



OESTERREICHISCHE NATIONALBANK  
EUROSYSTEM

# FINANCIAL STABILITY REPORT 44

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 20, 2022, and November 11, 2022 (key financial indicators).

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

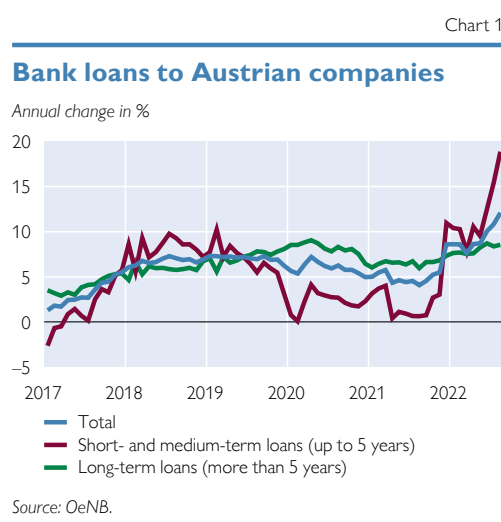
## Recent developments

**The Austrian economy grew strongly in the first half of 2022.** This growth spurt is mainly attributable to catching-up effects on both the demand side, i.e. in private consumption and foreign trade, and the supply side, namely in industry, wholesale and retail trade, and food services. However, in the second half of 2022 this brisk growth pace will level off markedly. A spurt in inflation since the beginning of the year and high uncertainty related to the war in Ukraine will weigh on the recovery. Strong inflation keeps slowing income growth and, by extension, consumption. Monetary policy tightening, which goes hand in hand with rising interest rates for the wider economy, drives up financing costs. This, in turn, puts a damper on companies' willingness to invest. Still, due to Austria's good economic performance in the first half of 2022, economic growth will come to slightly below 5% for 2022 as a whole, compared to 4.7% in 2021.

### Companies: insolvencies still below pre-pandemic levels

**Austrian companies have been borrowing more since the last quarter of 2021.** The growth rate of bank loans to companies started to accelerate in September 2021 and amounted to 12.1% (year on year) in August 2022 (see chart 1). This marked increase over the last couple of months has been attributable to a strong demand for short- and medium-term loans (i.e. loans with maturities up to five years). The Austrian results of the euro area bank lending survey (BLS) point to companies' high financing needs for inventories and working capital (rather than for capital investment). According to the banks surveyed, companies in Austria have built up their stocks to secure future deliveries as the war in the Ukraine had aggravated supply chain disruptions. Apart from that, the recently high loan demand also reflects anticipatory effects of rising future interest rates. Expecting imminent monetary policy tightening, companies are likely to have taken out loans now in order to profit from favorable interest conditions.

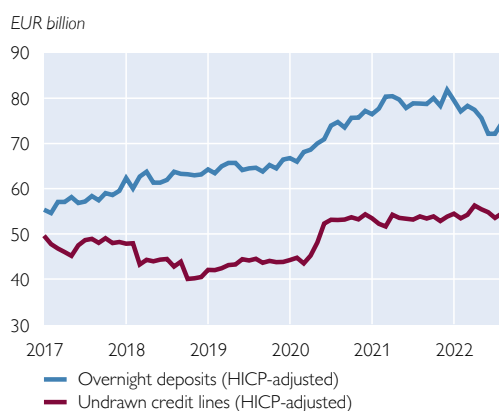
**Austrian companies' stronger borrowing in the first half of 2022 took place amid favorable economic developments.** Loan growth has been accelerating particularly strongly in the industries, which had been hit hard by the COVID-19 pandemic and have been recovering steadily – most notably the manufacturing and trade industry (wholesale and retail). On the back of strong loan growth, overall debt in the corporate sector (i.e. loans and bonds) increased by EUR 6.5 billion in the first half of 2022. However, given the strong rebound of the Austrian economy, the debt-to-GDP ratio has been on a downward path since it peaked in Q1 21 (declining from 79.8% to 75.1% in Q2 22). In contrast, the aggregate corporate sector's debt-to-income ratio<sup>1</sup> went up in the first half of 2022 as companies' profits went down in the same period.



<sup>1</sup> Defined as the consolidated gross debt of the corporate sector as a share of gross operating surplus.

Chart 2

### Indicators of Austrian companies' liquidity



Source: OeNB.

2021, companies' overnight deposits held by Austrian banks declined markedly (see chart 2). There is evidence that government support measures taken during the COVID-19 pandemic might have driven up firm deposits significantly.<sup>2</sup> Hence, the reduction by almost 9% observed in the last eight months could reflect the gradual expiry of these measures. Despite the recent drop in overnight deposits, liquidity buffers (at EUR 74.5 billion) are still above the pre-pandemic level of end-2019 (EUR 66.5 billion). Moreover, companies have access to additional liquidity if needed, as they have a substantial amount of undrawn credit lines at their disposal (EUR 54.5 billion in August 2022). These credit lines increased strongly at the beginning of the COVID-19 pandemic and have remained rather constant since (see chart 2).

**Companies' debt-servicing costs remained low in the first half of 2022 but are expected to increase amid rising interest rates.** The ratio of interest payment obligations for domestic bank loans to gross operating surplus amounted to 2.9% in Q2 22. This ratio corresponds to the historically low figures observed over the last five years and reflects the still low level of interest rates. As the bulk of new (euro-denominated) loans consists of variable rate loans (81% in Q2 22), interest expenses are expected to rise soon in the wake of monetary policy tightening. Hence, a considerable share of companies' outstanding loan volumes is exposed to interest rate risk. Moreover, the borrowing costs of new debt will go up, irrespective of whether interest rates are agreed to be fixed or to be allowed to float. Given that short-term loans (with maturity periods of up to one year) make up only a small share (15%) of companies' outstanding loan volumes, the related refinancing risks are rather moderate.

Standing at 324.8% in Q2 22, the ratio still remains below the peak of 333.1% it had reached early in the pandemic in Q2 20 and well below the euro area average of 354.9%. Rising energy prices and interest rates as well as further possible supply chain disruptions could put a drag on companies' profits and thus negatively affect debt sustainability. It is likely that such developments will not fall evenly across businesses and could make highly indebted firms particularly vulnerable to adverse shocks.

**The buildup of liquidity buffers that accelerated during the COVID-19 pandemic has come to a halt.** Compared with the end of

<sup>2</sup> See *Elsinger et al. 2022. Where have all the insolvencies gone? In: Monetary Policy & the Economy Q3/22. OeNB. Forthcoming.*

**Insolvency numbers<sup>3</sup> have started to rise since mid-2021 after having fallen significantly in the first year of the pandemic.** The reduction observed early in the pandemic reflects neither underlying economic developments nor higher rates of firm exits (due to other reasons), but is mainly attributable to government support programs aimed to mitigate adverse developments in the corporate sector.<sup>4</sup> Despite the increase recorded since mid-2021 (see chart 3), the number of insolvencies remains below pre-pandemic levels (according to the latest available data of September 2022). However, as mitigating measures continue to expire, insolvencies might rise further in the near future, especially as input prices and interest rates go up.

#### Households: sufficient debt-servicing capacity despite rising prices and interest rates

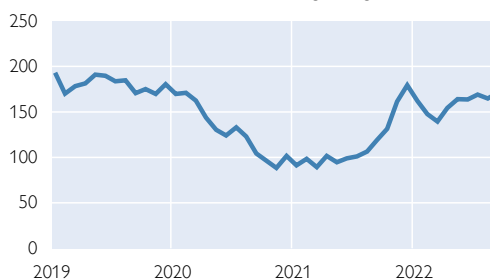
**Austrian banks' lending to households has grown at a rather constant pace since end-2021, standing at 5.2% in August 2022.** While consumption loans have rebounded, dynamics in lending for housing purposes have been rather stable (chart 4). Accounting for a share of about 70%,

housing loans make up a large portion of overall outstanding bank loans and are therefore significant in shaping total lending growth in Austria. In August 2022, housing loans grew by 6.6%, thus remaining at a relatively high level. BLS results indicate first signs of a possible trend reversal. While Austrian banks again slightly tightened their credit standards for housing loans in the second quarter of 2022 (compared to Q1 22), they said they expected credit standards to tighten further, and more significantly, in the third quarter and demand for housing loans to decline from the high levels observed in recent years.

Chart 3

#### Insolvencies

Number of insolvencies, three-month moving average

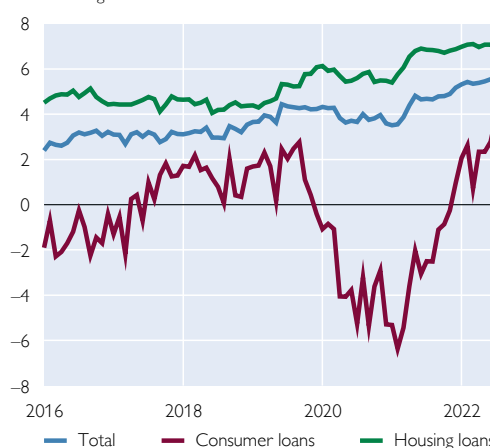


Source: Austrian insolvency register, authors' calculations.

Chart 4

#### Bank loans to households

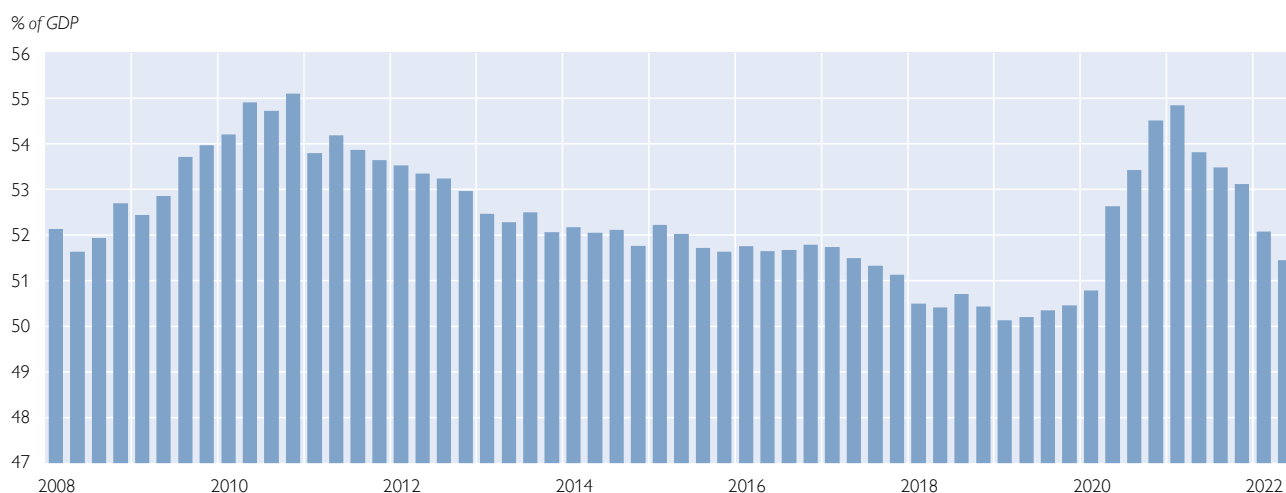
Annual change in %



Source: OeNB.

<sup>3</sup> Insolvency numbers reflect insolvencies of firms that are registered in the Austrian business register without sole proprietorships, i.e. excluding the household sector. Please note that these figures are not based on the same database as the figures presented in previous Financial Stability Reports, where sole proprietorships were included. As the bulk of loan volumes is held by firms in the nonfinancial corporate sector, the figures presented here better reflect the risks to financial stability. For a detailed definition, see Elsinger et al. 2021. *The calm before the storm? Insolvencies during the COVID-19 pandemic*. In: *Financial Stability Report 41*. OeNB. 57–76.

<sup>4</sup> See Elsinger et al. 2022. *Where have all the insolvencies gone?* In: *Monetary Policy & the Economy Q3/22*. OeNB. Forthcoming.

**Household debt**

**Rising economic activity and nominal disposable household income cushion relatively strong lending growth.** The level of total household sector debt in relation to GDP has been decreasing since the peak it had reached during the pandemic in Q1 21, amounting to 51.5% in Q2 22 (see chart 5). This figure is below the average value observed over the last 15 years (52.4%). Likewise, total debt as a share of net disposable income has been on a downward path since Q1 21. At 94.0% in Q2 22, it is slightly above the average observed since 2008 (91.5%). Hence, aggregate debt statistics so far do not point to any steady debt accumulation in the household sector.

**Residential property prices in Austria grew more slowly in Q3 22.** From the beginning of 2021, housing prices grew at rates of above 10% year on year, peaking in the second quarter of 2022 at 13.1%. In Q3 22, the growth rate of residential property prices dropped to 10.8%. This slowdown is largely attributable to price developments in Vienna, where house price growth decelerated from 13.0% to 9.6% in the third quarter of 2022.

**Rising inflation dampens real disposable household income in 2022.** On the back of high employment and wage growth, the growth of households' disposable income is anticipated to more than double in 2022, in nominal terms, from figures recorded in the previous year. However, inflation continued to rise sharply in Austria in recent months, reaching 10.9% in September 2022, and it is expected to remain high throughout the rest of the year. According to the OeNB's most recent forecast, inflation will amount to 8.5% for 2022 as a whole. This will considerably weigh on real disposable household income, which is expected to stagnate, on average, in 2022.<sup>5</sup> Yet, the impact of inflation on the financial situation

<sup>5</sup> *Fiscal measures to support household income helped prevent real disposable household income from declining steeply in 2022. For further details, see Prammer, D. and L. Reiss. 2022. Fighting (the effects of) inflation: government measures in Austria and the EU. In: Monetary Policy & the Economy Q4/22–Q1/23. OeNB. Forthcoming.*

of individual households is very heterogeneous.<sup>6</sup> Indebted households whose financial margins had already been tight before the strong surge in prices might increasingly run into repayment difficulties. Compared to the euro area average, though, the share of indebted households whose expenditures exceed their net disposable income is rather low in Austria (4.6% versus 23.0% in the euro area).<sup>7</sup> Moreover, in general, inflation reduces the real value of debt. Hence, once higher wages compensate borrowers for rising prices, loan repayments become relatively smaller in real terms, which makes it easier to pay off outstanding debt.

**On top of rising prices, interest rate hikes reduce the financial scope of households that hold variable rate loans.** Over the last five

years, the average share of variable rate loans in total new euro-denominated loans amounted to 50% in Austria, which is relatively high compared to the euro area average of around 20%. Hence, a considerable share of indebted households faces higher debt service payments amid rising interest rates. While the share of variable rate loans in total new euro-denominated loans decreased considerably since 2015, this trend came to a halt more recently (see chart 6). Past low interest rates made fixed-rate loans more and more popular in Austria, as households took advantage of favorable financing conditions. Over the course of 2022, however, rising policy rates started to make fixed-rate loans more expensive. As a result, Austrian borrowers increasingly turned back to variable rate loans.

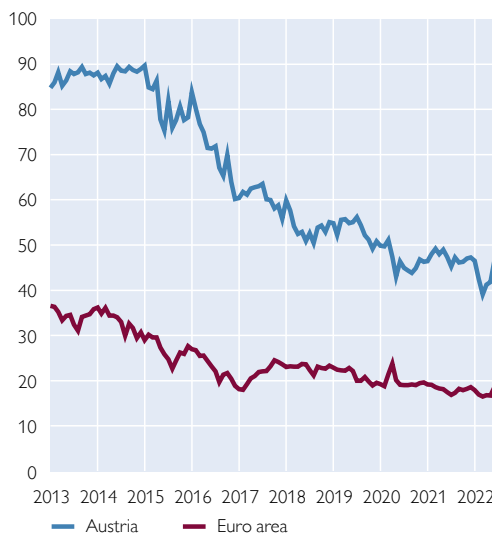
**An OeNB simulation exercise shows that interest rate and price rises are likely to drive up the number of financially vulnerable indebted households in Austria.** This increase is more pronounced when considering rising prices than in a scenario where households only have to face rising interest rates. On the other hand, the associated surge in debt at risk, which reflects the debt held by vulnerable households as a share of overall outstanding debt in Austria, is less pronounced in the scenario of rising prices. This is because households that become vulnerable due to higher inflation mostly hold consumer loans (rather than mortgage loans), whose outstanding debt amounts are relatively low. In contrast, a rise in interest rates mostly affects households holding mortgage loans.

**We expect credit risks to remain contained despite the anticipated increase in the number of vulnerable households amid rising prices**

Chart 6

### Variable rate loans to households

% of total new euro-denominated loans to households



Source: OeNB, ECB.

<sup>6</sup> See Fessler P., F. Fritzer and M. Salish. 2022. *Who pays the price when prices rise?* In: *Monetary Policy & the Economy Q4/22–Q1/23*. OeNB. Forthcoming.

<sup>7</sup> See Albacete et al. 2022. *Effects of interest rate and inflation shocks on household vulnerability in Austria: a microsimulation using HFCS data*. OeNB. *Financial Stability Report 44*.



**and interest rates.** Simulations from a combined scenario – a rise in prices by 10% and an increase in interest rates by 3 percentage points – reveal that debt at risk would grow from 3.1% to 5.1% of overall outstanding debt in Austria and from 12.0% to 15.8% of overall outstanding debt in the euro area.<sup>8</sup> Hence, both the level of and the increase in debt at risk are significantly lower in Austria than the euro area average. An analysis of further scenarios and more details on the simulation exercise are provided in this issue of the Financial Stability Report by Albacete et al (2022).

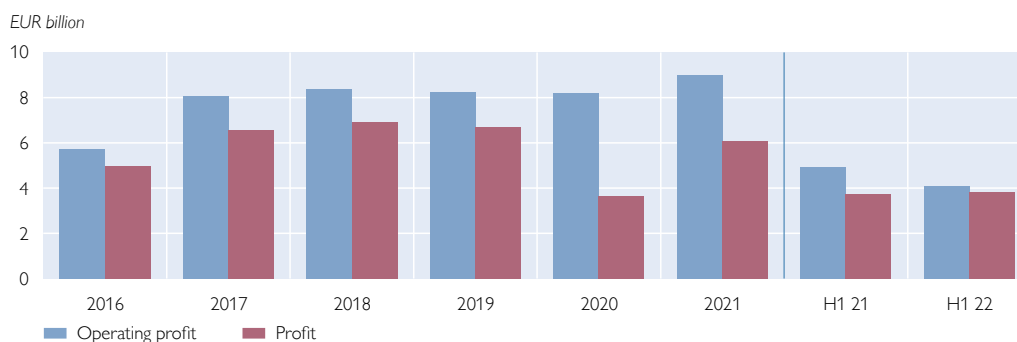
### Austrian banking sector: solid foundations serve as firewall against potential future challenges

**The Austrian banking sector earned EUR 3.8 billion in the first half of 2022, in line with last year's result.** Operating income went up by more than one-tenth year on year to EUR 14.3 billion, supported by stronger net interest income and dynamic growth in fees and commissions, but operating costs rose at a much quicker pace, mainly due to impairments on equity participations. Consequently, operating profit declined (see chart 7). Despite a rise in risk provisioning, several one-off effects – such as extraordinary profits and profits from discontinued operations – resulted in banking sector profits of EUR 3.8 billion for the first two quarters of 2022. As total assets continued to grow, the Austrian banking sector's return on assets declined slightly to 0.6% (–10 basis points year on year).<sup>9</sup>

**The profitability outlook for the banking sector is fairly uncertain, given rising interest rates, stronger inflation and elevated geopolitical uncertainties.** On the one hand, given their large stock of variable rate loans, Austrian banks' net interest margin could profit from the end of the low interest rate environment. On the other hand, higher loan – and potentially deposit – rates, strong inflation and the fact that customers are affected by the surge in production costs and cost of living may drive up (funding, operating and risk) costs and slow down lending. The development of credit quality also depends on the extent of public support measures, which reduce the financial strain on households and

Chart 7

#### Profitability indicators of the Austrian banking system



Source: OeNB.

<sup>8</sup> In this scenario, we assume only loans with adjustable interest rates to be affected.

<sup>9</sup> For an in-depth analysis of Austrian banks' profitability from 2017 to 2021, please refer to the special topics section in this Financial Stability Report (Gruber, M. and S. Kavan. 2022. DuPont reloaded: the profitability of the Austrian banking sector and the impact of the COVID-19 pandemic).

corporations in light of energy price hikes. In these highly uncertain times, the Austrian banking sector benefits from the strong resilience it built up over the last decade. Going forward, banks should aim at protecting this resilience by being very careful with regard to profit distributions and ensuring that credit and interest rate risk management practices adequately reflect changes in the risk environment.

**The Austrian banking sector's total assets rose strongly in the first half of 2022, while credit quality remained unchanged.** Austrian banks' consolidated total assets surpassed EUR 1.2 trillion, as lending was brisk (see above). These dynamics contributed to stabilizing banks' nonperforming loan (NPL) ratio at the historically low level of 1.8% in June 2022. Well over half of banks' NPLs are classified as unlikely to pay, yet not overdue, and an additional 1.8% of loans were forborne. At the same time, the coverage of NPLs with provisions declined slightly to 46% as provisioning did not keep pace with the contained (absolute) increase in NPLs.

**Thanks to major improvements in capitalization over the past decade, Austrian banks managed both the COVID-19 pandemic and first-round effects of the war in Ukraine well.** During the pandemic, Austrian banks benefited from a capitalization level that had more than doubled since the great financial crisis. This helped maintain confidence in the banking sector and positively influenced its assessment by rating agencies and investors. This resilience also supported Austrian financial stability in 2022, after Russia started its war of aggression against Ukraine. During the first half of 2022, however, dynamic lending and the resumption of profit distributions slightly burdened the Austrian banking sector's common equity tier 1 (CET1) ratio, which declined slightly to 15.8%. The Austrian Financial Market Stability Board concluded in its September meeting that Austrian banks' capital levels had remained below those of their European peers and therefore advised that macroprudential buffer requirements be set at an additional 0.5 percentage points for selected banks, to be gradually raised over two years.

**Austrian banks' subsidiaries in CESEE recorded a profit of more than EUR 2 billion in the first half of 2022 despite the war in Ukraine and a massive energy price shock.** The operating profit surged by 60% year on year to EUR 3.1 billion, supported by expanding operating income (+35%) and a slower rise in operating costs (+13%). Despite a historic low of just 1.8% in the overall NPL ratio (as of mid-2022), credit risk provisioning nearly quadrupled to EUR 0.5 billion. The resulting aggregate profit of more than EUR 2 billion in the first half of 2022 is already higher than in the entire pandemic-burdened year of 2020 and significantly higher than in the first half of 2021. This positive development is also reflected in the return on assets, which rose from 1.2% in the first half of 2021 to 1.4% one year later. Given the clouded outlook for CESEE, including uncertainties related to the war in Ukraine, the supply of natural gas during the winter and monetary policy tightening in several countries, credit risks may rise and Austrian banks are well advised to ensure an adequate level of loan loss provisions.

**By mid-2022, the aggregate CET1 ratio of Austrian banks' CESEE subsidiaries stood at 16% and the loan-to-deposit ratio at 70%.** These solid levels bear testament to past efforts by banks and supervisors to make local banking systems more resilient. Together with adequate provisions, they will serve financial stability well, as CESEE faces multiple economic and geopolitical challenges going into 2023.

## Recommendations by the OeNB

The Austrian banking sector has weathered recent headwinds well so far. During the COVID-19 pandemic and after the onset of the war in Ukraine, the sector benefited from its much-improved capitalization level, solid profitability and a very low NPL ratio. That said, it should be noted that in the first half of 2022, the sector's capital ratio decreased slightly despite high profits, and there is little room left for improving credit quality. The OeNB therefore recommends that banks take the following measures to strengthen financial stability in Austria:<sup>10</sup>

- Strengthen the capital base in a sustainable and forward-looking manner, especially by exercising restraint with regard to profit distributions.
- Adhere to sustainable lending standards for residential<sup>11</sup> and commercial real estate financing.
- Ensure that credit and interest rate risk management practices adequately reflect changes in the risk environment, especially considering the past long period of low risks.
- Continue efforts to improve cost efficiency in order to ensure sustainable profits.
- Further develop and implement strategies to deal with the challenges of new information technologies, cyber risks and climate change.

Box 1

### Macroprudential policy in Austria

**Macroprudential policy in Austria aims at building up and ensuring high resilience to systemic shocks in the financial system.** Along with this goal come safeguarding public finance and perpetuating frictionless financial intermediation even in times of crisis. To this end, the OeNB follows an integrated approach that relies on the interplay of measures such as macroprudential buffers, borrower-based instruments, resolution and deposit guarantee schemes.

**The Austrian banking system faces a number of key structural systemic risks.** These risks stem from (1) the large, tightly connected financial industry (compared to Austria's relatively small economy) and (2) its low structural profitability, (3) close ties to the real economy and specific ownership structures, (4) insufficient preparation for the discontinuation of implicit state guarantees (long-term structural spread risk) and (5) high exposure, particularly to emerging markets in CESEE.

**To address these structural risks, the Austrian Financial Market Stability Board (FMSB), which is responsible for macroprudential policies in Austria, introduced a systemic risk buffer (SyRB) already in 2016.** Together with the buffer for other systemically important institutions (O-SII buffer), the SyRB considerably contributed to enhancing the Austrian banking sector's resilience, helped maintain its excellent rating, kept refinancing costs at low levels both for the real economy and financial institutions and prevented the banking sector from requiring government support.

**The FMSB regularly reviews its macroprudential policy decisions with a view to financial and macroeconomic developments in Austria and abroad.** In its latest review of its macroprudential buffer policy of September 2022, the FMSB concluded that the above-mentioned structural risks persisted and Austrian banks' capital levels remained below

<sup>10</sup> Please note that the European Systemic Risk Board (ESRB) issued a warning on risks to EU financial stability: [https://www.esrb.europa.eu/pub/pdf/warnings/esrb.warning220929\\_on\\_vulnerabilities\\_union\\_financial\\_system~6ae5572939.en.pdf](https://www.esrb.europa.eu/pub/pdf/warnings/esrb.warning220929_on_vulnerabilities_union_financial_system~6ae5572939.en.pdf).

<sup>11</sup> See box 1 on macroprudential policy in Austria and please also refer to <https://www.fma.gv.at/en/fma-issues-regulation-for-sustainable-lending-standards-for-residential-real-estate-financing-kim-v>.

those of their European peers.<sup>12</sup> Therefore, combined SyRB and O-SII buffers continue to fulfill an important role in safeguarding financial stability in Austria.

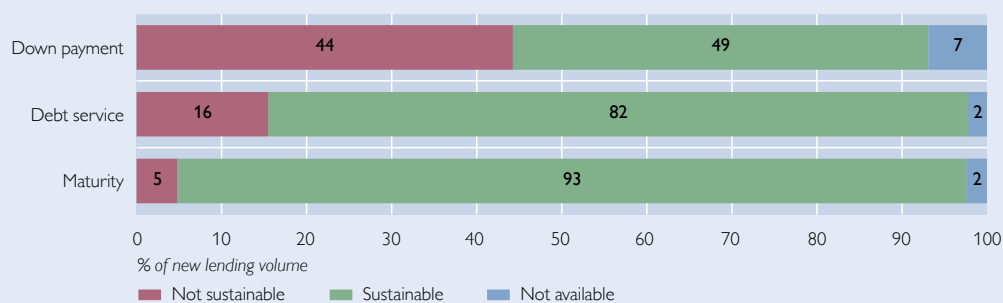
**Even if pandemic-related uncertainties have decreased significantly since the FMSB's decision on combined macroprudential buffers in 2020, new uncertainties have arisen, mainly due to Russia's invasion of Ukraine, rising energy prices and high inflation.** Thus, in line with the OeNB's assessment of the impact of the macroprudential buffers on banks and the real economy, the increase of the combined buffer rate will be limited to 25 basis points per year with an overall limit of +50 basis points for the 12 banks subject to SyRB and O-SII buffers for the next two years.<sup>13</sup> The systemic risk analysis that will take place during the next regular evaluation of the macroprudential buffer regime will again consider reactions from banks and the financial system as well as changes in financial and macroeconomic conditions. Based on previous experience in Austria and other EU countries, the OeNB does not expect the FMSB's buffer decisions to significantly affect credit supply in Austria.

**Borrower-based measures address elevated systemic risk from residential real estate financing.** Over the past ten years, residential real estate (RRE) prices have doubled in Austria; in Q2 22, the overvaluation of RRE prices reached a record value of 39%. RRE overvaluation in Vienna is currently estimated at 45%. Rising RRE prices made housing less affordable and the market more vulnerable to credit-driven exuberance and future price corrections.

**Lending to households for house purchase was still growing strongly, at a rate of 7%, in mid-2022.** While the share of variable rate RRE lending in total lending declined in the past, some evidence for the second half of 2022 suggests that it is back on the rise. Variable rate contracts make borrowers vulnerable to rising interest rates. Furthermore, a considerable share of new mortgage loans continues to be offered at unsustainable lending standards: In the first half of 2022, loans with debt service-to-income ratios exceeding 40% accounted for a share of 16% in new lending, leaving little room for maneuver in case of unforeseen adverse developments (e.g. increased costs of living or unemployment) or in the event of interest rate increases. At the same time, 44% of the total loan volume were accounted for by loans for which borrowers' own contribution to project financing was less than 20%. On the positive side, Austria has a well-developed housing rental market with a high share of nonprofit providers, and Austrian borrowers tend to have high incomes and wealth by international standards.

Chart B1

### Sustainability of residential real estate lending in the first half of 2022



Source: OeNB.

<sup>12</sup> For more details on the FMSB's macroprudential policy decisions of September 12, 2022, see <https://www.fmsg.at/en/publications/press-releases/2022/33rd-meeting.html>.

<sup>13</sup> For more details on the FMSB's policy decisions, see its "Recommendation FMSB/5/2022 on adjusting the systemic risk buffer (SyRB) and the other systemically important institution (O-SII) buffer" at <https://www.fmsg.at/en/publications/warnings-and-recommendations/2022/recommendation-fmsb-5-2022.html>.

**However, in times of crisis, systemic risks in RRE financing may prove critical to Austria's financial stability and should therefore be addressed.** Consequently, and upon the initiative of the OeNB and the FMSB, Austria's Financial Market Authority issued a new regulation including upper limits for loan-to-value ratios (90%), debt service-to-income ratios (40%) and loan maturities (35 years) – subject to exemptions that would give credit institutions adequate operational flexibility. As of August 1, 2022, these new measures apply to all new mortgage lending to households of above EUR 50,000. Furthermore, the FMSB recommended to adhere to a conservative DSTI ratio (30% to 40%) for variable rate loans or loans with a short interest rate fixation period. Borrower-based instruments are internationally accepted as being effective in reducing risks to financial stability and protecting borrowers from taking on excessive household debt.

