the Commercial Register. All data thus obtained were subsequently converted into machine-readable data.

While being the best obtainable data on Austria's fintech industry, the information gathered still has some shortcomings. First, not all data are available for all firms. While core data such as the firms' address or legal status could be obtained for all 112 firms⁸, detailed balance sheet data were only available for about two-thirds, i.e. 72 firms. Second, balance sheet information shows some lag⁹, with turnover and staff figures only being available for about half of the firms.

Our study is mainly based on medians instead of means to minimize the impact of outliers on the results of the analysis. Moreover, for some parts of the analysis, we had to confine ourselves to subsamples of firms.

3 Key findings on the Austrian fintech market

3.1 Austria's fintech market is still relatively small but shows high growth rates

The Austrian fintech industry has an aggregated balance sheet of roughly EUR 110 million, generates an annual turnover of EUR 130 million and employs around 1,000 staff members. To put these figures into perspective: On a national level, the Austrian GDP at current prices came to EUR 385 billion and the Austrian workforce consisted of 4.34 million people in 2018.¹⁰ In other words, the fintech industry currently represents some 0.025% of the Austrian economy. Despite still

⁶ As a case in point, the Irving Fisher Committee of the Bank for International Settlements (BIS) is exploring options how to better delineate fintechs from non-fintechs in its industry classification systems.

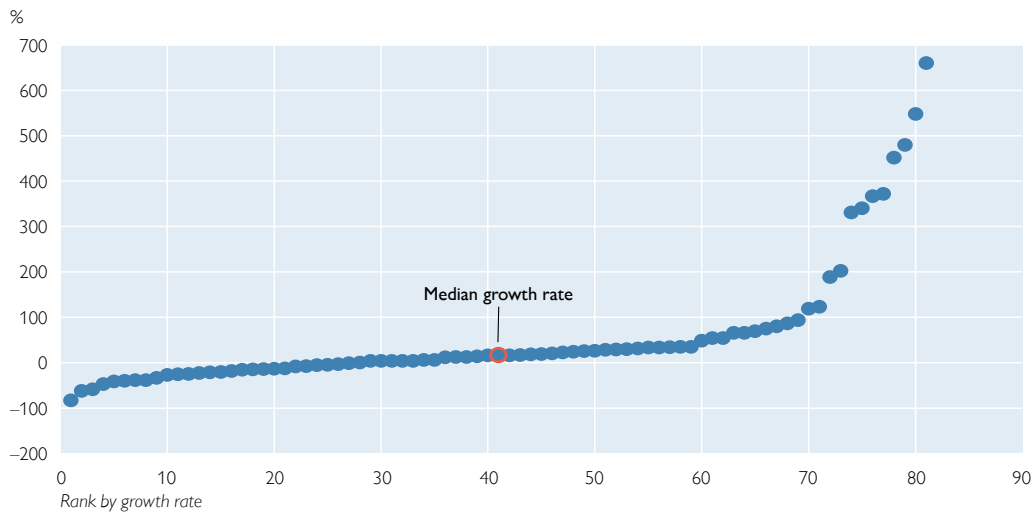
⁷ For more information, see <http://austrianfintech.directory/>.

⁸ In fact, the FDA currently comprises 132 undertakings. However, not all of them are included in Austria's Commercial Register for different reasons (not yet established as a firm, in liquidation, established as a research project or non-commercial initiative, etc.).

⁹ For 30 firms, latest balance sheet data stemmed from 2018, for 41 from 2017 and for 1 from 2016.

¹⁰ For more information, see Statistics Austria: https://www.statistik.at/web_de/statistiken/wirtschaft/volkswirtschaftliche_gesamtrechnungen/bruttoinlandsprodukt_und_hauptaggregate/jahresdaten/019505.html (available in German only) and https://www.statistik.at/web_en/statistics/PeopleSociety/labour_market/employed/063359.html.

Chart 1

Ranking of 81 Austrian fintechs by annual growth rate (2016 to 2018)

Source: OeNB, Fintech Austria, Commercial Register.

being rather small in absolute terms, the fintech industry is highly dynamic, posting growth rates far exceeding those of the financial industry as a whole. As a case in point, the fintechs for which balance sheet data were available from 2016 to 2018 showed a median annual growth rate of 16%. However, as illustrated in chart 1,¹¹ their growth rates are highly skewed to the right with an average growth rate of even 60%.

The median fintech has a balance sheet size of EUR 350,000, a turnover of EUR 650,000 and a workforce of six staff members. Respective averages are three to four times higher across all dimensions, indicating that the sample is highly skewed to the right with some large outliers.¹²

3.2 Austrian fintechs are mostly concentrated in Vienna

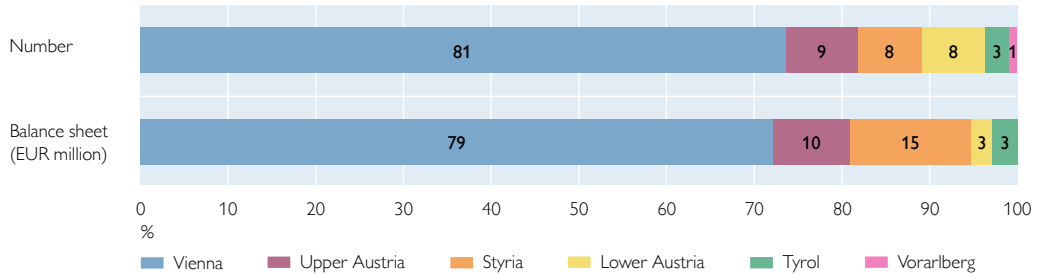
Three-quarters of the aggregated balance sheet of Austria's fintech industry are held by Vienna-based firms (see chart 2). This indicates that even among tech-savvy internet users innovation happens in geographical clusters. Vibrant innovation ecosystems require a community of a critical scale and social interaction as illustrated by, e.g., Breschi and Lissoni (2006). Moreover, bigger cities are better equipped to provide supporting infrastructure such as accelerators and incubators.

¹¹ Note that outliers with growth rates well above 1,000% were excluded from the analysis and are therefore not shown in the chart.

¹² 15 firms have a balance sheet size of more than EUR 1 million. A closer look at the data reveals that the largest firm alone accounts for about 10% of the industry's turnover and for about 15% of the aggregated balance sheet size.

Chart 2

Geographical breakdown of Austrian fintechs



Source: OeNB, Fintech Austria, Commercial Register.

3.3 Despite a recent surge in more specialized business models, payments is still the largest sector

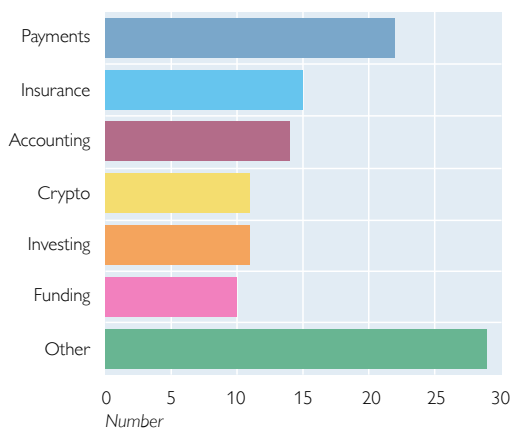
The FDA classifies the Austrian fintech industry into seven key sectors, each containing at least four firms. As shown in chart 3, the sector with the highest number of firms¹³ – payments – represents one-fifth of Austria’s fintechs. This sector is characterized by disproportionately large firms that account for about one-third of the fintech industry’s aggregated balance sheet size, turnover and workforce.

The median fintech was founded some five years ago. A breakdown of newly established fintechs by sector over time reveals that the founding rates of firms operating in the payments and accounting sectors have remained relatively stable over time (see chart 4). At the same time, the last five years have seen a burst of activity in the crypto and insurance sectors, in particular, as well as a wealth of highly specialized business models that are subsumed under the sector “other.”

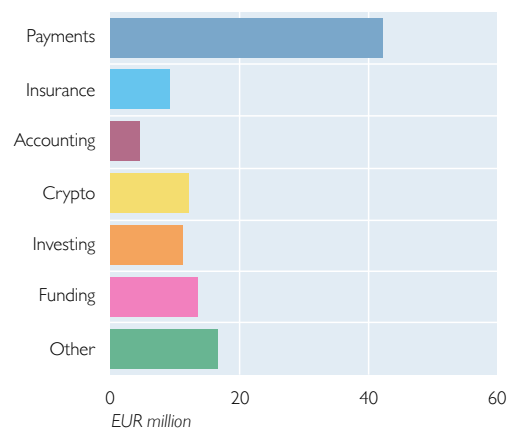
Chart 3

Sectoral breakdown of Austrian fintechs

Number of fintechs by sector



Aggregated balance sheet of fintechs by sector



Source: OeNB, Fintech Austria, Commercial Register.

¹³ A total of 29 firms falls into the category “other.” However, since these firms operate in various subsectors, the category “other” may not be considered to be the largest sector.

Box 1

Recent developments in the Austrian fintech ecosystem

While the payments sector continues to be the largest sector, other areas have shown growth trends recently, in particular lending, (non-crypto-based) funding and accounting as well as investment management and personal finance.¹⁴ In this context, it is also worth mentioning that one of the by now largest firms in the field of regulatory technology is based in Austria.

Most Austrian fintechs have business models that do not fall within the regulatory perimeter. However, as these firms extend the breadth and depth of their offerings, regulatory demands increase. As a result, some fintechs aim to offer services on a standalone basis and thus abandon previously existing cooperations with licensed partners that ensured regulatory compliance under their umbrella.

By contrast, other fintechs increasingly cooperate with each other and with established financial institutions in selected niche markets, complementing each other’s businesses in these areas. This trend can be observed across Europe.

All in all, Austria’s fintech industry is likely to see some consolidation in the future, with a few strong players with sound business models emerging – be it on a standalone basis or in cooperation with larger platforms.

3.4 Austria’s fintechs are typically founded by middle-aged men

The predominant legal form for fintechs is a firm with limited liability (GmbH) which accounts for 91% of all fintechs in Austria. This business form is best suited to limit the financial fall-out for founders should their business idea fail.

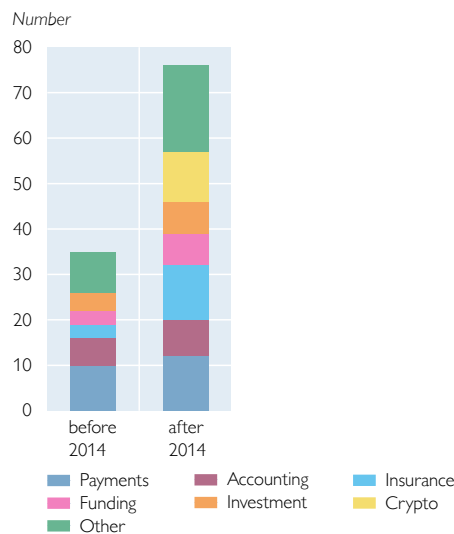
Management is male-dominated, with 92% of all managing directors being men. The median age of fintech founders when starting out is 38 years, which indicates that they have, in general, already pursued a career prior to founding their business.

This finding is in line with those of, e.g., Azoulay et al. (2018) who show that successful founders of high-growth tech firms in the U.S.A. tend to be middle-aged men in their 40s, which contrasts with the common myth of the start-up *wunderkinder*.

13% of Austrian fintechs have a supervisory board whose members have a median age of 46.

Chart 4

Number of newly established fintechs in Austria by sector over time



Source: OeNB, Fintech Austria, Commercial Register.

¹⁴ Some of these areas are subsumed under the sector “other” in chart 4.

3.5 Austrian fintechs have a diversified ownership structure and benefit from substantial foreign investment

In Austria, ownership of fintechs is typically divided between three ultimate owners¹⁵ (median of the distribution of the number of ultimate owners). Only 32 ultimate owners have investments in more than one fintech (25 owners invest in 2 firms, 7 owners in 3). Three-quarters of investors in Austrian fintechs are domestic natural persons (see chart 5). Foreign investors are located, one-third each, in Germany, other EU countries and outside the EU.

In terms of total assets, the majority of the fintech sector is owned by foreign investors, followed by domestic natural persons. A small share belongs to Austrian foundations or other organizations for which the ultimate owner could not be identified. Almost one-half of foreign investments stems from the U.K., about one-quarter from Germany and one-sixth from the U.S.A. (see chart 6). The remaining investments come predominantly from other EU Member States.

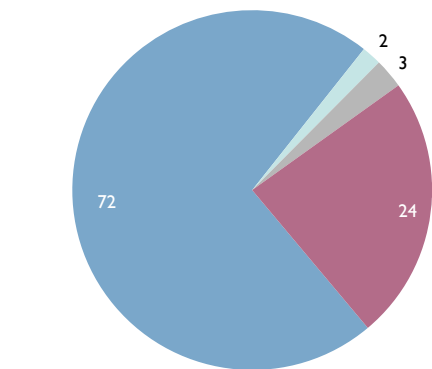
As is evident in charts 5 and 6, domestic investments dominate in terms of numbers but not in terms of investment volume, which indicates that the domestic investor base is quite granular. At the same time, there are a few large funding providers from abroad.

Chart 5

Breakdown of fintechs' investor base by number of investors

Ownership structure of Austrian fintechs

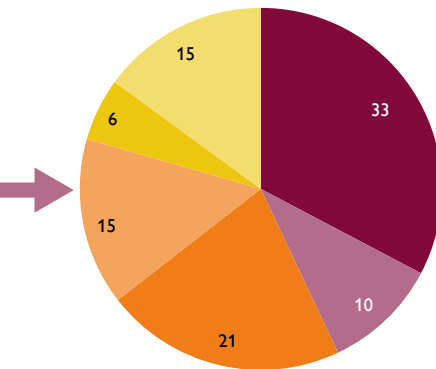
%



■ Households ■ Foundations
■ Other ■ Foreign investors

Foreign investors in Austrian fintechs by country

%



■ DE ■ UK ■ Other EU
■ CH ■ US ■ Rest of the world

Source: OeNB, Fintech Austria, Commercial Register.

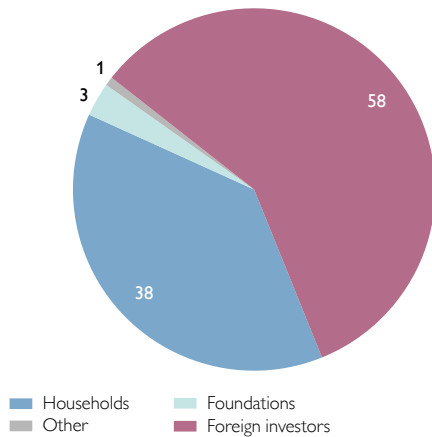
¹⁵ The owners of fintechs may be firms which, in turn, may be owned by other firms. This can lead to very complex ownership structures, masking who is actually in control. Based on data reported to the OeNB, we generated a list of ultimate owners (i.e. of owners for which no further owner could be identified such as natural persons, cooperatives, foundations or firms abroad) and their consolidated shares in the respective fintech's capital.

Chart 6

Breakdown of fintechs' investor base by owned assets

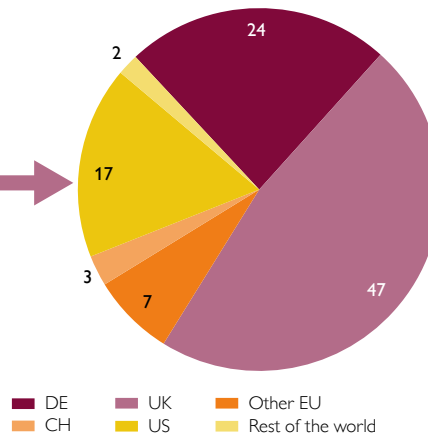
Ownership structure of Austrian fintechs

%



Foreign investors in Austrian fintechs by country

%



Source: OeNB, Fintech Austria, Commercial Register.

3.6 Most of Austria's fintechs are not yet profitable

To analyze balance sheet structures, we first calculate the percentage of each balance sheet component for the firms¹⁶ for which balance sheet data are available¹⁷. The resulting statistics reveal that Austrian fintechs typically have about ten times as many working assets as fixed assets, which points to a lean corporate structure.¹⁸ This also reflects the fact that fintechs build their infrastructure from scratch and thus typically operate using an asset-light business model. As regards their funding structure, one-quarter of fintechs records negative capital ratios with some extreme outliers. However, the median capital ratio comes to a sound 32%.

A closer look at the OeNB's central credit register suggests that banks do not provide major funding for fintechs. This finding is supported by the banking industry, which highlights the difficulties in rating firms without a rating history and with highly specialized business models that are difficult to understand. We conclude from these findings that the respective fintech's liability side mostly comprises shareholders' loans and, potentially, money provided by business agencies.

Considering balance sheet profitability¹⁹ in more detail reveals that around two-thirds of Austrian fintechs are still unprofitable. While there are profitable fintechs across all sectors in which they operate, the fintechs for which detailed balance sheet data are available report a median return on assets of -40%. For this subsample of firms, we moreover identified an aggregated loss of around EUR 20 million (i.e. profits of EUR 5 million versus losses of some EUR 25 million). Yet, balance sheet

¹⁶ Of the 112 firms listed in the FDA, we were able to obtain data on balance sheet size for 86 firms. Of these, 72 firms provided additional detailed data on balance sheet components, including information on profitability.

¹⁷ As a rule, the fintechs' balance sheet is split up into the following key components: asset side = fixed assets, working assets, accruals and deferred income; liability side = capital, borrowed funding and accrued liabilities.

¹⁸ As indicated by the median of the distribution of the fintechs' ratio of working assets to fixed assets.

¹⁹ Balance sheet gains and losses are subcomponents of the firm's capital.

data for some large firms are missing in this analysis. Had they been available, this might have given a different picture of the fintech industry as a whole.

4 Conclusions and next steps

By looking into descriptive statistics of Austria's fintech industry, the present analysis provides a comprehensive overview of important aspects of the domestic fintech ecosystem. While the latter is still rather small, it grows at a much faster pace than the rest of the economy does. Furthermore, Austrian fintechs are concentrated in the country's larger cities and are based on a diversified range of business models that become increasingly specialized. There has been a recent surge in newly established firms, founded mostly by middle-aged men that have already acquired some industry experience. Capital comes, on the one hand, from a diversified domestic investor base and, on the other hand, from a few large funding providers abroad. Investments are typically made in larger fintechs, which account for more than one-half of all fintechs in terms of balance sheet size. Median capital ratios are sound but there is a substantial share of negative outliers. Overall, Austria's fintech industry still seems to be unprofitable, except for some notable exceptions across all sectors.

While the fintech industry is not yet of paramount importance for the Austrian economy, its underlying dynamics warrant close monitoring to identify potential financial stability implications early on. In this context, interactions between the fintech industry and the banking sector also play a role. On the downside, if fintechs become important third-party providers for incumbent banks, their failure could have spillover effects on the established financial sector. On the upside, fintechs can contribute to efficiency, transparency and resilience of, as well as competition within, the financial system (see FSB, 2017 and 2019). In this respect, timeliness of monitoring is crucial as suggested by the rapid growth of internet-based service providers. Moreover, we expect fintechs that provide third-party services for incumbent banks and insurance companies as well as "neobanks" such as N26, Revolut and Monzo to become increasingly important. This is evidenced by the fact that the neobanks' customer base has grown from virtually zero to several million over the past two years. Other industries also show tendencies to grow rapidly and become near-monopolies in the future (e.g., Airbnb, Spotify and Uber).