Box 2

## The OeNB's latest solvency stress test for Austrian banks

### Background

**The OeNB conducts annual stress tests for all Austrian banks under its dual mandate for banking supervision and financial stability.** The solvency stress test is designed to assess banks' resilience to adverse macroeconomic shocks and provides insights on both a bank and a system-wide level. Conducted in a top-down fashion, it relies on the OeNB's well-established stress testing framework ARNIE, which is continuously improved. Stress testing covers both significant and less significant institutions at the highest consolidated level. It focuses on risks relevant for the Austrian banking sector, including spillover effects among banks, which are particularly important for the decentralized sector. The most recent stress test is based on data as of end-2021 and covers the period from 2022 to 2024.

### Scenarios for the 2022 exercise

**The OeNB's most recent stress test was based on the Eurosystem's June 2022 macroeconomic forecast, with its central projection serving as the baseline scenario and an aggravated version of its downside scenario serving as the adverse scenario.** The baseline scenario foresees a cumulative GDP growth of 7.9% for the Austrian economy over the stress test horizon (2022–24). In the adverse scenario, the intense phase of the war in Ukraine is assumed to extend into 2023 and subside in 2024, when economic conditions are assumed to return to normal. Russian energy exports are assumed to cease for two years, leading to a rationing of gas supplies, significantly higher commodity prices, lower trade activities and intensified global value chain problems. Austria's GDP would sharply contract in the first two years of the stress test horizon and slightly rebound in the third year, resulting in an overall cumulative growth rate of –4.3%. The euro area and the CESEE countries would experience a GDP decline of around 5%, while Russian GDP would shrink by almost one-quarter over that period. With respect to inflation, large commodity price increases imply intense upward price pressures, resulting in strongly elevated inflation throughout 2022 and 2023; under these assumptions, inflation would return to target levels in 2024. For purposes of this stress test only, both short- and long-term interest rates are assumed to rise above 3%. Real estate prices are projected to drop by 22.3% for both commercial and residential real estate.

### Results and risk drivers

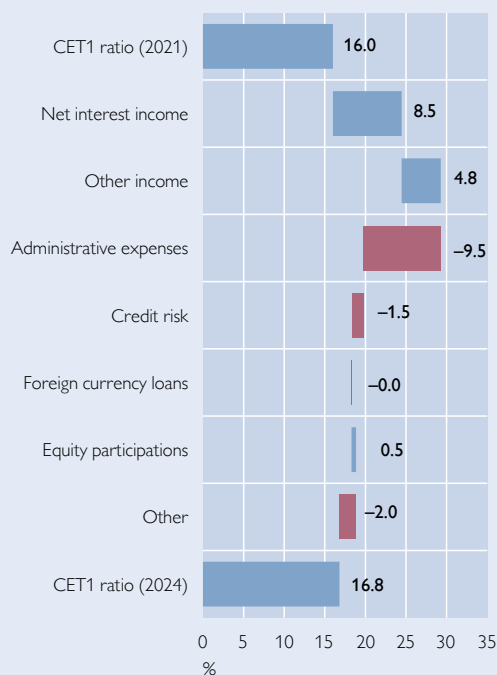
**While Austrian banks' aggregate CET1 ratio increases by 0.8 percentage points in the baseline scenario, it declines by 5.8 percentage points in the adverse scenario, coming to 10.2% at end-2024.** The waterfall chart shows the most important risk drivers and their contribution to capital depletion for both the baseline and adverse scenarios.

Credit risk remains the main risk driver, drawing down capital by 5.7 percentage points in the adverse scenario (baseline scenario: 1.5 percentage points). Gains and losses from equity

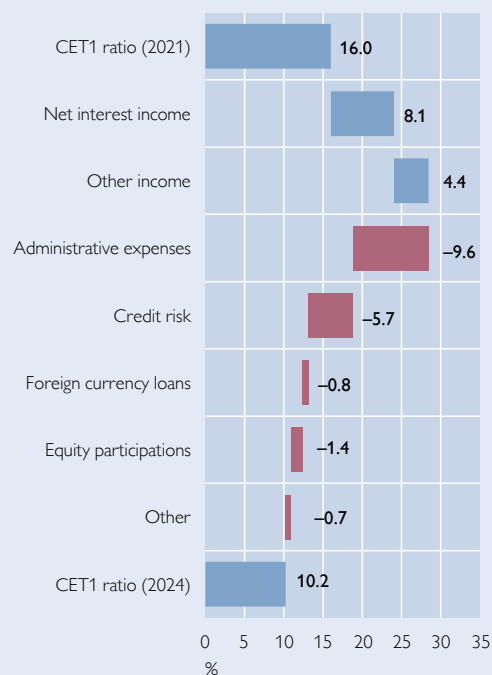
Chart B2

### The OeNB's 2022 solvency stress test for Austria – results and risk drivers

#### Baseline CET1 ratio of the Austrian banking system



#### Adverse CET1 ratio of the Austrian banking system



Source: OeNB.

participations in nonfinancial corporations and especially in other banks are significant as well. While in the baseline scenario, banks participate in the profits of entities they invested in and build up capital (+0.5 percentage points), the picture reverses in the adverse scenario (-1.4 percentage points) owing to reduced dividend income and the revaluation of equity stakes. In addition, net interest income shrinks from 8.5 percentage points in the baseline scenario to 8.1 percentage points in the adverse scenario, mainly as a result of both higher funding costs and a reduced income generation capacity following increases in nonperforming exposures. An interactive presentation of the results is available on the OeNB's website.<sup>14</sup>

#### Conclusions

**Overall, the stress test results indicate that the Austrian banking system is well equipped to withstand substantial macroeconomic shocks, including energy supply shocks.** The current baseline scenario is less optimistic than that of the 2021 stress test, reflecting the current state of the global economy. The harsher adverse scenario results in more pronounced capital depletion. Higher credit risk losses are, however, partially cushioned by improved net interest income resulting from higher interest rates. Across the Austrian banking system, results are more heterogeneous, with banks that are exposed to more affected regions experiencing greater losses and the equity participation risk channel being more significant in the decentralized sector. Nonetheless, capital ratios remain above those observed before the great financial crisis in 2007/08. The stress test highlights how important it is for the banking sector to be well capitalized. Amidst rising uncertainties and in an increasingly adverse economic environment, Austrian banks should be very careful with regard to profit distributions.

<sup>14</sup> <https://oenb.shinyapps.io/OeNBStressTests/>.

### First lessons from the resolution of Sberbank Europe AG

**Sberbank Europe AG, a 100% subsidiary of the state-owned Russian bank Sberbank of Russia, had been active as a universal bank headquartered in Austria.** It operated subsidiaries in Bosnia and Herzegovina, Croatia, Czechia, Hungary, Serbia and Slovenia and one branch in Germany that was in charge of collecting direct deposits and performing consumer lending activities. The total assets of this consolidated banking group amounted to EUR 13.6 billion as of end-2021.

**The banking group experienced severe liquidity problems in February 2022.** These problems were attributable to massive liquidity outflows in some countries, following Russia's invasion of Ukraine and related political tensions. Sberbank Europe AG and its subsidiaries in Croatia and Slovenia were assessed as "failing or likely to fail" by the ECB on February 27, 2022. This decision was confirmed by the Single Resolution Board (SRB), which consequently applied a moratorium (suspension of payments, enforcement and termination rights) to the Austrian, Croatian and Slovenian entities. Subsequently, the SRB found that resolution actions for the Croatian and Slovenian subsidiaries were in the public interest, while there was no public interest in the resolution of the Austrian parent entity.

**Following the negative public interest assessment for Sberbank Europe AG's Austrian entity, the Austrian Financial Market Authority (FMA) appointed a government commissioner on March 1, 2022, and banned Sberbank Europe AG from continuing business operations with immediate effect.** The prohibition of business operations legally triggered a deposit guarantee pay-out event in Austria, with Austria's deposit guarantee scheme paying out all covered deposits in the amount of EUR 941 million. Subsequently, following intense efforts of the responsible authorities and the bank itself, the insolvency of Sberbank Europe AG could be averted and the bank's orderly solvent wind-down was started in May 2022. Several asset portfolios were successfully sold to other banks in May and the weeks that followed. This approach ultimately made it possible to retain as much of the bank's asset values as possible. In the course of this wind-down and as a direct result of the executed transactions, Austria's deposit guarantee scheme was reimbursed in full within a short time, meaning that no financial damage occurred to the Austrian banking sector through the failure of Sberbank Europe AG. Also, all other creditors were (or will be) satisfied on time according to the wind-down plan and subject to the sanction regime applying to Russia and Russian legal entities.

**The orderly wind-down of Sberbank Europe AG is currently on track and is scheduled to be completed by end-2022.** After that, Sberbank Europe AG will hand back its banking license. As for Sberbank Europe AG's subsidiaries in CESEE, the subsidiaries in Croatia, Slovenia, Bosnia and Herzegovina, and Serbia were sold and regular business was resumed, while the subsidiaries in Czechia and Hungary are currently being liquidated under the oversight of the competent national supervisory authorities.

**The swift and effective reaction and close cooperation of European and national supervisory and bank resolution authorities ensured the orderly and loss-minimizing market exit of Sberbank Europe AG and its subsidiaries without causing any shock to financial stability.** Still, the authorities did learn some lessons during this challenging resolution process. Sberbank Europe AG with its seven subsidiaries in CESEE has probably been the most complex case of bank resolution in the European Union so far, involving two SSM subsidiaries, two EU non-SSM subsidiaries and three subsidiaries in third countries. Sberbank Europe AG's subsidiaries were subject to different supervision and resolution regimes, which required a swift and comprehensive exchange of information and close alignment between the competent authorities. Harmonizing these regimes would significantly reduce the complexity of such resolution cases.

**Sberbank Europe AG's crisis resulted in a potentially high burden on national deposit guarantee schemes.** The impact on the Austrian deposit guarantee scheme, in particular, was disproportionately high, given the large number of covered deposits in the

German branch of Sberbank Europe AG, whose operations relied on the freedom of establishment principle.<sup>15</sup> The complexity arising from the multitude of involved deposit guarantee schemes in different countries as well as the burden cross-border deposits placed on these schemes highlight the need to intensify discussions on creating a pan-European deposit guarantee scheme.

**Moreover, given the bank's complex cross-border structure, the case of Sberbank Europe AG was particularly challenging also in terms of banking resolution.** The SRB is directly responsible for resolving significant institutions and cross-border banking groups in the euro area only. The resolution of banks and banking subsidiaries outside the euro area is carried out by the national authorities and is outside the SRB's competence. Hence, involving the national authorities responsible for all subsidiaries of cross-border banking groups is key to performing their efficient and loss-minimizing resolution.

<sup>15</sup> Credit institutions with a banking license in a member state of the European Economic Area are generally authorized to also provide banking operations in other member states due to the freedom of establishment and the freedom to provide services principles. The intention to provide cross-border banking services must be notified to the competent supervisory authority ("European passporting"). In Austria, the subsequent authorization to provide cross-border banking services in other member states arises following a notification procedure by the FMA.



Special topics

## Nontechnical summaries in English

### **Financial vulnerabilities and debt at risk of CESEE borrowers: a cross-country analysis**

*Matthias Enzinger, Melanie Koch, Aleksandra Riedl*

In this study, we look into potential credit risks from the household sector in nine Central, Eastern and Southeastern European (CESEE) countries, a region where Austrian banks have traditionally been very active. Using OeNB Euro Survey data from fall 2020 and 2021, we compare the share of financially vulnerable households across countries. We consider those households financially vulnerable that may fail to fully meet their financial obligations in time, and we use five different debt burden indicators usually applied in the literature, which we condense into one vulnerability index. Based on this index, we calculate debt at risk, which means the outstanding debt of financially vulnerable households as a share of the overall outstanding household debt in each country. Our results reveal that the debt-at-risk level varies widely across CESEE. In six out of nine countries, the debt of vulnerable borrowers is overproportionately high. In Romania, both the credit risks from the household sector and the exposure of Austrian banks' subsidiaries are high. Against this backdrop and given the ongoing surge in consumer prices and rising interest rates, constant and in-depth monitoring of credit risks is crucial.

### **Systemic risks of commercial real estate funding in Austria**

*David Liebeg, Maximilian Liegler*

This paper presents a systemic risk analysis of commercial real estate (CRE) funding in Austria and highlights fields for future research. We analyze (1) real estate loans to corporates that fund commercial and residential property and (2) real estate loans to individuals that fund commercial property. International experience has shown that systemic CRE crises mainly stem from loan funding by banks, which also constitutes the major funding source for CRE in Austria. Compared with other EU banking markets, Austrian banks rely more heavily on CRE loans in their business models. Until recently, CRE loan growth rates increased, yet only very few Austrian banks reached critical levels concerning their business activities and loan growth. While median loan-to-value ratios of CRE loans are moderate, a substantial share exhibits critical levels. The reasons behind this circumstance are subject to further investigation. Real estate companies are structurally rated lower than other corporates. So far, however, rating migrations in Austria have not exhibited critical patterns thanks to a booming real estate market and supportive fiscal and monetary policies in the wake of the COVID-19 pandemic. Banks and supervisors ought to monitor how the forecast economic downturn and interest rate hikes will impact rating migrations and the market values of pledged CRE collateral.

### **Effects of interest rate and inflation shocks on household vulnerability in Austria: a microsimulation using HFCS data**

*Nicolas Albacete, Isabel Gerstner, Niklas Geyer, Peter Lindner, Nicolas Prinz, Verena Woharcik*

In this study, we investigate how the recent rise in interest rates and high inflation in the euro area have affected the vulnerability of households and their debt (“debt at risk”). We identify financially vulnerable households in Austria using several common vulnerability measures and data from the latest wave of the Household Finance and Consumption Survey (HFCS). We find that high inflation has a stronger impact on the share of vulnerable households than the rise in interest rates, which itself has a stronger impact on debt at risk: The loans of households becoming vulnerable because of higher interest rates (typically mortgages) tend to be larger than the loans held by households becoming vulnerable because of high inflation (typically nonmortgage loans). When we look at households in the euro area, the impact of high inflation and rising interest rates taken together is similar to the impact on households in Austria. However, both the share of vulnerable households in Austria and their debt is lower in the first place.

### **DuPont reloaded: the profitability of the Austrian banking sector and the impact of the COVID-19 pandemic**

*Manuel Gruber, Stefan Kavan*

This short study follows up on a previous paper published in the OeNB’s Financial Stability Report 33 that applied a DuPont analysis to examine the profitability of Austrian banks’ subsidiaries in Central, Eastern and Southeastern Europe (CESEE) for the period from 2004 to 2016. We now focus on the years from 2017 to 2021 and, in addition, look at the entire Austrian banking sector. Moreover, we explain trends in banks’ net interest income as we consider price and volume effects. We find that banks’ return on equity dropped substantially in 2020 but bounced back to pre-pandemic levels in 2021. The obvious driver were risk costs, which spiked at first but quickly calmed down again as the impact of the pandemic proved to be less severe than originally expected. Banks’ net interest margin was negatively affected during the pandemic, both by low interest rates and banks’ shift toward lower-margin business. The future development of profitability in the Austrian banking sector is highly uncertain. But even though much will depend on external factors, including monetary, fiscal and prudential decisions as well as geopolitical developments, our analysis suggests that the Austrian banking sector is well prepared to weather these challenging times.

## Nontechnical summaries in German

### **Finanziell vulnerable Haushalte und ausfallgefährdete Kreditvolumina in CESEE: eine länderübergreifende Analyse**

*Matthias Enzinger, Melanie Koch, Aleksandra Riedl*

In diesem Beitrag untersuchen wir mögliche Kreditrisiken, die von privaten Haushalten ausgehen, in neun Ländern Zentral-, Ost- und Südosteuropas (CESEE), einem für den österreichischen Bankensektor traditionell sehr wichtigen Markt. Mithilfe von Daten aus dem OeNB Euro Survey (Umfragen vom Herbst 2020 und 2021) vergleichen wir den Anteil finanziell vulnerabler Haushalte in den einzelnen Ländern. Dabei werden jene Haushalte als finanziell vulnerabel eingestuft, die ihren finanziellen Verpflichtungen möglicherweise nicht pünktlich und in vollem Umfang nachkommen können. Wir verdichten fünf unterschiedliche Indikatoren für die Schuldenlast, die üblicherweise in einschlägigen Studien verwendet werden, zu einem Vulnerabilitätsindex. Auf Grundlage dieses Index berechnen wir das ausfallgefährdete Kreditvolumen, d. h. die ausstehenden Schulden finanziell vulnerabler privater Haushalte im Verhältnis zum gesamten ausstehenden Haushaltskreditvolumen in jedem einzelnen Land. Es zeigt sich, dass der Anteil des ausfallgefährdeten Kreditvolumens stark variiert. In sechs von neun Ländern haben finanziell vulnerable Haushalte überproportional hohe Schulden. In Rumänien sind sowohl die aus dem Haushaltssektor erwachsenden Kreditrisiken als auch die Exposures österreichischer Bankentöchter hoch. Vor diesem Hintergrund und angesichts der anhaltend stark steigenden Verbraucherpreise und steigenden Zinsen ist die laufende, intensive Überwachung von Kreditrisiken von größter Wichtigkeit.

### **Systemische Risiken aus der Gewerbeimmobilienfinanzierung in Österreich**

*David Liebeg, Maximilian Liegler*

Diese Studie analysiert Risiken für das Finanzsystem, die sich aus der Finanzierung von Gewerbeimmobilien in Österreich ergeben, und zeigt künftige Forschungsfragen auf. Wir untersuchen 1) Immobilienkredite an Unternehmen, die zur Finanzierung von Gewerbe- bzw. Wohnimmobilien dienen, sowie 2) Immobilienkredite an private Haushalte, die zur Finanzierung von Gewerbeimmobilien dienen. Internationale Erfahrungen haben gezeigt, dass systemische Krisen im Zusammenhang mit Gewerbeimmobilien hauptsächlich auf Kreditfinanzierung durch Banken zurückzuführen sind – die wichtigste Finanzierungsquelle für Gewerbeimmobilien auch in Österreich. Im EU-Vergleich haben die österreichischen Banken ihre Geschäftsmodelle stärker auf Gewerbeimmobilienkredite ausgerichtet. Bis vor kurzem stiegen die Wachstumsraten für diese Kredite an, doch nur sehr wenige österreichische Banken erreichten im Hinblick auf Geschäftstätigkeit und Kreditwachstum ein kritisches Niveau. Weisen die Beleihungsquoten für Gewerbeimmobilienkredite im Median ein moderates Niveau auf, so erreichen sie für einen erheblichen Anteil kritische Werte. Die Gründe dafür sind Gegenstand weiterer Untersuchungen. Immobilienunternehmen weisen strukturell niedrigere Ratings auf als andere Unternehmen. Bislang jedoch zeigen Ratingmigrationen in Österreich dank des florierenden Immobilienmarkts und der geld- und finanzpolitischen Lockerungen in Folge der COVID-19-Pandemie noch keine kritischen Muster. Banken und Aufsichtsbehörden sind angehalten zu beobachten, wie sich der vorhergesagte Wirtschaftsabschwung und die Zinsanhebungen auf Ratingmigrationen und den Marktwert von Gewerbeimmobilien, die als Sicherheiten dienen, auswirken.

## **Auswirkungen von Zins- und Inflationsschocks auf die finanzielle Vulnerabilität privater Haushalte in Österreich: eine Mikrosimulation mit HFCS-Daten**

*Nicolas Albacete, Isabel Gerstner, Niklas Geyer, Peter Lindner, Nicolas Prinz, Verena Woharcik*

Wir untersuchen, inwiefern sich die jüngsten Zinsanhebungen und die hohe Inflation im Euroraum auf die finanzielle Vulnerabilität privater Haushalte und ihre Schulden (d. h. Kredite, die als ausfallgefährdet eingestuft werden) auswirken. Zur Bestimmung, welche Haushalte als finanziell vulnerabel einzustufen sind, verwenden wir eine Reihe gängiger Indikatoren sowie Daten aus der jüngsten Erhebungswelle des Household Finance and Consumption Survey (HFCS). Wir stellen fest, dass die hohe Inflation den Anteil vulnerabler privater Haushalte stärker beeinflusst als die Zinserhöhung, welche wiederum eine größere Auswirkung auf den Anteil des Kreditvolumens, der von potenziell vulnerablen Haushalten gehalten wird, hat: die Kredite privater Haushalte, die wegen gestiegener Zinsen finanziell vulnerabel werden, sind tendenziell höher (und in der Regel Hypothekendarlehen) als die Kredite jener Haushalte, die wegen der hohen Inflation vulnerabel werden (üblicherweise Konsumkredite). Im Vergleich zu den privaten Haushalten im Euroraum sind die Haushalte in Österreich grundsätzlich weniger finanziell vulnerabel, und ihre ausstehenden Kreditvolumina sind geringer. Hohe Inflation und Zinsanhebung zusammengenommen betreffen private Haushalte im Euroraum und in Österreich auf ähnliche Weise.

## **DuPont reloaded: Profitabilität des österreichischen Bankensektors und Auswirkungen der COVID-19-Pandemie**

*Manuel Gruber, Stefan Kavan*

Diese kurze Studie baut auf einer im Financial Stability Report 33 der OeNB veröffentlichten Studie auf, in der die Profitabilität der österreichischen Tochterbanken in Zentral-, Ost- und Südosteuropa (CESEE) im Zeitraum von 2004 bis 2016 anhand einer DuPont-Analyse untersucht wurde. Nun konzentrieren wir uns auf die Jahre von 2017 bis 2021 und beziehen außerdem den gesamten österreichischen Bankensektor mit ein. Darüber hinaus erklären wir Entwicklungen des Nettozinsetrags unter Berücksichtigung von Preis- und Volumeneffekten. Die Eigenkapitalrendite der Banken ging im Jahr 2020 deutlich zurück, erreichte aber 2021 wieder das Vor-Pandemie-Niveau. Das lag insbesondere an den Risikokosten, die zuerst in die Höhe schossen, sich in der Folge aber rasch wieder beruhigten, da die Auswirkungen der Pandemie in diesem Bereich weniger schwerwiegend waren als ursprünglich erwartet. Sowohl niedrige Zinsen als auch die Verlagerung auf Geschäfte mit geringeren Margen wirkten sich während der Pandemie negativ auf die Nettozinsmarge der Banken aus. Die künftige Entwicklung der Profitabilität des österreichischen Bankensektors ist höchst ungewiss. Doch obwohl vieles von externen Faktoren wie geld-, fiskal- und aufsichtspolitischen Entscheidungen sowie geopolitischen Entwicklungen abhängig sein wird, legt unsere Analyse nahe, dass der österreichische Bankensektor gut auf diese herausfordernden Zeiten vorbereitet ist.

# Financial vulnerabilities and debt at risk of CESEE borrowers: a cross-country analysis

Matthias Enzinger, Melanie Koch, Aleksandra Riedl<sup>1</sup>

Refereed by: Miguel Ampudia, Bank for International Settlements

We employ OeNB Euro Survey data to provide an assessment of the financial vulnerability of indebted households in nine Central, Eastern and Southeastern European (CESEE) economies for the first two years of the COVID-19 pandemic (2020 and 2021). Given the considerable exposure of Austrian banking subsidiaries in this region, it is of crucial policy relevance to swiftly identify potential risks stemming from household debt. Against this background, we calculate debt at risk, i.e. the outstanding debt held by financially vulnerable households as a share of overall outstanding household debt in each country, including nonbank debt. To determine which indebted households are vulnerable, we calculate five different indicators of financial vulnerability commonly used in the literature and combine them into one vulnerability index. Using our vulnerability index, we observe considerable heterogeneity across countries with respect to the debt-at-risk level. In six out of nine countries, vulnerable borrowers hold an overproportionate share of debt. Given the ongoing surge in consumer prices and rising interest rates, constant and in-depth monitoring of credit risks is crucially important.

JEL classification: D14, D39, G5, O52

Keywords: financial vulnerability, debt at risk, household overindebtedness, CESEE

The Austrian banking sector is traditionally tightly linked to Central, Eastern and Southeastern Europe (CESEE). At end-2021, the exposure of Austrian subsidiaries to the region as a whole amounted to EUR 277 billion, which corresponds to two-thirds of all foreign claims (Bank for International Settlements) or 24% of all Austrian banking system assets (see box 1). From a financial stability perspective, these strong interlinkages require in-depth surveillance of CESEE financial institutions. This is especially true against the background of the COVID-19 pandemic, which has decisively influenced economic developments since the beginning of 2020. The banking system has so far proven resilient in terms of credit risks. Nonperforming loan (NPL) ratios of Austrian subsidiaries in CESEE have remained low (2% in Q4 21) and capitalization is strong (see OeNB, 2022a; OeNB, 2022b).

However, while banking sector indicators are important in monitoring credit risks, a comprehensive financial stability assessment has to take the borrower's perspective into account to swiftly detect potential vulnerabilities building up (ESRB, 2018). The financial resilience of indebted households and firms in CESEE may have weakened as a result of the COVID-19 pandemic and the recent energy price shock. This could be further aggravated by rising interest rates due to monetary tightening, and CESEE borrowers are particularly challenged due to the predominance of variable interest rate loans (Riedl, 2019). Information on the financial resilience of borrowers is therefore crucial to quantify the group of debtors

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at higher risk of being unable to repay their loans in the event of a shock and to assess the associated credit risks. This is where this study contributes.

Using OeNB Euro Survey data from fall 2020 and 2021, we aim to shed light on potential credit risks arising from the household sector in the CESEE-9 region.<sup>2</sup> As the OeNB Euro Survey is a priori harmonized, household financial distress and the associated credit risks can be assessed comparably across the nine countries. With this paper, we also contribute to the literature on household financial vulnerability and the related literature on household overindebtedness, which both mostly rely on single-country household survey data.<sup>3</sup>

We proceed in two steps. First, we compare the share of financially vulnerable households across countries. We understand this to include indebted households at risk of failing to meet their financial obligations in due time and completely. We aim not to calculate the share of indebted households closest to default, but rather to assess how many debtors are in repayment difficulties or could run into difficulties paying back their loans in the event of a shock, given their current financial situation.<sup>4</sup> As this concept of vulnerability is multidimensional, where one way of measurement does not fit all households equally, we consider a heterogeneous set of debt burden indicators usually applied in the literature (including debt service-to-income ratio and debt-to-income ratio). We condense the information included in these indicators into one vulnerability index to facilitate cross-country comparison of vulnerable indebted households.

In a second step, we calculate the outstanding debt held by vulnerable households as a share of overall outstanding household debt in each country. The derived debt-at-risk measure reflects the exposure to vulnerable households not only of banks,<sup>5</sup> but also of private lenders and financial intermediaries outside the traditional banking sector. This is due to the survey also asking about informal debt. As nonbank finance may also become a source of systemic risk through its potential interconnectedness with the banking system, our derived measure provides a comprehensive picture of financial stability risks. Due to data limitations, we are however unable to assess how much of vulnerable households' estimated debt at risk could be covered by their assets (see for example Albacete et al., 2020), as information on the latter is not available in the OeNB Euro Survey. However, we can make use of some survey questions about household ownership of real estate to distinguish less wealthy from wealthier households.

<sup>2</sup> The CESEE-9 are Bulgaria (BG), Czechia (CZ), Croatia (HR), Hungary (HU), Poland (PL), Romania (RO), Bosnia and Herzegovina (BA), North Macedonia (MK) and Serbia (RS). Note that the OeNB Euro Survey is conducted in ten CESEE economies (the CESEE-9 and Albania), but we exclude Albania from our analysis due to ongoing data checks for this country for the survey waves 2020 and 2021.

<sup>3</sup> The literature on household financial vulnerability aims to assess financial stability risks by taking the borrower's perspective into account. Due to the lack of credit register data, most papers employ survey data to investigate financial vulnerability issues. Single country studies include Room and Merikull (2017), Banbula et al. (2016), Albacete et al. (2014), and Albacete and Fessler (2010). Studies analyzing financially vulnerable households across several countries include: Albacete et al. (2020), Ampudia et al. (2016), Fessler et al. (2017), and Riedl (2021, 2019). Literature on household overindebtedness looks rather at direct implications for financially vulnerable households, like poverty, and has a stronger consumer-protection angle (e.g. Betti et al., 2007; D'Alessio and Iezzi, 2013).

<sup>4</sup> Note that the real default rate is likely to be much lower, as only some of these loans will eventually be defaulted on.

<sup>5</sup> However, we do not know at which banks vulnerable households hold their debt and therefore cannot isolate the debt at risk to Austrian subsidiaries.

The timeliness of the data allows us to analyze a period which was very much shaped by the COVID-19 pandemic. Enzinger et al. (2021) report that the share of households exhibiting a negative income shock doubled in the CESEE region in 2020 compared to the years prior to the crisis (from 15% to 30%). According to the OeNB Euro Survey wave in fall 2021, 42% of all households had been negatively financially affected by the COVID-19 pandemic.<sup>6</sup> The potential negative impact of these shocks on the resilience of indebted households is therefore reflected in our analysis.

Our contribution is most closely related to Albacete et al. (2020), Riedl (2019) and Fessler et al. (2017), who study household vulnerability across a set of CESEE economies. Riedl (2019) employs almost the same country set as we do (for the year 2017), but does not estimate debt at risk due to data limitations. Albacete et al. (2020) and Fessler et al. (2017) present a broad selection of vulnerability indicators but for a quite different country sample.<sup>7</sup> The indicators presented in our study have not been available for most of the countries in the CESEE-9 region so far and the financial vulnerability of borrowers could not be assessed to such an extent.

This study is structured as follows. In section 1, we describe the OeNB Euro Survey data and the debt burden indicators we construct. Based on these indicators, we briefly discuss the financial situation of indebted households in the CESEE-9. Box 1 highlights the importance of this region for the Austrian banking sector. Section 2 explains how we condense these debt burden indicators into a single financial vulnerability index and provides descriptive evidence on financial vulnerability across the CESEE-9. In section 3, we assess the credit risk from (less wealthy) vulnerable households by calculating the share of debt held by these households in the total amount of household debt in each country. Section 4 concludes.

## 1 The financial situation of indebted CESEE households

### 1.1 Data

This paper uses newly available micro-level data for nine CESEE economies on households' indebtedness obtained from the OeNB Euro Survey 2020 and 2021 waves. The OeNB Euro Survey – conducted annually in fall – is based on approximately 1,000 randomly selected individuals per year and country and is harmonized across countries. The survey uses face-to-face interviews and is largely tablet-based (only for some cases in Czechia and Poland is it paper-based). In addition to information on debt, the survey elicits unique data on net disposable income, savings, euroization, respondents' "economic" expectations, sociodemographic variables and some broad measures on asset ownership.<sup>8</sup> The advantage of eliciting net

<sup>6</sup> This figure represents an unweighted average over all (nine) countries. The share ranges between 23% in Czechia and 51% in Bosnia and Herzegovina.

<sup>7</sup> Albacete et al. (2020) and Fessler et al. (2017) employ data from the Household Finance and Consumption Survey (HFCS), which includes eight CESEE economies in its most recent (third) wave. Of the nine economies captured in the OeNB Euro Survey, only three are currently included in the HFCS. The surveys are thus more complementary than redundant with respect to country coverage.

<sup>8</sup> For detailed information on the OeNB Euro Survey, visit [OeNB Euro Survey - Oesterreichische Nationalbank \(OeNB\)](#).