In addition to periodic updates of the analysis discussed in this study, there are several further routes one could take to shed light on additional aspects of the fintech industry. First, the scope of the study could be broadened by including information on digitalization initiatives of both domestic banks and international players in Austria²⁰. This would complete the picture of the fintech market's size and dynamics in Austria. Constraints arising from data on international players could be addressed by aligning domestic methodological approaches with those adopted by authorities in other jurisdictions. While a global picture of the fintech landscape might be hard to get, one could aim to provide at least a regional picture (e.g. of the DACH region, which consists of Germany, Austria and Switzerland, or of the Central, Eastern and Southeastern European (CESEE) region).²¹ Second, the analysis itself could be

²⁰ While regulatory reporting data provide at least some information on the digitalization initiatives of incumbent banks, it is very difficult to obtain figures on international players since they typically do not report their activities separately for Austria.

²¹ One could, e.g., use the services of fintechs that supply information on firms across jurisdictions in a harmonized way.

broadened by tracking, e.g., key performance indicators of individual firms over time, which would allow us to depict typical evolution paths of fintechs. This would help predict future sector developments and identify changing sector needs as the fintech industry matures. Moreover, a more detailed breakdown of firm profitability over time and by sector could further enhance our understanding of the typical trajectory firms pursue as they evolve over time.²²

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²² *Setting up such an analysis would require further methodological considerations to eliminate the survivor bias: Of the firms that were founded more than ten years ago, our current data only include those that have survived based on a more or less viable business model. However, our data do not include firms that have exited the market in the meantime.*

The recent upswing in corporate loan growth in Austria – a first risk assessment

Andreas Greiner, Katharina Steiner, Walter Waschiczek¹

Refereed by: Christina Gerberding, Deutsche Bundesbank

With Austrian banks having significantly expanded their lending to domestic nonfinancial corporations in 2017 and 2018, we are witnessing the fifth period of significant loan growth since 1982. While the recent rise in loan growth rates was broadly in line with past increases in magnitude, the year-to-year variation was generally much higher. This paper provides stylized facts on the latest increase in loan growth and a first assessment of potential systemic risks for the Austrian banking system. Developments in the real economy in 2017–2018 broadly followed those during past periods of loan growth – only investment grew at a stronger pace. Bank loans were losing importance in the financing mix of nonfinancial corporations and in banks' balance sheets throughout the review period. The most recent upturn started from historically low levels and has been more pronounced in some banking sectors as banks have been adjusting their business models following the financial crisis. A potential deterioration in loan quality would especially hit banks with currently high lending rates that have structurally low margins and weaker risk bearing capacity. From an industry-level perspective, the main borrowers were industries with high value-added growth, high profitability and low insolvency rates, yet with a concentration on real estate activities. Such a concentration on real estate business may pose risks given the ongoing buoyancy of the Austrian real estate market.

JEL classification: G21, G32

Keywords: bank lending, corporate finance, industry structure, credit quality, financial stability

In 2017 and 2018, the growth of Austrian banks' loans to domestic nonfinancial corporations gained strong momentum. It accelerated from 1.4% in the fourth quarter of 2016 to 6.8% in the final quarter of 2018 in nominal terms and from 0.3% to 5.2% in real terms (chart 1). On the one hand, this increase reflects the monetary policy stance of the ECB in recent years. The ECB's monetary policy measures have been aimed at supporting conditions for bank lending and thus loan growth in the euro area and, ultimately, real activity and the convergence of inflation toward the defined medium-term target. On the other hand, these growth figures should help to alleviate fears that the tightening of regulatory requirements for banks in recent years may have been hampering the supply of loans to the real sectors of the economy. As the figures show, loan growth accelerated although macroprudential capital buffers were put in place and even raised in recent years. From a macroprudential point of view, this upturn naturally warrants closer attention. After all, credit growth may be an indicator of future problems in both the financial and real sectors of an economy (e.g. Cecchetti and Kharroubi, 2015; Dell'Arriccia et al., 2012; Jordà et al., 2016) – as has been pointed out with regard to the strong growth of leveraged loans in recent years in the United States as well

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as in Europe.² Moreover, the International Monetary Fund (IMF) concludes in its most recent Global Financial Stability Report that the quantity of corporate debt is already elevated while the quality has been deteriorating (IMF, 2019). This makes banks and nonbank financial institutions with significant exposure in this business susceptible to losses in an adverse scenario.

In this paper, we present stylized facts on whether or to what extent the recent increase in corporate loan growth in Austria appears to be disproportionate. We do so in two ways: In the first section, we question whether the current upswing in lending differs from previous periods of high loan growth. Specifically, we analyze the long-term development of bank lending to nonfinancial corporations in Austria from 1982 to 2018 and relate these figures to variables of economic activity and banking variables. In the second part, we ask whether the loan expansion that occurred in 2017 and 2018 bears risks to financial stability. To this effect, we analyze bank-specific and loan-specific factors and break down loan growth by different industries. The concluding section assesses any potential pockets of vulnerability for the Austrian banking sector stemming from the recent upturn in loan growth.

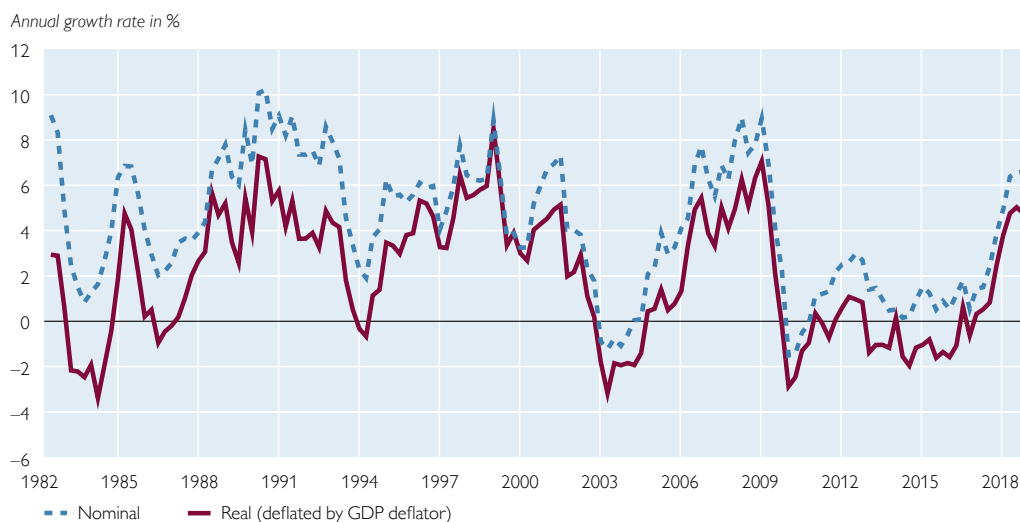
1 Long-term perspective on corporate loan growth in Austria

1.1 Upswings in bank lending to nonfinancial corporations since 1982

With a view to assessing possible implications of the most recent episode of rapid corporate credit growth for the financial stability of the Austrian banking sector, we analyze the characteristics of the recent upswing of loan growth rates to nonfinancial corporations in Austria and the differences to former credit cycles.³

Chart 1

Bank loans to Austrian nonfinancial corporations 1982–2018



Source: OeNB, authors' calculations.

² See for example Association for Financial Markets in Europe (2019). Given the lack of data on leveraged loans for Austria, we do not elaborate on this specific type of loan in this paper.

³ "Austrian" refers to banks with an Austrian bank license and firms registered in Austria. Throughout this paper, we use the term "nonfinancial corporations," as first introduced by the European System of Accounts (ESA) 1995, synonymously with companies, enterprises and firms. While the harmonized definition of "nonfinancial corporations" did not exist before the introduction of ESA, we use the term also for earlier data in order to enhance readability.

We collected a time series on the growth of loans granted by Austrian banks to domestic nonfinancial corporations in the period from 1982 to 2018 based on reporting data as available (chart 1). The choice of the starting date reflects the distinct macroprudential regime shift that occurred in the market for corporate loans in Austria in 1982. Up to 1981, Austrian banks were not allowed to raise their loan growth rates beyond a given limit, the so-called “limes” (Doeme et al., 2016).

In our data series, all growth rates until 1999 are based on changes in the outstanding stock of loans. From 1999, we have used the index of notional stocks as developed by the ECB. In other words, the annual changes since 1999 are based on net transactions, that is new lending and repayments (adjusted for valuation changes, exchange rate effects and reclassifications). Details on the time series and the role of reclassifications, write-offs and foreign currency adjustment are given in the annex.

The average compound annual growth rate of domestic corporate bank lending over the whole period was 4.2% in nominal terms and 2.0% when adjusted for inflation, using the GDP deflator. In this section, we focus on the real time series, as varying inflation rates would lead to biased results. As can be seen from chart 1, at least up to now, the recent upturn in loan growth mirrors the magnitude of earlier upswings in lending. Former upswings even showed higher annual compound loan growth rates, both in nominal and real terms – although it is not clear whether the current upturn has already reached its peak.

We identified four distinct upswings in real loan growth before the onset of the crisis in 2008: from Q2 1984 to Q1 1985, from Q3 1986 to Q2 1990, from Q1 1994 to Q2 1998 and from Q2 2003 to Q2 2008. Together, these periods lasted 59 quarters, with the corresponding downturns adding up to 45 quarters (from Q2 1985 to Q2 1986, from Q3 1990 to Q4 1993, from Q3 1998 to Q1 2003 and from Q3 2008 to Q1 2010). The first eight quarters preceding the current episode of rapid loan growth as well as the period of sluggish loan growth in the aftermath of the crisis (Q2 2010 to Q1 2016) have not been attributed to either an upturn or a downturn.⁴ The turning points, i.a. local minima and maxima in the time series, were determined using the Bry and Boschan (1971) algorithm – details of the method are given in the annex.

In terms of duration, the first upswing was much shorter (one year) than the following three ones (between 4.0 and 5.3 years). The most recent upswing has lasted two years so far. In terms of magnitude, as measured by the compound annual growth, the rate of 2.4% during 2017–2018 was well within the range of compound annual growth rates in earlier growth periods (with figures between 1.2% and 4.7%, see table 1, first column of “bank loans to nonfinancial corporations”).

To add the dimension of year-to-year variation, we also look at the change in annual loan growth. After all, the change in the (net) flow can be compared with the notion of a “credit impulse” introduced by Biggs et al. (2009).⁵ In other words, since spending is a flow variable – which is relevant for the next section – any

⁴ As a kind of robustness check, we set the starting date of the most recent upswing in Q2 2015, when a sluggish recovery set in. In that case, at 3.7 years the length of the period would still be below the duration of the majority of past upswings, and the compound annual growth rate at 1.1% well below the average of the past upswings.

⁵ Biggs et al. (2009) argue that GDP growth is driven both by the change in the stock of credit and by the change in the flow of credit, which they call “credit impulse.”

changes in spending should be compared with the change in the (net) flow of lending rather than with the growth rates of the stock of loans. Here, the results are as follows: the annualized rate of change in lending for the 2017–2018 period (2.3 percentage points) is below the annualized change during the first upswing in lending (6.4 percentage points) but well above the average for the other upswings in lending since 1982 (1.6 percentage points). We therefore analyze the characteristics of the current upswing in more detail in section 2.

1.2 Relationship between lending upturns, economic growth and later lending downturns

We ask whether the current rise in corporate bank lending is in line with historical regularities by relating it to developments in the real economy. Overall, loan growth rates are usually higher and more volatile than GDP growth rates.⁶ Nevertheless, real corporate loan growth shows some degree of co-movement with real GDP growth in Austria, particularly with a lag of four quarters.⁷ Considering this lag, GDP growth was on average 2.5% during the first four bank lending upturns and 2.6% during the 2017–2018 upturn (table 1, column 4). Gross fixed capital formation grew more strongly in the past two years (3.6%) than on average during the former lending upswings (3.3%), which is also reflected in a stronger increase in the investment ratio (table 2, column 5 and 6).⁸ The number of insolvencies declined in the most recent credit upturn as well as in two of the four previous lending upturns (table 1, column 7).

Another question is if the periods with the strongest upswings in credit growth were also followed by the “deepest” downturns in loan growth and real variables.

All upswings end in a steep fall in growth rates with a final contraction of real credit (negative real growth rates, see chart 1).⁹ The strongest upturn in credit growth in Austria did not come with the steepest fall in credit growth rates. Moreover, loan contractions must not be overinterpreted, as any contraction will in part be driven by a higher volume of repayments of existing loan contracts compared to the volume of new lending. Adalid and Falagiarda (2018) show that repayments are even higher after periods of strong credit growth.

A comparison with real sector variables shows that the upswing starting with the highest level of corporate bank loans to GDP among all upswings (46% in Q2 2003 according to chart 2) turned into the strongest downturn at least in investment and real GDP – also influenced by the weak financial and real market environment in the aftermath of the 2008 crisis. Dell’Arriccia et al. (2012) for

⁶ A higher standard deviation of real corporate loan growth (2.8) compared to real GDP growth (1.6) is a simple indication of higher volatility. For a similar assessment, see ECB (2011), which focuses on episodes of major downturns, which were of more relevance at the time.

⁷ Jordà et al. (2016) show that advanced economies show high correlations between the real and financial sector. We conducted a maximum correlation analysis (see section A2 in the annex). Correlation (without any indication of causality) is highest (56%), with real loan growth lagging real GDP by four quarters (correlation of 35% with no lead or lag). Results for Germany and the euro area are similar, with real GDP growth lagging real corporate loan growth by three quarters in both cases (ECB, 2009; ECB, 2011; Deutsche Bundesbank, 2011).

⁸ Data on investments of nonfinancial corporations have only been available since 1995, so we use investments of the total economy, which developed similarly (see chart 2). A comparison of investments of nonfinancial corporations in the loan upswing of Q2 2003 to Q2 2008 shows higher investment growth (+3.0%) than in the past two years (+2.4%).

⁹ Nominal loan growth rates only showed a contraction twice (during 2003 and 2009).

Table 1

Changes in real variables in selected upswings and downturns

Selected periods	Duration in quarters	Bank loans to nonfinancial corporations		(1)	(2)	(3)	(4)	(5)
		% ¹	Percentage points ²	GDP	GDP (lag 4)	Gross fixed capital formation (total)	Investment ratio	Number of insolvencies
Reference period				% ¹	% ¹	% ¹	Percentage points ³	% ¹
Q1 2017–Q4 2018	8	2.4	2.3	2.6	2.6	3.6	0.3	-3.0
Upswings								
Q2 1984–Q1 1985	4	4.7	6.7	1.4	2.0	4.1	0.4	6.2
Q3 1986–Q2 1990	16	4.0	1.9	3.6	3.0	4.5	0.1	-2.7
Q1 1994–Q2 1998	18	3.7	1.4	2.7	2.3	2.6	-0.1	-1.9
Q2 2003–Q2 2008	21	1.2	1.3	2.7	2.6	1.9	-0.1	5.5
Average	14.8	3.4	2.8	2.6	2.5	3.3	0.1	1.8
Downturns								
Q2 1985–Q2 1986	5.0	0.5	-4.0	2.5	1.6	4.0	0.2	-7.8
Q3 1990–Q4 1993	14.0	3.1	-1.6	2.2	2.9	3.1	0.2	20.1
Q3 1998–Q1 2003	19.0	3.6	-1.9	2.2	2.8	1.5	-0.4	2.4
Q3 2008–Q1 2010	7.0	3.7	-5.1	-2.1	-1.0	-6.5	-0.6	-4.2
Average	11.3	2.7	-3.2	1.2	1.6	0.5	-0.1	2.6

Source: OeNB.

¹ Compound annual growth rate.

² Change in annual growth rate (annualized).

³ Change in ratio.

Note: Investment ratio = gross fixed capital formation in % of GDP; insolvency rate = number of insolvencies in % of total number of enterprises.

example show a strong relationship between the size of leverage and the strength of the subsequent downturn.

Overall, investment growth was stronger in 2017–2018 than during most former lending upswings, and GDP growth was in line with previous developments. This can be interpreted as a reassuring factor, insofar as investment is the main channel from bank loans to GDP (Antoshin et al., 2017). However, a potential concentration of debt-financed investment in real estate-related activities poses risks given the ongoing buoyancy of the Austrian real estate market. The industry structure of loan growth will be discussed in section 2.

1.3 The changing role of bank loans to nonfinancial corporations

Bank loan intensity, defined as the ratio of bank loans to GDP, can be used to identify extraordinary episodes in the relationship between loans and economic activity. Applying the “credit boom” definition of Dell’Arriccia et al. (2012)¹⁰ to corporate bank loans, there were no periods with “truly booming” corporate loan growth in Austria as the change in the ratio to GDP never exceeded 6%. Looking at the long-term development, corporate bank loan intensity has declined by 25%

¹⁰ The literature provides an array of methodologies to identify credit boom episodes, which differ in various ways, such as whether the trend and thresholds should be country-specific or whether information unavailable at the time should be included or not. All in all, the boom episodes identified with different methods are rather robust (see Dell’Arriccia et al., 2012, for further details). In their paper, they classify an episode as a boom if either of the following two conditions is satisfied: (i) the deviation from trend is greater than 1.5 times its standard deviation and the annual growth rate of the credit-to-GDP ratio exceeds 10%; or (ii) the annual growth rate of the credit-to-GDP ratio exceeds 20%. Overall, how to define “normal” levels of credit growth always remains open to interpretation.

Table 2

Changes in real and financial variables in selected upswings and downturns

	(1) Loan intensity	(2) Indebtedness	(3) Importance of bank debt for non- financial corporations	(4) Importance of corporate loans for banks
Selected periods				
Reference period				
Q1 2017–Q4 2018	0.8	–0.7	1.4	0.8
Upswings				
Q2 1984–Q1 1985	1.0	n.a.	n.a.	–1.2
Q3 1986–Q2 1990	0.3	n.a.	n.a.	0.1
Q1 1994–Q2 1998	0.9	–1.9	0.0	0.3
Q2 2003–Q2 2008	–0.3	–1.7	–1.0	–1.1
Average	0.5	–1.8	–0.5	–0.5
Downturns				
Q2 1985–Q2 1986	–1.3	n.a.	n.a.	–0.7
Q3 1990–Q4 1993	0.3	1.6	n.a.	0.2
Q3 1998–Q1 2003	–0.4	–0.2	–2.7	–0.2
Q3 2008–Q1 2010	0.7	–0.0	0.3	0.4
Average	–0.5	0.5	–1.2	–0.4

Source: OeNB.

Note: Loan intensity = nominal loans to nonfinancial corporations in % of GDP; indebtedness = debt financing in % of total liabilities (data available from the first quarter of 1999 onward); importance of bank debt for nonfinancial corporations = share of bank loans in the stock of total debt liabilities (data available from the first quarter of 1995 onward); importance of corporate loans for banks = bank loans in total banking assets.

since its peak in 2001, reaching a historical low of 40% in 2018 (chart 2, upper left panel). The decline implies that the role of banks in external debt financing of the economy is shrinking. During the past two years, corporate bank loan intensity re-increased somewhat, but starting from a historically low level of 38.7% (table 2, column 1).¹¹

This picture corresponds to the changing importance of bank loans in the overall financing structure of non-financial corporations. Since the early 1990s, the importance of bank loans in debt financing of nonfinancial corporations has declined from 40% to 20% (chart 2, lower left panel). Nonfinancial corporations tend to increasingly draw on other sources of external debt financing, such as trade credit or domestic loans between nonfinancial corporations. Former upswings also showed a declining share of bank loans in the financing structure of nonfinancial corporations.