Table 1

### Summary statistics on CESEE-9 households

	BG	HR	CZ	HU	PL	RO	BA	MK	RS	CESEE-9
Household size (number of persons)	2.4	2.9	2.4	2.3	2.8	2.7	3.0	3.4	2.9	2.7
Equivalentized, monthly median household income (EUR, adjusted for purchasing power parity)	801.4	1,037	1,204	866.9	940	765.4	489.1	575.3	647.1	813.3
Household experienced income shock in previous year (% of all households)	29	22	28	21	24	27	19	36	23	25
Household owns main residence (% of all households)	94	90	72	88	79	90	95	83	93	87
Household owns secondary residence (% of all households)	14	13	6	4	10	7	11	9	16	10
Household owns other real estate (% of all households)	17	25	17	8	11	8	12	17	11	14
Number of observations	2,006	2,026	2,000	2,000	2,015	2,064	2,000	2,020	2,017	18,148

Source: OeNB Euro Survey 2020 and 2021.

disposable income directly is that a household's debt (service) amount can be related to the share of available income for spending. Moreover, the resulting debt burden indicators are more comparable across countries. However, the OeNB Euro Survey does not cover the full balance sheet of households, as complete value information on the asset side is missing. We will therefore approximate wealth.

While most survey questions focus on the individual, in some cases, respondents were asked to report about their household's financial situation. We use these questions to analyze household indebtedness. We pool the data over the 2020 and 2021 survey waves in order to increase sample size and employ household weights (based on the region and size of the household) to obtain indicators representative of the target population. Weighted summary statistics on some basic characteristics of households are presented in table 1.

Furthermore, like Hake and Poyntner (2022) and other surveys on household indebtedness (e.g. HFCS: Albacete et al., 2019; SCF: Kennickell, 1998), we correct for item nonresponse using imputation techniques. This is necessary as data are not missing completely at random (MCAR), and the usage of listwise deletion could seriously bias our estimates (Van Buuren, 2018). Subsequently, in line with Albacete et al. (2019), we use multiple imputation by chained equations. This procedure relies on the assumption that item nonresponse depends only on observed variables and is random if the correlation with those variables is considered (MAR) – still a strong assumption, but weaker than MCAR. We compute five imputed datasets and employ Rubin's rules for the statistics based on the data (see e.g. Little and Rubin, 2019). In general, all standard errors and p-values reported use the mentioned household weights and account for multiple imputation. Details on imputation technique, imputed variables and missingness can be found in the online supplement, section 2.

## 1.2 The debt burden indicators

We calculate five commonly used indicators for household financial vulnerability, summarized in table 2. The debt-to-income ratio (DTI) and the debt service-to-income ratio (DSTI) both link indebtedness to households' net income. The first

relates the outstanding debt of an indebted household ( $D_i$ ) to yearly net disposable income, illustrating how many years a household will need to repay its debt if its income is used exclusively for debt repayment but without taking actual loan maturity into account. Usually, an indebted household is classified as vulnerable if the DTI ratio is greater than or equal to 3. In the OeNB Euro Survey, the household's total outstanding debt includes bank loans as well as loans from other sources, like family, employer, stores, Internet lenders or leasing companies.<sup>9</sup> Unlike the DTI, the DSTI ratio is more of a liquidity than a solvency concept (Leika and Marchettini, 2017). It relates monthly loan installment payments ( $DS_i$ ) to the monthly net disposable income of an indebted household ( $I_i$ ) and therefore takes interest rate levels and loan maturities into consideration. By measuring short-term debt commitments, the DSTI is an indicator of the burden that debt holdings represent for current income. For the DSTI indicator, we define households as vulnerable when DSTI is equal to or exceeds 40% (see Noerhidajati et al., 2021).

In line with the DSTI ratio, the financial margin (FM) quantifies financial vulnerability according to the liquidity definition but, in addition to debt payments, considers other regular household expenses. It is obtained by subtracting loan installment payments and basic living costs in a country  $c$  ( $BLC_c^i$ ) from a household's net disposable income.<sup>10</sup> Based on this indicator, indebted households are classified as vulnerable if their FM is negative. Unlike the DSTI indicator, the FM takes the relative income position of the borrower into account. This is because  $BLC_c^i$  are the same for all households within a country, irrespective of income. Accordingly, indebted low-income households have less financial capacity after deducting basic living costs.

The final two indicators are obtained from survey questions which directly address financial distress. Respondents are asked whether their household's expenses<sup>11</sup> were (1) higher, (2) roughly equal to or (3) lower than their income in the 12 months preceding the interview. If expenses were higher (i.e.  $E>I=I$ ), indebted households are classified as vulnerable. Like the FM, the  $E>I$  indicator considers the household's expenses, but focuses more on a medium-term perspective. Finally, the arrears indicator provides information on whether an indebted household was behind on its loan repayments once or more often during the past 12 months on account of financial difficulties. If this is the case ( $arrears=I$ ), the indebted household is classified as vulnerable. Like the  $E>I$  indicator, arrears captures a medium-term perspective, i.e., both indicators point to households that have been in financial distress but might be doing well now. Moreover, the arrears indicator captures any duration of late payment, even if the delay was only a few days. The survey questions used to construct the indicators can be found in the online supplement (section 1).

<sup>9</sup> For an overview of nonbank loans of CESEE borrowers, see Allinger and Beckmann (2021a).

<sup>10</sup> Basic living costs of a household are defined as 40% of a country's median equivalized income adjusted by the equivalized household size. Furthermore, for tenants this threshold is set at 50% to account for rent payments (Ampudia et al., 2016). To calculate the household's equivalence factor, we follow the OECD-modified scale. It assigns a value of 1 to the household head, 0.5 to each additional adult and 0.3 to each child.

<sup>11</sup> Expenses exclude purchases of assets but include loan installment payments.

Table 2

### Debt burden indicators

Indicator	Vulnerability threshold	Formula
Debt-to-income (DTI) ratio	DTI ≥ 3 years	$DTI_i = \frac{D_i}{I_i * 12}$
Debt service-to-income (DSTI) ratio	DSTI ≥ 40%	$DSTI_i = \frac{DS_i}{I_i} * 100$
Financial margin (FM)	FM < 0	$FM_i = I_i - DS_i - BLC_i^c$
Expenses > income (E>I)	E>I = 1	$E>I = \begin{cases} 1 & \text{for } E>I \\ 0 & \text{for } E \leq I \end{cases}$
Arrears	Arrears = 1	$Arrears = \begin{cases} 1 & \text{for arrears in last 12 months} \\ 0 & \text{for no arrears in last 12 months} \end{cases}$

Source: OeNB Euro Survey 2020 and 2021; Albacete et al. (2020); Ampudia et al. (2016); Fessler et al. (2017).

Note:  $D_i$  is the outstanding debt amount,  $DS_i$  are the monthly loan installment payments,  $I_i$  is the monthly net income and  $BLC_i^c$  are the monthly basic living costs of a household  $i$ . Financial margin and Expenses > income are indicators that can be meaningful for nonindebted households as well. However, for our debt burden indicators, we only consider indebted households.

Box 1

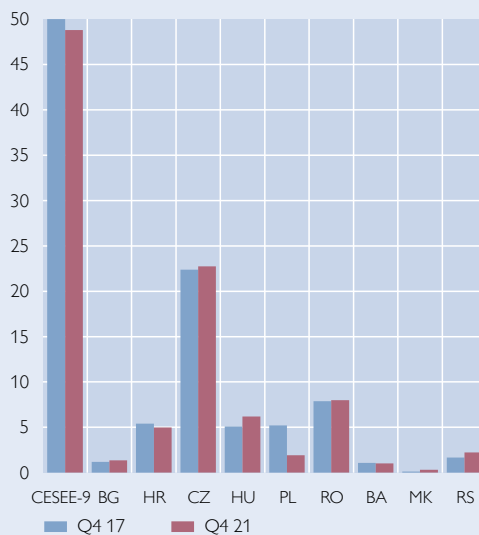
### Austrian banks and the CESEE-9

Chart 1

#### Austrian bank lending

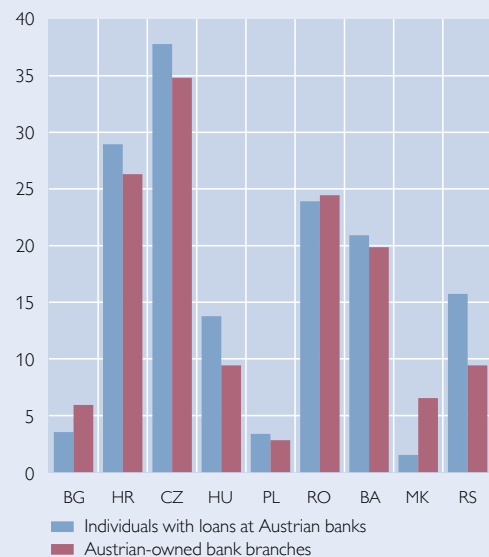
##### Consolidated foreign claims of Austrian banks

% of total foreign claims



##### Austrian bank lending to households

% of individuals with bank loans and % of bank branches



Source: Bank for International Settlements.

Source: OeNB Euro Survey 2017; Beckmann et al. (2018).

**CESEE is the most important foreign market for the business activities of Austrian banks. Moreover, by the end of 2021, roughly 50% of all foreign claims by Austrian banks were located in the nine CESEE countries covered in the OeNB Euro Survey (see chart 1, left panel). This totals around EUR 200 billion or 17% of all total assets. The distribution is rather uneven though, with claims in Czechia amounting to more than 20% of the total. Claims in Croatia,**

Hungary and Romania combined make up another 20%, whereas claims in the other six countries are below 3% each. Except for Poland, the share of exposures Austrian banks hold in the nine countries has changed little over recent years. In the four CESEE-9 countries where the most claims are located, at least half of Austrian bank branches' lending activities comprise consumer and mortgage loans (see Wittenberger, 2018). Unfortunately, we do not know at which bank the households interviewed in the OeNB Euro Survey in 2020 and 2021 have taken out their loans.

However, we have some bank information for respondents surveyed in 2017: In this survey, respondents with a bank loan were asked which bank they borrowed from. If they had several loans, they were asked to refer to their largest loan. For each country, tailor-made lists including all banks active in this country were provided. For all the listed banks, bank ownership data are available. The blue bars in the right-hand panel of chart 1 depict the weighted share of all indebted individuals who have their only or largest loan at an Austrian-owned bank. Austrian-owned banks in that case are defined as banks whose ultimate global owner was registered in Austria at the time of the survey. Respondents who could not or did not want to answer at which bank they hold their loan (around 7%) are treated as not having the loan at an Austrian bank. Thus, the plotted share is a lower bound, and the share is almost 40% still in Czechia. In Bosnia and Herzegovina, Croatia and Romania, the share is at least above 20%.

The red bars in the right-hand panel of chart 1 indicate the share of all bank branches in a country that belong to Austrian banks. Branch data were partially hand-collected and compiled by the OeNB for the year 2013 and are described in Beckmann et al. (2018). As can be seen, the share of individuals with a loan at an Austrian bank and the share of Austrian bank branches are strongly correlated. Both partially reflect the sum of foreign claims but also highlight the different credit volumes across countries.

Overall, households in the CESEE-9 owe substantial amounts to Austrian banks and their subsidiaries, making monitoring their financial vulnerability highly important for the Austrian central bank.

Table 3 summarizes household debt statistics for each country separately and the (unweighted) CESEE-9 average. The first row shows the share of households with any form of debt. Differences across countries are already evident as the share of indebted households ranges from 19% in Romania to 36% in Hungary. The next rows illustrate the proportion of indebted households at risk for our five financial distress indicators. The share of indebted households who are financially vulnerable according to the DSTI ratio is highest in Romania (25%) and in Bosnia and Herzegovina (27%), whereas Czechia (4%) and Hungary (3%) have the lowest shares. The picture is similar but not the same for the DTI ratio. Households in Romania (10%) and Bosnia and Herzegovina (12%) are again most heavily exposed, but households in Croatia, which were below average for the DSTI indicator, are here heavily exposed too (9%). Moreover, the percentage of vulnerable households in some countries more than halves under the DTI as opposed to the DSTI indicator. A larger share of indebted households may therefore have liquidity rather than solvency issues.

Row 4 of table 3 suggests that in Czechia, the share of vulnerable households according to the FM amounts to only 6%, while it is nearly three times higher in Bulgaria. The FM is usually higher than DSTI. This is because the share of vulnerable households in the low-income group is higher than among high-income households. The FM places more weight on the relative income position than the DSTI, thus increasing the share of financially vulnerable households. Compared to the E>I, the FM shows fewer households as vulnerable for many countries. The E>I indicator

Table 3

### Share of indebted households at risk by various debt burden indicators

	BG	HR	CZ	HU	PL	RO	BA	MK	RS	CESEE-9
	%									
Debt participation	20	33	28	36	32	19	31	33	21	28
DSTI $\geq$ 40%	13	7	4	3	6	25	27	11	6	11
DTI $\geq$ 3 years	6	9	5	5	6	10	12	7	4	7
FM < 0	16	10	6	9	14	22	25	13	11	14
E>I = 1	18	21	17	11	19	21	21	33	23	20
Arrears = 1	40	30	30	24	38	26	16	43	39	32
	Number									
Observations	2,006	2,026	2,000	2,000	2,015	2,064	2,000	2,020	2,017	18,148

Source: OeNB Euro Survey 2020 and 2021.

identifies the highest proportion of vulnerable households in North Macedonia (33%) and Serbia (23%). Strikingly, only 6% of indebted households in Serbia are vulnerable according to the DSTI measure. The arrears indicator reports the highest share of distressed households for nearly all countries – in some extreme cases, it is ten times higher than the indicator reporting the smallest share. This number is comparable to other countries and data sources.<sup>12</sup> Given that even short-term delinquency is counted in, these numbers are not surprising. Here, Bosnia and Herzegovina stands out again. However, this time in the opposite direction. It has by far the lowest share of indebted households who report having been in arrears.

In short, in each country, the share of indebted households which could be classified as vulnerable varies considerably depending on the debt burden indicator used.<sup>13</sup> In the most extreme case, North Macedonia, it varies from 7% to 43%. Moreover, there are large differences in the proportion of indebted households at risk between countries for all observed indicators. However, these differences are not the same for each indicator. Some countries rank higher for one measure but lower in another.<sup>14</sup> In that sense, individual debt burden indicators are not rank-preserving. Thus, relying on only one indicator to determine the financial vulnerability of an indebted household seems too narrow.

## 2 Financial distress – the vulnerability index

In measuring financial vulnerability, we rely on so-called objective debt burdens, which define indebted households as vulnerable if a certain quantitative threshold is crossed. In comparison to subjective debt burdens, which rely mostly on personally perceived household financial distress, they have the disadvantage of taking the

<sup>12</sup> For example, a report by Eurofound using similar arrears data from EU-SILC shows that in 2018, 8.9% of the whole EU-28 population was in some form of arrears, while four out of the six CESEE-9 EU economies ranked above average (see Eurofound, 2020). For the CESEE-9 countries, the population share of households in loan arrears amounts to 8.8%.

<sup>13</sup> A high variation can also be observed in Austria. Employing the latest wave of the Austrian Household Finance and Consumption Survey (HFCS, 2017), Albacete et al. (2022) find that the share of vulnerable households in Austria ranges between 2.3% and 15.8%, depending on the vulnerability indicator used.

<sup>14</sup> This variation within and between countries can also be seen when we look at households with consumer loans only, excluding households with mortgage loans. The variation does not therefore seem driven by pooling of both loan types.

individual situation less into account (for a discussion on debt burden indicators, see e.g. Disney et al., 2008; D’Alessio and Iezzi, 2013). However, their strong advantages are that they are less biased by personal factors like risk aversion or optimism and that – given their objectivity – households can be compared more easily. Still, it is not clear how to rank indebted households in terms of vulnerability given the five different indicators. As can be seen in section 1, one measure of financial vulnerability does not seem to fit all households equally well. It is therefore common in the literature to use several indicators that reflect different kinds of vulnerability.

In general, indebted households may show one dimension of vulnerability but still do relatively well in other dimensions of financial distress. For example, although a household’s DSTI is larger than 40%, its income may still exceed its expenses considerably, making payment difficulties less likely. Another important point is that single indicators are not always easy to compare across countries. This is well illustrated by table 3. An indicator’s bite can depend on local and institutional factors. In debt-averse countries, for instance, going into arrears is socially stigmatized, so a household’s DSTI may be already alarmingly high, but the arrears symptom might not pop up – as in Bosnia and Herzegovina.

Table 4 again illustrates the issue of different dimensions of vulnerability well. Almost all vulnerability indicators are statistically significantly correlated, but the correlation for most pairings is still weak in size. While a DSTI  $\geq 40\%$  is fairly correlated to a negative financial margin, the relationship between a DTI  $\geq 3$  years and expenses larger than income and being in arrears is very weak. Thus, looking at only one indicator neglects or overstates the vulnerability that might be revealed in a different dimension. Overall, a single indicator is only one symptom of financial vulnerability.

In order to compare household vulnerability across countries, it would be preferable to synthesize the different symptoms of household financial distress into a single measure. This allows for more consistent country comparisons than choosing a different indicator for each country, as the exact same measure is used for every country. In principle, such a combined indicator can be constructed in various ways. A simple and straightforward way would be to look at the share of indebted households that show at least one symptom of vulnerability, meaning the vulnerability threshold is crossed for at least one of the five debt burden indicators.

In chart 2, this share is depicted across the CESEE-9. In each country, at

Table 4

### Correlation of vulnerability indicators

	DSTI $\geq 40\%$	DTI $\geq 3$ years	FM $< 0$	E $> I = 1$
DTI $\geq 3$ years	0.316***			
FM $< 0$	0.599***	0.247***		
E $> I = 1$	0.010***	0.051***	0.153***	
Arrears = 1	0.065***	0.018	0.096***	0.202***

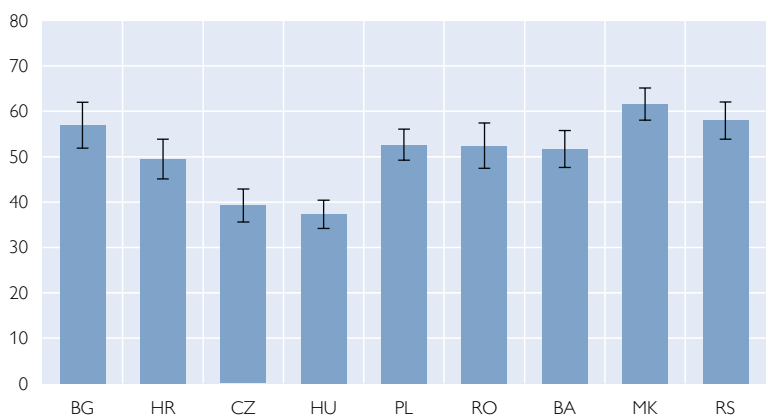
Source: OeNB Euro Survey 2020 and 2021.

Note: \* p-value  $< 0.10$ , \*\* p-value  $< 0.05$ , \*\*\* p-value  $< 0.01$ .

Chart 2

### Households displaying at least one symptom of vulnerability

% of all indebted households



Source: OeNB Euro Survey 2020 and 2021.

least a third of all indebted households suffer from some form of vulnerability. Having at least one symptom of financial vulnerability is thus quite common everywhere. Chart 3 complements that picture, plotting the distribution of the number of symptoms of a subsample of households with at least one symptom of vulnerability. This share varies considerably across countries. In Hungary and Serbia, more than 65% of vulnerable households show only one symptom and households have rarely more than two. In Bosnia and Herzegovina, North Macedonia and Romania, the fraction with more than one symptom is much higher. Overall, there is considerable heterogeneity across countries both in the fraction of indebted households with any symptom of financial vulnerability at all and in how many symptoms households have if they have any symptom at all. This compromises the use of an indicator which is based on having at least one symptom. For example, in Poland and Romania the share of indebted households with at least one symptom is almost the same (see chart 2), but in Romania, there are more indebted households with at least two symptoms (see chart 3). This means vulnerability is potentially overestimated in Poland relative to Romania if households are only classified by showing at least one symptom or not.

Another way of taking all symptoms into account is to simply add them up. This would give us a vulnerability score ranging from 0 to 5, where 0 means not vulnerable and 5 most vulnerable. In this score, all symptoms get equal weight. However, it is not clear that this is justified. A more structured way is to consider the correlation between symptoms and to get to the core of what they all measure. We therefore conduct a principal component analysis (PCA) over the whole

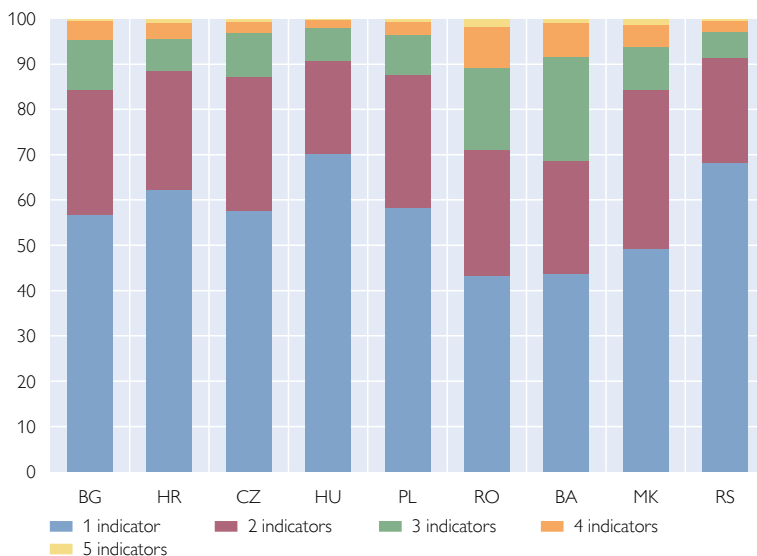
sample. A PCA reduces the multidimensionality of the indicators by identifying the common grounds (components) of the five indicators. Calculating the principal components over the whole sample means each country's distribution of vulnerability indicators is considered when constructing the overall index.<sup>15</sup> Importantly, this index allows for a cross-country comparison, as the same metric is considered for all countries.

Indeed, the first component from that PCA seems to reflect vulnerability. All five measures load the first component in the same direction, which is not the case for the second and third. The second and third principal components seem to capture other underlying factors. Vulnerability is one common ground these indicators measure but very likely not the only one. The first

Chart 3

### Household vulnerability by number of indicators

% of all households that are vulnerable at least according to one indicator



Source: OeNB Euro Survey 2020 and 2021.

<sup>15</sup> Note that each country impacts the index with a slightly different weight, as the number of observations (i.e., debt participation) is not the same across countries.

component explains around 37% of the variation and has an eigenvalue of about 1.9, again showing that the correlation between the individual debt burden measures is far from perfect but still there and sizable. Moreover, the PCA clearly does not assign each indicator an equal weight. In the first component, much more weight is given to the DSTI and FM indicator than to the arrears indicator.<sup>16</sup> Still, given the correlation structure for the first component, we interpret it as measuring overall financial vulnerability and call it vulnerability index (see Noerhidajati et al., 2021; Anderloni et al., 2012, who use a similar procedure). The index is a discrete measure and assigns one particular value out of 32 possible values to each indebted household. Higher values reflect higher degrees of vulnerability. The minimum number the index takes is  $-0.82$  and the maximum  $5.57$ . The mean value lies around zero and the standard deviation is  $1.37$  (see table 5).<sup>17</sup> The minimum and maximum values correspond to indebted households having no symptom at all and having every symptom. The charts in the annex show the distribution of the index and how the index values correspond to our single vulnerability indicators. We classify households as vulnerable based on this synthesized vulnerability index.

Table 5

**Vulnerability index: summary**

	Minimum	Maximum	Mean	Median	Standard deviation
Index	$-0.82$	$5.57$	$0.0$	$-0.44$	$1.37$

Source: OeNB Euro Survey 2020 and 2021.

### 3 Debt at risk

Usually, single debt burden indicators are used to define the share of vulnerable households and calculate financial stability risks stemming from the household sector.<sup>18</sup> In this paper, we use the previously derived vulnerability index to identify financially distressed households. Given the common approach, regardless of the specific design of such an indicator, a threshold has to be set to calculate the share of households ultimately classified as vulnerable. Setting the threshold between the lowest and the second-lowest index value would classify households with at least one symptom as vulnerable (see also chart 2). By moving further up the index scale, the different weighting of individual vulnerability symptoms (determined by PCA) starts to play a role and households with certain combinations of symptoms get ranked accordingly. For instance, indebted households with one symptom can be scored higher than those with two.<sup>19</sup> Out of the overall 32 scores of the vulnerability index, we set the threshold between the ninth and tenth, which corresponds to an index value centered around 1 standard deviation (sd) of the index. That is,

<sup>16</sup> The average loadings for the first component are as following:  $0.61$  for  $DSTI \geq 40\%$ ,  $0.41$  for  $DTI \geq 3$  years,  $0.24$  for  $E>I=1$ ,  $0.18$  for  $Arrears=1$  and  $0.6$  for  $FM<0=1$ .

<sup>17</sup> Notably, the correlation between that vulnerability index and simply counting the number of symptoms is very high ( $0.9$ ). As mentioned, the difference is that the first component of the PCA does not weight all symptoms equally.

<sup>18</sup> For instance, Johansson and Persson (2007) and Albacete and Fessler (2010) calculate the share of debt held by households with a financial margin less than zero. Albacete and Lindner (2013) estimate the share of debt held by four different groups of vulnerable households ( $debt\ to\ assets \geq 75\%$ ,  $DSTI \geq 40\%$ ,  $expenses > income$ ,  $inability\ to\ meet\ expenses$ ). Ampudia et al. (2016) define financial vulnerability based on the household's financial margin to calculate the share of debt at risk. Additionally, they contrast their results with debt shares derived using a broad set of alternative household distress metrics.

<sup>19</sup> For example, a household with a  $DTI \geq 3$  years is considered more vulnerable than one exhibiting the two symptoms  $E>I=1$  and  $arrears=1$ .



we define households as vulnerable, if their individual index score lies above 1 sd from the mean of the vulnerability index.<sup>20</sup> Above this threshold, households turn out to have at least two symptoms of vulnerability. The DSTI determines strongly if an indebted household's index score exceeds our threshold. In contrast, the arrears symptom mostly does not matter for our threshold (see also table A1). This corresponds to how these symptoms load on the vulnerability index.

As discussed in the previous section, we consider the whole sample (rather than individual country samples) to construct the PCA-based index and define the threshold value. The resulting shares of vulnerable households in each country can thus be set in relation to the (unweighted) average share of vulnerable households in the CESEE-9 region. Based on our threshold (mean + 1 sd), 12% of all indebted households are vulnerable in the entire region with large variation across countries (blue bars in chart 4). In two countries, Romania and Bosnia and Herzegovina, the share of vulnerable households is significantly higher than the CESEE-9 average. In Bosnia and Herzegovina, which exhibits the highest share, every fourth indebted household is vulnerable according to our definition. In contrast, in three out of the nine countries – Czechia, Hungary and Serbia – the share of vulnerable households is significantly lower than average.

After defining the group of vulnerable households, we estimate the share of debt held by these households as a percentage of the country's total household debt. We define that share in country  $c$  as

$$\text{debt at risk}^c = \frac{\sum_{i=1}^N v_i^c D_i^c}{\sum_{i=1}^N D_i^c},$$

where  $v_i^c$  is equal to 1 if household  $i$  is vulnerable and 0 otherwise<sup>21</sup> and  $D_i^c$  is a household's total outstanding debt.<sup>22</sup> It is noteworthy that, unlike in previous studies, we do not focus exclusively on banks' exposure to potentially vulnerable households but also on informal debt. For the purpose of this paper, this is very favorable, as nonbank finance could become a source of systemic risk through its potential interconnectedness with the banking system (and possible contagion effects). In 2020, the share of households with loans exclusively held by banks amounted to 79% (unweighted average over countries), meaning 21% of all indebted households had at least one loan from other sources.<sup>23</sup> Our derived measure of debt at risk therefore also reflects the exposure of private lenders and financial intermediaries outside the traditional banking sector to distressed households, providing a more comprehensive picture of financial stability risks.

<sup>20</sup> In addition, as a less conservative measure of vulnerability, we define households with values above 2 standard deviations (corresponding to the 17<sup>th</sup> score) from the mean as most vulnerable. Most of these households have at least three symptoms of vulnerability. We report the results in chart A2 in the annex.

<sup>21</sup> This implies that the whole debt amount of a vulnerable household is classified to be at risk. While such a binary assignment (i.e. 0 or 1) is common in the literature, there are also other approaches. Ampudia et al. (2016), e.g. assign different fractions of outstanding debt to be at risk depending on the liquid assets a vulnerable household has.

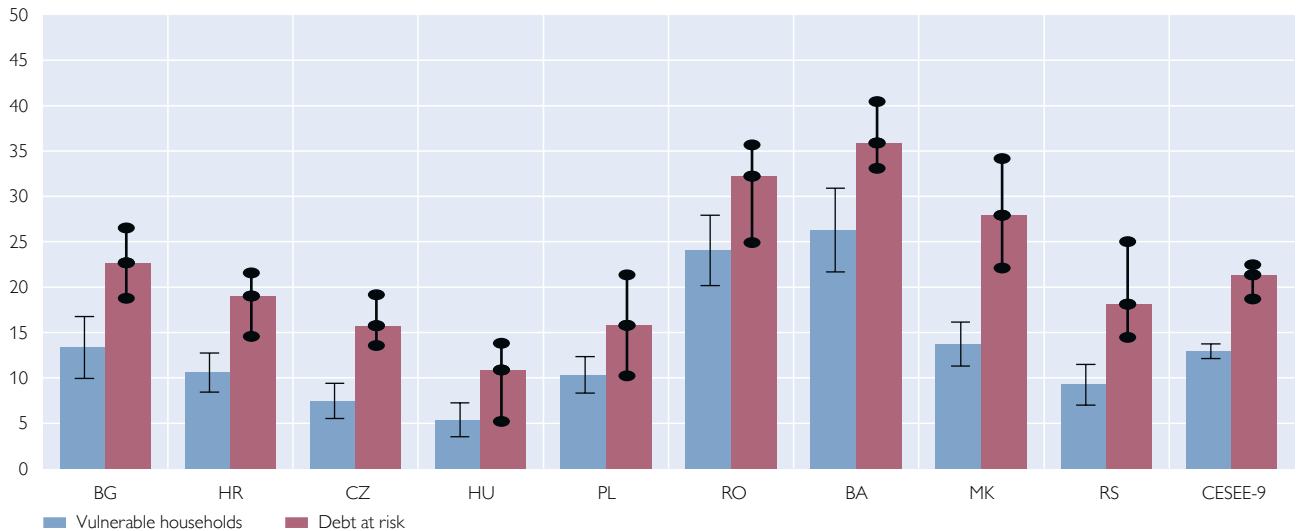
<sup>22</sup> Note that the debt-at-risk measure is often termed "exposure at default" in the literature (e.g. Ampudia et al., 2016). Still, we intentionally call it debt at risk in order to reflect the fact that the share of vulnerable households in our paper will be more broad-based and does not only reflect the households closest to default.

<sup>23</sup> The share of households with only nonbank loans amounted to 6%, whereas 15% of all indebted households had loans from both sources (not imputed). In 2021, respondents were not asked about the source of their finance.

Chart 4

### Vulnerable households and their debt at risk

% of all indebted households and % of all outstanding debt



Source: OeNB Euro Survey 2020 and 2021.

Note: 90% confidence intervals for the share of indebted households; minimum and maximum value over all imputations for debt at risk.

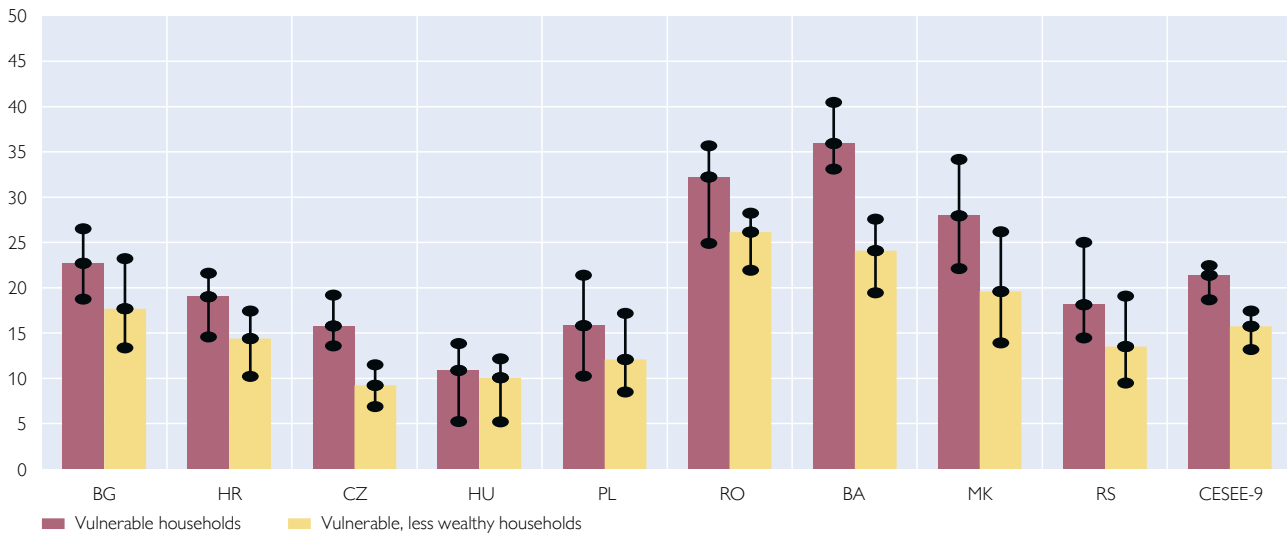
We report the debt-at-risk estimates in chart 4 (red bars). Again, we observe high cross-country heterogeneity. Again, in Romania and Bosnia and Herzegovina, vulnerable households hold a substantial share of overall household debt in the country (36% and 32%), while in Hungary debt at risk is rather small (11%). These results are partially driven by the simple fact that the share of vulnerable households differs across countries. However, debt seems more concentrated in countries exhibiting a lower share of vulnerable households. In Czechia, for example, the share of debt at risk is twice as high as the share of vulnerable households, while in Romania the respective shares are much closer together. On average, if a single vulnerable household in Czechia defaults, the impact on the local debt market is greater than in Romania. What all countries have in common, though, is that vulnerable borrowers hold more debt proportionally. Considering the uncertainty surrounding the presented indicators (reflected by the vertical confidence lines), debt is significantly concentrated among vulnerable households in six out of nine countries. Using additional information on the main purpose of the loans, we find that this is related to the share of housing loans – with amounts typically exceeding those in other loan categories (e.g. consumer or business loans) – being higher among vulnerable households in most countries. Moreover, looking at the number of loans alone, vulnerable borrowers tend to have more loans on average than nonvulnerable indebted households.

### 3.1 Considering household assets

While the presented debt-at-risk indicator tells us how much of the overall debt burden is concentrated among vulnerable households, it does not reflect the potential losses to creditors in the event of default. It is therefore common in the literature to take the asset side of households' balance sheets into account in order to assess

## Debt at risk

% of all outstanding debt



Source: OeNB Euro Survey 2020 and 2021.

Note: Minimum and maximum value over all imputations for debt at risk.

which fraction of the vulnerable borrowers' outstanding debt could not be recovered by the bank (Albacete et al., 2020; Ampudia et al., 2016). Unfortunately, the OeNB Euro Survey does not contain information on the amount of households' wealth. However, respondents are asked whether someone in the household owns the (1) main residence, (2) a secondary residence and (3) other real estate. We use this information to identify wealthier households. Unlike in Austria, the share of homeowners in the CESEE-9 region is very high due to the expansion of private ownership in the transition from a planned to a market economy (see table 1). This is why, on average, 87% of all CESEE-9 households own their main residence (see e.g. Beckmann et al., 2019). To determine wealthier households, we therefore narrow the definition of vulnerable households to those that do not own any secondary residence or other real estate. Out of all respondents in CESEE, only 20% report their household to have either a secondary residence or other real estate – meaning 80% of households qualify as less wealthy.

In chart 5, we display the share of debt held by vulnerable households (red bars) and contrast it with the debt-at-risk measure for the group of vulnerable, less wealthy households (yellow bars). This excludes the share of debt held by vulnerable but wealthier households. The underlying assumption is that the outstanding debt amount of borrowers who own real assets in addition to their main residence could be recovered fully by the creditor in the event of default. Under this – rather strict – assumption, we observe that debt at risk decreases in almost all countries, except Hungary. This is because almost all vulnerable households there are less wealthy. However, significant reductions are observed only in Czechia and Bosnia and Herzegovina, where the debt-at-risk indicator drops by 42% and 33%, respectively. Conversely, in Romania, the debt share held by vulnerable households falls

by only 19% after the exclusion of wealthier households, making it the highest in the region.

### 3.2 Discussion

We will now discuss the implications of our results by drawing on the findings in box 1, where we characterized the distribution of Austrian banking exposure across the CESEE-9 countries. Recalling that a significant share of consolidated foreign claims of Austrian banks is located in Romania (9% of all foreign claims), particular emphasis should be placed on monitoring the development of household debt there. In October 2018, the Romanian government introduced a DSTI cap of 40%, which came into force in January 2019, as a response to rising vulnerabilities associated with household indebtedness (IMF, 2018). The other countries exhibiting relative high debt-at-risk values, Bosnia and Herzegovina, North Macedonia and Bulgaria, have no borrower-based measures in place so far. In the case of Bulgaria, the European Systemic Risk Board (ESRB) has already recommended the introduction of borrower-based measures to mitigate the buildup of risks (ESRB, 2022). In contrast to Romania though, these countries do not account for a large part of the Austrian banking sector's exposure.

A far higher share of Austrian foreign claims in the CESEE-9 region is located in Czechia (23% of all foreign claims). Moreover, around 37% of all individuals in Czechia have at least one loan from an Austrian bank according to 2017 OeNB Euro Survey data. Although debt at risk in the Czech household sector is estimated to be among the lowest in the CESEE-9 countries, high interconnection with the Austrian banking sector requires a continued surveillance of household indebtedness there. Following the 2019 ESRB recommendations, Czechia adopted a legal framework for existing borrower-based measures in 2021 (i.e., upper limits for loan-to-value, DTI and DSTI credit ratios). This should mitigate systemic risks associated with loose lending standards by ensuring all credit providers comply fully (ESRB, 2019; CNB, 2022).

## 4 Summary and outlook

Austrian banks' strong ties to CESEE demand close and timely supervision of financial institutions and borrowers there. In the last three years, the COVID-19 pandemic has put a strain on many indebted households. Using OeNB Euro Survey data from 2020 and 2021, we consistently estimate the share of financially vulnerable households and associated credit risk for nine different CESEE countries. In contrast to previous studies, we have a large set of financial vulnerability indicators for countries for which these have not been analyzed jointly before. Considering several indicators is important as one single measure does not sufficiently capture the multidimensional issue of household vulnerability and makes country comparisons difficult. Although the five vulnerability indicators calculated in our study are interrelated, they draw distinct and often discordant pictures, both within and across countries. For a more consistent and nuanced picture, we combine the indicators into one vulnerability index using principal component analysis. Indebted households are deemed financially vulnerable where the index value lies 1 standard deviation above the mean.

We calculate the outstanding debt held by these vulnerable households as a share of overall outstanding debt in each country. This reveals high cross-country

heterogeneity. However, what most countries have in common is that vulnerable households have an overproportionately large share of debt. One country where Austrian exposure is large and where credit risks are high is Romania. Unfortunately, we cannot assess how much of the vulnerable households' estimated debt at risk could be covered by their assets because detailed data on households' wealth position are not available for our sample. We therefore approximate who can be classified as wealthier based on ownership of real estate. In most countries, debt at risk does not drop significantly if only less wealthy indebted households are considered.

With the pandemic and continuing global disruptions, what is the outlook for vulnerable households in the region? In response to the COVID-19 shock, loan moratoria were initiated in all countries, but often only for households directly affected by the pandemic. Moreover, most of these COVID-related moratoria expired in spring 2021. In fall 2020, most of our individuals reported never having used any moratoria during the pandemic or not using them anymore (see Beckmann and Allinger, 2021b). When asked in fall 2021 if the financial situation of their household would improve over the next year, nonborrowers were more likely to disagree with this statement than borrowers. However, respondents from (less wealthy) vulnerable households were also more likely to disagree as well. This means vulnerable households already had a grimmer outlook before further shocks materialized in 2022. Given the ongoing surge in consumer prices and rising interest rates, it seems that debt at risk will not decrease soon. With the data at hand, it is not clear what share of vulnerable households' debt could be recovered in the event of default. To ensure constant and in-depth monitoring of credit risks in the region, more detailed data on the whole balance sheet of households are essential.

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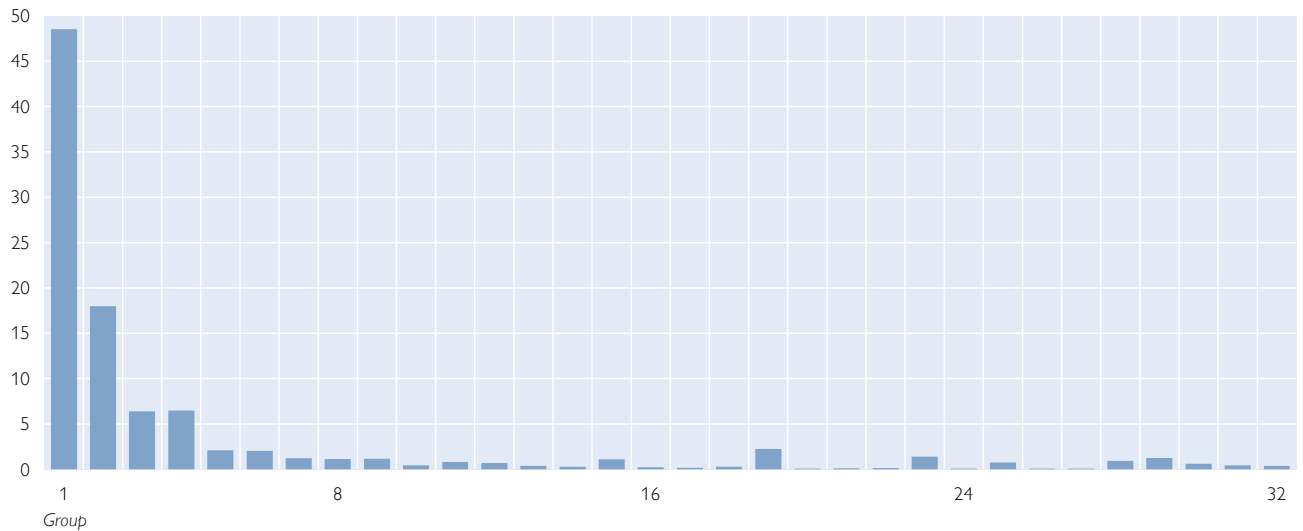
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## Annex

Chart A1

### Distribution of values: vulnerability index

% of indebted households



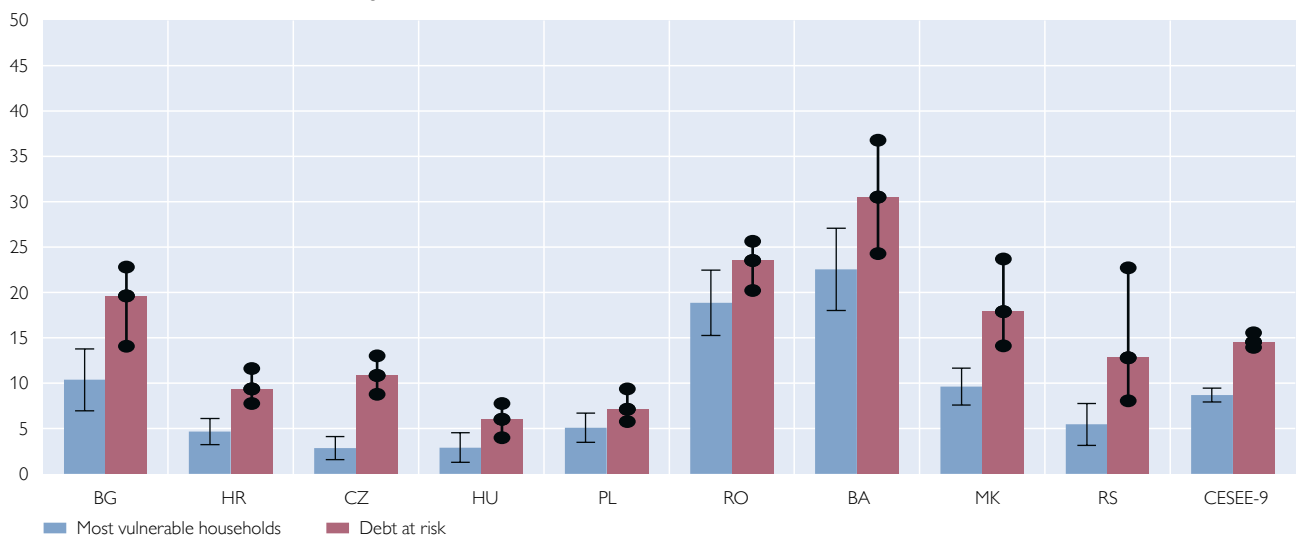
Source: OeNB Euro Survey 2020 and 2021.

Note: Index (principal component analysis – PCA) values are obtained by averaging over five imputed datasets. The 32 unique values (groups) represent the combinations of vulnerability indicators according to table A1.

Chart A2

### Most vulnerable households and their debt at risk

% of all indebted households and % of all outstanding debt



Source: OeNB Euro Survey 2020 and 2021.

Note: 90% confidence intervals for the share of indebted households; minimum and maximum value over all imputations for debt at risk.

Most vulnerable households are indebted households with an index value above two standard deviations from the mean of the vulnerability index.



Table A1

### Index composition

	E>I = 1	DSTI ≥ 40%	DTI ≥ 3 years	FM < 0	Arrears = 1	Number of symptoms	Group	Vulnerability index
						0	1	-0.81
					X	1	2	-0.43
	X					1	3	-0.21
	X				X	2	4	0.18
			X			1	5	0.79
				X		1	6	0.94
		X				1	7	1.16
			X		X	2	8	1.17
				X	X	2	9	1.32
> mean + 1 sd	X		X			2	10	1.39
	X			X		2	11	1.54
		X			X	2	12	1.55
	X	X				2	13	1.77
	X		X		X	3	14	1.78
	X			X	X	3	15	1.93
	X	X			X	3	16	2.15
			X	X		2	17	2.54
> mean + 2 sd		X	X			2	18	2.76
		X		X		2	19	2.92
			X	X	X	3	20	2.93
	X		X	X		3	21	3.15
		X	X		X	3	22	3.15
		X		X	X	3	23	3.30
	X	X	X			3	24	3.37
	X	X		X		3	25	3.52
	X		X	X	X	4	26	3.53
	X	X	X		X	4	27	3.75
	X	X		X	X	4	28	3.91
		X	X	X	X	3	29	4.52
		X	X	X	X	4	30	4.90
	X	X	X	X		4	31	5.12
	X	X	X	X	X	5	32	5.51

Source: OeNB Euro Survey 2020 and 2021.

Note: sd = standard deviation; PCA = principal component analysis; index (PCA) values are obtained by averaging over five imputed datasets. In one of the imputed datasets, households with E>I = 1 and DTI ≥ 3 years are already above the threshold of mean + 1 sd and thus are counted as vulnerable. Similarly, in one of the imputed datasets, households with DTI ≥ 3 years and FM < 0 have crossed the mean + 2 sd threshold.

# Systemic risks of commercial real estate funding in Austria

David Liebeg, Maximilian Liegler<sup>1</sup>

Refereed by: Neil Crosby<sup>2</sup>

Commercial real estate (CRE) has come under increasing scrutiny by macroprudential as well as microprudential authorities. Our policy paper is embedded in macroprudential policymaking in Austria and informs market participants on the current state of play.

In Austria, bank loans account for the majority of CRE exposures. Furthermore, Austrian banks are more exposed to CRE than banks in other EU banking markets. The growth of aggregate CRE lending to domestic borrowers is elevated, although most Austrian banks remain below critical thresholds. A large share of CRE loans in Austria is undercollateralized and at the same time exhibits high loan-to-value (LTV) ratios. Furthermore, the Austrian banking sector's high exposure to just a few CRE borrowers combined with below-average ratings of CRE loans warrants the heightened attention of both banks and supervisors. However, rating migrations have so far not shown critical patterns.

Research is under way to investigate the reasons behind high LTV and loan-to-collateral ratios, the impact of higher interest rates and/or an economic downturn on CRE market valuations, the adequacy of loan pricing and risk provisions, improvements of borrower-based indicators and the impact of climate risks and decarbonization.

JEL classification: G18, G21, G28, R30

Keywords: commercial real estate, systemic risk, macroprudential supervision

This policy paper is an integral part of macroprudential supervision in Austria and contributes to further developing systemic risk analyses in the commercial real estate (CRE) segment. It presents our approach to monitoring CRE funding in Austria and highlights challenges for future work in this field.

This paper is organized as follows: In section 1, we introduce our definition of CRE and present main literature findings and international experience with CRE-induced crises. In section 2, we provide a market overview of CRE funding in Austria, including a European perspective as well. Section 3 deals with risk-related indicators, while in section 4 we discuss macroprudential instruments available for tackling CRE-induced systemic risks. Section 5 concludes and summarizes the main challenges.

## 1 Theory and literature

### 1.1 What is CRE?

The European Systemic Risk Board (ESRB) issued two landmark publications on macroprudential policymaking with regard to CRE: ESRB (2019b), which focuses on methodologies, and ESRB (2016, as amended by 2019a), which concerns real

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Figure 1

**Definition of commercial real estate – an overview**

	Owner is a natural person	Owner is a legal person
Used for dwelling purposes	RRE - owner-occupied - bought/owned to let	CRE - bought/owned to let - used for RRE development - used for social housing
Used for nondwelling purposes	CRE - owner-occupied - bought/owned to let	CRE - used/developed as office space - used/developed as retail space - used/developed for logistical purposes - used/developed for tourism purposes - etc.

Source: Authors' compilation.

Note: RRE = residential real estate.

estate data gaps. Our work is largely supported and influenced by the approach put forward by the ESRB.

CRE can be distinguished from residential real estate (RRE) and other real estate by establishing either (1) whether a property's primary function is residential or not, or (2) how its purpose (i.e. it generates income by being let or sold) combines with the intentions of its owner/investor (i.e. an enterprise wishing to turn its investment into profits, or a household wishing to use it as living space). The first approach is laid down in the European Union's Capital Requirements Regulation (CRR), where according to Article 4 (75) residential property is a "residence that is occupied by the owner or the lessee of the residence," while commercial property is implicitly the remainder. The second approach is embraced by the ESRB (2016, 2019a), Fessenden and Muething (2017) and, for the most part, by us. Between these two main distinctions, three cases stand out: (1) RRE that is owned or acquired by a household to generate income ("bought/owned to let"), (2) RRE owned and rented out by a nonprofit organization, and (3) commercially used real estate that an enterprise uses to conduct its own business. We follow the ESRB in considering the first case to be RRE and the other two to be CRE, as owners' intentions play an essential role in how loans funding these types of properties contribute to systemic risks. In the first case, the owner is a household. In the other two cases, the owners are enterprises, but they do not hold the property with the aim to generate profits through it. By extension, the ESRB treats as CRE loans any loans that fund a property's CRE purposes as described above, but also includes loans that are collateralized by CRE. While we also take into account CRE-collateralized loans that fund non-real estate-related purposes, we focus on loans that fund the development, construction and purchase of real estate. In other words, we take more of a purpose-based and less of a collateral-based approach. Fessenden and Muething (2017) further differentiate between CRE loans that (1) finance the development and construction of property (typically with maturities of up to three years), (2) are commercial mortgages that enable the borrower to acquire an existing property (maturities of up to ten years) and (3) finance multi-family homes that generate rental income. We include loans that finance commercially used property that is to be rented out (e.g. as office or retail space) in this segment (see figure 1 for an overview).

**1.2 CRE (and CRE funding) as a source of systemic risks**

Crowe et al. (2013) find, for a sample of 19 advanced countries, that real estate booms associated with excessive leverage and loan growth have detrimental effects on financial stability and macroeconomic output once they go bust. Moreover, they find that a debt overhang and a weakened financial sector lead to weaker growth

after a real estate-induced financial and economic crisis. They emphasize that what matters here is not the asset boom itself, but how it is funded. Busts are more costly the more heavily the funding of the preceding booms relies on debt (mostly bank loans) and the more highly leveraged institutions (mostly banks) are involved. Booms with limited leverage and the involvement of institutions whose leverage is limited tend to deflate with limited economic consequences. What makes real estate markets stand out among other asset markets is the provision of loans by highly leveraged banks. Davis and Zhu (2011) confirm that banks are crucial in funding the CRE market. Banks grant loans to purchase land for development, to purchase existing buildings and to fund construction. They lend to nonbank financial intermediaries that in turn finance real estate, and they lend to nonfinancial corporations (NFCs) using real estate as collateral. CRE cycles and credit cycles interact via three dimensions: (1) CRE prices affect loan volumes through the wealth effect of changing prices and through the value of the collateral used. The Bank of England (2013) finds that property owners gain additional equity and collateral through rising property prices, which allows them to increase their borrowing. This channel also runs in the opposite direction – increased borrowing pushes prices up and allows for additional equity and collateral. (2) Bank lending provides liquidity. Changes in lending volumes and lending standards impact demand and investment decisions which, in turn, influence real estate prices. (3) Credit and property cycles are driven by common factors, most importantly GDP and interest rates.

For a sample of 23 advanced and 7 emerging market economies, Deghi et al. (2021) find that higher CRE price misalignments drive up risks to GDP growth – an effect that is further amplified by a higher leverage of lenders and borrowers or stronger cross-border funding of commercial real estate. Davis and Zhu (2011) find that CRE markets differ distinctly from markets for other asset classes; specifically the dependence of construction activities on current prices in combination with delivery lags as new constructions take several years to be completed. Therefore, adjustment to changes in the market is slow. Ross et al. (2021) argue that acquisition (of land), development and construction (ADC) loans – a subset of CRE loans as we define them – have often played a significant role in deteriorating bank balance sheets. In a similar vein, the Federal Deposit Insurance Corporation (2013) states that ADC loans are the riskiest class of CRE loans, often involving long development times and properties built on speculation.

### 1.3 Experience with CRE-induced systemic crises

Crowe et al. (2013) find that out of 46 systemic banking crises more than two-thirds were preceded by boom-bust cycles in house prices. That real estate can be a source of economic shocks also follows from the fact that the construction sector is a significant contributor to value added and employs a substantial share of the labor force. Losses in GDP are three times higher in recessions associated with real estate busts. Considerable commercial real estate bubbles were the savings and loans crisis in the United States at the beginning of the 1980s, the crises in the Nordic countries and Japan at the end-1980s and in the early 1990s, in Australia in the 1990s and in Southeast Asia at the turn of the millennium. Real estate developers played an important role in the real estate crises of the late 2000s in Ireland and Spain. Consequently, Ireland and Spain suffered severe losses from

CRE loans in the aftermath of the global financial crisis (GFC) (ESRB 2019b), which had a detrimental impact on sovereign indebtedness.

Davis and Zhu (2011) find that CRE prices are positively correlated with both GDP and credit in the short run. In the long run, though, the relationship remains positive only with GDP but turns negative with credit. Empirically, CRE prices drive credit more strongly than vice versa.

The Federal Deposit Insurance Corporation (2013) observed growth rates of 221% for ADC loans, 89% for other CRE loans and 78% for multifamily loans between December 2000 and March 2008, while RRE loans grew by 91% in the same period (these numbers correspond to compound annual growth rates of 17%, 9%, 8% and 9%, respectively). The most frequently reported causes of subsequent bank failures were the strong growth of, and high concentrations in, CRE loans. Similarly, Ross et al. (2021) observe, for their sample of ADC loans of failed US banks from 2008 to 2013, that market conditions that signal overheating – such as a higher share of construction loans in total loans and higher growth rates of construction loans – lead to higher losses induced by ADC loans. The Federal Reserve Bank (2017) confirms that from 2008 to 2012, US banks with higher shares of CRE loans in their portfolios were about three times more likely to fail than other US banks. They define highly concentrated portfolios as CRE loans exceeding a threshold of 400% of the bank's risk-based capital. The Federal Deposit Insurance Corporation (2013) notes that for its supervised institutions net charge-offs on ADC loans were three times higher from mid-2008 to end-2010 than for the preceding 17 years. Similarly, Fessenden and Muething (2017) argue that banks with high concentrations of CRE loans in combination with aggressive growth and funding strategies are more prone to failure and that banks that are geographically closer to borrowers benefit from better information on borrowers. Friend et al. (2013) find that 23% of US banks that exceeded both of the two supervisory criteria laid down by the Office of the Comptroller of the Currency (OCC, 2006) failed between 2007 and 2011, while only 0.5% of banks that exceeded neither of the two criteria failed during the same period. These two supervisory criteria were a threshold of 300% of total CRE loans in relation to risk-based capital and CRE lending growth of 50% during the previous 36 months. The OCC (2006) also issued a construction concentration criterion of a 100% of ADC loans in relation to risk-based capital. According to Friend et al. (2013), 13% of banks above that threshold failed. These banks, however, accounted for 80% of the losses to the Federal Deposit Insurance Corporation's insurance fund between 2007 and 2011. Net charge-off rates (gross charge-offs less recoveries) of ADC loans in the US peaked at 8% at the end of 2009 (up from 1% at end-2007), while those of loans for non-owner occupied CRE and those of loans for owner-occupied CRE peaked at only 2% and 1% (up from close to 0%), respectively.

The Bank of England (2013) observes that in the run-up to the GFC, from 2002 to 2006, losses on CRE lending were close to zero but that, from 2008 to 2012, they increased to a total of 6% of CRE loans. Clarke (2018) finds that losses recorded during the GFC outsized previous gains. A critical finding is that two-thirds of the peak CRE loan book were granted in the two years preceding the GFC. These “late-in-the-cycle” loans were also responsible for most of the losses in the following cooldown.

According to Deghi et al. (2021), higher CRE price misalignments drive up risks to GDP growth, an effect that is further amplified by a higher leverage of lenders and borrowers or by stronger cross-border funding of commercial real estate. Macroprudential policies, such as limits to loan-to-value (LTV) ratios, debt service coverage ratios and risk weights are effective in reducing price misalignments. The earlier the measures are introduced, the stronger the effect.

Gyourko (2009) estimates that the average LTV ratio for investment-grade CRE in the United States was 75% in 2008. A publicly traded real estate firm typically has an LTV ratio of 50%, and the riskiest real estate funds have an LTV of 67%. Life insurance companies typically do not grant CRE loans with LTV ratios above 75%. The Bank of England (2013) reports that the average maximum LTV ratio for CRE loans in the UK reached close to 80% at the peak of the cycle before falling steeply to 60% in the years that followed.

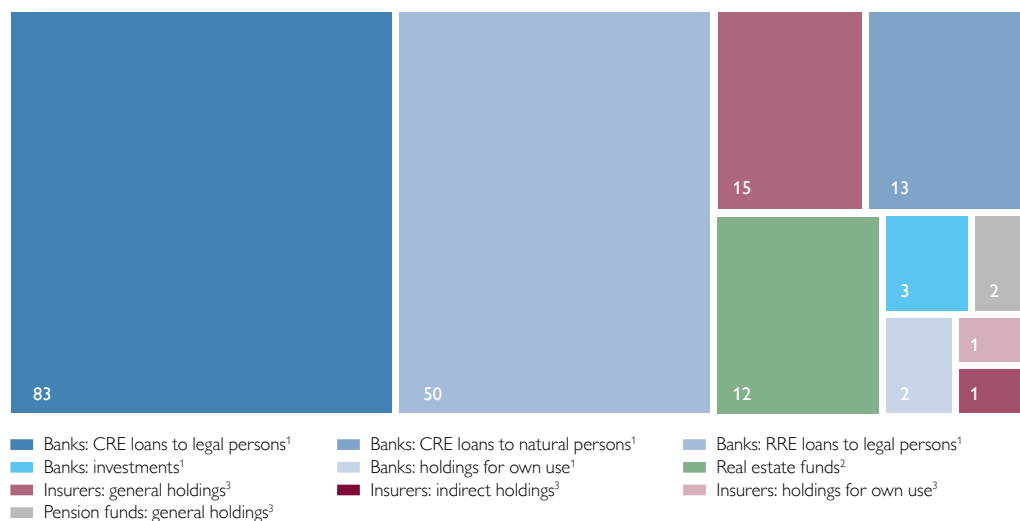
## 2 Market overview

Among financial intermediaries in Austria, banks are the main providers of CRE funding, which mostly takes the form of loans. Chart 1 illustrates the different types of funding, i.e. loans, investments and holdings for own use by banks, real estate funds, insurers and pension funds. The different data sources do not offer perfect comparability due to different definitions and scopes; however, they give a close enough picture of the distribution of Austrian financial intermediaries' CRE funds. Of the total of approximately EUR 180 billion of CRE funding in Austria at end-2021, 80% come in the form of bank loans. Insurers account for 10% with

Chart 1

### CRE funding provided by Austrian financial intermediaries

EUR billion, as of December 31, 2021



Source: OeNB, ECB, EIOPA, authors' calculations.

Note: CRE = commercial real estate; RRE = residential real estate. Banks' loans are collateralized by real estate and cover domestic and cross-border loans but exclude loans granted by foreign subsidiaries.