Only in the past two years have nonfinancial corporations turned back to bank loans (table 2, column 3).¹² With nonfinancial firms benefiting from price effects in bank financing given historically low interest rates (see section 2), this does not really come as a surprise. What is important, however, is that the indebtedness levels of nonfinancial corporations have declined in all past lending upswings (somewhat less most recently, see table 2, column 2).

The importance of bank loans for investment has also changed over the observation period (see chart 2, upper right panel). After an up and down movement with a peak at the beginning of the 2008 financial crisis, the share of bank loans in gross fixed capital formation is back at the comparatively low level of the early 1990s (165%).

Overall, the most recent upturn in bank loan intensity and in the share of loans in investment and corporate debt seems to differ from the previous lending upswings as all indicators start from historically low levels. Also, the overall decline in indebtedness and the long-term diversification in external debt financing sources is welcome from a financial stability perspective.

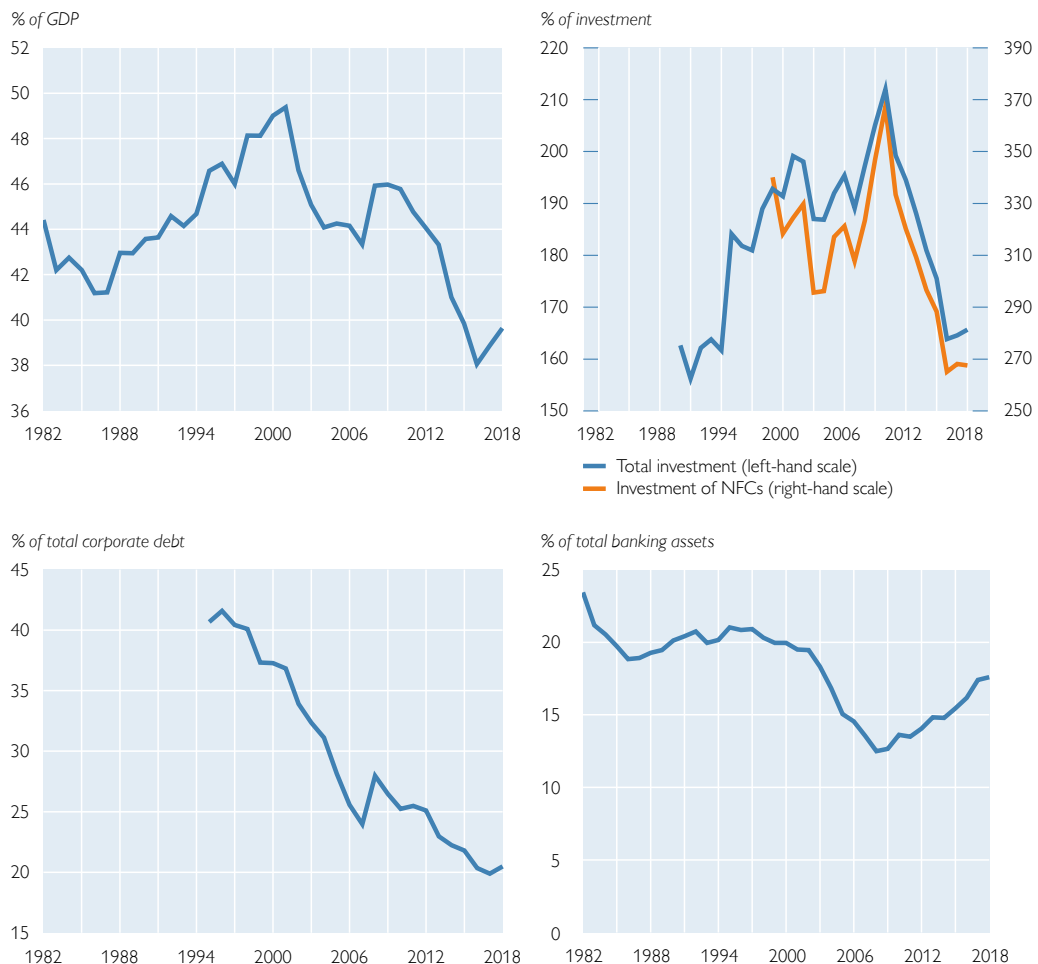
The bottom right panel of chart 2 shows that until the early years of this millennium, domestic corporate loans accounted for one-fifth or more of total

¹¹ Again, selecting the alternative starting date for the latest upswing (Q2 2015), loan intensity was similar (39%) but decreasing on average (–0.2 percentage points per year).

¹² Data for the relevance of bank loans for corporate financing have been available only since 1990. From 1990 to 1994, only annual data are available from financial accounts.

Chart 2

Loans to nonfinancial corporations 1982–2018



Source: OeNB, Eurostat, authors' calculations.

assets¹³ of Austrian banks. In the years prior to the financial crisis in 2008, this share nearly halved as Austrian banks increased interbank activities and their holdings of debt securities, including fixed-income securities. However, the crisis nudged Austrian banks to adjust their business models. They reduced the aforementioned activities, leading to a decrease in total assets, and increased lending. As a result of both developments, the share of corporate loans re-increased to over 17% as of end-2018. On average, 60% of the increase in the share of corporate loans in total banking assets was due to balance sheet reductions.

The buoyant growth in loans to nonfinancial corporations did not drive up the overall indebtedness of the nonfinancial corporation sector. Based on data from the financial accounts, loans from domestic monetary financial institutions (MFIs) contributed almost 40% to the external financing of nonfinancial corporations in 2017–2018 (and nearly two-thirds to debt financing). However, as loans from foreign banks – which had increased markedly in the preceding years – decreased

¹³ Unconsolidated total assets are used as a proxy for domestic assets.

(in particular in 2018), the share of total bank loans actually fell in the period under review (see OeNB, 2019).¹⁴ Thus, to a large extent loans from Austrian MFIs served as a substitute for other forms of finance in the past two years.

2 Loan growth on the rise in 2017–2018

In this section, we focus on the upswing of loan growth in the 2017–2018 period, concentrating on two questions: (1) which bank-specific and loan-specific factors have driven the upturn, and (2) which industries have borrowed most?

2.1 Bank- and loan-specific drivers of corporate loan growth

Based on year-end figures for 2018, table 3 displays selected bank and loan characteristics for the seven banking subsectors which the OeNB uses in banking analysis,¹⁵ comparing growth rates for corporate loans in Austria and loan characteristics for the individual sectors and their contribution to overall growth in 2017–2018. The last column sums up the shares in loan growth of all sectors with above-average ratios for each specific characteristic.

The biggest contribution to loan growth in 2017–2018 came from cooperative banks. Together with savings banks, they account for nearly 80% of the total increase in corporate loan volumes in Austria. Growth rates (in relative terms) were also above average at regional mortgage banks and foreign branches.

Annual growth rates of foreign currency loans to corporations have been negative since 2003 (with only a few exemptions), bringing down the share in total loans to 2.3% in 2018.¹⁶ The growth rates of euro-denominated loans were therefore even higher than the overall growth suggests, as euro loans compensated for the reduction and negative contribution to growth (–4%) of foreign currency loans.

The share of fixed interest rate loans in total outstanding corporate loans increased slightly in the past two years, to 17.6%, due to the low interest rate environment and the expectation of an end of quantitative easing. However, fixed interest loans only contributed one-fifth to the overall loan growth, and the outlook on “lower for longer” in terms of interest rates may make variable interest rate loans more popular again as they offer cheaper loan conditions.

The change in the interest rate environment also had an impact on the original maturity of corporate loans. In general, the share of corporate loans in Austria with an original maturity of more than five years declined somewhat, to 63% in 2017–2018, driven by an increase in loans due on demand and loans without a given maturity. In terms of growth contribution, though, loans with an original maturity of more than five years accounted for more than half of the total increase in the given period. Looking at specific bank sectors, regional mortgage banks and building societies were granting more loans with longer maturities than other sectors.

¹⁴ It is very likely that loans from foreign banks comprise mainly large-scale transactions to larger corporations, and thus are rather volatile, given their relatively low number. Likewise, corporate bond issuance, another financing instrument that is used primarily by larger corporations, also receded in 2017–2018.

¹⁵ These sectors reflect the multitier structure of the Austrian banking sector, based on banks' different business models, legal forms and ownership patterns. For better international comparability, the cooperative banks (i.e. Raiffeisen and Volksbanken) are shown as a single cooperative sector given business model similarity.

¹⁶ We analyze foreign currency loans based on monetary statistics, with a dataset starting in 2003. A comparison with data prior to this date would be difficult due to significant breaks in the reporting framework.

Table 3

Loan growth and loan- and bank-specific factors by type of bank

	Total	Joint stock banks	Savings banks	Regional mortgage banks	Cooperative banks	Building societies	Special purpose banks	Foreign branches	Contribution of loan characteristic to loan growth in % ²	Sum of growth contribution with above-average characteristic ³
Loan growth										
Average annual growth rate, 2017–2018 ¹	7.0	2.1	10.7	7.7	9.5	–4.8	–9.1	15.5		
Share in loan growth, 2017–2018 ¹	100.0	8.9	31.3	11.1	48.6	–1.1	–1.0	2.2		
Loan-specific factors (as from end-2018)										
Share of foreign currency loans	2.3	2.9	2.2	1.6	2.0	0.0	0.0	9.8	–4.0	11.1
Share of fixed interest rate loans (in outstanding corporate loans)	17.6	16.8	14.2	23.4	18.2	11.4	6.8	44.3	20.5	61.9
Share of loans with an original maturity of more than 5 years	62.9	58.3	65.6	72.6	63.2	99.8	2.7	15.9	53.6	89.9
Bank-specific factors (as from end-2018)										
Market share of total assets	100.0	25.9	19.8	6.3	35.8	2.6	7.0	2.7		
Market share of corporate loans in Austria	100.0	27.6	21.8	10.2	37.5	1.3	0.5	1.1		
Share of corporate loans in (unconsolidated) total assets	17.8	19.0	19.5	28.9	18.7	9.0	1.4	7.5		99.9
NPL ratio of corporate loans	2.9	3.1	2.5	1.7	3.5	0.0	0.9	0.2		57.5
Net interest margin (total interest)	1.0	1.2	1.0	1.0	1.0	1.1	0.1	1.4		52.4
CET1 ratio (consolidated data)	15.4	16.9	13.5	14.9	15.4	12.7	23.6	n.a.		56.5

Source: OeNB, authors' calculations.

¹ Not adjusted for valuation changes, exchange rate effects and reclassifications.

² Share of loans with the respective characteristic in total loan increase.

³ Sum of sector shares (with above-average ratios for the respective factor) to total loan increase.

Turning to bank-specific factors, we see that cooperative banks and joint stock banks top the list of market shares in corporate lending. When corporate loans are measured as a share of total assets, we find regional mortgage banks to have a disproportionately high share compared to their overall market share, making this banking sector highly exposed to developments in this business segment.

Austrian banks managed to reduce their portfolios of nonperforming corporate loans (NPL) by almost EUR 3 billion in 2017–2018. The reduction was particularly strong at regional mortgage banks (55% of total decline), which at the same time experienced above-average growth rates (as mentioned above). The same is true for cooperative banks, which combine strong loan growth with a significant NPL reduction (20% of total decline). However, 57% of the increase in corporate loans came from banks (sectors) with above-average NPL ratios. As a result, these banks experience a further increase in their credit risk exposure.

The average interest margin of Austrian banks is around 100 basis points,¹⁷ and none of the sectors of the banking industry deviates much from this level except for foreign branches, whose margins are well above this level. This can be one reason why foreign branches showed very strong growth rates in recent years. In general, approximately half of the loan growth came from banks with above-average margins.

¹⁷ Net interest margin is defined as total net interest income in percent of total assets as net interest income from corporate loans only is not available.

At the same time, this means that banks with below-average margins have been as active in lending as other banks with a view to bolstering their net interest income.

Finally, capitalization is an important factor concerning the ability of banks to grant new loans. In 2017–2018, the consolidated CET1 ratio of Austrian banks increased by 53 basis points to 15.4%. Almost half of the increase in corporate loans in the past two years came from cooperative banks, whose capitalization matches the banking sector average. One-third of the increase came from savings banks, which have a below-average CET1 ratio. Regional mortgage banks also show below-average CET1 ratios and strong loan growth. These results imply that capital ratios (that are still well above the regulatory minimum) do not hinder lending, especially in an environment of economic growth, improving loan quality and low (but stable) interest margins. Moreover, the introduction of macroprudential capital buffers obviously did not hinder banks' ability to provide Austrian companies with necessary financing.

2.2 The industry structure of loan growth

In this section, we look at the risk characteristics of the borrowers to whom the (net) flow of loans to the corporate sector can be traced back in the 2017–2018 period and ask how large a share of the increase in loan growth is attributable to borrowers with higher risk potential. To this end, we use the markedly enhanced data that have become available as a result of the new reporting data model implemented by the OeNB for the collection of bank data.¹⁸ Amongst others, these data allow to detail the loans by Austrian MFIs to nonfinancial corporations by industry. We link the rise in loan growth at industry level to a number of risk characteristics of the individual industries. As the index for notional stocks is not available for individual industries, we look at the nominal change in outstanding volumes. Column 1 of table 4 displays the compound annual growth rate of bank loans for 19 different industries based on the NACE classification, column 2 the contribution of the individual industries to the growth of loans to nonfinancial corporations, and column 3 the share in the outstanding stock of loans as of end-2018.

In a next step, we relate the loan growth by industry to risk-related economic and financial variables. For each of these variables, the most recent reading as well as the respective reference period is given for each industry in columns 4 to 11 of table 4. Based on this, we calculate for each of these variables the share of those industries in the growth of loans to nonfinancial corporations for which the respective indicator is above the average of the whole sector.

A striking feature of the industry composition of the loan growth in 2017–2018 was that it was broadly driven by real estate-related activities, which accounted for half (50.1%) of the total loan expansion. This share was well above the average loan growth of the whole corporate sector and well above the real estate industry's share in value-added growth (12.3 %) as evident from column 5 in table 4. However, imputed rents of owner-occupied housing account for around 55% of the value added of real estate activities as shown in the national accounts.

¹⁸ See Kienecker et al. (2018) for an overview of the new reporting model. As the new data model allows the collection of more granular data, the analytical possibilities have grown substantially. In the case of loans, newly available attributes include factors such as loan purpose, industry and country of borrower and (remaining as well as original) maturity.

As a result, the 50.1% contribution to corporate loan growth made by companies actually active in the real estate business compares with a contribution of these companies of 5.6% to value-added growth.

In most other industries, the share of growth of loans to the corporate sector was in fact below that in the expansion of gross value added. One reason for the relative importance of bank loans is the business model of the individual industries.

Table 4

Loan growth and economic indicators by industry

	Loans to nonfinancial corporations			Gross value added			Financing structure		Profitability		Risk indicators	
	Compound annual growth rate ¹ , 2017–2018	Contribution to growth, 2017–2018	Share in outstanding volume, 2018	Compound annual growth rate, 2017–2018	Contribution to growth, 2017–2018	Labor productivity, 2017	Total equity, 2017	Amounts owed to credit institutions, 2017	Gross operating profit, 2017		Insolvencies, 2018	Nonperforming loans, 2018
	% p.a.	Percentage points	%	% p.a.	Percentage points	Per hour worked	% of balance sheet total	% of net turnover	% of total net debt	% of enterprises	% of outstanding loans	
Agriculture	-1.1	-0.1	0.6	7.0	2.1	9.2	37.8	33.0	10.7	21.8	0.05	3.9
Mining	6.7	0.3	0.3	8.2	0.6	91.3	43.1	20.0	16.3	38.1	0.05	1.7
Manufacturing	5.8	10.4	11.1	3.6	15.9	57.0	39.7	12.3	9.6	29.3	0.19	5.5
Energy	-4.5	-1.9	2.2	10.0	4.6	106.1	41.7	9.4	10.8	17.4	0.04	2.5
Utilities	-4.0	-1.0	1.4	3.2	0.8	69.6	39.1	21.1	11.5	22.7	0.17	0.6
Construction	2.3	6.0	15.5	5.8	8.6	27.3	27.8	14.0	8.0	7.5	0.51	2.9
Trade	2.4	3.6	8.8	3.6	10.1	32.0	39.1	13.8	5.2	27.5	0.27	5.4
Transportation	1.1	0.6	3.2	3.0	4.1	36.7	39.7	20.7	12.4	32.9	0.64	2.8
Accommodation	2.9	2.6	5.4	6.4	8.0	22.9	24.1	49.6	16.1	17.5	0.53	5.7
Information	-9.6	-1.5	0.8	3.2	2.7	47.6	44.5	5.8	16.3	58.3	0.14	7.5
Financial activities	12.9	10.1	5.4	2.1	2.0	71.6	.	.	.	.	0.12	2.2
Real estate	10.4	50.1	32.2	5.3	12.3	235.8	30.5	33.9	48.3	7.6	0.09	1.3
Professional activities	20.4	22.8	8.4	4.7	6.0	28.9	54.9	10.6	16.9	7.6	0.14	2.2
Administration	17.2	5.4	2.3	6.3	6.5	30.8	31.9	11.3	12.2	35.4	0.42	1.9
Public administration	-38.7	-6.0	0.4	3.1	3.7	30.0	.	.	.	.	0.00	0.0
Education	-2.9	-0.0	0.1	2.8	3.5	33.7	33.3	9.0	0.0	51.0	0.12	6.8
Health and social work	-7.7	-1.0	0.7	4.1	6.8	24.7	42.9	12.9	4.3	13.9	0.13	1.1
Arts and entertainment	7.8	0.8	0.7	3.0	0.9	31.1	38.7	17.9	16.6	37.9	0.16	2.2
Other services	-11.0	-1.3	0.6	2.2	0.8	20.1	38.2	15.6	14.2	30.7	0.16	7.3
All industries	6.3	100.0	100.0	4.2	100.0	37.5	38.1	19.4	10.9	14.2	0.24	2.9

Share of industries with above-average values² in

Growth of loans to NFCs				85.3		66.5	33.2	54.7	78.9	12.0	18.3	13.7
Growth of loans to NFCs without real estate	4.5			70.6		32.9	69.6	5.5	52.1	26.3	36.7	27.5
Outstanding volumes of loans to NFCs				66.9		53.3	40.5	45.7	55.2	37.8	35.2	27.4

Source: OeNB, Eurostat, BACH database, Kreditschutzverband von 1870, authors' calculations.

¹ Not adjusted for valuation changes, exchange rate effects and reclassifications.

² In % of those industries for which data are available.

Note: For loans to nonfinancial corporations, see section A1. Gross value added at current prices (Eurostat). Labor productivity: gross value added per hour worked (Eurostat). Total equity (BACH database) comprises capital, reserves, earnings and other equity instruments as well as revaluations, adjustments on financial investments and other comprehensive income. Amounts owed to credit institutions (BACH database) comprise debt liabilities vis-à-vis all credit institutions (including financial leasing). Gross operating profit: net turnover + variation in stocks of finished goods and work in progress + capitalized production + operating subsidies and supplementary operating income – cost of goods sold, materials and consumables – external supplies and services – staff costs – operating taxes and other operating charges, in % of net turnover (BACH database item R31), in % of total net debt (BACH database item R27). Insolvencies: Kreditschutzverband von 1870 (KSV). Number of insolvencies (opened and rejected) in % of the number of enterprises in that quarter as reported by KSV. For nonperforming loans, see section 2.1.

An industry will use more loans when high fixed costs are incurred in the early stage of the production process while the corresponding cash flows accrue at its end. That would suggest an above-average loan intensity for producing companies. Yet, loans to the manufacturing industry accounted for 10.4% of bank lending to the corporate sector while manufacturing accounted for 15.9% of value-added growth (see columns 2 and 5 of table 4, respectively). In general, loans to the tertiary sector grew at a faster pace and contributed more to loan growth than loans to the secondary sector, even when leaving aside real estate activities.¹⁹

Column 4 reports the compound annual growth rates of the (nominal) gross value added in 2017–2018. In this period, 85% of the growth of loans to nonfinancial corporations is attributable to industries whose value-added growth was above the whole corporate sector’s average. The same picture emerges when adjusting growth of value added by the hours worked in the respective industries (see column 6 of table 4; data are available for 2017 only). Two-thirds (66.5%) of the corporate loan growth can be traced back to industries whose labor productivity was above the sector’s average.²⁰ Thus, apart from the economic aspect that bank finance obviously supported economic growth in 2017 and 2018, from a stability perspective it is relevant that favorable economic conditions foster firms’ repayment capacity. This, however, also implies that the repayment capacity of nonfinancial corporations may deteriorate once economic conditions weaken. Yet, loan growth cannot be assumed to be fully aligned with economic developments. The points in time when a loan is taken out and value added is created may differ (and time intervals may vary), depending on the type of activity of the company, its liquidity situation or the (loan-financed) investment project. Furthermore, there are some statistical uncertainties.²¹

As differences in loan growth might reflect different funding and liquidity modalities, such as varying access to – or use of – other forms of financing, we relate the loan growth in the past two years to the financial structure of the individual industries, based on data from the BACH database.²² In 2017–2018, as can be seen in column 7, about one-third (38%) of the loan growth in the period under review is attributable to companies that had an above-average share of total equity in the balance sheet. While this might reflect different financing needs (as firms that are able to finance their activities in the form of bank loans have less need to resort to equity), from a stability perspective a low equity ratio can be an

¹⁹ The tertiary sector saw an annual compound growth rate of 8.1% in 2017–2018, so that 86.3% of the (net) new corporate loans went to this sector (against a contribution of GDP growth of 67.4%). In contrast, growth of loans to the secondary sector averaged 2.7% in the past two years.

²⁰ The high value of the labor productivity for real estate activities can be attributed at least partly to the imputed rents of owner-occupied housing.

²¹ About 16% of total bank loan expansion in 2017–2018 was attributed to the division “activities of head offices.” Such “headquarters” often borrow for a group of companies and then distribute loans within a group. A number of stock-listed companies are also included here. In addition, MFI statistics also include loans to companies in financial and insurance services. These loans are not money market or interbank loans as this industry also includes companies that perform activities for other industries, such as property management companies or holding companies that are not involved in corporate governance. In total, this industry contributed 10% to the growth of loans to nonfinancial corporations. This implies that up to one-quarter of the credit expansion cannot be allocated to the “actual” borrowing industries.

²² The BACH database does not provide data on financial services and public administration. At the time of writing, BACH data were available only up to 2017. However, as the balance sheet structure of the corporate sector has changed only very slowly in recent years, it seems justifiable to use these data for current analysis.

indication of possible risks.²³ Conversely, loans tended to go to industries with a higher historical propensity to take out bank loans, as 55% of the loan growth is attributable to industries with an above-average share of bank loans in the balance sheet (see column 8). This implies that the share of those borrowers who bear more interest-rate risk in the loan portfolio of the Austrian banks rose in the past two years (which is exacerbated by the very high share of variable-rate loans in Austria).

A main factor for the ability of a company to meet its debt obligations is its profitability. We took two profitability indicators from the BACH database, which relate to gross operating profit to turnover and to outstanding debt. Gross operating profit is total income (without financial income) minus operating expenses. Column 9 relates gross operating profit to net turnover, indicating the percentage of a company's earnings remaining after operating expenses are deducted. In the 2017–2018 period, 79% of the loan growth took place in industries with above-average profitability. However, when looking at gross operating profit over total outstanding (net) debt as a measure for debt payment capability (see column 10), a different picture emerges.²⁴ Only 12% of the loan growth is attributable to industries with an above-average income-to-debt ratio. All else being equal, firms with a higher income-to-debt ratio are more likely to be able to make interest and debt-related payments from their income. This difference is mainly due to real estate activities (and to a lesser extent to professional activities). But even without real estate activities, the share of loans to industries in the “above-average segment” is markedly lower when relating income to debt compared to that when relating it to turnover.

Finally, we look at two indicators directly related to credit risk. Both indicate that industries with above-average risk ratios accounted for only a comparatively small part of the loan growth. The first indicator is the insolvency ratio (given in column 11), obtained by dividing the number of insolvencies that occurred in 2018 by the total number of companies in the same year (using data from KSV 1870).²⁵ Only 18.3% of the loan growth is attributable to industries with an above-average insolvency ratio. NPL ratios²⁶ (see column 12) yield a very similar picture: industries with an above-average NPL ratio accounted for only 13.7% of the loan growth.

Overall, in the past two years, banks lent primarily to industries with high value-added growth, high profitability and low insolvency rates. However, as discussed above, loan growth was strongly concentrated on real estate business (but even before 2017, as the high share in outstanding loan volumes implies). Real estate activities exhibited stronger value-added growth and higher profitability than the corporate sector as a whole as well as below-average insolvencies and nonperforming loans. Yet, this performance was based largely on the buoyancy of the Austrian residential real estate market and is therefore prone to reversal once the tide turns. Moreover, its financial structure showed a stronger dependence on bank loans as well as other forms of debt, as its equity ratio was one of the lowest of all industries. Thus, despite the highest profit margin of all industries, its debt

²³ For a recent overview of the equity ratio of Austrian nonfinancial corporations see Beer and Waschiczek (2019).

²⁴ Another possibility would be to look at the interest coverage ratio. But in the current environment of low (and still declining) interest rates this indicator is less apt to gauge interest rate risks or debt service difficulties.

²⁵ A more meaningful indicator for risk considerations would be the amount of insolvency liabilities, related e.g. to total liabilities of nonfinancial corporations. However, while the Kreditschutzverband von 1870 reports a breakdown of insolvency liabilities by different industries, these data are not structured according to the NACE classification.

²⁶ See section 2.1.

payment capability was one of the lowest. Given the strong impact of real estate activities on the year-to-year variation of loan growth in the past two years, we repeated the calculations without this industry. As to financial structure, when leaving out real estate activities, loans went largely to industries with an above-average equity ratio but with a low share of loans in total liabilities. The share of industries with an above-average debt payment capability more than doubles but still remains low. The same holds for the direct risk indicators – the insolvency and NPL ratios – which both do not change fundamentally but also are twice the overall share.²⁷

3 Summary and conclusions

The aim of this paper was to analyze the recent episode of strong increase in corporate loan growth in Austria with respect to potential systemic vulnerabilities. We did so in two ways: (1) along the time dimension, relating corporate loans to real and financial factors in a longer-term perspective, and (2) looking at bank- and loan-specific factors of the recent loan expansion by industry.

To sum up, we have identified the following risks and vulnerabilities – but also mitigating factors – for the Austrian banking sector that stem from the recent upswing in corporate loan growth:

- Whereas corporate loan growth in 2017–2018 was well in the range of former lending upswings in terms of magnitude, the year-to-year variation of growth was higher than in most past upswings. In the real economy, growth patterns were broadly in line with historical regularities. Investment growth was even stronger than during previous upswings in lending, but the most recent upturn in the investment ratio started from a historically low level.
- Overall, the indebtedness levels of nonfinancial corporations have decreased since the early 1990s. In this process, bank loans came to play a smaller role in the financing mix of nonfinancial corporations and in banks' asset structure.
- In the past two years, the growth of bank lending to nonfinancial corporations in Austria was primarily driven by lending to industries with high value-added growth, high profitability and low insolvency rates. Since corporate indebtedness levels did not rise as fast, banks' credit risks did not rise as much as the strong increase in loan growth would suggest. However, the interrelation between economic conditions and the ability of firms to take out and repay loans may also imply systemic risks once the repayment capacity of nonfinancial corporations deteriorates when economic conditions weaken. A potential deterioration in loan quality would therefore hit above all banks with currently high lending rates that have structurally low margins and weaker risk bearing capacity (measured via capitalization).
- As bank loans have recently become a substitute for other forms of debt financing of nonfinancial corporations, there has been a slight shift of risks to the domestic banking sector. These risks are increasingly real estate-related, particularly for banks heavily involved in this business segment.²⁸ While real estate lending has

²⁷ When using the shares of outstanding loans (instead of growth rates) of industries in which the respective indicator is above the average of the nonfinancial sector as a whole, the results do not change much.

²⁸ In addition to the strong concentration of the growth of loans to nonfinancial corporations on real estate activities, the growth of loans to households was driven primarily by housing loans (see the section "Recent developments" in this issue of the Financial Stability Report).

been fostered by the buoyancy of the Austrian real estate market, the banking sector has become more sensitive to possible shocks in this market.²⁹

- The repayment capacity of indebted nonfinancial corporations is being supported by the current low interest level, implying an interest rate risk for both borrowers and lenders in the medium to long run.
- The favorable economic conditions supporting the lending upturn in 2017–2018 were conducive to the improvement of loan quality indicators, enabling banks to reduce provisioning and bolster their profitability. However, changes in economic conditions may cause credit quality to worsen again. In this case, provisioning needs for banks could quickly rise, putting pressure on already low margins.
- Weak capitalization (in an international comparison) of Austrian banks and the introduction of macroprudential capital buffers has not burdened banks' lending activities in recent years. Much of the credit growth even came from banks with below-average capitalization. Deteriorating credit quality would therefore especially hit banks with lower risk-absorbing capacity.

Yet, our assessment has to be seen as a starting point for future work. While we were able to break down loan developments as well as economic and financial indicators at the industry level, which is rather coarse and somewhat blurred due to statistical reasons, other firm characteristics such as firm size, regional characteristics or individual firms' financial positions derived from individual balance sheets, could not be taken into account. These blanks might be filled when more granular data become available, for instance after the implementation of the analytical credit datasets (central credit register: AnaCredit). Future analysis should also look at the role of pricing and interest rate risks in corporate financing and bank lending patterns on a solo-level basis. Moreover, given the strong and increasing concentration of the loan portfolio of Austrian banks on real estate risks, the real estate industry warrants closer examination – both with respect to its economic performance and in terms of its financing structure.

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²⁹ See for example Schneider (2019), who posits that the outlook for the real estate industry might be characterized by an oversupply in the housing market beyond 2020, which could represent a risk factor for real estate-related industries.

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Annexes

A1 Description of time series for loans to nonfinancial corporations

Data on loans to nonfinancial corporations in this paper have been compiled from OeNB statistics, which are in turn based on the data reported to the OeNB by all Austrian banks. As the scope of the reporting requirements changed over time, there are a number of breaks in this time series. The time series starts in June 1981. From this month onward, the OeNB’s “monthly credit statistics” included data on direct lending (“Direktkredite”) by Austrian banks. As of December 1995, banks were required to report claims on nonbanks at monthly intervals. From the fourth quarter 1997 onward, the time series shows the development of loans granted from MFIs headquartered in Austria, according to the requirements of the ECB’s balance sheet items (BSI) statistics. The ECB’s reporting requirements led to adjustments in the definition of loans as well as in the definitions of the counterpart sector (which was adjusted to ESA requirements) and the reporting population (monetary financial institutions instead of banks). The ensuing time series breaks in 1995 and 1997 have been extrapolated with the growth rates of the annual growth rates of the first three quarters of the previous year. It has to be pointed out that these extrapolations did not affect the determination of turning points in loan growth.

Until 1999, growth rates are calculated as changes in the volume of outstanding loans. From 1999, they are based on the index of notional stocks developed by the ECB. This index adjusts changes in outstanding volumes for changes that are not related to transactions, such as valuation changes (write-downs), exchange rate

effects, loan transfers or reclassifications and therefore is based solely on the contributions of net transactions to loan growth. It is obtained (starting from a base period) by dividing transactions by the outstanding amounts at the beginning of the period to which they refer.³⁰ This means reclassifications do not affect growth rates. However, outstanding volumes are not affected by this method and therefore reflect data breaks due to reclassifications (major reclassifications took place in 2005 and 2007). Moreover, as of June 2005, the nominal value (including value adjustments) of loans is being reported. In 2014, the conversion to ESA 2010 entailed further changes.

The time series on loans to nonfinancial corporations exclude loans to freelance professionals and self-employed persons, as is required by BSI statistics. For the years before 2004, when the OeNB adapted reporting accordingly, loans to freelance professionals and self-employed persons have been deducted.

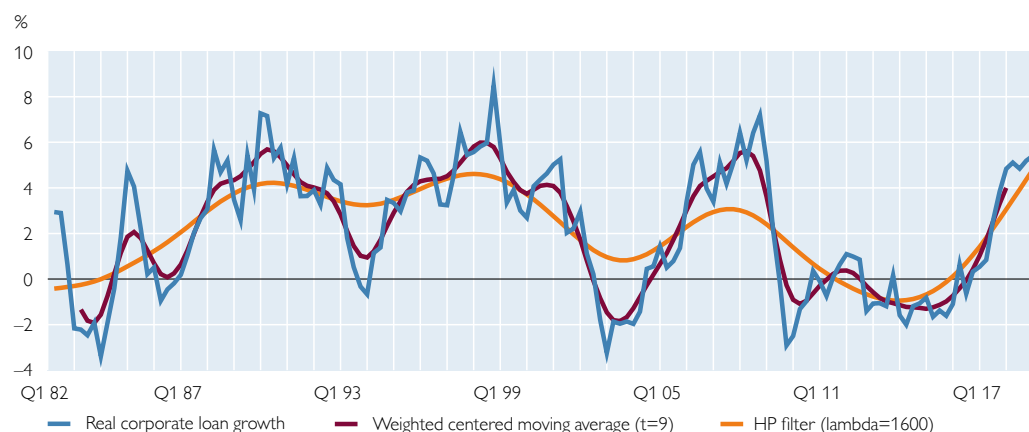
The time series is neither seasonally nor working-day adjusted. Real data are defined as nominal data adjusted for inflation using the GDP deflator.

A2 Determination of turning points and leads/lags of loan growth

Turning points refer to local minima and maxima in the growth cycle. Due to this definition, an upswing can start with negative growth rates. For the identification of the turning points, we detrended the time series by calculating several moving averages (MA) for different lengths of time (simple MA, centered MA (symmetric) and weighted centered MA (symmetric)). We also applied the Hodrick-Prescott filter (HP filter) for comparison. Among the moving averages, the weighted centered MA with $t=9$ ³¹ allowed a clear identification of turning points without losing too much information on the variation of the data – given the available length of the time series (chart 3). Applying the HP filter ($\lambda=1600$)³² broadly supported our results. As growth rates at the end of the time series only turned positive at end-2016, we

Chart 3

Weighted centered moving average and HP filter 1982–2018



Source: OeNB, authors' calculations.

³⁰ For a detailed explanation of the concept of the index of notional stocks, see ECB (2012).

³¹ Observations near the center receive higher weights than observations at the two ends of the sample period.

³² Ravn and Uhlig (2002) recommend the application of $\lambda=1600$ for quarterly data.

decided to focus on the past two years. As a kind of robustness check we set the starting date of the most recent upswing in Q2 2015, when a more sluggish recovery set in. The final selection of local turning points was guided by the Bry-Boschan procedure (see Bry and Boschan, 1971; and OECD, 2019, for an application).

To determine the strength of the link between bank lending to corporations and economic developments, we conduct a correlation analysis applying different leads and lags. The corresponding variables (e.g. GDP and investment) were shifted back and forth by a maximum of eight quarters. The highest correlation between real credit growth and real GDP growth was observed with a lag of four. This means that a loan growth to corporations lags real GDP growth by one year.

Nonbank financial intermediation in Austria – developments since 2008

Thomas Pöchel, Alexandra Schober-Rhomberg, Alexander Trachta, Matthias Wicho¹

Nonbank finance is an alternative to bank finance that fosters competition in the supply of financing and supports economic activity. However, nonbank finance may also become a source of systemic risk, both directly and through its interconnectedness with the banking system, if it involves activities that are typically performed by banks, such as maturity or liquidity transformation and the creation of leverage. While in the EU, the relative importance of nonbank finance vis-à-vis traditional banking has increased noticeably in the past decade, the Austrian financial system is still dominated by the bank finance model. Overall, the fractional growth of nonbank finance assets is not seen as a concern in itself, as the risks from nonbank financial intermediation seem contained. Neither the structure nor the size of nonbank financial intermediation in Austria are currently considered to pose a threat to financial stability.

JEL classification: G23

Keywords: nonbank finance, nonbank financial intermediation, nonbank financial institutions, investment funds, insurance corporations, pension funds, other financial institutions, finance leasing, systemic risk, financial stability

In response to the financial crisis of 2008, policymakers worldwide substantially expanded the regulatory and supervisory perimeter over the financial system and its most important actors. The area most acutely concerned by these efforts was the banking sector, i.e. the credit institutions fully regulated and supervised under traditional banking laws. Consequently, traditional banks are deemed safer and sounder today than before the global crisis, e.g. in terms of institutions' capital or liquidity resources.²

However, over the past decade, asset volumes in markets of nonbank financial intermediation grew markedly in size compared to banking assets. Part of this growth stems from taking over risk positions from banks, but it is also the result of genuine credit intermediation activities by nonbanks, such as the granting of loans and purchases of debt securities. Thus, nonbank finance has become an increasingly important funding source for the real economy over the past decade. In the European context, the importance of nonbank finance can be expected to increase further with the progress of the capital markets union.³ But this also means that some types of risks associated with the traditional banking business have shifted into other areas of the financial market that are differently or less strictly regulated than banks. Much of the related work since the financial crisis has been conducted under the heading “shadow banking,” but recently this term with its somewhat pejorative connotation has increasingly been replaced by the neutral term “nonbank financial intermediation.”

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² See, e.g., FMA (2019) and Carmassi et al. (2019).

³ Pires (2019).

Given the enhanced supervisory attention given to financial intermediation outside the traditional banking sector that has resulted from these developments, this study attempts to replicate for Austria the benchmark monitoring exercise for nonbank financial intermediation in the EU conducted by the European System Risk Board (ESRB). It also follows up on a previous analysis carried out by the OeNB in 2017.⁴ We made some adjustments to the international monitoring methodology to account for national specificities. In particular, in the context of the Austrian financial system, it makes sense to take the assets of insurance corporations and pension funds into account when analyzing “bank-like activities” of nonbank financial institutions.

1 Risks and vulnerabilities of nonbank finance

Nonbank finance potentially brings benefits to the financial system, for instance a greater diversity of funding sources for the economy and increased risk-sharing across the financial system. This can mean more competition for traditional banking services and, hence, more choices for investors and consumers, e.g. in terms of product innovation and better or cheaper services. However, these developments may also go hand in hand with increased risk-taking in potentially less regulated parts of the financial sector, thereby possibly circumventing the prudential requirements applicable to banks, and can involve new forms of risks to financial stability.