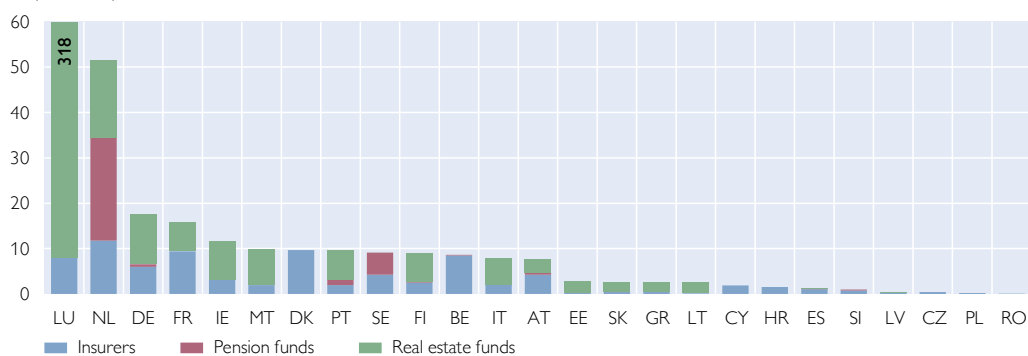
<sup>1</sup> Source: OeNB (banks' own use as of end-2020).

<sup>2</sup> Source: ECB.

<sup>3</sup> Source: EIOPA; authors' calculations.

**CRE exposures of EU nonbank financial intermediaries**

% of GDP, as of December 31, 2021



Source: ECB, EIOPA, OeNB, authors' calculations.

either direct holdings, investments in shares and bonds of real estate companies or funds (the “general” category according to data provided by the European Insurance and Occupational Pensions Authority). 7% are provided by real estate funds. Banks’ and pension funds’ investments make up the remaining 3% and 1%, respectively.

Chart 2 shows that real estate funds in relation to GDP are higher than in Austria in nine other EU countries, with the Netherlands and Germany standing out. Being a central hub for the investment fund industry, Luxembourg overshadows the rest of Europe, with CRE exposures being as high as 318% relative to GDP. Insurers’ CRE exposures are particularly high in Luxembourg, the Netherlands, France, Denmark and Belgium, while the CRE exposure of pension funds is notable in the Netherlands and Sweden.

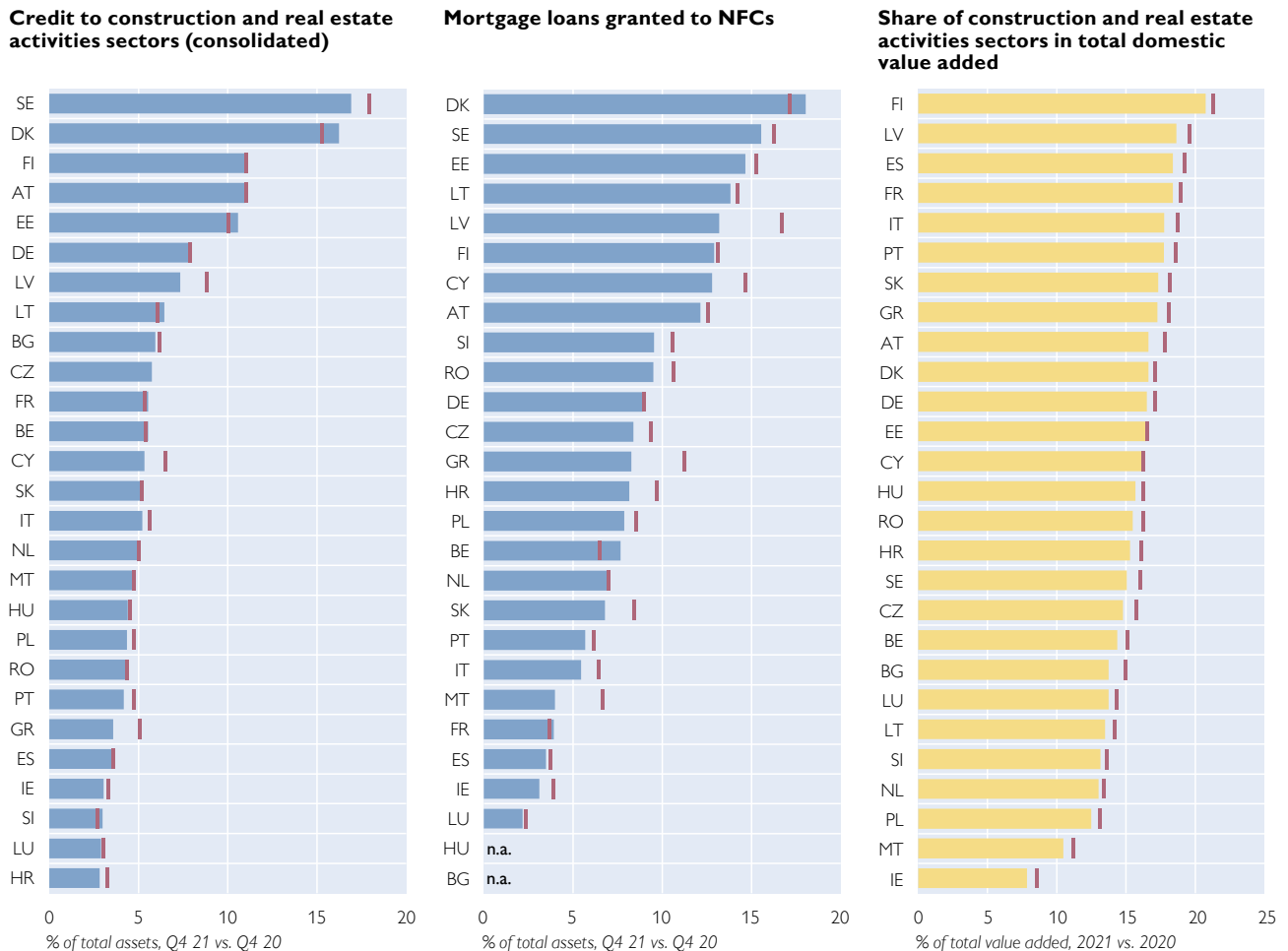
To assess the inherent risks of commercial real estate lending, we take a top-down approach in analyzing first, how much credit goes to the construction and real estate sectors and second, how much these sectors contribute to total domestic value added. Chart 3 puts bank lending to the construction and real estate sectors into a European context. In Q4 21, loans to real estate companies (i.e. the sectors “construction” and “real estate activities” according to NACE<sup>3</sup>) accounted for 11% of Austrian banks’ total assets, which is only a minor reduction compared to Q4 20 and the fourth highest share in the EU. Only Danish, Finnish and Swedish banks lent more to real estate companies in the same quarter. Austrian banks’ exposure to domestic real estate companies (chart A3) accounted for 8% of banks’ total consolidated assets in Q4 21. One caveat is that the construction sector also comprises construction on and below ground, such as infrastructure and roads, and that a further data breakdown is not available.

As chart 3 shows, the share of the construction and real estate activities sectors in the total domestic value added to the Austrian economy is 17% at the end of 2021, down 1 percentage point from 2020. This places Austria ninth in an EU-wide comparison, though the reduction holds for all EU countries collectively. When

<sup>3</sup> *Nomenclature générale des activités économiques dans les Communautés Européennes (Nomenclature of Economic Activities).*

Chart 3

### Credit to construction and real estate sectors, mortgage loans to NFCs and sectors' share in total domestic value added



Source: ECB, authors' calculations.

Note: The bars indicate Q4 21; the red vertical lines indicate Q4 20; n.a. = not available.

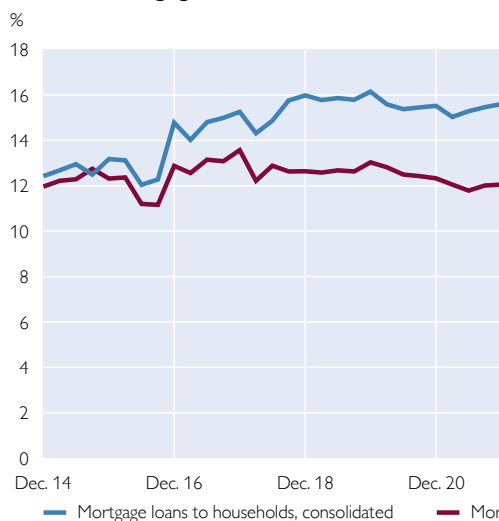
compared to that observed in other EU countries, Austrian banks' exposure to real estate corporations is therefore higher than the share these sectors contribute to the economy. The sector "construction" according to NACE exhibits a more cyclical nature than the sector "real estate activities." While construction contributes an increasing share to total value added in Austria, its current share of 7% remains well below the shares observed in countries that experienced real estate crises in the 2000s. Spain, Ireland and the Baltic countries all recorded shares of above 10% around 2008 that fell sharply in the years that followed.

Narrowing the view on CRE loans, the medium panel of chart 3 shows mortgage loans (consolidated) as a share of total assets in Q4 21 as compared with Q4 20 across the EU. We see that Austrian NFCs' mortgage loans account for a share of 12% in total assets at the end of 2021, down less than half a percentage point from the previous year. This marks Austrian NFCs' importance in the mortgage lending business, which is above the EU average. The three Scandinavian



### Development of mortgage loans in Austria

Share of mortgage loans in total assets



Annual change in mortgage loan volumes



Source: ECB, OeNB, authors' calculations.

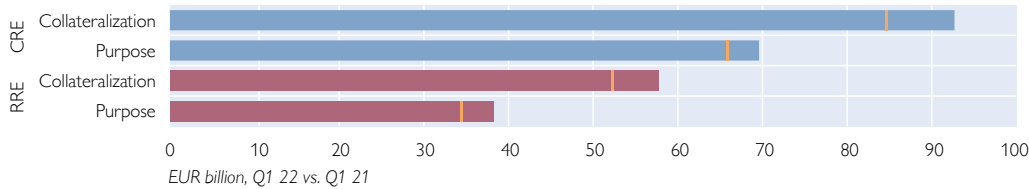
countries, the three Baltic countries and Cyprus record higher shares. Interestingly, almost all countries' banking systems reduced NFC mortgage loans as a share of total assets during the pandemic, except in Belgium, Denmark and France, as banks' balance sheets typically increased because of their exposures to central banks.

To add a time component to this cross-sectional view, we look at yearly mortgage loan growth versus the share of mortgage loans in total assets in chart 4. Austrian NFCs' mortgage loans stand at 12% of banks' total assets at end-2021. This is markedly lower than the close to 16% of household mortgage loans as household loans have been growing more strongly than NFC loans since 2017. The decline in the share of mortgage loans in total assets since end-2019 is attributable to a stronger rise in total assets than in mortgage loans. The right-hand panel of chart 4 clearly shows a steady and positive year-on-year growth of mortgage loans in Austria for both households and NFCs. At the end of 2021, mortgage loan growth rates stand at 8% and 5%, respectively. Nonetheless, CRE loan growth rates are higher when taking a domestic view: CRE loans to domestic borrowers grew by an annual rate of 7% at the end of 2021 and even by 8% in Q1 22. The dip between mid-2016 and mid-2017 in chart 4 marks the fact that a large Austrian bank shifted its CESEE exposure to its parent headquarters abroad.

In most cases, real estate loans are collateralized by property and therefore classified as traditional mortgage loans although they need not serve the purpose of real estate funding. In the following, we identify loans that are collateralized by either CRE or RRE as well as loans that serve the purpose of real estate funding. In Q1 22, EUR 93 billion of Austrian banks' loans to domestic and foreign borrowers were collateralized by commercial property while only EUR 70 billion were used for the purpose of CRE funding (chart 5). Loans collateralized by RRE amounted to EUR 58 billion while roughly EUR 38 billion were outstanding as RRE funding.

Chart 5

### Real estate loans to legal persons: purpose and collateralization

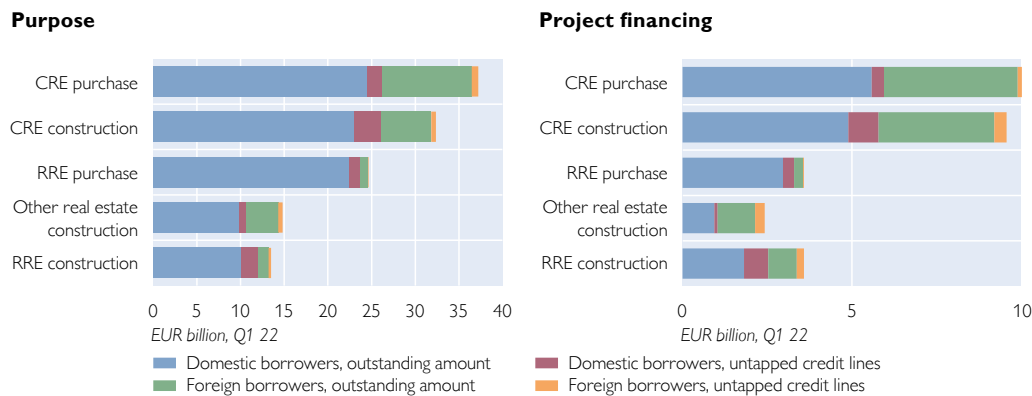


Source: OeNB, authors' calculations.

Note: The bars indicate Q1 22; the vertical lines indicate Q1 21.

Chart 6

### Real estate loans to legal persons: purpose and project financing



Source: OeNB, authors' calculations.

The same findings hold for 2021. A significant amount of real estate-collateralized loans is thus used for other purposes.

Narrowing down the individual purposes of loans (chart 6), we find that most loans are used to purchase CRE property (EUR 37 billion), followed by the purpose of constructing CRE (EUR 32 billion), purchasing RRE property (EUR 25 billion), constructing other real estate (EUR 15 billion) and constructing RRE (EUR 13 billion). The majority of borrowers are domestic (EUR 99 billion, versus EUR 24 billion lent to foreign borrowers).

A major caveat of this analysis is that we can only identify the borrower's and collateral's location but not the location of the funded property. In other words, no information is collected on where the intended purpose is to be realized. Project financing accounts for roughly one-quarter of the entire lending volume described above and is similarly split between the various purposes. Since in project financing, loan repayments solely rely on cash flows directly generated through the project, which in many cases is yet to be built, it is more speculative by nature. Likewise, Ross et al. (2021) and the Federal Deposit Insurance Corporation (2013) identify ADC loans as the riskiest class of loans. In our analysis, we take project financing loans as a proxy for ADC loans.

### 3 Risk indicators

#### 3.1 Concentration and growth risks

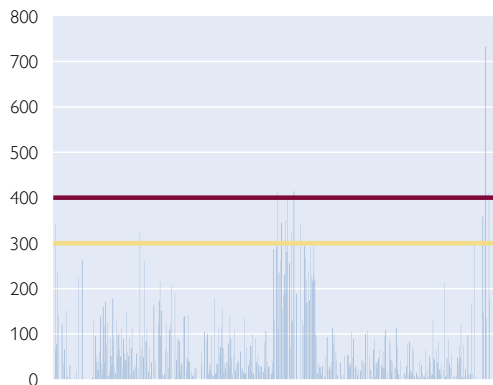
Since granular, loan-level time series data in loadable quality have only been available since 2019, we draw on experience from other countries, following the approach of the US Office of the Comptroller of the Currency (OCC, 2006) and the US Federal Reserve Bank (Fed, 2013). Chart 7 illustrates all individual Austrian banks' exposure to CRE-purposed and/or project financing loans. 14 banks exceed the OCC's 300% threshold while 4 banks even exceed the Fed's threshold of 400% of CRE-purposed exposure in relation to their common equity tier 1 (CET1) capital. For project financing loans, the OCC's threshold is 100%, which is exceeded by 9 banks, while one bank even surpasses the 200% mark. In a next

Chart 7

#### Banks' CRE exposures

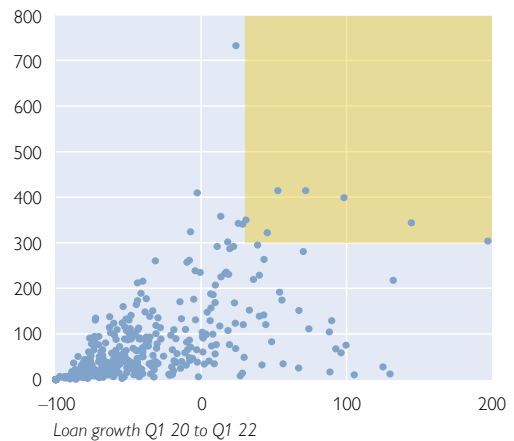
##### CRE-purposed loans

Share in CET1 in %, Q1 22



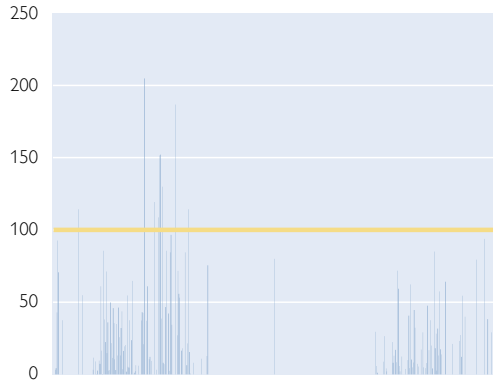
##### CRE-purposed loans vs. two-year growth

Share in CET1 in %, Q1 22



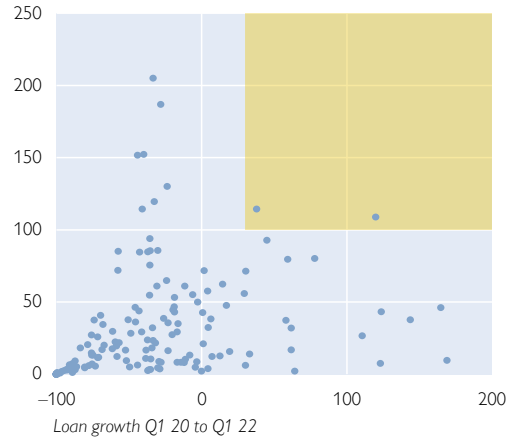
##### Project financing loans

Share in CET1 in %, Q1 22



##### Project financing loans vs. two-year growth

Share in CET1 in %, Q1 22



Source: OeNB, authors' calculations.

Note: Yellow lines indicate moderate risk, red lines indicate significant risk; yellow-shaded areas are critical areas for which both indicators (share of CET1 and high growth) are triggered. Axes are capped for illustration purposes. There are very few banks recording higher values in one of the two cases; however, none of them record higher values in both cases. Blue lines or dots indicate individual banks.

step, we plot banks' exposure as a share of CET1 capital against the growth of CRE-purposed and project financing loans. The OCC recommends remaining below a threshold of 50% growth over three years. Since our time series is limited to two years, we opt for a threshold of 30%. 47 Austrian banks with CRE-purposed financing and 30 banks with CRE project financing loans in their loan portfolios breach this threshold. To form a risk-based measure, the OCC suggests focusing on banks that surpass both thresholds at the same time, which is indicated by the shaded areas in the right-hand panels of chart 7. 7 banks exceed both thresholds for CRE-purposed loans and 2 do so for project financing loans, all of which have negligible market shares.

Guidance by the US authorities states that institutions exceeding the above thresholds should have enhanced credit risk controls in place, including stress testing of CRE portfolios, and that these institutions may be identified for further supervisory analyses. While these criteria were not intended to establish hard limits or caps, they have proven effective in distinguishing vulnerable banks from others in the US CRE crisis during the GFC (see section 1.3).

### 3.2 Nonperforming loans

Going further into the riskiest lending practices, we analyze nonperforming loan (NPL) ratios and loan loss provisions for CRE loans granted by Austrian banks. NPL ratios have continuously been declining since 2016 for both NFCs and households (chart A1). This may indicate a sounder financial system at first; however, state guarantees and further fiscal aid during the pandemic have supported credit quality. Moreover, NPLs are a backward-looking indicator of credit risk and therefore less suitable for macroprudential policy that aims to limit the build-up of systemic risks. Incidentally, losses in the UK were negligible in the run-up to the GFC but skyrocketed thereafter (Bank of England, 2013). Rising NPLs indicate a turning point. Indeed, NPL ratios for CRE loans to NFCs have been rising slightly since 2020. IFRS 9 Stage 2 loans<sup>4</sup> further indicate deteriorating CRE credit quality in a more forward-looking way. The NPL volume of CRE loans taken out in Austria was EUR 2.6 billion in Q1 22 on a consolidated basis (which corresponds to an NPL ratio of 3.4%), EUR 760 million of which stem from CESEE subsidiaries. The IFRS 9 Stage 2 CRE loan volume on a consolidated basis has been rising in Austria since the onset of the pandemic, standing at EUR 23 billion (27% of CRE loans) as of Q1 22.

### 3.3 Collateral-based indicators

Among the most relevant indicators for real estate lending are loan-to-value (LTV) and loan-to-collateral (here: LTC<sup>5</sup>) ratios. In real estate lending, the LTV ratio is one of the most important risk metrics for lenders to assess a borrower's credit-worthiness. We calculate the LTV ratio by dividing the sum of the outstanding amount and untapped credit lines by the market value of the collateral; and we define the LTC ratio as the outstanding amount divided by the total protection value. Crosby and Hordijk (2021) point out that Austria is among the European

<sup>4</sup> *International Financial Reporting Standards (IFRS) 9 Stage 2 loans are loans that have deteriorated significantly in credit quality since their initial recognition but are not yet impaired and do not offer objective evidence of a credit loss event.*

<sup>5</sup> *Not to be confused with loan-to-cost ratios.*

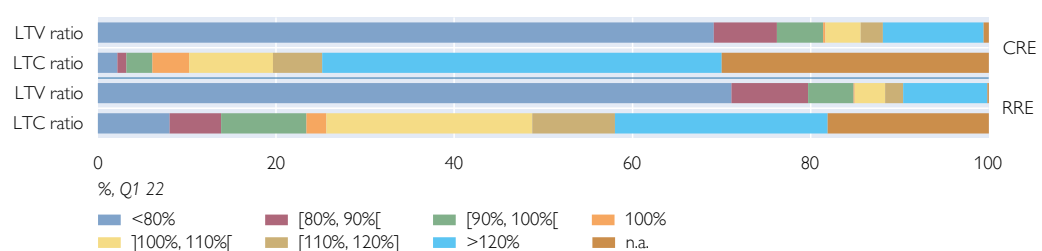
countries that apply a prudent value in lending, i.e. the mortgage lending value as defined in Article 4 (74) CRR. The protection value we apply in calculating the LTC ratio constitutes a lower bound for the mortgage lending value.

As indicated in the introduction, most real estate firms have LTV ratios of around 50% since very rarely are loans granted to companies with LTV ratios higher than 75% and the industry standard requires certain guarantees or an insurance against defaults in the higher LTV brackets. Indeed, the average maximum LTV ratio of CRE loans was below 80% at the peak of the UK CRE cycle during the GFC (Bank of England, 2013). When risks build up, the LTV ratio is the key measure for assessing how leverage in CRE loans is changing. It has the major drawback, however, that it is procyclical and hinges on the valuation method applied to establish the property's value. For the German real estate market, for instance, Reinert (2021) finds that internal valuers tend to deviate further from sales prices than external valuers. Park (2018) reports upward biases in values determined by lenders' internal appraisers or in those selected by the lender. Crosby and Hordijk (2021) emphasize that lending based on static LTV ratios increases available funds that in turn lead to higher prices that again allow for more lending. The LTC ratio at least partly addresses this issue and shows to what extent the banking system is protected in a downturn. Therefore, we use both indicators complementarily. We plot LTV and LTC ratios for both CRE- and RRE-collateralized loans in Austria in chart 8 and examine loans granted to legal persons only. Overall, we see certain buffers for price downturns, as roughly 70% of all loans have LTV ratios of less than 80%. However, the credit line outstrips the market value of the underlying property for 18% of all loans ( $LTV > 100%$ ) in the sample for CRE-collateralized loans and for 14% of all loans in the sample for RRE-collateralized loans.

In a market downturn where the LTC ratio indicates how much of the protection value can be liquidated, it is the lending behavior in the riskier brackets that regulators need to pay special attention to. In the protection perspective, roughly 60% of all loans have an LTC ratio of over 100% for both CRE-collateralized and RRE-collateralized loans. Thus, the sector is largely undercollateralized in case of system-wide defaults, and only a fraction of the actual value of real estate assets could be used to dampen the impact of such defaults. For a large share of loans, collateral is either not identifiable or does not consist of real estate at all, as indicated by "n.a." (not available) in chart 8. Roughly 30% of CRE loans and 15%

Chart 8

### LTV and LTC ratios of CRE- and RRE-collateralized loans to legal persons



Source: OeNB, authors' calculations.

Note: n.a. = not available.

of RRE loans fall into the “n.a.” category. The finding that LTV ratios are higher than LTC ratios indicates that while some collateral is pledged as security, lenders are not fully protected against a borrower’s default.

One explanation for high LTV ratios could be that loans are granted and extended to known borrowers on a rolling basis, which is not an uncommon practice in the Austrian real estate market. For a longitudinal perspective starting in Q4 21, please refer to chart A4.

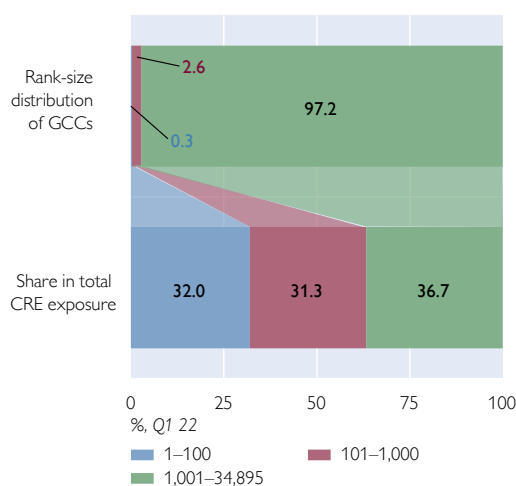
### 3.4 Concentration risk

Concentration risk means the overreliance of a financial firm’s investment portfolio on a single entity or a specific sector. A commonly used and easily applicable measure for concentration is the relative share of market participants in total outstanding exposure. To this end, we look at the largest groups of connected clients (GCCs) of Austrian banks (chart 9) as defined in Article 4 (39) CRR<sup>6</sup>. We find that the largest 100 GCCs (0.3% of the sample) account for EUR 39 billion or 32% of the total CRE- and RRE-collateralized loan exposure of Austrian banks. The next 899 GCCs (3% of the sample) hold 31% (EUR 38 billion) of Austrian banks’ CRE exposure while the remaining 97% (33,894) of GCCs hold 37% (EUR 45 billion). This measure is, however, a crude approximation of concentration risk and warrants further investigation by applying finer calibration and risk metrics. On average, the top 100 GCCs have better ratings than the remaining GCCs. However, the bulk of the top 100 GCCs’ exposure is in bucket 4, which is equivalent to the lowest investment grade rating awarded by major rating agencies.

Chart 9

#### Groups of connected clients: CRE exposure and ratings

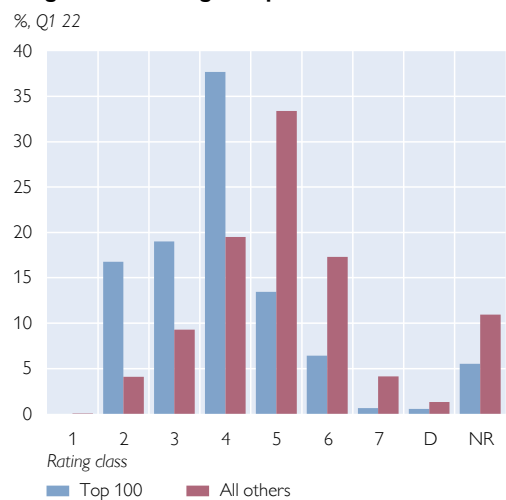
Distribution of GCCs’ CRE exposures



Source: OeNB, authors’ calculations.

Note: The chart shows that the largest 100 GCCs account for 0.3% of all clients but for 32% of total CRE exposure; the next largest 1,000 GCCs account for 2.6% of all clients and for 31.3% of total CRE exposure, etc.

Largest GCCs’ ratings compared with rest of market



Source: OeNB, authors’ calculations.

Note: D = default, NR = not rated.

<sup>6</sup> See EBA Single Rulebook, Article 4 CRR.

### 3.5 Rating risk

In ESRB (2020), the authors argue that large-scale corporate bond downgrades of NFCs from investment grade (4 and above) to high yield (5 and below), so-called “fallen angels,” can result in system-wide stress. Chart 10 shows the rating distribution of all Austrian companies in comparison with that of Austrian real estate companies (NACE codes F41, F43, L, excluding infrastructure F42). Indeed, on average, real estate companies are found to have substantially lower ratings, especially in pre-default classes 6 and 7. As chart 9 shows, corresponding loans are mostly undercollateralized which, in the case of adverse events, can lead to a propagation of risk through the system. The fact that the collateralized assets of real estate loans are highly illiquid makes adequate risk management by lenders in this segment even more pressing, especially when this analysis is seen together with the cumulated insolvencies shown in the right-hand panel of chart 9. Cumulative insolvencies in the construction and real estate sectors are above those in all other sectors and have almost reached pre-pandemic levels after significant drops in 2020 and 2021 due to large-scale support measures.

The exposure-weighted rating distribution of CRE-purposed loans to NFCs exhibits a slight shift toward the mid-lower end from the end of 2019, though with less exposure in the pre-default categories 6 and 7 or in default (chart A2).

Davis and Zhu (2011), Ross et al. (2021) and the FDIC (2013) hypothesize that CRE construction loans are riskier than loans funding CRE purchases. Our analysis partially confirms this theory. CRE construction loans granted by Austrian banks in Q1 22 exhibit higher default rates (1.5%) than loans funding CRE purchases (1.2%). However, NPLs financing RRE construction are significantly below their RRE purchasing counterpart (0.3% and 0.7%, respectively). Default rates of RRE construction loans benefited from an exceptional boom over the past few years; it remains to be seen if and to what extent the economic slowdown and rising interest rates will have an impact on default rates.

Chart 10

#### Ratings and insolvencies of real estate companies

##### Rating distribution: real estate companies vs. all companies



Source: OeNB, authors' calculations.

Note: D = default, NR = not rated.