Such systemic risk may stem directly from credit intermediation activities of particular nonbank financial entities, for instance, which may involve maturity and liquidity transformation, imperfect credit risk transfer and leverage.⁵ Furthermore, issues may arise directly and indirectly through the interconnectedness of the nonbank financial intermediation sector with the regular banking system. Other interlinkages such as connections created through the repo or securities lending market might not always be visible from aggregate statistics and because of existing data gaps. In addition, the current low interest rate environment may incentivize search for yield and might render nonbank financial intermediaries and investors vulnerable to a sudden repricing of risk. Finally, vulnerabilities can build up unnoticed among entities where statistical information is not readily available or not granular enough, e.g. in some parts of the other financial intermediaries (OFI) sector.

2 Nonbank financial intermediation in the international context

At the global level, the Financial Stability Board (FSB) has adopted a two-pronged strategy to address risks and vulnerabilities from outside traditional banking to financial stability.⁶ The FSB put in place an annual system-wide monitoring exercise to assess global trends and risks from the growing role of nonbank financial intermediation. The FSB also works on developing policies commensurate with the financial stability risks inherent in these activities.

According to the FSB global monitoring report on nonbank financial intermediation,⁷ the broad measure of the monitoring universe of nonbank finance comprises insurance corporations, pension funds, financial auxiliaries and OFIs. The latest

⁴ *Wagner et al. (2017).*

⁵ *For a thorough discussion of the risks and vulnerabilities of nonbank finance, see ESRB (2019).*

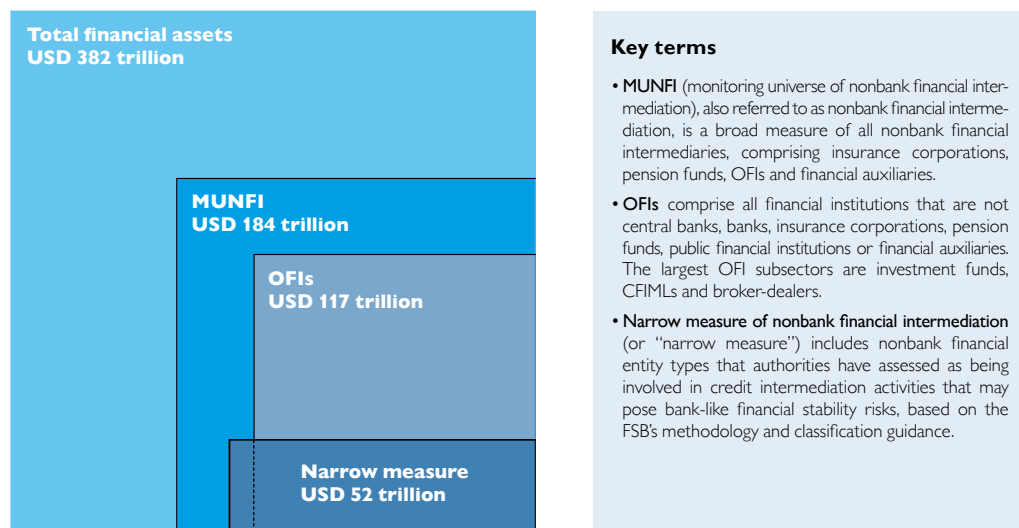
⁶ *FSB (2018).*

⁷ *The FSB recently decided to replace the somewhat pejorative term “shadow banking” with the neutral term “non-bank financial intermediation.”*

Global financial assets by FSB monitoring aggregates

Monitoring aggregates at end-2017

Narrowing down



Source: FSB, *Global Monitoring Report on Nonbank Financial Intermediation 2018*, 4 February 2019, p. 7.

issue of this report⁸ shows that the broad universe of worldwide nonbank financial intermediation grew to an aggregate USD 184.3 trillion in 2017, up by roughly 79% since the inception of the financial crisis in 2007, when it stood at around USD 103 trillion. Thus, the share of the broad aggregate in total global financial assets (i.e. including banking assets), which the FSB estimated at USD 382 trillion, increased for the sixth consecutive year, reaching 48.2%.

The assets of the OFI category alone, which includes all financial institutions that are not central banks, banks, insurance corporations, pension funds, public financial institutions or financial auxiliaries, grew to USD 116.6 trillion globally in 2017. OFI assets currently represent 30.5% of total global financial assets.

The FSB methodology also defines a “narrow measure” of nonbank finance, which aims at depicting all nonbank financial entity types that authorities have assessed as being involved in credit intermediation activities that may pose bank-like financial stability risks. This narrow measure of nonbank finance expanded to altogether USD 51.6 trillion worldwide at end-2017, which is an increase of around 57%, up from USD 32.8 trillion in 2007.

Chart 1 displays the broad measure, the narrow measure and the OFI category of nonbank finance according to the FSB terminology and contrasts these aggregates with the overall volume of total financial assets worldwide, estimated at USD 382 trillion by the end of 2017.

⁸ FSB (2019).

3 Macroprudential oversight of the financial system in the European context

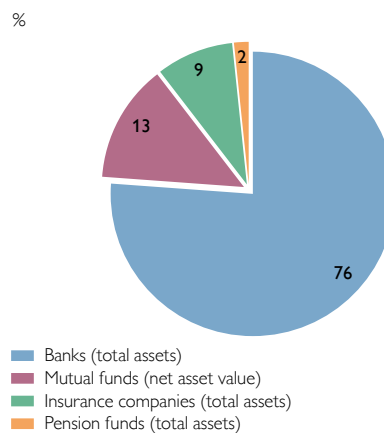
In the EU, the ESRB has been responsible for the macroprudential oversight of the financial system and the prevention of systemic risk since 2011.⁹ Therefore, the mandate of the ESRB has a wide scope, encompassing credit institutions as well as insurers, asset managers, nonbank financial intermediaries, financial market infrastructures and other financial institutions and markets. Since 2016, the ESRB has issued an annual report about developments, risks and vulnerabilities in the nonbank financial sector. The ESRB also works on tools regarding the macroprudential supervision of nonbank financial entities and activities in order to mitigate systemic risks to financial stability.¹⁰

The ESRB measures the size of the nonbank financial intermediation universe by total assets under management. At year-end 2018, this measure stood at EUR 41.9 trillion EU-wide, while in the euro area, it amounted to EUR 33.6 trillion.¹¹ Assets in the investment fund (IF) and OFI sectors in relation to the banking sector in the EU were 96.4% at the end of 2018. The share of the IF and OFI sectors in the overall financial sector, thus, accounted for 38.1% and 42.8% of the EU and the euro area financial sector, respectively, in 2018. Overall, the size of nonbank finance in the EU grew from approximately EUR 23 trillion in 2008 to EUR 41.9 trillion in 2018,¹² an increase of roughly 82% within a decade. However, only six Member States (Luxembourg, the U.K., the Netherlands, Ireland, Germany and France) account for around 80% of this measure of nonbank finance in the EU.¹³

4 Nonbank financial intermediation in Austria since 2008

In the Austrian financial system, the total assets of the consolidated banking sector decreased by roughly 16% over the course of the last decade, from EUR 1,176 billion (year-end 2008) to EUR 986 billion (year-end 2018). In comparison, the asset volume of the other main financial sectors grew substantially during the same period. Investment funds (IFs) increased their assets under management from EUR 127.4 billion to EUR 173.5 billion (+36%), insurance corporations (ICs) from approximately EUR 107 billion to EUR 133.2 billion (+24%) and pension funds (PFs) from EUR 11.6 billion to EUR 21.1 billion (+82%). This shows that altogether, the

Chart 2
The Austrian financial sector at a glance



Source: OeNB Financial Stability Report 37, p. 36.

Note: Data as of end-2018.

⁹ Regulation (EU) No 1092/2010, Official Journal of the European Union, December 15, 2010, L331/1-11.

¹⁰ ESRB (2016).

¹¹ ESRB (2019).

¹² ESRB (2019).

¹³ ESRB (2019).

nonbank financial sector has gained importance relative to the traditional banking system also in Austria over the past decade. That said, the banking system still accounts for approximately 76% of the financial system's assets (see chart 2).¹⁴

4.1 Credit intermediation by nonbank financial entities

This study focuses particularly on financial intermediation in Austria that relates to credit intermediation in a broad sense, i.e. granting loans and buying debt securities by nonbank entities as a funding channel outside the banking system. The European System of National and Regional Accounts (ESA 2010) uses definitions of subsectors of the financial system which are not identical, but very similar to the FSB definitions. Therefore, Austria's financial accounts data structured in accordance with ESA 2010 can be used for a nonbank financial intermediation classification. These data are available for money market funds (MMFs), IFs, OFIs, financial auxiliaries, captive financial institutions and money lenders as well as ICs and PFs. Nevertheless, money market funds are not taken into account, as they do not play a relevant role in Austria. OFIs according to ESA 2010 comprise financial vehicle corporations engaged in securitization transactions, security and derivative dealers, financial corporations engaged in lending and specialized financial corporations. Thus, the measure of credit intermediation in a broad sense by nonmonetary financial institutions in Austria encompasses mainly IFs, ICs and PFs, but also some other financial intermediaries. In the OFI category, for instance, leasing companies that provide leasing finance and do not report as part of a banking group are of relevance in the context of credit intermediation in a broad sense outside the banking system.

Chart 3 depicts the stock data regarding ICs and PFs separately from the aggregate measure in accordance with the ESRB "broad approach" because in Austria, ICs and PFs are included in the measurement of nonbank credit intermediation, while in the international context, they are often excluded. The transactions-based growth rate since the first quarter of 2008 shows the development of all these sectors together.

The stock of loans (excluding trade loans) and debt securities under management by nonbank financial entities including ICs and PFs increased by roughly 22% from EUR 134.5 billion at year-end 2008 to a volume of EUR 163.8 billion at year-end 2018. Within the broad measure excluding ICs and PFs (yellow part in chart 3), IFs play a dominant role. Of the stock of approximately EUR 104 billion, roughly EUR 78 billion in assets belong to IFs. About EUR 26 billion are attributable to the OFI category and are basically only loans. The relative importance of nonmonetary financial institutions vis-à-vis monetary financial institutions regarding credit intermediation in a broad sense, thus, expanded from around 18% in 2008 to approximately 22% in 2018. Since the first quarter of 2008 there have been cumulative net transactions of EUR 11.9 billion.

Changes in stocks have been caused not only by transactions but also by price and other effects and other changes (e.g. reclassifications). Although there have been several periods with negative growth rates, the overall importance of loans and debt securities under management by nonbank financial intermediaries increased steadily at an overall growth rate of 8.4%. Compared to nonbank financial entities, banks have recorded cumulative net transactions of loans granted to nonbanks as well as investments in debt securities issued by nonbanks of EUR 55.7 billion

¹⁴ OeNB (2019).

since the first quarter of 2008. For issuers of debt securities outside the euro area, no counterparty split is available. Therefore, the above-stated net transactions may also include some debt securities issued by banks outside the euro area.

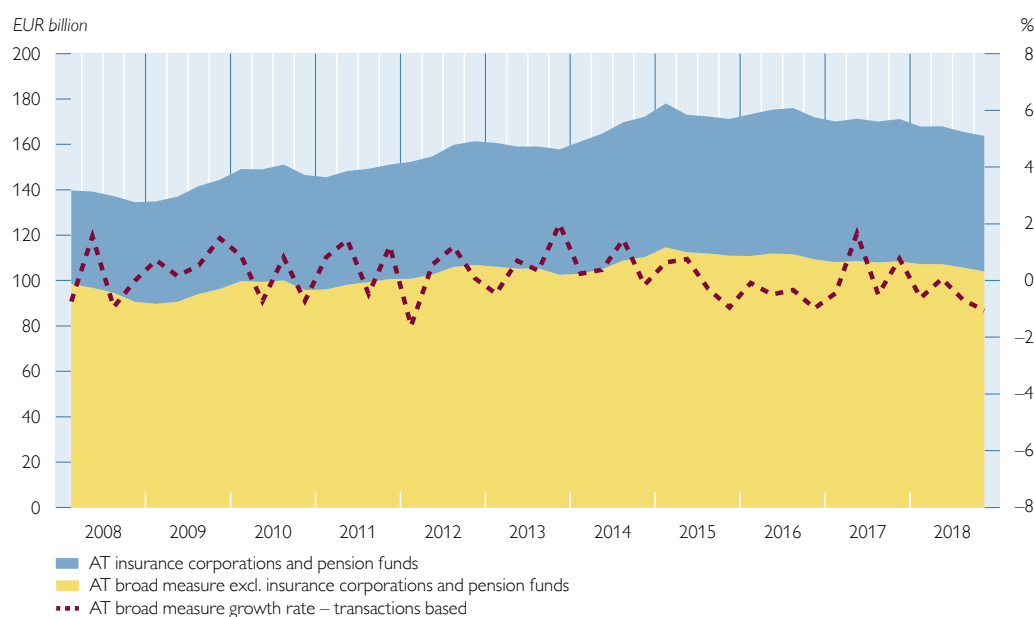
4.2 Highest increases for insurance corporations and pension funds

The growth rates of these types of assets under management by Austrian nonbank financial intermediaries show higher increases for ICs and PFs than for other nonbank financial entities. However, it must be emphasized that loans and debt securities are first and foremost held by ICs rather than PFs. The asset side of PFs mainly consists of investment fund shares. By analyzing these investment fund shares with a look-through approach,¹⁵ it can be shown that parts of PFs' assets are indirectly invested in debt securities.

While the loans shown in chart 3 are granted to nonbanks, debt securities held by nonbank financial entities can also include issues placed by banks. Thus, nonbank financial intermediaries also play a role in providing various forms of wholesale funding to banks, particularly through purchases of bank debt securities and depositing funds. In this respect, developments over the last ten years in wholesale funding provided by nonbank financial entities to the banking sector have led to slight changes in the interconnectedness between the banking sector and the nonbank financial sector in Austria. Investment volumes have shifted from certain counterparty sectors to others, while overall volumes of deposits and debt securities have hardly changed. Exposures of ICs toward banks stood at 18.43% as of end 2018, which is slightly above the average in the EU, due to holdings of equities and participations in credit institutions as part of the same group.¹⁶

Chart 3

Debt securities and loans under management by nonbank financial intermediaries



Source: OeNB.

¹⁵ The look-through approach analyzes the assets of funds and thus outlines the indirect holding of financial assets through investments in fund shares.

¹⁶ EIOPA (2019).

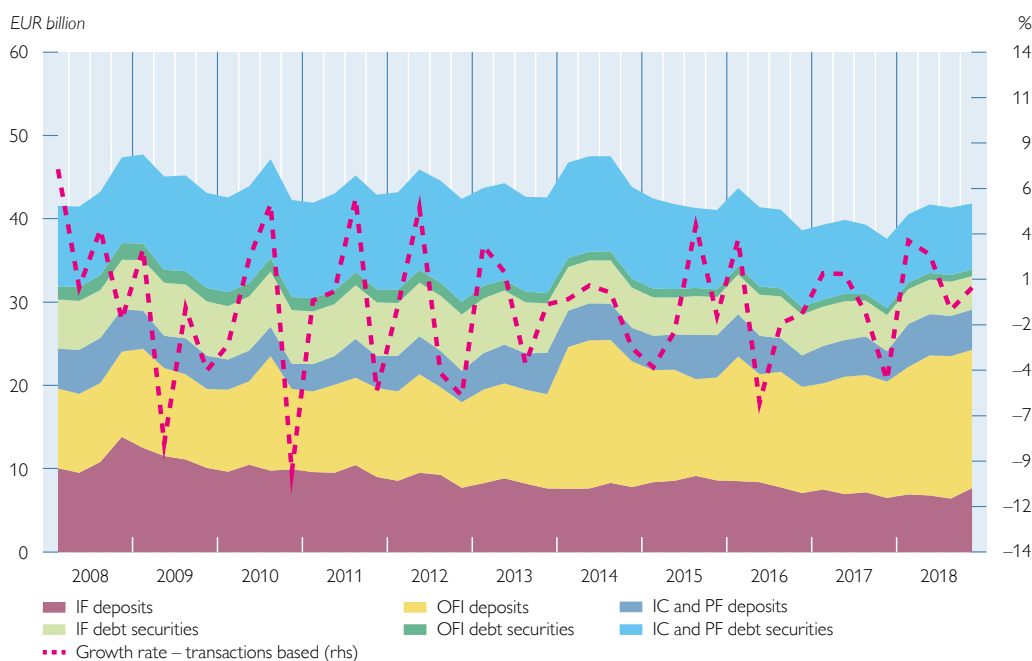
4.3 Wholesale funding of banks by nonbank financial entities

The total volume of wholesale funding of the Austrian banking sector by domestic nonbank financial entities, both through deposits and purchases of bank debt, increased only slightly from EUR 41.5 billion in the first quarter of 2008 to EUR 41.8 billion at year-end 2018. This amounts to approximately 19% of the total volume of domestic wholesale funding in the form of deposits and debt securities in the Austrian banking sector. The major amount of domestic wholesale funding can be attributed to interbank funding.¹⁷ Due to the current accommodative stance of monetary policy in the euro area, the need for banks to issue bonds has been very subdued for the past ten years. Especially for OFIs, holdings of bank debt are negligible. However, increased volumes of bank deposits from entities of the nonbank financial sector have compensated for the overall decline of investment into bank debt.

In this regard, OFIs have gained more importance than traditional financial institutions like IFs, ICs and PFs. OFIs increased their outstanding volume of bank deposits from EUR 9.5 billion to EUR 16.6 billion during the observation period. Bank deposits of ICs and PFs remained stable, while bank deposits of IFs decreased. Consequently, within the nonbank financial sector OFIs became the largest category of providers of deposit funding for banks, leading to a higher interconnectedness between banks and OFIs, e.g. in the form of leasing companies and holding companies.

Chart 4

Wholesale funding provided by nonbank financial entities to the banking sector



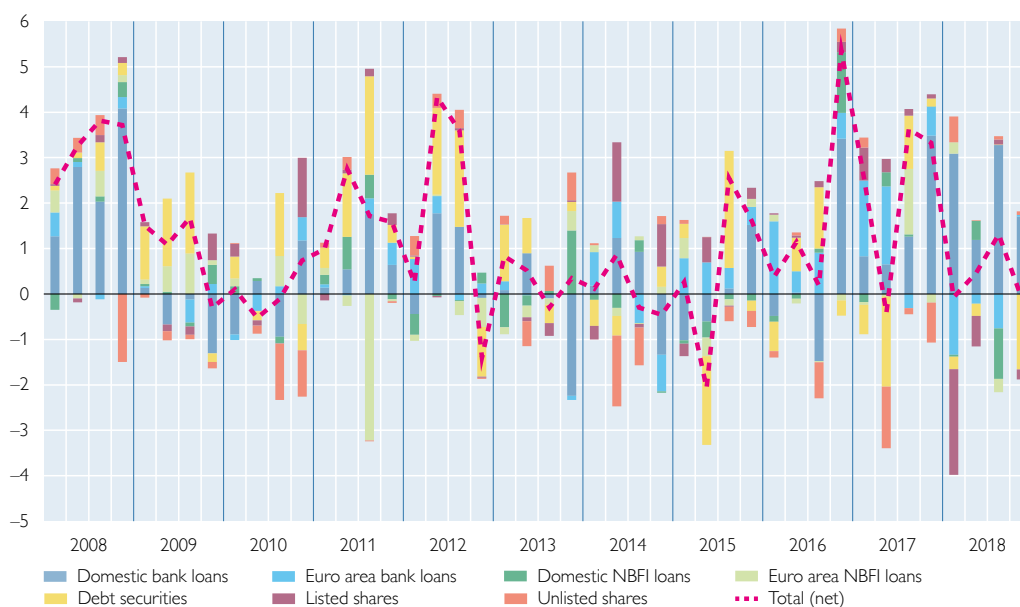
Source: OeNB.

¹⁷ In this calculation “wholesale funding” is assumed to consist of all domestic funding in the form of deposits and debt securities except deposits from nonfinancial corporations and deposits and debt securities from households and nonprofit institutions serving households.

Chart 5

Net finance raised by NFCs

EUR billion



Source: OeNB.

4.4 Financing of the nonfinancial corporate sector

On the creditor side, however, banks are still the most important counterparty sector as regards the financing of nonfinancial corporations. Nevertheless, financing via the capital market has also gained importance. Especially the issuance of debt securities has been an important alternative source of financing after the peak of the financial crisis. Debt securities issued by nonfinancial corporations are to a major part held by nonbank sectors, including a large proportion of nondomestic investors, leading to a diversification of counterparty sectors. But altogether, debt securities issued by nonfinancial corporations in Austria are limited to a few issuers, and shares (listed or unlisted) are generally a less important form of financing. Most small and medium-sized companies in Austria do not issue shares at all. Their equity positions are classified as other equity. However, especially since 2015, traditional financing in the form of bank loans has again become disproportionately important compared to financing via the capital market.

Chart 5 depicts the growth and distribution of net finance raised by nonfinancial corporations across various financing instruments, i.e. bank loans, loans from nonbank financial entities, debt securities and shares.

4.5 Interconnectedness between sectors of financing

The following chord diagrams (charts 6 and 7) show the interconnectedness between sectors of financing provided by Austrian financial entities through loans and debt securities to domestic as well as foreign debtors (located in the euro area).¹⁸ The

¹⁸ The figures are based on data from three different ECB statistics, namely those on financial accounts, investment funds and balance sheet items (statistics on monetary financial institutions).

diagrams highlight the distinction between traditional financial intermediation by banks and funding provided by other financial entities. The flows within the diagrams indicate funding through loans on the one hand and debt securities on the other hand; they are drawn in the color of the corresponding finance provider (creditor). The outer edge of each sector thus denotes the sum of the funding it provided (i.e. the creditor side) and received (i.e. the debtor side), thereby illustrating its relative importance in this process.

Charts 6 and 7 focus solely on the financing provided by financial entities. All other sectors (i.e. nonfinancial corporations, general government and the household sector) are represented only as recipients of financing in these illustrations, while financial institutions provide and receive funding, that is, they play an active and passive role at once within the charts. The sectors comprise all relevant entities according to the ESA 2010 definitions, with one exception: In line with the FSB's definition of the narrow approach for nonbank financial intermediation, we only include open-end funds due to the fact that closed-end funds have different risk characteristics. This adjustment, however, concerns only a small amount in the Austrian investment fund population.

4.6 Interconnectedness through funding via loans

Chart 6 presents outstanding loans granted by Austrian financial entities and their borrower structure at the end of 2018. Credit intermediation via security financing is depicted in chart 7. Not surprisingly, in Austria, deposit-taking entities (i.e. banks) dominate funding via loans, accounting for an outstanding amount of loans of EUR 398.4 billion. All other nonbank financial entities together only account for a fraction of the loan supply side, i.e. an amount of EUR 20.3 billion in total. The main debtors of bank loans are nonfinancial corporations (EUR 179 billion) and households (EUR 166.4 billion), while loans to other financial entities (EUR 27 billion), general government (EUR 24.8 billion) and IFs, ICs and PFs (EUR 1.2 billion in total) only account for a much smaller amount.

Altogether, loan financing still represents the largest part of funding in Austria, accounting for an outstanding amount of EUR 418.7 billion at the end of 2018. At the same time, funding through bonds (held by Austrian financial entities) accounts for only EUR 117.3 billion. The data do not show a significant increase of loan origination through nonbank financial institutions in the last ten years. Although the total volume of loans supplied by nonbank financial institutions rose from EUR 17.3 billion in 2008 to EUR 20.3 billion in 2018, this type of funding still only accounts for roughly 5% of total loan funding provided by the Austrian financial sector, while deposit-taking corporations still account for 95% of the total amount.

4.7 Interconnectedness through funding via debt securities

Chart 7 presents the sectoral holding of debt securities (at the end of 2018), linking the creditor side (i.e. investors in debt securities) with the debtor side (i.e. issuers of debt securities). With an investment amount of EUR 51.7 billion in debt securities, Austrian deposit-taking corporations (DTC excluding the central bank) are the biggest creditors, providing most of their funding to the general government (EUR 40.8 billion). However, overall debt security-based funding through nonbank financial institutions as creditors exceeds bond funding provided by the traditional banking sector: Domestic investment funds and insurance corporations provide a

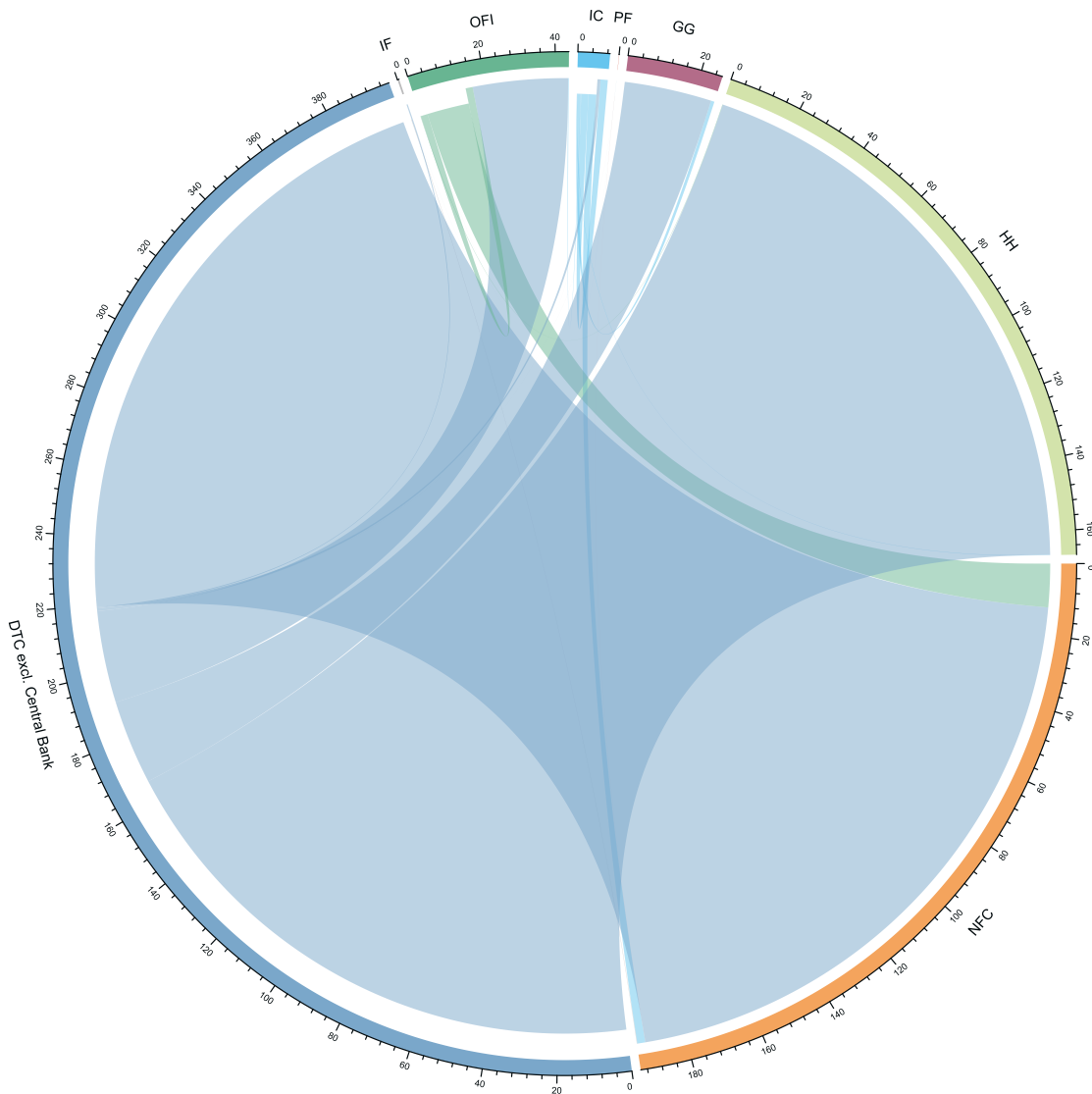
substantial amount of financing via investments in debt securities (EUR 40.2 billion and EUR 23.7 billion, respectively), primarily through the holding of general government bonds (EUR 24.9 billion and EUR 14.2 billion, respectively), while pension funds and other financial intermediaries (including financial auxiliaries and captive financial institutions) account for EUR 1.6 billion in total. Regarding the debtor side, i.e. bonds issued by nonfinancial corporations, the holdings of both investment funds (EUR 7.2 billion) and insurance corporations (EUR 4.9 billion) account for the largest part, while the holdings of banks (EUR 4.3 billion) only represent a quarter of the total amount.

Like in the previous section on loans, we do not see a large increase of debt security-based funding by the nonbank financial sector over the last ten years.

Chart 6

Sectoral borrowing structure of lending by Austrian entities

EUR billion



Source: OeNB.

Note: NFC=nonfinancial corporations; DTC=deposit-taking corporations; IF=open-end investment funds; OFI=other financial intermediaries incl. financial auxiliaries, captive financial institutions and money lenders; IC=insurance corporations; PF=pension funds; GG=general government; HH=households incl. nonprofit institutions serving households.

Although the total amount of bond funding by entities outside the traditional banking sector increased from EUR 49.6 billion to EUR 65.6 billion between 2008 and 2018, the relative importance of the nonbank financial sector even declined (accounting for 56% in 2018, compared to 60% in 2008).

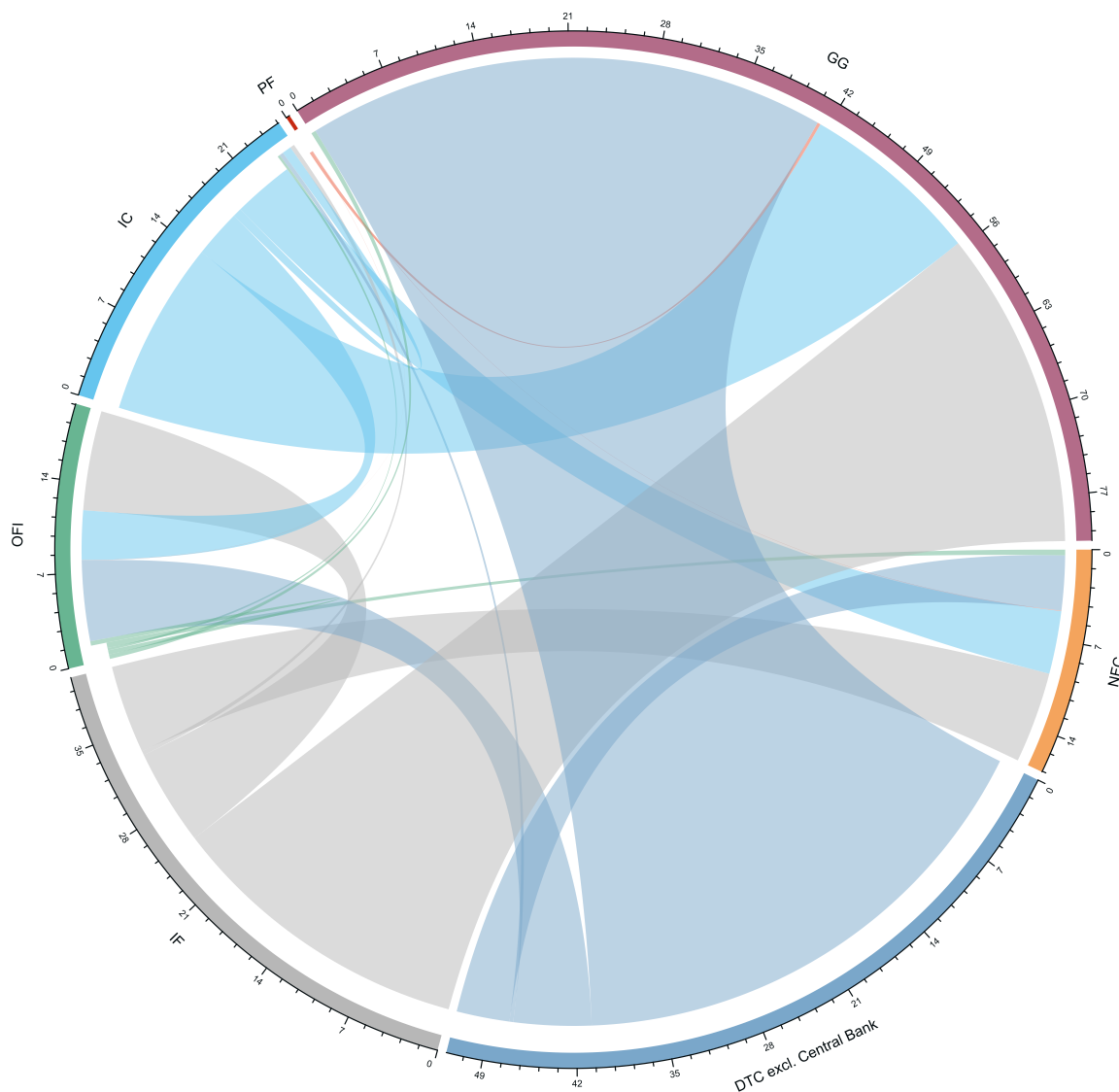
4.8 Funding: the debtor perspective

From the debtor perspective, the funding of general government heavily depends on the issuance of bonds (in 2018, EUR 80.5 billion of euro area government bonds were held by Austrian nonbank financial entities), while loans to the general government sector (of euro area countries including Austria) play a much smaller role (in 2018, EUR 25.8 billion of loans were in the books of domestic nonbank

Chart 7

Sectoral holding of debt securities issued by Austrian entities

EUR billion



Source: OeNB.

Note: NFC=nonfinancial corporations; DTC=deposit-taking corporations; IF=open-end investment funds; OFI=other financial intermediaries incl. financial auxiliaries, captive financial institutions and money lenders; IC=insurance corporations; PF=pension funds; GG=general government; HH=households incl. nonprofit institutions serving households.

financial entities). In contrast, nonfinancial corporations mainly use loans (EUR 193.8 billion) rather than the issuance of debt securities (EUR 16.9 billion of outstanding amount) when they raise debt funding. The same applies to households (including nonprofit institutions serving households), which receive their funding solely in the form of loans (EUR 166.7 billion; all figures for end-2018).

Most of the debtors of loans are domestic entities (EUR 368.6 billion), only EUR 50.2 billion are owed by entities located abroad. In contrast, in the case of debt securities, non-Austrians (EUR 72 billion) dominated the issuer side, while domestic issuers account for only EUR 45.3 billion. Thus, in general, loan funding largely remains within Austria, while debt security financing by Austrian creditors predominantly serves debtor entities from abroad.

5 Summary and conclusions

In Austria, the bulk of nonbank finance is provided primarily by open-end investment funds, followed by insurance corporations and pension funds. Only approximately one-tenth of nonbank finance in Austria is provided by other entities that are attributable to the OFI category, including leasing companies. All actors in the markets for nonbank financial intermediation that pursue substantial activities are subject to financial regulation and supervision by the Austrian Financial Market Authority (FMA). Furthermore, the Austrian Banking Act establishes a broad definition of core banking activities so that either taking deposits or granting loans is subject to full banking regulation and supervision unless specific financial regulations provide otherwise (as is the case, e.g., for insurance corporations). The FMA estimates that a mere 3% of nonbank financial assets originate from unregulated service providers.¹⁹

While the relative importance of nonbank finance compared to traditional banking has somewhat increased in the past decade, the Austrian financial system is still dominated by the bank finance model, and market-based finance continues to play a smaller role. Overall, the fractional growth of nonbank finance assets is not seen as a concern in itself, as the risks from nonbank financial intermediation seem contained. Neither the structure nor the size of nonbank financial intermediation in Austria are currently considered to pose a threat to financial stability. On the other hand, this also means that the Austrian financial system remains largely dependent on traditional banks and, hence, does not reap the potential benefits of diversification in funding sources for the economy.

Nevertheless, the prolonged low level of interest rates continues to pose significant challenges for many financial sectors, not only for banks but also for life insurers and pension funds, making it increasingly difficult to generate sufficient investment returns to meet long-term financial obligations. Hence, the concern of possible mispricing of funding provided arises in the context of the search for yield. In addition, supervisors need to keep their focus on the questions whether nonbank financial intermediaries are prone to runs, how levered they are and to what extent they can withstand losses. As regards the investment fund sector, concerns of underpricing risk are in the forefront, given the current environment of elevated market risk, subdued economic growth prospects and flattening yield curves. In the sector of alternative investment funds (AIFs), open-end real estate funds exhibit a

¹⁹ FMA (2019).

substantial liquidity mismatch. Nonetheless, in light of the sectoral holding and borrowing structure of investment funds in Austria, there are no signs of abundant risk-taking at present.

The increasing importance of nonbank financial activities is high up on the list of supervisory priorities in the EU. The national supervisory authorities together with the ESRB and ECB will continue their close monitoring and scrutiny of the respective systemic risks and develop appropriate micro- and macroprudential policies to address them, should the need arise.

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OeNB Macroprudential Policy Conference

Financial stability in 2030: Maintaining effectiveness while reducing regulatory complexity

Michaela Posch, Stefan W. Schmitz¹

Regulatory complexity is becoming a concern and top priority for policymakers and the financial industry, both at the global and European level. The speed of the debate has gained pace very recently as the political pressure to deregulate has increased. In light of this, the Oesterreichische Nationalbank (OeNB) hosted a Macroprudential Policy Conference on May 9, 2019, where policymakers discussed the tradeoff between reducing the complexity of financial regulation and maintaining financial stability. At this one-day conference, high-level representatives from finance, politics and academia shed light on the drivers of complexity and explored ways to address them. In three panel discussions, the speakers drew on national and international experience with macroprudential policy to investigate what the future regulatory framework, one that also includes nonbank financial intermediaries, could and should look like. The main conclusion of the conference was a call for a high-level expert group at the EU level to explore the main sources of regulatory complexity and measures to reduce it. With less distortionary incentives for banks as well as effective macroprudential supervision and reliable resolution frameworks in place, supervisors should be able to put more emphasis on reducing the systemic costs of banks' market exit. Less emphasis could be put on keeping all banks in business and regulatory complexity could be reduced without jeopardizing financial stability.