##### Cumulated insolvencies in the construction and real estate sectors

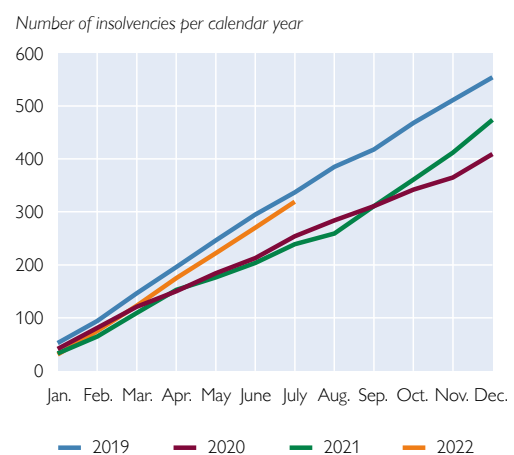


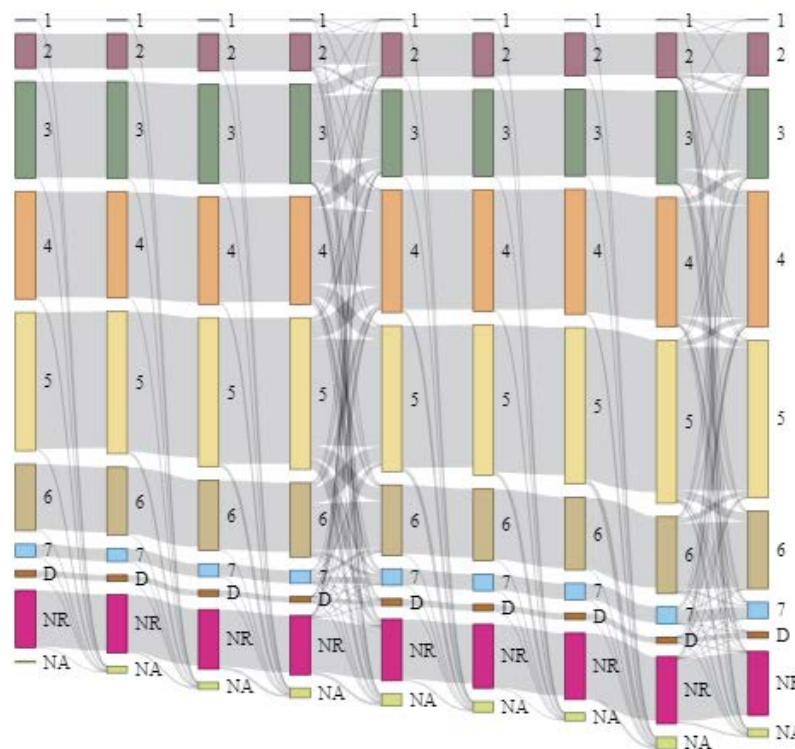
Chart 11 illustrates the rating migrations of loans granted by Austrian banks to NFCs for the purpose of CRE funding. A striking characteristic are the rating migrations between Q4 20 and Q1 21 and between Q4 21 and Q1 22, while in the other periods movements toward the “NA” (not available) brackets are prevalent. One explanation for this phenomenon could be that banks wait for the respective borrowers to publish their annual financial statements, including any (re)valuation of properties’ market values, on which to base their ratings.

Between Q4 20 and Q1 21, downgrades in the rating classes 3, 4 and 5 overshadow upgrades in the same classes in spite of a significant amount of exposure that was upgraded from rating class 6 to 5. Rating migrations from class 7 and default (“D”) are not of a comparatively significant size and exhibit net upgrades rather than downgrades. This indicates a shift in the distribution of ratings toward the lower end despite the better performance of pre-default classes over less risky classes.

Between Q4 21 and Q1 22, the picture reverses since downgrades from rating class 3 to rating class 4 outnumber the upgrades from all buckets. Particularly striking are the consistently small fractions of loans in pre-default class 7 and in default over the entire sample period. This may largely be due to fiscal and monetary support measures in combination with booming real estate markets, an explanation that is also supported by chart 10, which shows significantly lower insolvencies in the same period than before the pandemic.

Chart 11

### Rating migrations of CRE loans



Source: OeNB, authors' calculations.

Note: D = default, NR = not rated, NA = not available



#### 4 Macprudential instruments in the EU and Austria

EU legislation provides various instruments to increase banks' risk-absorbing capacities if systemic risks are deemed to be excessive. According to the Capital Requirements Regulation (CRR), a macroprudential authority may change the risk weights of CRE loans under the standardized approach (Article 124 CRR) and introduce minimum loss-given-default values under the internal ratings-based approach (Article 164 CRR). Article 458 CRR provides a more general clause on changing risk weights of CRE exposures when facing systemic risks. Its advantage is that it enables the direct steering of risk weights under the internal ratings-based approach, but at the cost of more elaborate safeguard procedures by EU authorities and of subsidiarity to other measures. Article 133 CRR (EBA, 2020) allows for the implementation of a systemic risk buffer for CRE exposures.

Moreover, Austrian legislation provides borrower-based measures for tackling systemic risks in real estate lending according to Article 23 lit h Austrian Banking Act. These measures can be applied to both households' and corporates' (i.e. legal persons') real estate loans. They encompass limits to loan-to-value ratios, debt-to-income ratios (or a suitable measure that relates overall indebtedness to viable income figures for legal persons), debt service-to-income ratios (or a suitable measure that relates overall debt servicing costs to viable income figures for legal persons), terms to maturities and amortization requirements. Currently, borrower-based measures are not laid out in EU legislation. Internationally, only a limited number of measures have been implemented to curb systemic risks in CRE markets (BIS, 2022).

Among borrower-based measures, only data for LTV and LTC ratios are easily available while data for measures based on cash flows, costs and income constitute the most pressing gaps in supervisory databases. The latter come with the major drawback of being based on projections carried out for a major, and riskier, part of loan portfolios. The most important income- or cost-based lending indicators are the loan-to-cost ratio<sup>7</sup>, interest coverage ratio<sup>8</sup>, debt service coverage ratio<sup>9</sup> and the credit multiplier<sup>10</sup> (Wendlinger, 2018). The European Banking Authority (EBA, 2020) additionally proposes to apply a modified credit multiplier, the total debt-to-EBITDA<sup>11</sup> ratio, to legal persons. As there are no uniform rules on how to generate the necessary projections, data comparable across various lenders are difficult to come by and the resulting data gaps cannot easily be mended. Further nonnegligible challenges in implementing macroprudential measures targeting CRE funding are the heterogeneity of borrowers, funding strategies and types of properties, especially when compared to RRE funding.

<sup>7</sup> The loan-to-cost ratio measures the leverage on the level of the funded property and relates a loan exposure to total investment costs.

<sup>8</sup> The interest coverage ratio measures the ability of a project to cover its interest costs and relates net operating income to interest costs.

<sup>9</sup> The debt service coverage ratio extends the perspective on interest costs to total debt servicing costs by dividing net operating income by the sum of interest rate costs and debt redemption. Debt redemption can either be by regular instalments or at maturity.

<sup>10</sup> The credit multiplier relates total loan exposure to net operating income.

<sup>11</sup> EBITDA: earnings before interests, taxes, depreciation and amortization.

## 5 Conclusions

In this paper we focus on commercial real estate (CRE) loans, i.e. real estate loans granted to nonfinancial corporations and used to fund either commercial or residential property as well as real estate loans granted to individuals and used to fund commercial property. The definition of CRE loans by type of collateral, i.e. mortgage loans, provides a supplementary, but secondary perspective. Since CRE-induced systemic risks first and foremost emanate from the leverage (i.e. loans) provided by highly leveraged institutions (i.e. banks), and banks remain the dominant source of debt capital in CRE funding, we focus on CRE bank loans. At the same time, we will continue to monitor funds provided by other financial intermediaries as well.

In an EU-wide comparison, CRE loans are of above-average importance to Austrian banks' business models, while the relevance of other financial intermediaries' CRE funds do not stand out in Austria. CRE loan growth rates in Austria have recently reached levels that warrant heightened alertness by macroprudential supervisors. Yet, only a few Austrian banks have so far exceeded critical concentration and growth thresholds. Related developments will be continuously monitored and supervisory action will be considered if deemed necessary.

The median loan-to-value (LTV) levels of Austrian banks' CRE loans exhibit moderate risk by international standards; however, a substantial share of LTV ratios is above 80% or even 100%. This applies both to CRE loans that fund commercial property and to CRE loans that fund residential property. A source of concern is that over half of all CRE loans taken out in Austria are undercollateralized, i.e. in only half of all cases, lenders have access to collateral high enough to cover a total loan default. A high share of Austrian CRE loans is not collateralized at all. The reasons behind this situation will be subject to future investigation and, potentially, a case for further macroprudential action.

Risks from concentrated exposures vis-à-vis a few groups of connected clients cannot be ruled out. Rating migrations have so far not exhibited critical patterns as a booming real estate market has combined with generous fiscal and monetary policies in the wake of the COVID-19 pandemic. Both banks and supervisors will need to monitor how the forecast economic downturn and interest rate increases will impact rating migrations and the market values of CRE collateral. Further research on whether loan pricing and risk provisioning adequately reflect CRE risks will be necessary.

A host of macroprudential instruments are available to tackle systemic risks stemming from banks' CRE loans – capital-based measures based on EU law and borrower-based measures based on national law. Creating income-based indicators as a subset of borrower-based indicators remains a challenge to be tackled. Our assessment of a potential credit-price spiral is limited as reliable data on CRE price developments are still lacking. This will, however, be mended by improved data availability from 2023.

Finally, this paper does not touch upon the impact of decarbonization on CRE. The transition to less energy-intensive properties will pose both an opportunity for, and a hazard to, CRE loans.

For supervisors and banks alike, the continued monitoring of CRE loan growth and concentrations, the reasons behind high loan-to-value and loan-to-collateral ratios, the impact of higher interest rates and/or an economic downturn on

CRE market valuations, as well as the adequacy of loan provisions and pricing require further attention. The implementation of borrower-based indicators, the identification of further data needs as well as climate risks and decarbonization-related risks on CRE markets continue to provide rich grounds for future research.

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## Annex

### Abbreviations

Table A1

#### Countries

AT	Austria	FR	France	NL	Netherlands
BE	Belgium	GR	Greece	PL	Poland
BG	Bulgaria	HR	Croatia	PT	Portugal
CY	Cyprus	HU	Hungary	RO	Romania
CZ	Czechia	IE	Ireland	SE	Sweden
DE	Germany	IT	Italy	SI	Slovenia
DK	Denmark	LT	Lithuania	SK	Slovakia
EE	Estonia	LU	Luxembourg	UK	United Kingdom
ES	Spain	LV	Latvia	US	United States
FI	Finland	MT	Malta		

Source: Authors' compilation.

Table A2

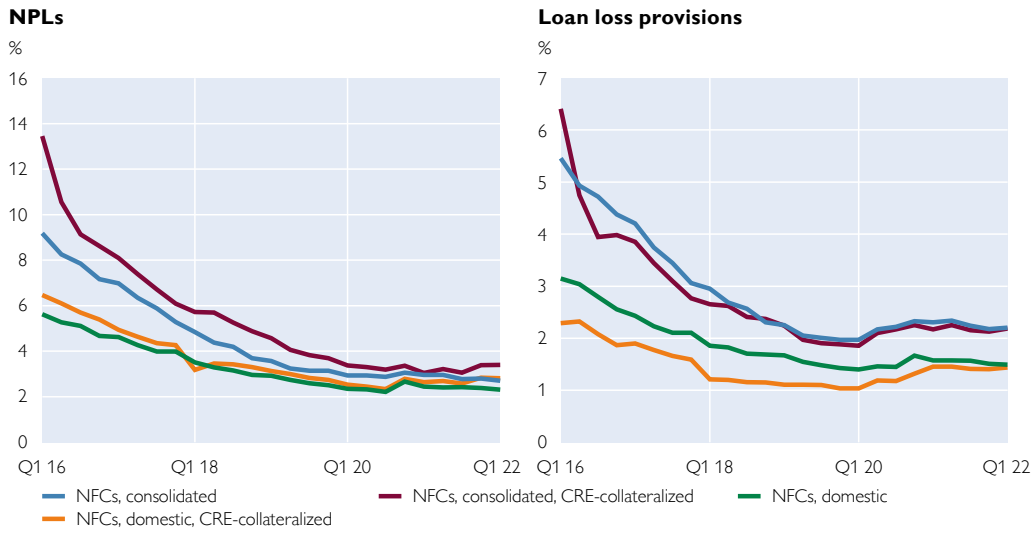
#### Other abbreviations

ADC	Acquisition, development and construction
BIS	Bank for International Settlement
CESEE	Central, Eastern and Southeastern Europe
CET1	Common equity tier 1
CRD	Capital Requirements Directive
CRE	Commercial real estate
CRR	Capital Requirements Regulation
EBA	European Banking Authority
EBITDA	Earnings before interests, taxes, depreciation and amortization
ECB	European Central Bank
EIOPA	European Insurance and Occupational Pensions Authority
ESRB	European Systemic Risk Board
EU	European Union
FDIC	Federal Deposit Insurance Corporation
FED	Federal Reserve Bank
GCC	Groups of connected clients
GDP	Gross domestic product
GFC	Global financial crisis
IFRS 9	International Financial Reporting Standard 9
LTC	Loan-to-collateral
LTV	Loan-to-value
NACE	Nomenclature générale des activités économiques dans les Communautés Européennes (Nomenclature of Economic Activities)
NFC	Nonfinancial corporation
NPL	Nonperforming loan
OCC	Office of the Comptroller of the Currency
RRE	Residential real estate

Source: Authors' compilation.

Chart A1

### NFC loans in Austria: nonperforming loans and loan loss provisions

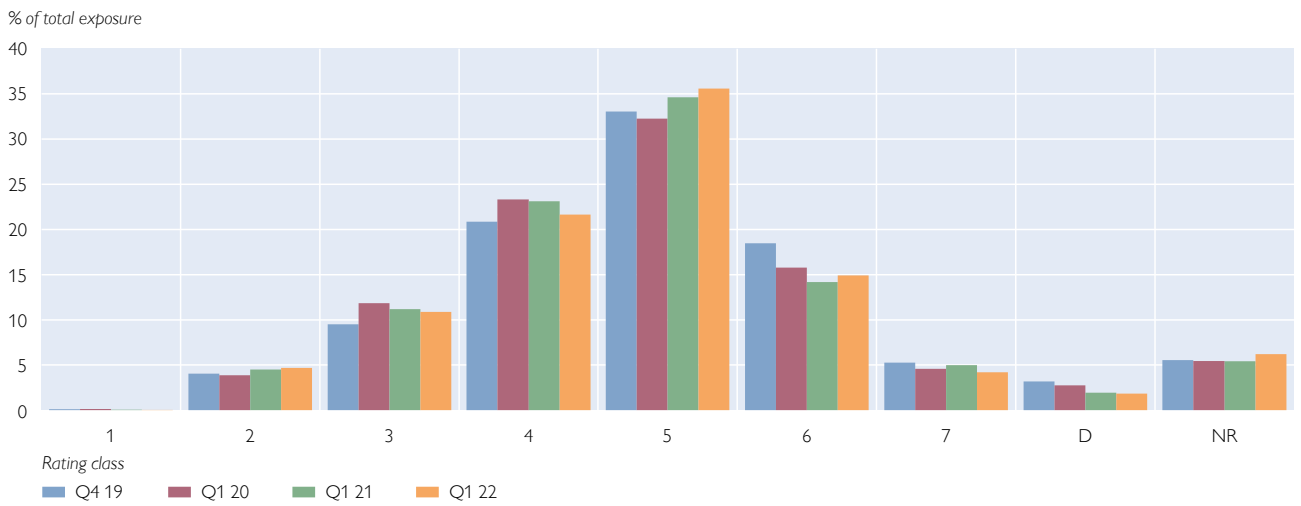


Source: ECB, OeNB, authors' calculations.

Note: NFCs = nonfinancial corporations.

Chart A2

### Rating distribution of CRE-purposed loans



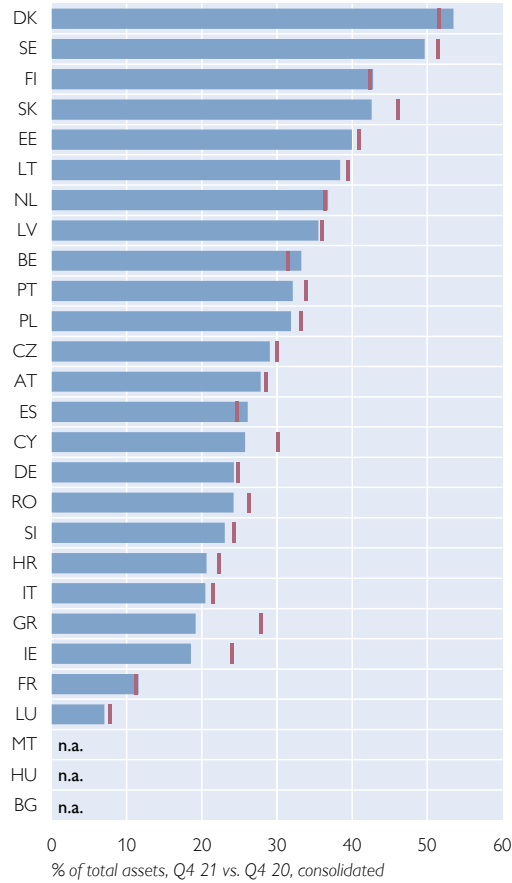
Source: OeNB, authors' calculations.

Note: D = default, NR = not rated.

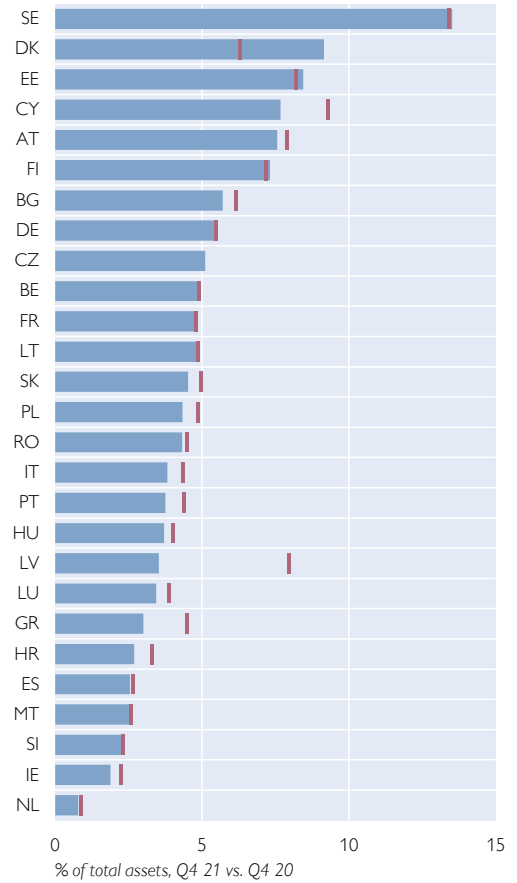
Chart A3

**EU-wide comparison: mortgage loans and credit to domestic real estate companies**

**Mortgage loans to NFCs and households**



**Credit to construction and real estate activities sectors (domestic)**



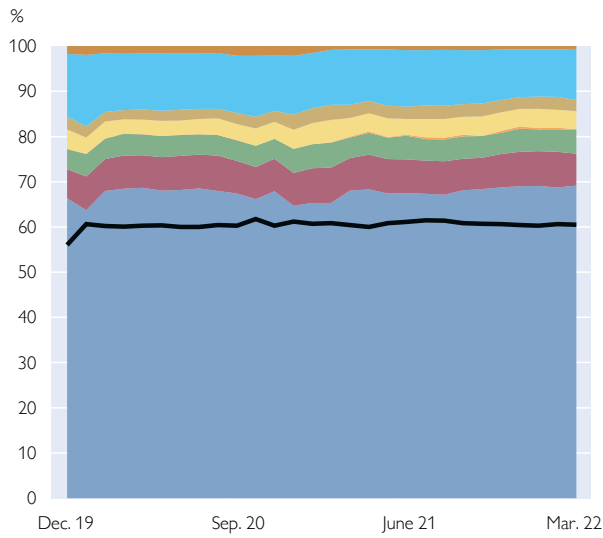
Source: ECB, authors' calculations.

Note: The bars indicate Q4 21; the red vertical lines indicate Q4 20; n.a. = not available.

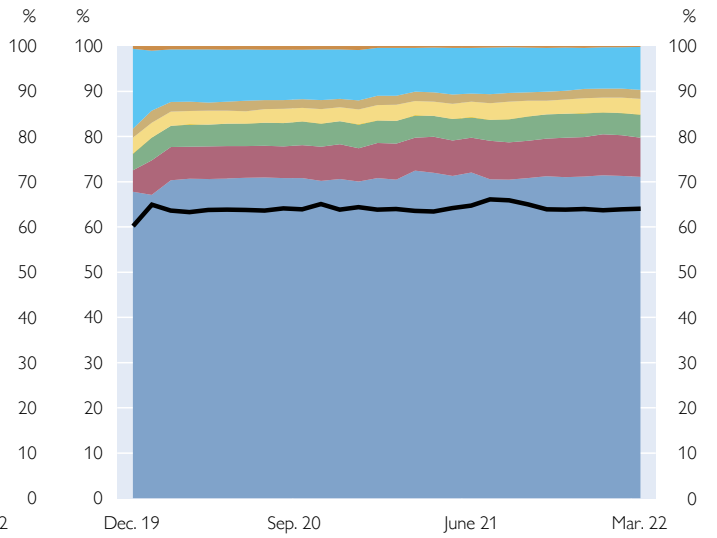
Chart A4

**Development of LTV and LTC ratios in Austria**

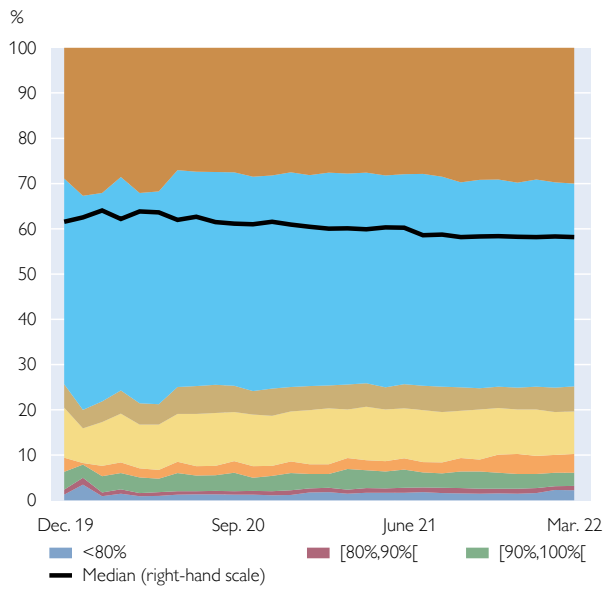
**LTV ratio of CRE-collateralized loans**



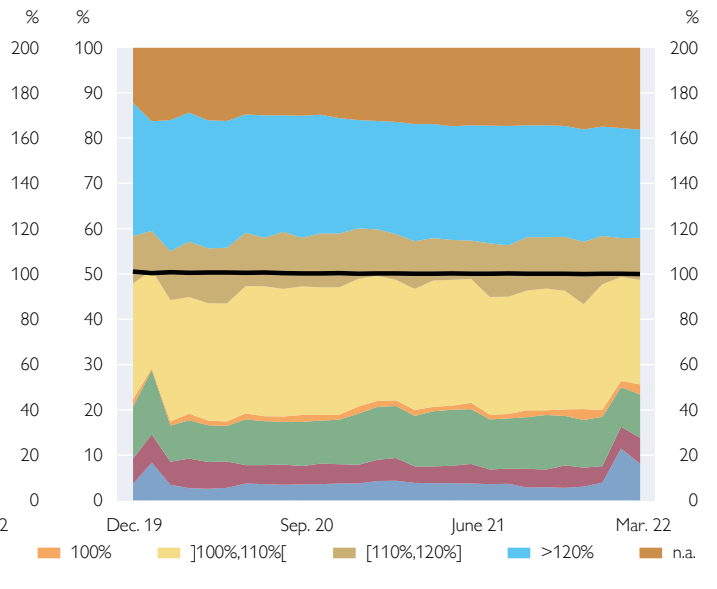
**LTV ratio of RRE-collateralized loans**



**LTC ratio of CRE collateralized loans**



**LTC ratio of RRE-collateralized loans**



Source: OeNB, authors' calculations.

Note: Loans to natural persons are not included; n.a. = not available.



# Effects of interest rate and inflation shocks on household vulnerability in Austria: a microsimulation using HFCS data

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Peter Lindner, Nicolas Prinz, Verena Woharcik<sup>1</sup>

*Motivated by the recent rise in interest rates and high inflation in the euro area, we test households' resilience against these shocks by performing microsimulations to investigate the impact of these shocks on household vulnerability and on debt at risk. We identify financially vulnerable households in Austria using several vulnerability measures common in the literature and household-level data from the latest wave of the Household Finance and Consumption Survey (HFCS). We find that the inflation shock has a stronger impact on the share of vulnerable households than the interest rate shock. However, the interest rate shock has a stronger impact on debt at risk than the inflation shock: the debt of households becoming vulnerable after the former (typically mortgage debt) tends to be larger than the debt held by households becoming vulnerable after the inflation shock (typically nonmortgage debt). Compared to the euro area, the departing levels of household vulnerability and debt at risk are much lower in Austria. The impact of a combined scenario is similar in both regions.*

JEL classification: D10, D14, E44, G10, G21

Keywords: macroprudential risk assessment, household vulnerability, stress tests, HFCS

Recent economic developments have been posing great challenges to households in the euro area. Rising gas and energy as well as food prices are putting households under pressure to make ends meet. To tackle the high inflation rates across the euro area the ECB has raised the monetary policy rate three times – by 50 basis points on July 21, 2022, by another 75 basis points on September 8, 2022, and by another 75 basis points on October 27, 2022 (ECB, 2022). This has given rise to the concern that households may face difficulties in servicing their debt. Given these recent inflation and interest rate shocks, it has become increasingly important for macroeconomic and borrower-based macroprudential policymaking to take into account the effects of macroeconomic shocks on household financial vulnerability and the share of debt held by financially vulnerable households (debt at risk).

We employ several commonly applied measures to identify potentially financially vulnerable households (see e.g. Albacete and Fessler, 2010; Albacete and Lindner, 2013; Albacete et al., 2014; Ampudia et al., 2016; or Bankowska et al., 2017) using the 2017 wave of the Household Finance and Consumption Survey (HFCS) coordinated by the ECB.<sup>2</sup> For estimating net income we use information from the microsimulation tool EUROMOD (Boone et al., 2019; or Kuypers et al., 2020).

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<sup>2</sup> See Albacete et al. (2018) for a methodological overview.

We simulate macroeconomic shocks, differentiating between an interest rate shock and an inflation shock to uncover their potential consequences for Austria and the euro area. Firstly, we assume the interest rate shock works through an adjustment of households' debt service similar to Albacete et al. (2014). Secondly, we assume the inflation shock works through an increase in households' consumption expenditure. To reflect current developments and uncertainty about inflation and the ECB's interest rate decisions, we use both a milder and a more pronounced scenario. A further refinement of the analysis allows for some discussion on short- and long-run scenarios of the impact of the interest rate and inflation shock (described in detail in section 2.1). We find that increases in inflation have a larger impact on the share of financially vulnerable households both in Austria and the euro area than interest rate shocks. However, debt at risk is more affected by interest rate increases than by inflation shocks.

## 1 Financial vulnerability measures

To identify households that may face difficulties in covering their expenses, we calculate different measures for the financial situation of a household (see tables A2 and A3 for the definitions of the variables used in this study). We include the three standard financial burden indicators: debt service to income (DStI), debt to asset (DtA) and debt to income (DtI).<sup>3</sup> In contrast to related literature (see Albacete et al., 2014; Albacete et al., 2020), we are able to use annual net income derived from EUROMOD instead of gross income to compute the DStI and DtI ratios. We approximate net income from the 2017 wave by employing the relation of net to gross income in each of the 50 income quantiles in every country from the 2014 wave.<sup>4</sup> Like the recent literature, our microsimulation mainly relies on the measure of financial margin (FM), which is defined as the difference between a household's income and expenditure (net income minus annual consumption and debt service).<sup>5</sup> A household is financially vulnerable if the FM is negative. The definition of consumption expenditure includes spending on food and utilities as well as on rent, trips and holidays. These items capture all information available in the HFCS. We consider changes in the price level of food and utilities to have an immediate impact while the effects of changes in prices for rent and holidays may take some time to materialize. Lastly, like Ampudia et al. (2016), we include a measure for subjective distress (SD) based on a question from the HFCS.<sup>6</sup>

Chart 1 shows the share of financially vulnerable households as a percentage of indebted households according to the different measures for Austria and the euro

<sup>3</sup> We define a household as financially vulnerable if  $DStI \geq 0.4$ ,  $DtA \geq 0.75$  and  $DtI \geq 4$ . These thresholds are in line with the abovementioned literature. The first two threshold bear close resemblance to the recently introduced borrower-based macroprudential policy limits in Austria.

<sup>4</sup> The implicit assumption necessary for this estimation is that the overall tax system in the country did not change drastically in this period. For the euro area results, we approximate in this gross-net transformation Malta and the Netherlands with Cyprus and Belgium, respectively, and Lithuania and Latvia both with Estonia as they are not available in 2014.

<sup>5</sup> The financial margin of household  $i$  is defined as  $FM_i = NetInc - (consumption\ expenditure + debt\ service)$ .

<sup>6</sup> This information is based on a question in the HFCS whether the households deemed itself able to meet their expenses or not.

area.<sup>7</sup> This share varies between 2.3% and 15.8% in Austria. For example, 5.2% of indebted Austrian households have a negative FM; this means that these households' annual consumption plus their annual total debt service exceeds their annual net income.<sup>8</sup> Our results indicate that the share of vulnerable households is significantly lower in Austria than in the euro area.

The share of debt held by financially vulnerable households is also of considerable interest for financial stability considerations. Like Albacete et al. (2014), we calculate the debt at risk, i.e. the share of debt held by potentially vulnerable households (table 1). Depending on the financial burden indicator, this share ranges from 3% to 34% in Austria. The table also shows that debt at risk is significantly lower in Austria than in the euro area (except for the subjective vulnerability measure), which points to a relatively high resilience of households in Austria compared to their euro area peers. Socioeconomic information on vulnerable households can be found in the annex (table A1).

## 2 Microsimulations

In this chapter we first describe the simulation scenarios. We then analyze the increase in financially vulnerable households and in debt at risk following various shocks and compare the results for Austria with the euro area.

### 2.1 Simulated scenarios

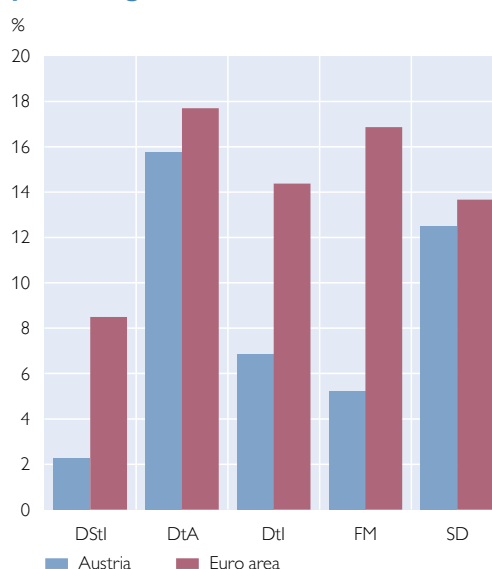
Interest rate shocks affect households' debt service when interest rates increase. We assume a 100% pass-through of the simulated interest rate changes, which is in line with the empirical literature (e.g. Albacete et al., 2014). We opt for two different interest rate increases: a 100 basis point increase representing a milder scenario and a 300 basis point increase for a more pronounced scenario. Further,

<sup>7</sup> In the 2017 wave, the euro area countries in the HFCS include Austria, Belgium, Cyprus, Germany, Estonia, Spain, Finland, France, Greece, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, the Netherlands, Portugal, Slovenia and Slovakia.