JEL classification: G28, F36

Keywords: regulatory complexity, financial stability, macroprudential supervision

This article summarizes the results of the Macroprudential Policy Conference organized by the Oesterreichische Nationalbank (OeNB) in May 2019, and is structured as follows: section 1 introduces the overarching theme of the conference and presents the gist of the opening speech. Section 2 outlines the key takeaways of the three policy discussions and keynote addresses. Section 3 presents what remains to be done and provides options for realigning the incentive structure in financial regulation. Section 4 concludes with some preliminary considerations regarding the work ahead.

1 Conference theme and opening remarks

The costs of the global financial crisis have been high in all major economies and particularly high in the euro area. Improving the framework for financial stability has not only helped strengthen European Economic and Monetary Union (EMU) in recent years but has also brought the issue of regulatory complexity to the fore (Posch et al., 2018). Regulatory reforms implemented after the global financial crisis have made the financial system safer and more resilient, but, at the same time, regulation has reached a high degree of complexity. Policymakers are faced with a tradeoff between reducing the complexity of financial regulation and maintaining financial stability. In his opening speech, *Andreas Ittner*, former Vice Governor of the Oesterreichische Nationalbank, emphasized that in the medium term, financial regulation should be less complex while not increasing systemic

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risk but potentially even reducing it; otherwise the pressure on deregulation will mount. To balance this tradeoff, correcting flawed incentives for banks is one of the most effective contributions to reducing complexity. Solid macroprudential capital buffers, a robust deposit guarantee scheme and good resolution planning will be vital to ensure that the impact of a bank's market exit on the financial system and the real economy is reduced significantly. As a result, regulation could be greatly simplified.

2 Key findings of the panel sessions and keynotes

The three panel discussions revolved around the following questions: (1) What works? Effectiveness of macroprudential measures – national and international experiences, (2) Agnostic on nonbanks? The design for a macroprudential framework, and (3) Flawed incentives in banking regulation? – A long-term vision for financial stability in 2030. A keynote address on “Systemic risk, macro shocks and macroprudential policy” rounded out the conference.

Panel 1 focused on the effectiveness of macroprudential measures based on national and international practices. High-level experts representing the IMF, the Česká národní banka, De Nederlandsche Bank and the Sveriges Riksbank shared their experiences in using macroprudential tools and showed that borrower-based measures (BBMs) are an effective instrument (also in a number of advanced economies, e.g. Australia and Canada). Nevertheless, given the lack of consistent definitions of BBMs, there is a need for further harmonization, particularly in the EU. According to the panelists, a mix of measures including fiscal measures and information campaigns is used to support macroprudential policy. This makes it possible to close important gaps in the policy setup between monetary policy, fiscal policy and microprudential supervision. The panelists stressed that macroprudential supervisors should withstand the temptation to micromanage the banking sector and be aware of the danger of doing so. They also highlighted that the EU's legal framework for macroprudential policy should become less prescriptive as the observed costs of inaction outweigh those of excessive macroprudential measures (including potential ring-fencing). In future, macroprudential supervision needs to be more forward looking so that unwanted practices, such as unsustainable lending standards, do not become entrenched. The speakers on this panel concluded that, to date, macroprudential policy in the EU has worked better in practice than in theory.

After that, the panelists turned to the institutional setup of macroprudential policy. They stressed that, here, the main pillars are independence and close coordination. Macroprudential policy is complementary to monetary policy, especially when coordinated properly. In most EU countries, the macroprudential authority and/or the national designated authority is either the central bank (as is the case in two-thirds of EU countries) or a financial market stability council. Clearly assigning the responsibilities for macroprudential policy is considered to be crucial to avoid a “collective responsibility barrier” to decision making and to reduce inaction bias. The panelists plausibly argued that central banks should have a leading role in macroprudential policymaking. Moreover, the macroprudential authority needs to have full access to any information and data necessary for conducting a comprehensive analysis of systemic risk. Today's focus on banks could weaken the effectiveness of macroprudential policy, with the nonbanking sector possibly posing higher systemic risks in the future. Systemic risk analysis should therefore look at the financial system as a whole and also cover tax incentives, e.g. tax deductibility of mortgage

interest payments. The discussants highlighted that tradeoffs have to be made within the regulatory framework (BCBS, 2013). On the one hand, various backstops of the banking system (such as implicit government guarantees, emergency liquidity assistance and deposit insurance), the tax deductibility of the cost of debt, and bank shareholders' limited liability lead to incentives for increasing leverage. On the other hand, financial regulation aims to limit leverage to counterbalance the negative consequences of flawed incentives. Thus, reducing such incentives is a prerequisite for reducing the complexity of regulation.

Panel 2 dealt with the main systemic risks for nonbank financial intermediaries (NBFIs) and explored how to address those risks. In addition, the discussants examined what a macroprudential framework for the nonbanking sector should look like.

In the keynote address held by an industry representative (from BlackRock), leverage and funding liquidity risk were identified as the main idiosyncratic risks in the nonbank sector. Overall, the financial crisis had led to meaningful new microprudential regulation, also in the nonbanking sector. From an industry perspective, the current regulatory measures suffice to address systemic risks stemming from leverage and funding liquidity risk. Given several amendments to different areas of microprudential regulation, complexity has, however, increased substantially for NBFIs. Macroprudential regulation should not be extended to asset managers as owners, and not funds, hold 75% of the respective assets. Thus, even if asset managers incur significant losses, the negative externalities should largely be small. Since NBFIs are very heterogeneous, regulating subsets of NBFIs further would only induce shifts from one subset to another. Instead, a product- and activity-based approach should be pursued to address risks stemming from different products, clients and capital structures. Nevertheless, financial stability reporting requirements and the availability of granular data are essential for monitoring systemic risks that might be building up across the financial system and for understanding the ecosystem as a whole. It was argued that given the current low levels of expected systemic risk in the nonbanking sector, the financial safety nets for banks should not be extended to NBFIs.

The policymakers from the Financial Stability Board, the European Central Bank and the European Commission represented on the panel disagreed with these views. They highlighted how important it is for regulation to have a systemic risk perspective rather than an idiosyncratic focus. Supervisors should focus on those activities that are material to the system. NBFI assets have almost doubled since the crisis, reaching EUR 23 trillion in 2018. NBFIs have become an increasingly important source of funding for sustainable growth. The panelists stressed that, as a capital markets union (CMU) is being pursued, strengthening the macroprudential framework and broadening it beyond the banking sector would be warranted. To address new and emerging systemic risks, it will be necessary to reassess the EU's institutional architecture and further analyze and develop the toolbox. However, ultimately, the need for new macroprudential tools will depend on whether regulatory frameworks for transparency, microprudential supervision and investor protection will be enough to keep systemic risk at low levels. If NBFIs' role in funding the real economy increases, NBFIs' behavior is likely to be procyclical. This might induce destabilizing externalities for the real economy and call for the introduction of additional macroprudential instruments. In particular, leveraged loans, securitization and exchange-traded funds pose new challenges.

The second *keynote address* revolved around systemic risk, macro shocks and macroprudential policy. From the academic perspective, the expectations for macroprudential supervision are probably too high. Furthermore, the past ten years have introduced the element of routine in macroprudential policymaking. Any attempt to regulate systemic risk as such would be doomed even if the authorities were to do more than tick off boxes.

The keynote speaker presented three closely related arguments: First, understanding current systemic risk in the financial system requires continually evolving analysis. In systemic risk assessment, a great many effects need to be considered in a highly nonlinear system which probably has multiple equilibria/behavior constellations in which there is no transparency about the other participants' policy positions and in which these different positions are continuously changing. Various phenomena of systemic risk are linked via risk correlations that are often hidden and are notoriously difficult to estimate even when they are exogenous. Second, regulation should aim for robustness rather than calibration. Empirical research on banks' experiences in the global financial crisis from 2007 to 2009 showed that equity relative to risk-weighted assets had been a poor predictor of institutions' robustness to the shocks that were hitting them. By contrast, equity relative to total assets was a fairly reliable predictor of bank robustness in the crisis. A higher, but simple leverage ratio instead of a complicated risk-weighted capital ratio would reduce complexity substantially. Third, macroprudential policy necessarily involves an element of discretion and judgment. It might be useful to separate analysis and policy decisions. The results of systemic risk analysis should be presented to councils of monetary policymakers, microprudential supervisors and fiscal policymakers. According to the presented proposal, the analysis would remain holistic and clean, while the respective prudential, monetary and fiscal authorities would be responsible for discretionary decisions, especially if these decisions are coordinated, e.g. in a joint committee of central bankers, supervisors and ministries of finance.

The debate in *panel 3* centered on the overarching theme of the conference, with the panelists discussing the root causes of, and remedies for, flawed incentives in banking regulation and reflecting on a long-term vision for financial stability in 2030. Policymakers from the Bank for International Settlements and the Advisory Scientific Committee (ASC) of the European Systemic Risk Board found that due consideration should be given to complexity when designing policy and that incentives play a key role in this context. There would be an illusion of control as additional supervisory instruments also create incentives to game the system, which might even increase systemic risk. It would be advisable to provide for the flexibility to react quickly to unknown contingencies. Panelists stressed the significance of incentives, not just for bankers, but also for regulators, politicians and investors. Furthermore, they called for a differentiation of complexity along two dimensions, namely good vs. bad and essential vs. accidental complexity. In other words, there may be good reasons for complexity (such as different rules for small local banks and large international and complex banks, or multiple risk measures to avoid arbitrage) and bad ones (e.g. national discretions that make national markets less contestable). Similarly, essential complexity refers to complexity that is unavoidable, while accidental complexity is created by regulation itself. Complex regulation dealing with internal rating models under the internal ratings-based (IRB) approach is an interesting example: allowing banks to use internal models instead of regulatory risk

weights leads to essential complexity of the rules that govern the use of elaborate models and the associated processes. Banks can choose between complex rules (IRB approach) and simple rules (standardized approach). Financial regulators could address complexity by setting limits for behaviors and outcomes (e.g. through bank structural reforms) and by providing adequate incentives for regulated entities (e.g. through higher capital requirements). A proper combination of limits and incentives should minimize accidental complexity and would be an adequate response to the significant essential complexity that exists in the financial system already. Policymakers have identified the following as the main root causes of complexity: the (good and essential) complexity of the global banking system and the complexity of the underlying institutional architecture, which often comprises multiple institutions or agencies. Flawed incentives in the financial system have led to essential but bad complexity. In times of crisis, markets tend to revert to simpler measures and quickly lose confidence in complex measures. To remedy this, it would be necessary to emphasize the credibility of simpler and more conservative approaches built into the regulatory framework. The panelists argued that less complex rules may even deliver better outcomes, but simplicity would not be for free. According to a recent ASC report presented at the conference, regulation should be principle based and flexible in dealing with risks, uncertainties and endogenous responses of agents in an evolving framework (Gai et al., 2019).

One panelist representing the banking industry (Erste Bank Group) stressed that, for banks, legal certainty, predictability and transparency are key. He confirmed that bad and accidental complexity renders bank and regulatory resources inefficient and hinders both banks' senior management and supervisors to adequately oversee the risks of banks. Bad and accidental complexity would also entail incomparable results for analysis and credit ratings. The lack of comparability among banks would, in turn, erode confidence in regulatory rules and the data reported by banks. The bank representative flagged three interrelated main drivers for complexity: First, too little consideration has been given to the interplay between micro- and macroprudential supervision, resolution and deposit insurance. Second, all players within the supervisory landscape act within their own fields of responsibility without taking into account the interlinkages with, and impacts from, the other regimes and vice versa. Third, the absence of an overarching strategy has resulted in piecemeal overregulation or even multiple contradictory layers of regulation. In particular, the macroprudential framework in the EU remains too fragmented, and Pillar 2 measures and yearly stress testing exercises are much too complex and costly. The banking industry would like to do away with complex and time-consuming ex ante model applications. Besides, reviewing model applications and related procedures before introducing an additional output floor could significantly reduce banks' and supervisors' administrative efforts and costs. Furthermore, banks should have the option to use IFRS accounting for all financial statements instead of local GAAP. The Erste Bank Group representative also called for one common supervisor and one common resolution body for the whole EU, including a harmonized insolvency law to ensure that creditors are treated in the same way by 2030 at the latest. A comprehensive review of the existing rules might help simplify the regulatory framework. The following two criteria should be used for such an assessment: First, does a rule contribute to financial stability, and second, does the approach feature risk-based differentiation? Finally, ensuring a level playing field for fintechs

and traditional market players should be a guiding principle for future regulation. The panel discussion showed that there is a tradeoff between calls for flexibility and principle-based regulation on the one hand and legal certainty on the other. Any attempt to make legal provisions more flexible is likely to require increased room for supervisory discretion and would, thus, translate into less certainty.

3 What needs to be done to reduce complexity?

The consensus, in a nutshell, is to address the root causes of complexity rather than its symptoms and to make sure to do it in ways that do not reduce financial stability. Here are the main options put forth at the conference.

First, it is important to challenge implicit government guarantees and tax subsidization of bank debt. The debate on fiscal and liquidity backstops for euro area banks shows that a significant number of banks is still considered to be too big to fail as well as too big to be resolved without recourse to public funds (Regling, 2018). Similarly, activating macroprudential buffers for other systemically important institutions (O-SIIs) can make an important contribution. If well calibrated, such buffers can reduce the likelihood of bank failure and hence the value of the implicit government guarantee. In the case of a bank's failure, the buffers reduce the capital shortfall, consequently facilitating resolution. Complementarily, the systemic risk buffer (SyRB) should aim at addressing systemic vulnerability: banks must be able to withstand the inevitable rise in volatility associated with the market exit of banks. It is also important that insolvency procedures and – in selected cases – the resolution framework are both transparent and rule based in order to stabilize expectations. Such “gone concern” rules are a prerequisite for the risk-sensitive pricing of liabilities in a going concern that are subject to bail-in in case of resolution. The underpricing of liquidity risks, among other things, is a common feature of credit booms; that was particularly true in the buildup to the financial crisis (Goodhart, 2008). To reduce the negative-incentive effects of emergency liquidity assistance (ELA), the facility could be priced fairly ex ante or the provision of ELA could be subject to automatic sanctions, e.g. triggering early intervention (BCBS, 2014). In the medium term, ELA provision could revert to its original purpose: to avoid the negative externalities of asset fire sales by offering liquidity to stable banks rather than the failing bank (cf. Thornton, 1802), which enables the former to buy the assets of the latter while reducing destabilizing price volatility.

Second, the risk-bearing capacity of the financial system could be strengthened such that it can absorb the costs of bank failures. The minimum requirement for own funds and eligible, i.e. loss-absorbing, liabilities (or MREL) would need to be high enough to cut dependence on public backstops. In the same vein, deposit guarantee schemes (DGSs) could be strengthened to ensure credible protection for insured depositors in the event of a bank's market exit, with a view to making sure that systemic risk is not amplified should a bank become insolvent. Either ex ante funds are large enough to require only small ex post contributions or banks should hold additional capital for them to be able to absorb the contingent costs of substantial ex post contributions. Moreover, ex ante credit arrangements should allow the DGS to raise additional funds in a timely manner.

Third, better and common disclosure standards without national deviations could help increase market discipline and strengthen transparency. More reporting data would have to be made available to the public in the EU, similar to U.S. and Swiss practice for smaller banks.

Fourth, the size and complexity of banks could be reduced by promoting alternatives to bank funding for the real economy and by establishing a true capital markets union (CMU). This would reduce the negative externalities of bank failure by further increasing the substitutability of bank loans for the real economy. Consequently, the negative externalities of bank market exits would be lower. The focus of regulation could shift away from avoiding market exits at all costs.

Fifth, to address the potential buildup of excessive leverage in other parts of the financial system and to forestall a future crisis, it might be necessary to expand the macroprudential regulatory framework to the nonbanking sector. The growing shift from bank-based financing to a more market-based financing model – which is mainly traceable to the diversification of funding for the real economy, CMU-related incentives and increased banking regulation – calls for the introduction of new macroprudential tools, e.g. for addressing systemic liquidity risk (Houben et al., 2015) that include margin and haircut requirements for derivatives and securities financing transactions.

Not least, when enacting new Basel standards (e.g. the fundamental review of the trading book) into EU supervisory legislation, limiting proportionality to areas in which application to small, noncomplex institutions appears expedient to enhance financial stability could make an effective contribution to addressing regulatory complexity (Boss et al., 2018). Part of the complexity of EU rules stems from applying rules designed for large international banks to all banks. Future regulatory proposals could consider a separate rulebook for small, noncomplex banks.

4 Conclusions

To effectively reduce regulatory complexity, it will take an EU initiative that tackles this problem in a sustainable way. Complexity per se is unavoidable in a complex world, but regulators need to avoid making rules unnecessarily, i.e. accidentally, complex. Better incentives for banks, effective macroprudential supervision and reliable resolution frameworks should empower supervisors to put more emphasis on reducing the systemic costs of banks' market exit. By extension, less emphasis could then be put on keeping all banks in business, and regulatory complexity could be reduced without jeopardizing financial stability. As a starting point, flawed incentives in financial regulation need to be reduced. In parallel to implementing the final package of Basel III (also known as “Basel III finalization” or “Basel IV”), the European Commission should set up a high-level expert group that, much like this conference, brings together all relevant EU and international stakeholders. Such a group could be modeled on the de Larosière group that had done work after the onset of the financial crisis. The new expert group should be tasked with evaluating the options for reducing complexity while maintaining the same level of stability and effectiveness in the financial system. The first step in this process would have to be a thorough assessment of the costs of complexity for banks and supervisors and of the preferences and reasoning regarding tradeoffs between complexity, risk sensitivity, contingency and financial stability. Work in this regard has already started at the Basel level. At the same time, regulators need to step up regulatory review and assessment of financial regulation (including the aspects of interplay and duplication) at the international level and identify how technology may support and accelerate simplification. The commitment of all key stakeholders will be important to make this initiative a success.

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Cutoff date for data: October 31, 2019

Conventions used:

× = 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

Table A1

Short-term interest rates¹

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>Three-month rates, period average, %</i>								
Euro area	0.22	0.21	-0.02	-0.26	-0.33	-0.32	-0.33	-0.31
U.S.A.	0.27	0.23	0.32	0.74	1.26	2.31	2.13	2.60
Japan	0.24	0.21	0.17	0.08	0.06	0.07	0.07	0.07
United Kingdom	0.51	0.54	0.57	0.50	0.36	0.72	0.62	0.84
Switzerland	0.02	0.01	-0.75	-0.75	-0.73	-0.73	-0.74	-0.71
Czech Republic	0.46	0.36	0.31	0.29	0.41	1.27	0.88	2.07
Hungary	4.31	2.41	1.61	0.99	0.14	0.12	0.06	0.16
Poland	3.02	2.52	1.75	1.70	1.73	1.71	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.

Table A2

Long-term interest rates¹

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>Ten-year rates, period average, %</i>								
Euro area	3.01	2.28	1.27	0.93	1.17	1.27	1.19	0.95
U.S.A.	2.35	2.54	2.14	1.84	2.33	2.91	2.84	2.49
Japan	0.70	0.54	0.35	-0.06	0.05	0.07	0.05	-0.06
United Kingdom	2.03	2.14	1.79	1.22	1.18	1.41	1.42	1.11
Switzerland	0.94	0.73	-0.06	-0.35	-0.08	0.04	0.07	-0.29
Austria	2.01	1.49	0.75	0.38	0.58	0.69	0.76	0.31
Czech Republic	2.11	1.58	0.58	0.43	0.98	1.98	1.86	1.78
Hungary	5.92	4.81	3.43	3.14	2.96	3.06	2.66	2.94
Poland	4.03	3.52	2.70	3.04	3.42	3.20	3.25	2.68

Source: ECB, Eurostat, Macrobond.