<sup>8</sup> If one considers consumption to exclude expenditure on holidays (and rent) this figure is obviously lower (at about 2%).

Chart 1

### Financially vulnerable households as a percentage of indebted households



Source: Eurosystem HFCS 2017, OeNB.

Note: DStI  $\geq 0.4$ , DtA  $\geq 0.75$ , Dtl  $\geq 4$ , FM  $< 0$ , SD = not able to meet expenses.

Table 1

### Debt at risk

	DStI	DtA	Dtl	FM	SD
	% of total household debt				
Austria	9.7	20.3	34.3	3.1	8.2
Euro area	21.5	22.8	45.6	12.0	6.2

Source: Eurosystem HFCS 2017, OeNB.

Note: DStI  $\geq 0.4$ , DtA  $\geq 0.75$ , Dtl  $\geq 4$ , FM  $< 0$ , SD = not able to meet expenses.

Table 2

### Overview of interest rate and inflation shock simulations

		Baseline	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Interest rate shock	Magnitude	+0 basis points	+100 basis points	+100 basis points	+300 basis points	+300 basis points
	Loans affected	-	Variable rate	Variable and fixed rate	Variable rate	Variable and fixed rate
	For the following measures	DStI, DtA, Dtl, FM, SD	FM	FM	FM	FM
Inflation shock	Magnitude	0%	5%	5%	10%	10%
	Prices affected	-	Food, utilities	Food, utilities, housing rent, trips and holidays	Food, utilities	Food, utilities, housing rent, trips and holidays
	For the following measures	DStI, DtA, Dtl, FM, SD	FM	FM	FM	FM

Source: Authors' calculations.

like Albacete et al. (2014), we distinguish between a shock which is assumed to affect only loans with variable interest rates (denoted as “short-term”) and a shock which affects all loans (denoted as “long-term”). The change in debt service after the interest rate increase affects the FM and hence determines which households are deemed potentially vulnerable. An overview of the baseline and the simulated shock scenarios (1 to 4) is shown in the top panel of table 2.<sup>9</sup>

The inflation shocks trigger an increase of households’ consumption expenditure.<sup>10</sup> To observe the effect of inflation increases in the short term, we simulate a 5% and a 10% increase in prices for food and utilities. Thus, we capture the situation that potential inflation shocks are first transmitted through food and utilities, which is in line with the literature (Gallin and Verbrugge, 2019; Gautier and Le Bihan, 2022; Gautier et al., 2022). Additionally, we simulate a scenario where we also increase housing rents and prices paid for holidays by 5% and 10% (reflecting a longer-term impact). The bottom panel of table 2 gives an overview of the different simulated inflation shock scenarios.

## 2.2 Simulation results

While it is not clear whether the magnitudes of the inflation and interest rate shocks are equivalent within each scenario, the scenarios are comparable in the sense that scenarios 1 and 2 represent a milder assumption on increases in inflation and interest rates, while scenarios 3 and 4 depict more pronounced cases, which imply higher costs for households.

The simulation results reported in chart 2 show some distinct differences in the relative increase in vulnerable households and debt at risk after interest rate shocks and inflation shocks. For Austria, we find that the share of financially vulnerable households after the inflation shock rises from about 5% to above 7%, which is a

<sup>9</sup> The baseline scenario reflects the most recent data available from the third wave of the HFCS in Austria with a reference period of 2017 for households’ balance sheet information. Acknowledging the limitation of the time lag of the HFCS and 2022, we need to assume that the structure of household vulnerability in Austria did not change significantly in the last years.

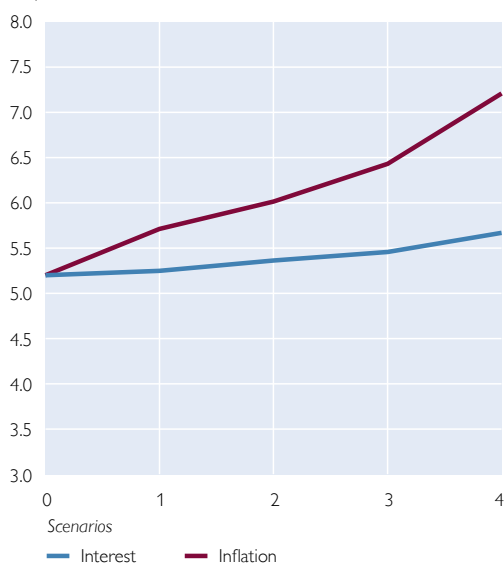
<sup>10</sup> We acknowledge that the HFCS provides only limited information on consumption expenditure and that more information would be desirable.

Chart 2

### Results of interest rate and inflation shock simulations

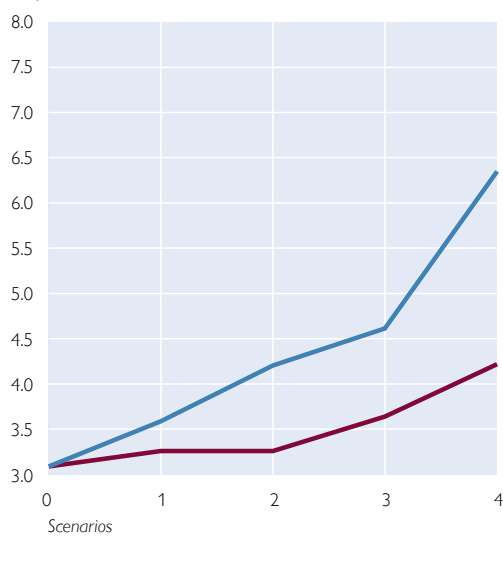
#### Vulnerable households

% of indebted households



#### Debt at risk

% of total household debt



Source: Eurosystem HFCS 2017, OeNB.

Note: Vulnerable households are households whose  $FM < 0$ .

relative increase by almost 40%. By contrast, the increase is relatively small following the interest rate shock. In the latter case, the share of vulnerable households only increases from just above 5.2% to 5.7%. On the other hand, turning to the share of debt held by vulnerable households in scenario 4, we find that debt at risk increases by about 37% after the inflation shock and by almost 106% – from 3.1% to 6.4% – after the interest rate shock. Hence, the interest rate change has a higher impact than the inflation shock on the aggregate level of household liabilities, which may turn into loans that cannot be repaid. This result is due to the fact that interest rate changes impact mortgage holders with larger outstanding amounts more, while inflation affects everybody, and particularly poor debtors with a relatively low level of nonmortgage debt may turn vulnerable.

### 2.3 Combined scenario and comparison with the euro area

In the real world, households are obviously affected by a combination of these shocks at the same time. Therefore, we simulate scenarios 1 to 4 for both shocks at the same time and put the results in an international context, comparing the results for Austria with euro area figures.<sup>11</sup> Recall from section 1 that both the share of vulnerable households as well as the share of debt held by these households is larger in the euro area than in Austria.

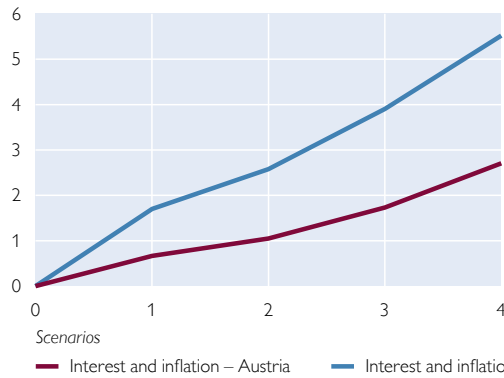
<sup>11</sup> Note that Austria is included in the euro area figures.

Chart 3

### Combined microsimulation: results for Austria and the euro area

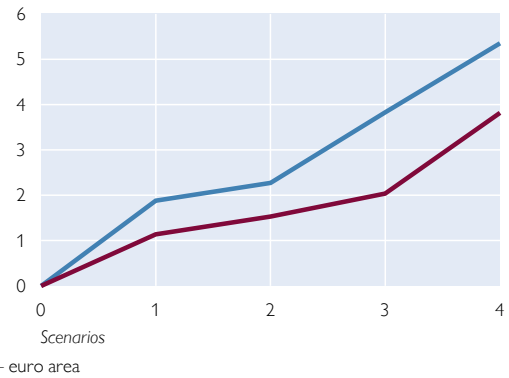
#### Vulnerable households

Percentage point change (from baseline)



#### Debt at risk

Percentage point change (from baseline)



Source: Eurosystem HFCS 2017, OeNB.

Note: Vulnerable households are households whose FM < 0.

Chart 3 shows the percentage point increase of the share of vulnerable households and the share of debt held by these households after each scenario of a combined shock for both Austria and the euro area. Obviously, the resulting increases are higher in the combined shock than in each shock separately (scenario 4 in Austria: +2.7 percentage points for vulnerable households and +3.8 percentage points for debt at risk compared to the baseline of 5.2% and 3.1% respectively). The increases in percentage points follow a similar trajectory in Austria and the euro area. The percentage point increase in both vulnerable households and debt at risk in the euro area is even larger than in Austria over all scenarios. Relative to the different starting levels, however, this translates into larger relative increases in Austria. Given Austrian households' high sensitivity to inflation and interest rate shocks, the continued monitoring and analysis of potential associated risks seems warranted.<sup>12</sup>

### 3 Conclusion

In this study, we perform simple simulations of interest rate and inflation shock scenarios to measure the impact of such shocks on the number of financially vulnerable households and debt at risk. Our results suggest significant differences in the magnitude of relative increases after inflation and interest rate shocks. The shocks impact both the share of financially vulnerable households and the share of debt held by these households in Austria and the euro area. Inflation has a larger impact on the number of financially vulnerable households, while interest rate changes have a larger impact on the level of debt at risk.

We acknowledge the limitations of this type of short exercise given the reference period and the limited information on consumption expenditure available in the HFCS. Further research could better take into account dynamic changes – such as rising real estate prices and their impact on mortgage demand – or use the new wave of the HFCS once it becomes available.

<sup>12</sup> The literature cited in this short study gives a good first overview of the work done in this field in Austria.

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## Annex

Table A1

### Vulnerable households by household characteristics

	Austria			Euro area		
	As share of all households	As share of households with mortgage debt	As share of households with nonmortgage debt	As share of all households	As share of households with mortgage debt	As share of households with nonmortgage debt
All	1.7	1.1	2.8	7.1	7.9	7.9
Gender <sup>1</sup>						
Male	1.5	1.4	2.8	6.4	7.4	7.7
Female	1.9	0.8	2.8	7.8	8.8	8.1
Gross income						
1-20 percentile	6.7	10.6	10.9	22.8	52.3	28.6
21-40 percentile	1.1	2.0	1.4	6.6	21.0	9.9
41-60 percentile	0.4	1.8	0.8	3.6	8.5	5.9
61-80 percentile	0.1	0.0	0.3	1.6	3.2	1.9
81-100 percentile	0.2	0.5	0.9	0.9	1.6	1.4
Gross wealth						
1-20 percentile	4.1	.	5.7	11.8	6.0	12.0
21-40 percentile	0.8	0.0	1.5	7.8	11.4	8.9
41-60 percentile	1.1	0.3	1.3	5.5	7.2	4.6
61-80 percentile	1.2	1.6	1.4	4.7	5.9	5.2
81-100 percentile	1.2	0.9	2.4	5.7	9.8	8.2
Age <sup>1</sup>						
16 to 30	4.3	3.0	5.9	11.6	8.7	9.5
31-59	1.9	0.9	2.6	7.4	7.2	8.1
60+	0.7	1.3	0.0	5.4	11.2	6.0
Household size						
1 household member	2.0	2.5	3.4	9.1	12.1	10.5
2 household members	1.2	0.8	2.4	5.3	8.0	6.4
3 household members	0.4	0.4	0.8	6.3	6.9	7.1
4 household members	3.2	1.2	3.7	7.0	6.4	7.7
Education level <sup>1</sup>						
Primary or lower	4.6	0.0	12.1	6.2	12.6	10.5
Secondary	1.7	1.1	3.0	7.7	9.0	7.6
Tertiary	1.5	1.1	1.7	6.4	6.1	7.6
Household main residence						
Owner	1.1	1.1	1.5	5.2	7.4	5.9
Renter <sup>2</sup>	2.2	0.6	3.5	9.6	14.5	10.1

Source: Eurosystem HFCS 2017, OeNB.

<sup>1</sup> Statistics refer to the head of household.

<sup>2</sup> For simplicity, "renter" includes part owners and people that live in the main residence for free.



Table A2

### Variable definitions

Measure (short)	Measure	Formula in words	Formula with variables	Financially vulnerable if	Explanation
DStI	Debt service to income	$= \frac{\text{debt service}}{\text{monthly net income}}$	$= \frac{DL2000}{DI2000net/12}$	>0.4	A household is considered to be financially vulnerable if it must use more than 40% of its monthly net income for monthly debt service payment.
DtI	Debt to income	$= \frac{\text{total outstanding debt}}{\text{yearly net income}}$	$= \frac{DL1000}{DI2000net}$	>4	A household is considered to be financially vulnerable if its total outstanding debt is more than 4 times higher than its yearly net income.
DtA	Debt to asset	$= \frac{\text{total outstanding debt}}{\text{total assets}}$	$= \frac{DL1000}{DA3001}$	>0.75	A household is considered to be financially vulnerable if the ratio of its total outstanding debt to its total assets is higher than 0.75.
FM	Financial margin	$= (\text{annual net income}) - (\text{annual consumption}) - (\text{annual debt service})$ ... where $\text{consumption} = \text{food} + \text{utilities} + \text{rent} + \text{trips and holidays}$	$= (DI2000net) - 12 * (HI0100 + HI0200 + HI0210 + HB2300 + HI0230 / 12) - (12 * DL2000)$	<0	A household is considered to be financially vulnerable if its annual consumption and annual debt service exceed its annual net income.
SD	Subjective distress	Some questions based on HI0600 and HI0700 in the HFCS			A household is considered to be financially vulnerable if it indicates that expenses are above income and the additional expenses are financed by overdrafts, loans, financial help from others or by leaving bills unpaid.

Source: Authors' compilation.

Note: HI0100=monthly amount spent on food at home, HI0200=amount spent on food outside home, HI0210=monthly amount spent on utilities, HB2300=monthly amount spent on rent, HI0230=annual expenditure on trips and holidays.

Table A3

### Additional variable definitions

Variables of interest	Formula in words	Formula with variables	Explanation
Share of financially vulnerable households (FV HH)	$= \frac{\text{number of FV HH}}{\text{number of indebted HH}}$	$= \frac{\sum FM}{\sum DL1000i}$	Share of financially vulnerable households as a percentage of indebted households.
Debt at risk	$= \frac{\text{total outstanding debt held by FV HH}}{\text{total outstanding debt held by all HH}}$	$= \frac{\sum FM * DL1000}{\sum DL1000}$	Total outstanding debt held by financially vulnerable households as a percentage of total outstanding debt held by all households.

Source: Authors' compilation.

Note: HI0100=monthly amount spent on food at home, HI0200=amount spent on food outside home, HI0210=monthly amount spent on utilities, HB2300=monthly amount spent on rent, HI0230=annual expenditure on trips and holidays.

# DuPont reloaded: the profitability of the Austrian banking sector and the impact of the COVID-19 pandemic

Manuel Gruber, Stefan Kavan<sup>1</sup>

*This short study follows up on our previous paper that analyzed the profitability of Austrian banks' subsidiaries in Central, Eastern and Southeastern Europe (CESEE) from 2004 to 2016 on the basis of a DuPont analysis.<sup>2</sup> Now, we not only update the time frame to include years before and during the COVID-19 pandemic (2017 to 2021), but also look at the entire Austrian banking sector. In addition, we explain trends in banks' net interest income in more detail by analyzing to what extent it depends on price and volume effects. We find that banks' return on equity dropped substantially during 2020 but bounced back to pre-pandemic levels in 2021. The obvious driver were risk costs, which spiked at first but quickly calmed down again as the impact of the pandemic proved to be less severe than originally expected. Also, banks' net interest margin was negatively affected during the pandemic, both by low interest rates and banks' shift toward lower-margin business. The future development of profitability in the Austrian banking sector is highly uncertain. But even though – like in the past few years – much will depend on external factors, including monetary, fiscal and prudential decisions as well as geopolitical developments, our analysis suggests that the Austrian banking sector is well prepared to weather these challenging times.*

JEL classification: G21

Keywords: bank, profitability, Austria, CESEE, DuPont analysis, net interest income

In this short study, we analyze the relative profitability of Austrian banks both from a subconsolidated and a consolidated point of view, i.e. regarding their subsidiaries in Central, Eastern and Southeastern Europe (CESEE) in particular and Austria's banking sector in general. This study is structured as follows: Section 1 explains how our adapted DuPont analysis can be used to dissect banks' return on equity (ROE) and to highlight profit and loss drivers. In section 2, we first apply this logic to the profitability of Austrian banks' subsidiaries in CESEE for the period from 2017 to 2021, before turning our attention to the consolidated Austrian banking sector. This approach enables us to discern trends that occurred prior and during the COVID-19 pandemic. Section 3 concludes by providing a cautious profitability outlook in challenging times.

## 1 How does a DuPont analysis help explain banks' profitability?

A corporation's profit and loss statement can be seen as a funnel where we put in operating income at the top and then – by adding and deducting a number of components – produce a net profit at the bottom (“the bottom line”). In our case, a bank earns operating income (e.g. net interest income), then deducts operating and risk costs, makes adjustments for other profits (or losses) and pays taxes, all of

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<sup>2</sup> For further details, see Gruber M., S. Kavan and P. Stockert (2017).

which results in a net profit (or loss). In terms of relative profitability, the net profit (or loss) is turned into a return on assets (ROA) and – after substantial leveraging – results in the bank’s return on equity (ROE).<sup>3</sup>

To identify the driving forces behind banks’ ROE, we rely on our (adapted) DuPont formula. The DuPont formula is named after the company where, in the early 20<sup>th</sup> century, a return-on-investment formula was developed that decomposes the profitability ratio “return on investment” into several subratios. For a complete introduction to the formula’s workings, please refer to our previous study.<sup>4</sup> We rely, again, on the appealing simplicity of dissecting a bank’s ROE according to underlying accounting terms to explain ROE developments on the basis of their main drivers, i.e. the operating income margin (OIM),<sup>5</sup> the cost-income ratio (CIR), risk costs (RC)<sup>6</sup> and financial leverage<sup>7</sup>. The formula guiding our train of thought – where most nominators and denominators simply cancel each other out – is as follows:

$$\begin{aligned}
 RoE &= \frac{\text{net profit}}{\text{PBT}} * \frac{\text{PBT}}{\text{OP after risk}} * \frac{\text{OP after risk}}{\text{OP before risk}} * \frac{\text{OP before risk}}{\text{operating income}} * \frac{\text{operating income}}{\text{av. total assets}} * \frac{\text{av. total assets}}{\text{av. equity}} \\
 (1) \quad &= \left(1 - \frac{\text{taxes}}{\text{PBT}}\right) * \frac{\text{PBT}}{\text{OP after risk}} * \left(1 - \frac{\text{provisioning}}{\text{OP before risk}}\right) * \left(1 - \frac{\text{operating cost}}{\text{operating income}}\right) * \frac{\text{operating income}}{\text{av. total assets}} * \frac{\text{av. total assets}}{\text{av. equity}} \\
 &= (1 - \text{tax rate}) * \text{impact of other profit} * (1 - \text{RC}) * (1 - \text{CIR}) * \text{OIM} * \text{financial leverage} \\
 &= \text{OIM} * (1 - \text{CIR}) * (1 - \text{RC}) * \text{impact of other profit} * (1 - \text{tax rate}) * \text{financial leverage}
 \end{aligned}$$

where PBT is profit before tax, OP is operating profit and “av.” stands for average.

## 2 What drove the profitability of the Austrian banking sector from 2017 to 2021?

### 2.1 Profitability of Austrian banks’ CESEE subsidiaries reached pre-pandemic levels in 2021, despite margin pressure, as risk costs quickly moderated and leverage rose

In this section, we apply our DuPont logic to all subsidiaries of Austrian banks active in CESEE from 2017 to 2021, with a particular focus on the impact of the COVID-19 pandemic.<sup>8</sup> The reason for starting our analysis with Austrian banks’ CESEE subsidiaries is that they contributed more than 40% to the Austrian banking sector’s overall profit over the five years analyzed, and even more than half in 2020.

<sup>3</sup> As we use accounting terms in this short study, equity refers to the equity position on a bank’s balance sheet (and not to regulatory own funds or market capitalization). Therefore, the ROE and leverage data we present will diverge from other published OeNB data, which are calculated using regulatory (tier 1) own funds.

<sup>4</sup> See footnote 2.

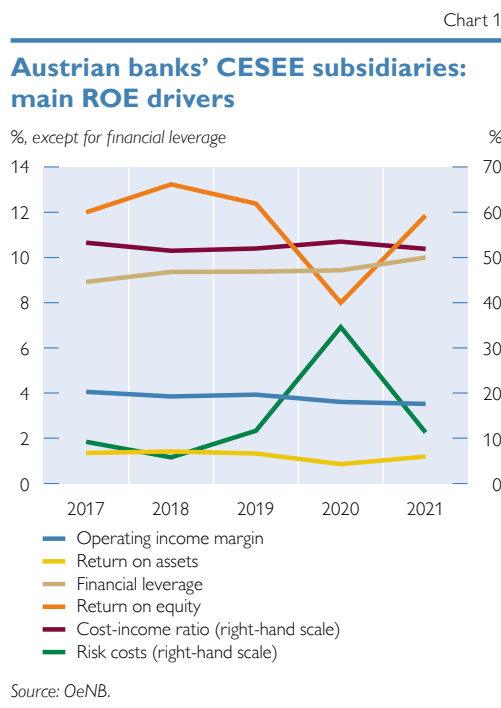
<sup>5</sup> The OIM is defined as operating income over average total assets.

<sup>6</sup> RC are defined as provisioning over operating profit (before risk provisioning).

<sup>7</sup> Financial leverage is defined as average total assets over average equity. For the sake of simplicity, we exclude the impact of other profit or the tax rate from our analysis as they concern non-core business areas and a (mostly) external factor.

<sup>8</sup> In this study, CESEE comprises a highly diverse set of countries across the region, and our sample of subsidiaries is variable (i.e. it is not adjusted for market exits, entries, mergers or acquisitions as these had little effect especially in the later years of the observation period).

We see in chart 1 that the ROE was rather stable before the pandemic (2017 to 2019), ranging between 12% and 13%, before dropping substantially to 8% in 2020 and quickly rebounding to pre-pandemic levels in 2021. Risk costs are an obvious culprit for the extreme slump observable during the first year of the pandemic, when provisioning consumed more than one-third of the operating profit (up from about one-tenth). Cautiousness was a prudent reaction by banks, as the economic consequences of the general health crisis proved difficult to assess at first. Thanks to various public and regulatory COVID-19 support measures, however, credit risks did not materialize as initially feared. Banks therefore quickly returned provisioning to low levels, similar to those before the pandemic, which boosted the recovery of profitability.



Apart from this obvious relationship, what story do the other main factors of the DuPont formula unveil over the observation period?

First, subsidiaries' financial leverage had been rising over the five years under consideration (especially in 2018 and 2021) from a factor of below 9 to a factor of 10. This trend, however negative from a financial stability perspective, positively affected subsidiaries' ROE.<sup>9</sup> Looking beyond risk costs and leverage, the operational profitability of subsidiaries' core business comes into focus. Here, developments have been twofold: On the one hand, their CIR was fairly stable at slightly above 50%. This highlights banks' general struggle to improve cost efficiency, given that digital transformation entails both medium-term savings and short-term investments, while wage pressure was high in several countries because of tight labor markets. On the other hand, subsidiaries' operating income margin (OIM) came under pressure, in particular during the pandemic. So what caused the vital pricing engine to stutter?

First, we take a broad look at the overall trend in the OIM as depicted in chart 1. From 2017 to 2021, the OIM declined markedly from slightly over 4.0% to barely over 3.5%, with a particular downward trend setting in with the pandemic. Digging deeper, chart 2 (left-hand panel) decomposes the OIM into its main components, i.e. the net interest margin (NIM)<sup>10</sup> as well as indicators for fees,

<sup>9</sup> The ROE strongly depends on leverage (regardless of the definition of equity) and is most commonly used by shareholders. Supervisors and financial stability analysts prefer assessing a banking system's profitability by using the nonleveraged ROA.

<sup>10</sup> The NIM is defined as net interest income over average total assets.

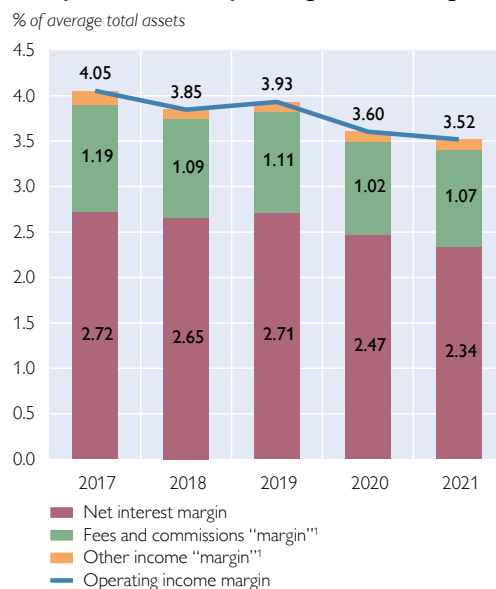
commissions and other income.<sup>11</sup> Two lessons can quickly be drawn: First, the NIM was consistently responsible for two-thirds of the OIM and, second, its decline was the primary driver of OIM degradation in 2020 and 2021. This highlights the profitability pressures banks' traditional activities had to face as expansive monetary policy cushioned the pandemic's effects for the real economy but at the same time hit banks' (pre-risk) lending margins and investment yields.<sup>12</sup> In addition to this external price pressure, the composition of loan books changed significantly as supply and demand dynamics favored lower-margin, lower-risk segments. Much has been written in this context about the boom in residential real estate (RRE)-secured lending to households in 2020 and 2021. However, RRE loans barely held on to their share of one-quarter of total gross loans. In fact, their boom was dwarfed by the increase in banks' business with central banks, which expanded from less than one-fifth to one-quarter of total gross loans in just two years. All in all, the first two years of the pandemic proved to be challenging for Austrian banks' CESEE subsidiaries' NIM.

We might end our analysis of relative profitability factors at this point, but we also want to provide insights into how Austrian banks' CESEE subsidiaries attempted to protect their (absolute) net interest income (i.e. their profits' cornerstone) in a time of quickly falling margins. The overall answer is straightforward,

Chart 2

### Austrian banks' CESEE subsidiaries

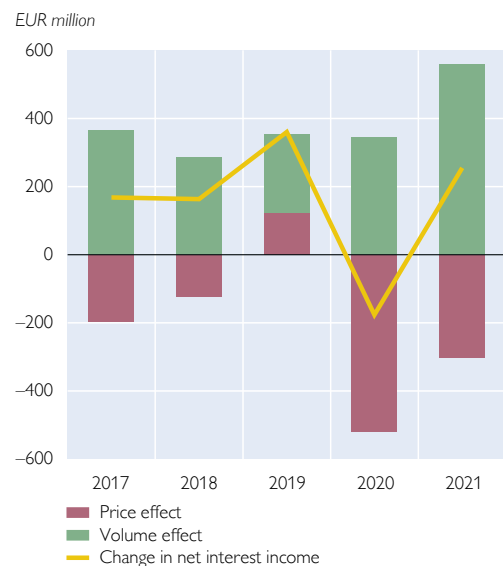
#### Components of the operating income margin



Source: OeNB.

<sup>1</sup> See footnote 11 in the main text for details on "margins."

#### Drivers of net interest income



<sup>11</sup> Dividing fees and commissions (or other, residual, income) by a banks' average total assets is not a "standard" profitability measure as fees and commissions are typically not earned on a banks' assets, but this is a necessary step to make all OIM components comparable in our analysis.

<sup>12</sup> During the pandemic, some CESEE central banks resorted to asset purchase programs, which put pressure on the yield earned on newly bought government securities. For Croatia and Romania, see Magyar Nemzeti Bank (2020a, p. 14), and for Hungary, see Magyar Nemzeti Bank (2020b).

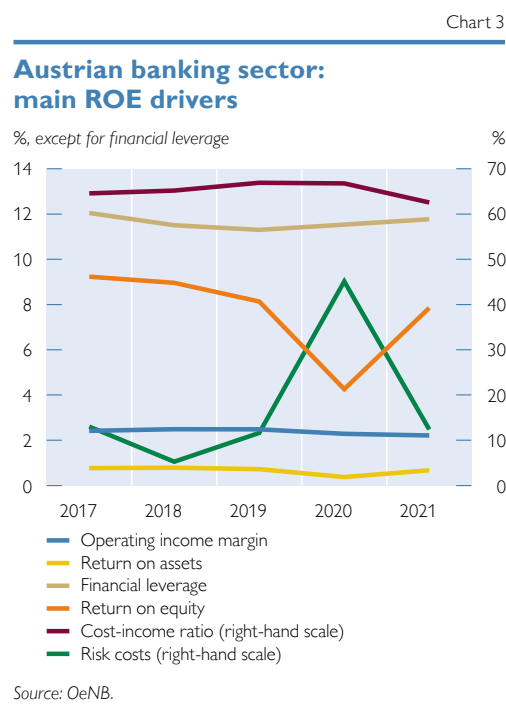
given that they recorded their highest five-year net interest income in 2021 in spite of the lowest NIM (i.e. price): Subsidiaries had to increase their average total assets (i.e. volume). This explanation can be expanded on, however, as we discern price and volume effects for each year to determine the exact underlying dynamics affecting subsidiaries' net interest income. As chart 2 (right-hand panel) highlights, rising volumes had a positive effect every year (and the highest positive effect in 2021), while price effects consistently put pressure on net interest income, in particular in 2020 (but not in 2019). This shows that Austrian banks' CESEE subsidiaries countered detrimental external price shocks and shifts in their loan books by expanding their assets year after year. This strategy raises questions about the future sustainability of profits, as trying to outgrow price pressures in potentially overheating markets (and RRE markets in particular) or relying on central bank operations might not prove sustainable in the long run.

## 2.2 Consolidated profitability quickly rebounded to pre-pandemic levels in 2021, but inflated balance sheet masks pressure on net interest margin

In this subsection, we apply the DuPont logic to the entire Austrian banking sector. As we identify the most important drivers influencing the sector's consolidated profitability over the last five years, our focus is on the impact of the COVID-19 pandemic.

The ROE of the Austrian banking sector shows a pattern very similar to that of Austrian banks' CESEE subsidiaries (see chart 3): It was quite stable in the years before the pandemic, ranging between 8% and 9%, before falling dramatically to 4% in 2020 and rebounding to pre-pandemic levels in 2021. Unsurprisingly, one driver of the massive decline in ROE in the first year of the pandemic were, again, risk costs, which quadrupled from a low level of slightly less than EUR 1 billion in 2019 to EUR 3.7 billion in 2020. This substantial increase absorbed nearly half of the sector's operating profit, which had remained stable in the turbulent year of 2020.<sup>13</sup> In 2021, the Austrian banking sector's profitability recovered quickly: Like for banks' CESEE subsidiaries, credit risk did not materialize to the extent originally feared thanks to swift support measures, and banks were able to reduce their risk costs to pre-pandemic, i.e. low, levels.