¹ Yields of long-term government bonds.

Table A3

Stock indices

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>Annual change in %, period average</i>								
Euro area: EURO STOXX	17.53	13.07	11.76	-9.67	17.16	-0.48	4.38	-5.87
U.S.A.: S&P 500	19.17	17.49	6.71	1.63	16.92	12.13	15.06	3.13
Japan: Nikkei 225	49.20	13.84	24.21	-11.90	19.41	10.44	15.31	-5.03
United Kingdom: FTSE100	12.69	3.23	-1.38	-1.74	13.96	-0.21	1.65	-3.25
Switzerland: SMI	24.14	9.28	4.23	-10.12	10.91	-0.16	2.53	5.50
Austria: ATX	16.94	-2.36	1.28	-5.42	34.83	7.56	18.96	-12.44
Czech Republic: PX 50	2.53	1.62	0.81	-11.49	14.29	7.88	13.35	-4.56
Hungary: BUX	3.26	-3.89	17.28	28.94	31.55	5.55	13.59	8.24
Poland: WIG	16.05	8.07	-0.31	-9.83	30.01	-2.67	3.88	-2.28

Source: Macrobond.

Table A4

Corporate bond spreads¹

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>Percentage points, period average</i>								
Euro area								
AA	0.89	0.63	0.73	0.80	0.73	0.70	0.59	0.85
BBB	2.25	1.75	1.91	2.11	1.70	1.78	1.53	2.02
U.S.A.								
AA	1.12	0.88	1.04	0.93	0.74	0.76	0.72	0.78
BBB	2.17	1.76	2.13	2.21	1.54	1.59	1.46	1.83

Source: Macrobond.

¹ Spreads of seven- to ten-year corporate bonds against ten-year government bonds (euro area: German government bonds).**Financial indicators of the Austrian corporate and household sectors**

Table A5

Financial investment of households¹

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>EUR billion, four-quarter moving sum</i>								
Currency	1.2	0.9	0.9	0.6	0.6	0.8	0.7	0.8
Deposits	1.9	3.2	6.5	10.3	8.8	11.4	10.3	8.3
Debt securities ²	-1.8	-4.2	-3.5	-2.7	-2.7	-1.8	-3.0	-0.2
Shares and other equity ³	-0.1	1.9	-0.3	1.1	-0.3	0.5	-0.1	1.7
Mutual fund shares	2.7	3.5	4.1	3.1	3.8	2.2	3.5	1.1
Insurance technical reserves	3.4	3.3	1.3	1.0	0.6	0.4	0.7	0.5
Other accounts receivable	0.0	1.7	1.1	-0.4	1.5	-0.1	1.7	0.1
Total financial investment	7.3	10.3	10.1	13.0	12.3	13.4	13.8	12.3

Source: OeNB (financial accounts).

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

Table A6

Household¹ income and savings

	2011	2012	2013	2014	2015	2016	2017	2018
<i>EUR billion, four-quarter moving sum</i>								
Net disposable income	178.3	185.4	185.6	190.7	193.1	201.0	207.3	214.6
Savings	14.2	16.6	13.3	14.0	13.1	15.6	15.3	16.6
Saving ratio in % ²	7.9	8.9	7.1	7.3	6.7	7.7	7.3	7.7

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

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

Table A7

Financing of nonfinancial corporations

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
	<i>EUR billion, four-quarter moving sum</i>							
Debt securities ¹	1.7	-0.7	0.0	0.7	-1.9	-1.2	0.2	2.1
Loans	7.0	3.3	5.7	14.2	15.2	13.4	13.2	12.7
Shares and other equity	4.4	4.1	2.5	3.7	12.4	-0.9	10.5	1.0
Other accounts payable	3.1	2.9	4.5	5.6	0.8	1.3	2.6	5.6
Total external financing	16.2	9.6	12.7	24.2	26.5	12.6	26.5	21.4

Source: OeNB (financial accounts).

¹ Including financial derivatives.

Table A8

Insolvency indicators

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
Default liabilities (EUR million)	6,255	2,899	2,430	2,867	1,863	2,071	908	864
Defaults (number)	3,266	3,275	3,115	3,163	3,025	2,985	1,525	1,529

Source: Kreditschutzverband von 1870.

Note: Default liabilities for 2013 include one large insolvency.

Table A9

Housing market indicators

	2011	2012	2013	2014	2015	2016	2017	2018
Residential property price index	<i>2000=100</i>							
Vienna	156.1	180.7	196.3	204.6	209.2	217.2	220.4	232.0
Austria	132.7	149.1	156.0	161.4	168.1	180.4	187.2	200.1
Austria excluding Vienna	124.0	137.4	141.1	145.4	152.9	166.7	174.9	189.8
Rent prices¹	<i>2015=100</i>							
Rents of apartments excluding utilities, according to the CPI	85.6	89.4	92.2	95.8	100.0	103.1	107.4	111.4
OeNB fundamentals indicator for residential property prices²								
Vienna	2.1	10.9	14.8	15.5	15.6	16.7	18.4	20.8
Austria	-6.0	-0.4	-1.6	-1.7	0.2	4.4	8.6	11.9

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

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

Austrian financial intermediaries¹

Table A10

Structural indicators

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period</i>								
Number of banks in Austria	790	764	738	672	628	597	622	592
Number of bank branches	4,359	4,255	4,096	3,926	3,775	3,639	3,677	3,561
Number of foreign subsidiaries	93	85	83	60	58	55	57	42
Number of branches abroad	151	200	207	209	215	219	216	225
Number of bank employees ¹	77,712	75,714	75,034	74,543	73,712	73,508	73,592	73,469

Source: OeNB.

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

Table A11

Total assets

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period, EUR million</i>								
Total assets on an unconsolidated basis	927,155	896,424	859,165	832,267	815,275	854,582	836,461	875,052
Total assets on a consolidated basis	1,089,713	1,078,155	1,056,705	946,342	948,861	985,981	972,449	1,018,964
Total assets of CESEE subsidiaries ¹	264,998	285,675	295,557	184,966	205,532	206,582	211,736	216,931
Leverage ratio (consolidated, %) ²	6.5%	6.1%	6.3%	7.6%	7.7%	7.7%	7.6%	7.9%

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.

Table A12

Sectoral distribution of loans to domestic nonbanks

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period, EUR million</i>								
All currencies combined								
Nonbanks	326,820	328,324	333,970	338,322	341,227	355,983	348,042	363,614
of which: nonfinancial corporations	140,329	136,606	137,235	136,963	143,113	153,036	148,099	159,019
households ¹	139,052	140,946	146,432	153,501	156,376	161,991	157,268	164,626
general government	25,970	28,102	28,076	27,630	24,292	24,561	24,663	23,835
other financial intermediaries	21,244	22,578	22,127	19,987	17,316	16,395	16,852	16,027
Foreign currency								
Nonbanks	40,108	36,288	33,950	30,089	22,181	20,567	20,841	20,188
of which: nonfinancial corporations	6,985	6,379	5,293	4,296	3,408	3,542	3,428	3,504
households ¹	28,385	25,374	24,423	21,224	16,486	14,994	15,429	14,272
general government	2,478	2,777	2,858	2,623	943	516	526	493
other financial intermediaries	2,257	1,759	1,374	1,945	1,343	1,515	1,458	1,920

Source: OeNB.

¹ Including nonprofit institutions serving households.

Note: Figures are based on monetary statistics.

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

Table A13

Loan quality¹

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
	<i>End of period, %</i>							
Nonperforming loans in % of total loans (Austria ²)	4.1	4.4	4.0	3.2	2.5	2.0	2.2	1.9
Nonperforming loans in % of total loans (consolidated)	8.6	7	6.5	5.2	3.4	2.6	3.0	2.3
Nonperforming loans in % of total loans (Austrian banks' CESEE subsidiaries)	14.0	11.8	11.5	8.6	4.5	3.2	3.9	2.8
Coverage ratio ³ (Austria ²)	x	x	47	59	60	62	61	62
Coverage ratio ³ (consolidated)	x	x	54	53	52	51	52	50
Coverage ratio ³ (Austrian banks' CESEE subsidiaries)	53	57	59	67	61	64	64	65

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.

Table A14

Exposure to CESEE

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
	<i>End of period, EUR million</i>							
Total exposure according to the BIS ¹	201,768	184,768	186,397	193,273	210,616	217,078	217,952	226,368
Total indirect lending to nonbanks ^{2,3}	161,439	177,389	176,728	108,738	118,268	120,816	119,500	128,333
Total direct lending ⁴	52,926	43,144	40,866	32,976	28,507	27,526	28,135	27,079
Foreign currency loans of Austrian banks' CESEE subsidiaries ³	79,047	76,736	69,317	32,576	31,027	29,836	29,846	30,063

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 basis¹

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
	<i>End of period, EUR million</i>							
Operating income	35,271	28,717	28,064	22,408	22,837	24,023	11,677	12,097
of which: net interest income	18,598	19,345	18,336	14,604	14,536	15,210	7,484	7,681
fee and commission income	7,590	7,741	7,730	6,562	6,885	7,097	3,536	3,494
trading income	670	426	-50	110	95	-628	-449	-239
other operating income ²	8,413	1,205	2,048	1,132	1,322	2,344	1,106	1,161
Operating expenses	27,318	19,833	17,612	16,687	14,752	15,661	7,728	7,902
of which: staff costs	10,378	9,543	8,959	8,774	8,415	8,602	4,188	4,224
other administrative expenses	6,628	6,569	6,830	5,820	5,571	5,630	2,938	2,859
Operating profit/loss	7,953	8,884	10,452	5,723	8,087	8,361	3,948	4,194
Net profit after taxes	-1,035	685	5,244	4,979	6,577	6,916	3,592	3,521
	%							
Return on average (total) assets ³	0.0	0.0	0.5	0.6	0.8	0.8	0.8	0.8
Return on average equity (tier 1 capital) ³	-0.7	0.7	8.5	8.3	10.5	10.3	10.9	10.2
Net interest income to operating income	53	67	65	65	64	63	64	63
Cost-to-income ratio	73	69	63	74	65	65	66	65
Risk provisioning to operating profit	88	77	45	21	13	5	-5	2

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 Since end-2014, other operating income and other operating expenses have been netted under other operating income.³ Based on profits after tax, but before minority interests.

Table A16

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

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period, EUR million</i>								
Operating income	12,544	12,159	12,261	7,752	7,914	7,925	3,979	4,060
of which: net interest income	8,414	9,068	8,431	5,135	5,304	5,467	2,770	2,844
securities and investment earnings	63	27	49	57	71	87	77	76
fee and commission income	3,164	3,477	3,358	2,184	2,315	2,241	1,144	1,135
trading income	736	-251	642	681	381	145	76	-131
other operating income ³	-374	-831	-528	-344	-157	-15	-88	137
Operating expenses ³	6,253	6,413	6,264	4,084	4,216	4,081	2,135	2,118
of which: staff costs	2,922	2,978	2,896	1,956	2,052	2,004	1,036	1,034
Operating profit/loss	6,291	5,746	5,998	3,668	3,698	3,845	1,844	1,942
Net profit after taxes	2,201	672	2,050	2,354	2,627	2,913	1,582	1,349
	%							
Return on average assets ⁴	0.8	0.2	0.7	1.3	1.3	1.4	1.5	1.3
Return on average equity (tier 1 capital) ⁴	8.4	9.9	9.5	14.3	14.3	16.5	16.9	13.9
Net interest income to operating income	67	75	69	66	67	69	70	70
Cost-to-income ratio ³	50	53	51	53	53	51	54	52

Source: OeNB.

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

Table A17

Solvency

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period, EUR million</i>								
Own funds	88,994	87,584	87,793	80,699	84,983	86,529	85,041	89,403
Total risk exposure	578,425	562,790	537,447	442,870	449,451	465,623	462,049	478,683
<i>End of period, eligible capital and tier 1 capital, respectively, % of risk-weighted assets</i>								
Consolidated total capital adequacy ratio	15.4	15.6	16.3	18.2	18.9	18.6	18.4	18.7
Consolidated tier 1 capital ratio	11.9	11.8	12.9	14.9	15.9	16.0	15.8	16.3
Consolidated core tier 1 capital ratio (common equity tier 1 as from 2014)	11.6	11.7	12.8	14.8	15.6	15.4	15.1	15.5

Source: OeNB.

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

Table A18

Market indicators of selected Austrian financial institutions

	2012	2013	2014	2015	2016	2017	2018	Sep. 2019
Share prices	<i>% of end-2012 prices, end of period</i>							
Erste Group Bank	100	106	80	121	119	159	132	139
Raiffeisen Bank International	100	81	42	45	58	100	74	66
EURO STOXX Banks	100	126	120	114	105	116	77	72
Uniq	100	94	79	76	73	89	80	82
Vienna Insurance Group	100	89	92	63	53	64	50	55
EURO STOXX Insurance	100	133	138	160	151	165	151	164
Relative valuation: share price-to-book value ratio	<i>%, end of period</i>							
Erste Group Bank	62	82	71	95	86	106	85	92
Raiffeisen Bank International	60	51	48	50	59	100	69	63
EURO STOXX Banks	58	81	77	74	72	83	56	56
Uniq	105	103	78	74	69	86	81	79
Vienna Insurance Group	107	102	98	79	62	71	57	62
EURO STOXX Insurance	75	107	93	102	89	105	97	102

Source: Bloomberg.

Table A19

Key indicators of Austrian insurance companies

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
Business and profitability	<i>End of period, EUR million</i>							
Premiums	16,608	17,077	17,342	16,920	16,975	17,178	9,378	9,485
Expenses for claims and insurance benefits	13,150	14,157	15,514	14,751	14,727	14,088	7,012	7,301
Underwriting results	592	477	475	560	581	507	306	434
Profit from investments	3,354	3,211	3,216	3,051	2,815	2,528	1,341	1,785
Profit from ordinary activities	1,524	1,421	1,354	1,414	1,244	1,168	694	1,150
Acquisition and administrative expenses	3,528	3,573	3,697	3,818	3,728	3,800	1,953	2,006
Total assets	110,391	113,662	114,495	114,707	137,280	133,082	136,609	138,706
Investments								
Total investments	105,496	107,442	107,933	108,897	109,235	108,522	109,673	108,849
of which: debt securities	39,560	41,667	41,517	43,241	44,030	43,529	44,109	43,559
stocks and other equity securities ¹	12,464	12,619	12,522	12,534	11,862	11,850	12,588	12,134
real estate	5,689	5,858	5,912	6,022	6,149	6,472	6,240	6,548
Investments for unit-linked and index-linked life insurance	19,127	20,179	19,776	20,142	20,587	19,123	20,160	19,750
Claims on domestic banks	16,687	15,800	15,492	13,793	10,313	9,728	10,058	9,714
Reinsurance receivables	824	918	971	1,027	1,036	1,116	1,237	1,374
	%							
Risk capacity² (median solvency capital requirement)	368	380	375	x	276	255	238	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.

Table A20

Assets held by Austrian mutual funds

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period, EUR million</i>								
Domestic securities	49,757	52,116	52,970	54,382	54,824	52,480	54,053	53,08
of which: debt securities	16,203	15,467	13,609	13,278	11,879	11,313	11,619	11,165
stocks and other equity securities	3,610	3,345	3,530	4,283	4,678	3,607	4,371	3,959
Foreign securities	99,647	110,397	114,833	120,330	128,836	121,038	128,071	131,862
of which: debt securities	62,972	69,642	70,326	69,911	70,353	67,956	69,763	70,395
stocks and other equity securities	16,278	17,910	18,521	20,145	22,924	20,747	23,195	24,889
Net asset value	149,404	162,513	167,802	174,712	183,661	173,518	182,124	184,942
of which: retail funds	83,238	89,163	91,626	94,113	97,095	89,923	95,787	95,214
institutional funds	66,167	73,350	76,177	80,599	86,572	83,600	86,337	89,729
Consolidated net asset value	128,444	138,642	143,249	148,682	156,173	154,235	155,442	159,561

Source: OeNB.

Table A21

Structure and profitability of Austrian fund management companies

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period, EUR million</i>								
Total assets	670	725	745	691	674	655	641	633
Operating profit	131	158	184	157	177	177	82	87
Net commissions and fees earned	310	368	411	402	407	407	202	205
Administrative expenses ¹	219	246	266	284	267	251	134	125
Number of fund management companies	29	29	29	29	30	24	29	22
Number of reported funds	2,161	2,118	2,077	2,029	2,020	2,017	2,013	1,988

Source: OeNB.

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

Table A22

Assets held by Austrian pension funds

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period, EUR million</i>								
Total assets	17,385	19,011	19,646	20,839	22,323	21,494	22,198	23,125
of which: direct investment	1,640	1,065	990	835	848	863	838	874
mutual funds	15,745	17,946	18,656	20,004	21,475	20,631	21,360	22,251
foreign currency (without derivatives)	5,964	7,578	7,279	9,169	x	9,149	9,698	11,667
stocks	5,472	6,250	6,200	6,972	7,867	7,034	7,980	7,489
debt	7,650	9,163	9,552	9,521	9,054	9,724	9,709	10,776
real estate	583	576	690	754	1,165	978	986	1,033
cash and deposits	2,033	1,598	1,850	1,863	2,192	1,632	1,445	1,494

Source: OeNB, FMA.

Table A23

Assets held by Austrian severance funds

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>End of period, EUR million</i>								
Total direct investment	1,528	1,415	1,565	1,682	1,893	2,416	2,074	2,393
of which: euro-denominated	1,507	1,299	1,502	1,647	1,847	2,348	1,998	2,322
foreign currency-denominated	21	x	63	35	46	68	75	71
accrued income claims from direct investment	21	15	14	15	13	12	13	14
Total indirect investment	4,701	5,912	6,741	7,745	8,720	9,674	8,981	10,083
of which: total of euro-denominated investment in mutual fund shares	4,220	5,190	5,790	6,743	7,429	7,989	7,719	8,459
total of foreign currency-denominated investment in mutual fund shares	481	722	951	1,002	1,291	1,685	1,262	1,624
Total assets assigned to investment groups	6,218	7,306	8,294	9,412	10,597	1,205	11,049	12,432

Source: OeNB.

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

Table A24

Transactions and system disturbances in payment and securities settlement systems

	2013	2014	2015	2016	2017	2018	H1 18	H1 19
<i>Number of transactions in million, value of transactions in EUR billion</i>								
Large-value payment system (domestic, operated by the OeNB)								
Number	1	1	1	1	1	1	1	1
Value	5,906	7,438	6,381	4,316	3,690	1,536 ¹	809	695
System disturbances	3	0	1	4	0	3	2	0
Securities settlement systems								
Number	2	2	2	2	2	2	1	1
Value	369	377	315	335	701 ²	658	436	336
System disturbances	5	2	3	3	0	3	2	0
Card payment systems								
Number	673	856 ³	901	963	1,061	1,178	565	623
Value	72	91 ³	97	101	108	116	55	58
System disturbances	2	0	2	4	1	2	1	0
Participation in international payment systems								
Number	53	113	144	166	191	217	104	118
Value	1,643	2,463	2,420	3,029	3,242	3,831	1,852	1,931
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.