As with the CESEE subsidiaries in section 2.1, we now look at the other underlying drivers of Austrian banking sector profitability. We find that lever-

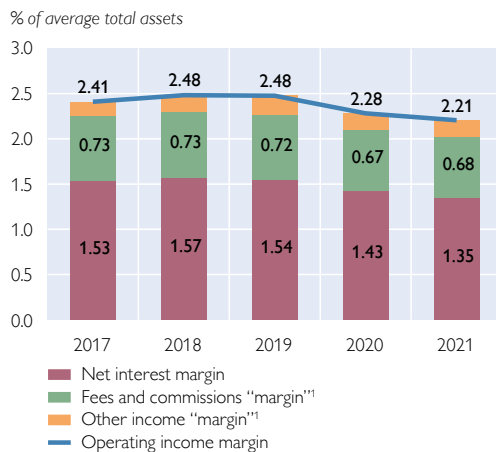


<sup>13</sup> For further information on this detail, which is counter-intuitive at first glance, please refer to OeNB (2021, p. 37ff).

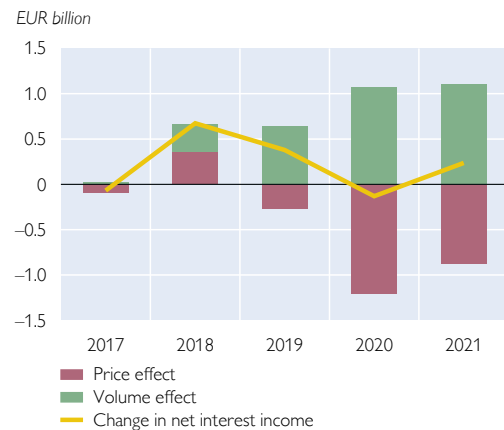
Chart 4

### Austrian banking sector

#### Components of the operating income margin



#### Drivers of net interest income



Source: OeNB.

<sup>1</sup> See footnote 11 in the main text for details on "margins."

age shows a slightly U-shaped trend, as it declined somewhat to reach its minimum factor of 11 in 2019, before increasing back to its starting factor of 12. Overall, therefore, leverage played a marginal role in the development of the Austrian banking sector's ROE. What is more important, however, is the question of how the operating profitability of banks' core business developed. First, the CIR fluctuated at a high level (between 60% and 70%), indicating a persistent cost efficiency issue in the sector. Second, the OIM showed a downward trend from the beginning of the pandemic, declining from 2.5% in 2019 to 2.2% in 2021. Thus, the picture is very similar to that of Austrian banks' CESEE subsidiaries. A decomposition of the consolidated OIM into its main components (see chart 4, left-hand panel) reveals that it is heavily dependent on the NIM, which accounts for almost two-thirds of the OIM, and that the 20 basis points decline in the NIM observed between 2019 and 2021 was the main cause of the deterioration of the OIM. As mentioned in section 2.1, extraordinary monetary policy operations proved to be challenging for banks' NIM since they put pressure on pre-risk lending margins and investment yields after a prolonged period in which interest rates had already been low. We might assume that this circumstance left a dent in net interest income, but quite to the contrary: The Austrian banking sector not only compensated for this margin pressure but, in 2021, even recorded its highest absolute net interest income in the period analyzed. As we have already seen for Austrian banks' CESEE subsidiaries, this was only possible through the fast expansion of average total assets (in terms of volume), which in this case was fueled mainly by extraordinary monetary policy operations, such as the ECB's targeted longer-term refinancing operations (TLTROs).<sup>14</sup> Like chart 2 (right-hand panel) in section 2.1, chart 4 (right-hand panel) depicts the yearly price and volume effect on net interest income – in this

<sup>14</sup> From end-2019 to end-2021, the share of deposits with central banks in banks' total assets almost tripled from 5% to 14%. For details on Austrian banks' extensive use of central bank operations, see OeNB (2022a, p. 44–45).

case for the Austrian banking sector. We find that increasing volumes had a positive impact on banks' net interest income in every year under observation, while price effects were negative almost across the board, with particularly noticeable effects during the pandemic in 2020 and 2021.

The overall picture of the Austrian banking sector was thus very similar to that of its CESEE subsidiaries.

### **3 Challenging outlook for Austrian banks as geopolitics, inflation and monetary tightening fundamentally change business environment**

Analyzing banks' profitability has several dimensions beyond absolute profits and ROEs for shareholders as it is equally important to understand the underlying drivers of these figures, especially when shocks such as a pandemic occur. For the Austrian banking sector and its subsidiaries in CESEE, we find that their ROE dropped substantially during 2020 but bounced back to pre-pandemic levels in 2021. The obvious driver behind this movement were risk costs that spiked at first, but then quickly calmed down as the impact of the pandemic proved to be less severe than originally expected due to various support measures. Importantly, we also find that the CIR was no decisive factor, while banks' NIM was negatively affected both by the low interest rate environment and banks' shift to lower-margin business (e.g. RRE-secured lending and TLTROs).

Based on our analysis of the past five years, what is the medium-term outlook for the sector's profits? Unfortunately, any forecast at this point is clouded by extreme uncertainty. Nonetheless, we end this study by putting forward our cautious thoughts, relying once again on the main profitability drivers identified in our DuPont analysis:

- (1) The Austrian banking sector's (absolute) operating income continues to depend strongly on net interest income, despite growing fees and commissions. This is one of the areas that should be watched closely as the very low interest rate environment in the euro area and in CESEE is coming to an end and RRE is becoming less and less affordable for borrowers. On the pricing side, banks' NIM is likely to rise, as higher rates directly affect the large stock of variable rate loans (especially in Austria<sup>15</sup>) as well as new business, while deposit rates may experience a slower upward adjustment. Regarding credit growth, the outlook is more difficult as the demand for loans is negatively affected by higher rates, but inventory build-ups (aimed at dealing with supply bottlenecks) and high inflation may actually increase the demand for, and the nominal value of, loans.<sup>16</sup> Overall, we expect the rise in the NIM to overcompensate potentially lower lending growth.
- (2) Banks' CIR has been highlighted as a potential area of improvement for years, as Austrian banks keep struggling – despite consolidation efforts, the reduction of branch offices and the push toward digital transformation – to meaningfully enhance their operating efficiency. Cost-cutting in an inflationary environment may prove particularly difficult, and much will depend on upcoming wage negotiations and the clearing of supply bottlenecks.

<sup>15</sup> For example, the share of variable rate loans extended by Austrian banks to Austrian households was more than 60% of the outstanding loan volume as of mid-2022.

<sup>16</sup> See OeNB (2022b).



- (3) Relative risk costs dropped to their pre-pandemic, i.e. low, level in 2021, while nonperforming loan ratios of just 1.8% as of mid-2022 are at historic lows on both the consolidated and the CESEE subsidiary level. Banks' past efforts to clean up their loan portfolios will prove helpful now as the end of the very low interest rate environment, the outbreak of war in Ukraine and high inflation will call these moderate levels into question (despite public measures to dampen inflationary pressures). As economic and geopolitical uncertainties are high, risk provisioning is likely to rise again.
- (4) Although they were not at the core of our analysis, fiscal measures may become an issue. Some European governments currently discuss "windfall taxes" on banks,<sup>17</sup> while at the same time lowering banking customers' default risks by establishing new fiscal safety nets. Political attempts to shield the real economy from the cost-of-living and cost-of-production crisis may therefore have multiple and partly opposing effects on banks' profitability, and the resulting balance is still unknown.
- (5) While this means blurring the lines between regulatory own funds and accounting equity, we would like to point out that higher capitalization levels in place since the global financial crisis have substantially reduced financial leverage. More recently, however, leverage has been slightly on the rise again (see charts 1 and 3). Numerous factors may play a role in this context over the medium term. After the recovery from the pandemic's initial impact, several European supervisors tightened capital buffer requirements again,<sup>18</sup> and decreased risk weights have become a focus of supervision,<sup>19</sup> which may lead to higher capital requirements for banks. Given that the course of the pandemic and of the war in Ukraine are highly uncertain, however, capital buffers may also be released again. Furthermore, banks' strong asset growth, which was partly fueled by expansive monetary policy (e.g. via TLTROs, but also the RRE lending boom), may go into reverse as central banks return to more normalized operations and residential real estate becomes less affordable for borrowers.

Given that several black swan events humbled eager forecasters in recent years, we deem predicting Austrian banking sector profitability no easy feat, either. From a financial stability point of view, it is comforting that the sector appears generally well prepared to weather a multitude of new challenges, given its (still) record-low nonperforming loans ratio as well as several lines of defense in terms of capitalization and coverage (with provisions and collateral).<sup>20</sup> For Austrian banks, much will – as in the past few years – depend on external factors, including monetary, fiscal and prudential decisions as well as geopolitical developments. After years of extraordinary circumstances, a gradual normalization would constitute a silver lining that allows banks to adapt their business models to a new normal, earn

<sup>17</sup> See e.g. *The Financial Times* (2022).

<sup>18</sup> See e.g. *Financial Market Stability Board* (2022a).

<sup>19</sup> *Austria's Financial Market Stability Board* (2022b) e.g. points out that "risk weights for mortgage-backed loans and corporate loans have decreased to levels that are very low by historical standards" and the *Czech National Bank* (2022) states that "[l]owered risk weights in the loan portfolios of banks applying the IRB approach also remain a source of systemic risk."

<sup>20</sup> For the latest profitability trends covering the first half of 2022, please refer to the recent developments section in *Financial Stability Report 44*.

risk-adequate returns in a sustainable manner and thereby foster financial stability in Austria and in their CESEE host markets.

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Annex

# Key financial indicators

International financial markets	Table
<i>Short-term interest rates</i>	A1
<i>Long-term interest rates</i>	A2
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Cutoff date for data: November 11, 2022

Conventions used:

x = no data can be indicated for technical reasons.

.. = data not available at the reporting date.

Revisions of data published in earlier volumes are not indicated.

Discrepancies may arise from rounding.

## International financial markets

Table A1

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

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	Three-month rate, period average, %							
Euro area	-0.26	-0.33	-0.32	-0.36	-0.43	-0.55	-0.54	-0.44
USA	0.74	1.26	2.31	2.33	0.65	0.16	0.18	1.01
Japan	0.08	0.06	0.07	0.07	0.07	0.07	0.07	0.07
United Kingdom	0.50	0.36	0.72	0.81	0.29	0.09	0.07	x
Switzerland	-0.75	-0.73	-0.73	-0.74	-0.71	-0.76	-0.75	x
Czechia	0.29	0.41	1.27	2.12	0.86	1.13	0.38	5.29
Hungary	0.99	0.14	0.12	0.19	0.70	1.44	0.81	5.96
Poland	1.70	1.73	1.71	1.72	0.67	0.54	0.21	4.85

Source: Bloomberg, Eurostat, Macrobond.

<sup>1</sup> Average rate at which prime banks are willing to lend funds to other prime banks for three months.

Table A2

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

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	Ten-year rates, period average, %							
Euro area	0.93	1.17	1.27	0.58	0.21	0.20	0.17	1.40
USA	1.83	2.32	2.81	2.33	0.89	1.44	1.45	2.44
Japan	-0.01	0.04	0.06	-0.08	0.00	0.06	0.07	0.20
United Kingdom	1.22	1.18	1.41	0.88	0.32	0.74	0.66	1.71
Switzerland	-0.36	-0.09	0.03	-0.43	-0.50	-0.26	-0.28	0.56
Austria	0.38	0.58	0.69	0.06	-0.23	-0.09	-0.11	1.06
Czechia	0.43	0.98	1.98	1.55	1.13	1.90	1.65	3.90
Hungary	3.14	2.96	3.06	2.47	2.22	3.06	2.64	6.21
Poland	3.04	3.42	3.20	2.35	1.50	1.95	1.53	5.42

Source: ECB, Eurostat, Macrobond.

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

Table A3

### Stock indices

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	Annual change in %, period average							
Euro area: EURO STOXX	-9.67	17.16	-0.48	-0.37	-3.69	24.46	22.20	0.30
USA: S&P 500	1.63	16.92	12.13	6.09	10.45	32.80	34.54	6.39
Japan: Nikkei 225	-11.92	19.47	10.40	-2.75	4.67	26.97	36.07	-6.80
United Kingdom: FTSE100	-1.74	13.96	-0.21	-1.17	-13.75	11.57	6.34	8.69
Switzerland: SMI	-10.12	10.91	-0.16	9.56	4.01	15.15	11.36	6.80
Austria: ATX	-5.42	34.83	7.56	-8.95	-20.45	42.45	27.46	6.89
Czechia: PX 50	-11.53	14.31	8.04	-3.16	-11.65	29.13	15.78	23.60
Hungary: BUX	28.96	31.47	5.51	10.14	-10.36	29.42	17.08	0.28
Poland: WIG	-9.87	30.11	-2.72	-1.27	-13.79	29.17	21.82	1.85

Source: Macrobond.

Table A4

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

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>Percentage points, period average</i>								
Euro area								
AA	0.80	0.73	0.70	0.79	0.86	0.63	0.61	1.00
BBB	2.11	1.70	1.78	1.85	1.83	1.29	1.28	1.94
USA								
AA	0.93	0.74	0.76	0.72	0.96	0.60	0.60	0.86
BBB	2.21	1.54	1.59	1.73	2.05	1.22	1.23	1.73

Source: Macrobond.

<sup>1</sup> Spreads of seven- to ten-year corporate bonds against ten-year government bonds (euro area: German government bonds).**Austrian corporate and household sectors**

Table A5

**Financial investment of households<sup>1</sup>**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>EUR billion, four-quarter moving sum</i>								
Currency	0.6	0.6	0.8	0.9	2.4	-0.2	0.3	0.3
Deposits	10.3	8.8	11.5	11.8	17.7	12.4	16.8	7.8
Debt securities <sup>2</sup>	-2.7	-2.7	-1.8	-1.1	-3.3	-2.2	-3.1	-0.6
Shares and other equity <sup>3</sup>	1.1	-0.5	0.2	1.1	5.9	2.4	2.6	2.6
Mutual fund shares	3.1	3.8	2.2	2.6	4.1	9.4	6.9	8.7
Insurance technical reserves	1.0	0.6	0.4	0.8	-0.2	0.6	0.6	0.8
Other accounts receivable	-0.2	1.8	0.9	0.7	1.9	1.9	0.5	1.4
Total financial investment	13.2	12.4	14.2	16.8	28.5	24.3	24.6	21.0

Source: OeNB (financial accounts).

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

Table A6

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

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>EUR billion, four-quarter moving sum</i>								
Net disposable income	201.3	208.3	215.2	222.5	220.9	227.0	224.2	236.3
Savings	15.9	15.8	16.7	19.1	32.1	26.8	33.2	21.2
Saving ratio in % <sup>2</sup>	7.8	7.5	7.7	8.5	14.4	11.8	14.5	8.2

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

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

Table A7

**Financing of nonfinancial corporations**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>EUR billion, four-quarter moving sum</i>								
Debt securities <sup>1</sup>	0.7	-1.9	-1.5	-1.2	8.0	-3.3	5.8	-5.4
Loans	14.1	14.4	16.3	21.8	3.3	30.4	2.8	39.0
Shares and other equity	2.8	11.9	-0.6	3.6	-3.6	3.2	-0.8	4.0
Other accounts payable	5.6	3.3	7.6	-2.0	-0.4	1.7	-3.7	3.3
Total external financing	23.2	27.7	21.8	22.2	7.3	32.0	4.1	40.9

Source: OeNB (financial accounts).

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

Table A8

**Insolvency indicators**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
Estimated default liabilities (opened insolvency proceedings, EUR million)	2,867	1,863	2,071	1,697	3,057	1,761	392	629
Opened insolvency proceedings (number)	3,163	3,025	2,985	3,044	1,804	2,060	701	1,370
Dismissed applications for insolvency proceedings (number)	2,063	2,054	1,995	1,974	1,230	974	358	938
Total insolvencies (number)	5,226	5,079	4,980	5,018	3,034	3,034	1,059	2,308

Source: Kreditschutzverband von 1870.

Table A9

**Housing market indicators**

	2014	2015	2016	2017	2018	2019	2020	2021
<i>(2000=100)</i>								
<b>Residential property price index</b>								
Vienna	204.6	209.2	217.2	220.4	232.0	243.2	259.6	287.6
Austria	161.4	168.1	180.4	187.2	200.1	208.0	222.6	248.8
Austria excluding Vienna	145.4	152.9	166.7	174.9	189.8	194.8	209.4	236.2
<i>(2020=100)</i>								
<b>Rent prices<sup>1</sup></b>								
Rents of apartments, excluding utilities (as measured in the CPI)	80.3	84.5	86.4	89.9	93.3	96.0	100.0	102.0
<b>OeNB fundamentals indicator for residential property prices<sup>2</sup></b>								
Vienna	11.9	12.0	12.9	14.4	16.9	18.3	19.7	29.2
Austria	-4.9	-3.1	1.0	5.4	8.8	9.3	9.4	20.4

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

<sup>1</sup> Free and regulated rents.<sup>2</sup> Deviation from fundamental price in %.

Austrian financial intermediaries<sup>1</sup>

Table A10

## Structural indicators

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	<i>End of period</i>							
Number of banks in Austria	672	628	597	573	543	520	542	519
Number of bank branches	3,926	3,775	3,639	3,521	3,134	3,438	3,479	3,342
Number of foreign subsidiaries	60	58	55	53	53	54	52	50
Number of branches abroad	209	215	219	229	231	187	227	166
Number of employees <sup>1</sup>	74,543	73,706	73,508	73,203	71,896	68,705	71,678	68,715

Source: OeNB.

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

Table A11

## Total assets

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	<i>End of period, EUR million</i>							
Total assets on an unconsolidated basis	832,267	815,275	854,582	884,964	973,817	1,024,399	1,005,106	1,040,186
Total assets on a consolidated basis	946,342	948,861	985,981	1,032,285	1,136,427	1,196,594	1,168,625	1,231,364
Total assets of CESEE subsidiaries	184,966	205,532	206,582	222,947	234,468	270,676	257,994	286,261

Source: OeNB.

Table A12

## Sectoral distribution of domestic loans to nonbanks

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	<i>End of period, EUR million</i>							
<b>All currencies combined</b>								
Nonbanks	335,644	341,149	355,869	371,790	385,384	410,860	393,600	422,683
of which: nonfinancial corporations	135,569	143,758	153,028	162,905	169,795	184,676	175,107	192,655
households <sup>1</sup>	152,516	156,386	161,947	168,824	174,494	184,214	178,193	189,268
general government	27,681	24,443	24,562	23,576	24,718	25,376	23,745	24,105
other financial intermediaries	19,878	16,562	16,332	16,485	16,330	16,541	16,555	16,655
<b>Foreign currency</b>								
Nonbanks	30,088	22,182	20,563	19,619	16,528	14,862	15,388	14,760
of which: nonfinancial corporations	4,296	3,397	3,538	3,321	2,628	2,497	2,801	2,824
households <sup>1</sup>	21,224	16,486	14,993	13,590	11,581	10,057	10,241	9,543
general government	2,623	943	517	471	425	360	362	343
other financial intermediaries	1,945	1,356	1,516	2,237	1,891	1,946	1,984	2,050

Source: OeNB.

Note: Figures are based on monetary statistics.

<sup>1</sup> Including nonprofit institutions serving households.<sup>1</sup> The OeNB's financial indicators relate to all banks operating in Austria. For this reason, some of the figures presented here may deviate from the Financial Soundness Indicators published by the IMF.



Table A13

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

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	<i>End of period, %</i>							
Nonperforming loans in % of total loans (Austria <sup>2</sup> )	3.2	2.5	2.0	1.7	1.5	1.4	1.4	1.3
Nonperforming loans in % of total loans (consolidated)	5.2	3.4	2.6	2.2	2.0	1.8	1.9	1.8
Nonperforming loans in % of total loans (Austrian banks' CESEE subsidiaries)	8.6	4.5	3.2	2.4	2.4	2.0	2.2	1.8
Coverage ratio <sup>3</sup> (Austria <sup>2</sup> )	59	60	62	61	68	70	71	71
Coverage ratio <sup>4</sup> (consolidated)	53	52	51	49	49	48	49	46
Coverage ratio <sup>4</sup> (Austrian banks' CESEE subsidiaries)	67	61	64	67	67	64	64	64

Source: OeNB.

<sup>1</sup> 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.

<sup>2</sup> Austrian banks' domestic business.

<sup>3</sup> Total loan loss provisions in % of nonperforming loans.

<sup>4</sup> Loan loss provisions on nonperforming loans in % of nonperforming loans.

Table A14

**Exposure to CESEE**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	<i>End of period, EUR million</i>							
Total exposure according to the BIS <sup>1</sup>	193,273	210,616	217,078	233,275	243,569	278,902	268,571	294,341
Total indirect lending to nonbanks <sup>2</sup>	108,738	118,268	120,816	133,169	133,437	150,945	139,452	151,290
Total direct lending <sup>3</sup>	32,976	28,507	27,526	23,992	25,656	24,125	24,722	24,517
Foreign currency loans of Austrian banks' CESEE subsidiaries	32,576	31,027	29,836	29,766	29,376	30,362	28,755	30,243

Source: OeNB.

<sup>1</sup> As from mid-2017, comparability of data with earlier figures is limited due to several methodological adjustments in data collection.

<sup>2</sup> Lending (net lending after risk provisions) to nonbanks by all fully consolidated bank subsidiaries in CESEE.

<sup>3</sup> Cross-border lending to nonbanks and nonfinancial institutions in CESEE according to monetary statistics.

Table A15

**Profitability on a consolidated basis**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>End of period, EUR million</i>								
Operating income	22,408	22,837	24,023	24,997	24,750	25,805	12,783	14,332
of which: net interest income	14,604	14,536	15,210	15,589	15,458	15,659	7,814	8,725
fee and commission income	6,562	6,885	7,097	7,226	7,314	8,042	3,858	4,703
Operating expenses	16,687	14,752	15,661	16,733	16,530	16,783	7,854	10,219
of which: staff costs	8,774	8,415	8,602	8,740	8,461	8,724	4,182	4,279
other administrative expenses	5,820	5,571	5,630	5,673	5,835	5,959	3,022	3,486
Operating profit/loss	5,723	8,087	8,361	8,264	8,220	9,022	4,929	4,113
Risk provisioning	1,192	1,049	438	960	3,708	1,412	410	708
Net profit after taxes	4,979	6,577	6,916	6,713	3,668	6,085	3,746	3,841
%								
Return on average (total) assets <sup>1</sup>	0.6	0.8	0.8	0.7	0.4	0.6	0.7	0.6
Cost-to-income ratio	74	65	65	67	67	65	61	71
Risk provisioning to operating profit	21	13	5	12	45	16	8	17

Source: OeNB.

<sup>1</sup> Based on profits after tax, but before minority interests.

Table A16

**Profitability of Austrian banks' CESEE subsidiaries**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>End of period, EUR million</i>								
Operating income	7,753	7,914	7,926	8,442	8,243	8,889	4,164	5,619
of which: net interest income	5,135	5,304	5,467	5,827	5,651	5,906	2,770	3,511
fee and commission income	2,184	2,315	2,241	2,393	2,327	2,701	1,225	1,859
Operating expenses	4,084	4,216	4,081	4,390	4,412	4,616	2,237	2,530
of which: staff costs	1,956	2,052	2,004	2,126	2,059	2,181	1,033	1,106
other administrative expenses	1,726	1,753	1,672	1,652	1,746	1,816	902	1,120
Operating profit/loss	3,668	3,698	3,845	4,053	3,831	4,273	1,927	3,089
Risk provisioning	720	340	221	472	1,326	482	161	539
Net profit after taxes	2,354	2,627	2,913	2,837	1,941	2,996	1,432	2,017
%								
Return on average (total) assets	1.3	1.3	1.4	1.3	0.8	1.2	1.2	1.4
Cost-to-income ratio	53	53	51	52	54	52	54	45
Risk provisioning to operating profit	20	9	6	12	35	11	8	17

Source: OeNB.

Table A17

**Solvency on a consolidated basis**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
	<i>End of period, EUR million</i>							
Own funds	80,699	84,983	86,529	90,928	94,257	99,223	96,399	101,018
Total risk exposure (i.e. risk-weighted assets)	442,870	449,451	465,623	486,507	482,394	514,690	498,516	538,988
	%							
Total capital adequacy ratio	18.2	18.9	18.6	18.7	19.5	19.3	19.3	18.7
Tier 1 capital ratio	14.9	15.9	16.0	16.3	17.2	17.1	17.1	16.8
Common equity tier 1 (CET1) ratio	14.9	15.6	15.4	15.6	16.1	16.0	16.1	15.8
Leverage ratio (transitional)	6.9	7.3	7.5	7.6	7.4	7.7	7.7	7.4

Source: OeNB.

Table A18

**Market indicators of selected Austrian financial institutions**

	2017	2018	2019	2020	2021	Sep. 22
	<i>% of end-2017 prices, end of period</i>					
<b>Share prices</b>						
Erste Group Bank	100	80	93	69	115	63
BAWAG P.S.K.	100	81	91	85	122	100
Raiffeisen Bank International	100	74	74	55	86	40
EURO STOXX Banks	100	67	74	57	77	60
Uniqqa	100	89	103	73	91	69
Vienna Insurance Group	100	79	99	81	97	81
EURO STOXX Insurance	100	91	112	97	113	96
	<i>%, end of period</i>					
<b>Relative valuation: share price-to-book value ratio</b>						
Erste Group Bank	115	89	97	69	106	57
BAWAG P.S.K.	124	96	101	86	123	103
Raiffeisen Bank International	100	69	62	46	66	26
EURO STOXX Banks	83	56	61	49	66	51
Uniqqa	86	81	83	57	75	94
Vienna Insurance Group	71	57	64	52	58	..
EURO STOXX Insurance	105	92	101	82	96	113

Source: Bloomberg.

Table A19

**Key indicators of Austrian insurance companies**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>End of period, EUR million</i>								
<b>Business and profitability</b>								
Premiums	16,920	16,975	17,178	17,555	19,082	19,766	10,635	11,379
Expenses for claims and insurance benefits	14,751	14,727	14,088	15,016	15,764	16,545	8,225	8,085
Underwriting results	560	581	507	618	554	766	464	188
Profit from investments	3,051	2,815	2,528	3,118	1,771	3,082	1,831	845
Profit from ordinary activities	1,414	1,244	1,168	1,693	744	1,942	1,348	560
Total assets	114,707	137,280	133,082	138,411	141,081	145,351	144,098	132,674
<b>Investments</b>								
Currency and deposits	3,247	2,749	3,402	2,732	2,681	3,250	3,960	3,985
Debt securities	55,006	55,616	53,830	54,679	54,332	50,007	51,356	41,602
of which: issued by domestic residents	16,760	16,157	15,342	14,832	13,942	11,749	12,706	9,633
issued by euro area residents (other than domestic)	27,101	27,442	27,001	28,269	28,037	26,237	26,626	21,943
issued by non-euro area residents	11,145	12,017	11,487	11,577	12,352	12,021	12,025	10,025
Shares and other equity	22,474	21,258	19,677	19,413	21,178	25,514	23,599	26,060
Investment fund shares (including money market funds)	33,981	34,877	33,414	37,498	37,702	40,280	39,268	34,868
Insurance technical reserves and related claims	3,568	3,128	2,683	2,713	2,994	3,445	3,458	3,540
<b>Risk capacity<sup>1</sup></b> (median solvency capital requirement), %	x	276	255	238	220	229	221	231

Source: FMA, OeNB.

<sup>1</sup> A new reporting system based on Solvency II was introduced in 2017; therefore, some indicators cannot be compared with historical values.

Table A20

**Assets held by Austrian mutual funds and information on asset structure**

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>End of period, EUR million</i>								
Domestic securities	54,383	54,824	52,480	54,114	56,272	62,001	60,377	56,468
of which: debt securities	13,278	11,879	11,313	10,759	10,563	9,857	10,214	9,062
stocks and other equity securities	4,284	4,678	3,607	4,108	3,669	4,486	4,287	3,505
Foreign securities	120,330	128,836	121,038	140,616	146,178	168,714	159,109	147,463
of which: debt securities	69,911	70,353	67,956	72,949	74,353	77,261	75,222	69,729
stocks and other equity securities	20,145	22,924	20,747	27,983	31,511	44,394	39,547	36,780
Net asset value	174,713	183,661	173,518	194,730	202,450	230,715	219,486	203,932
of which: retail funds	94,113	97,095	89,923	101,536	105,467	124,005	115,164	110,048
institutional funds	80,600	86,572	83,600	93,194	96,983	106,711	104,322	93,884
Consolidated net asset value	148,684	156,179	148,930	168,013	175,239	198,201	187,810	176,644
Number of funds	2,029	2,020	2,017	1,935	1,953	1,970	1,950	1,978
Number of fund management companies	29	30	24	21	21	22	21	22

Source: OeNB.

Table A21

### Selected assets held by Austrian pension funds and information on asset structure

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<i>End of period, EUR million</i>								
Total assets	20,882	22,234	21,494	24,705	25,391	27,334	26,631	24,930
Currency, deposits and loans	x	x	x	466	557	559	423	606
Investment fund shares	19,796	21,198	20,379	23,507	24,170	26,088	25,479	23,593
of which: equity funds	x	x	x	5,961	5,900	6,979	6,476	5,534
bond funds	x	x	x	8,232	7,404	7,477	7,265	6,578
mixed funds				7,565	9,014	9,476	9,777	8,973
real estate funds	x	x	x	832	871	994	916	1,049
other funds, including money market and hedge funds	x	x	x	917	981	1,163	1,046	1,458
Defined benefit schemes	x	x	x	5,111	4,869	5,026	4,994	4,291
Defined contribution schemes	x	x	x	19,295	20,193	21,870	21,246	20,248

Source: OeNB

Table A22

### Transactions and system disturbances in payment and securities settlement systems

	2016	2017	2018	2019	2020	2021	H1 21	H1 22
<b>Large-value payment system (domestic, operated by the OeNB)</b>								
<i>Number of transactions in million, value of transactions in EUR billion</i>								
Number	1	1	1	1	1	1	1	1
Value	4,316	3,690	1,536 <sup>1</sup>	1,412	1,651	2,107	969	1,298
System disturbances	4	0	3	0	0	1	1	0
<b>Securities settlement systems</b>								
Number	2	2	2	2	2	2	1	1
Value	335	701 <sup>2</sup>	658	639	700	893	473	520
System disturbances	3	0	3	1	0	5	1	0
<b>Card payment systems</b>								
Number	963	1,061	1,178	1,299	1,350	1,494	700	810
Value	101	108	116	125	115	123	57	66
System disturbances	4	1	2	1	3	1	0	0
<b>Participation in international payment systems</b>								
Number	166	191	217	242	290	334	162	178
Value	3,029	3,242	3,831	3,304	2,252	2,104	1,050	1,092
System disturbances	0	0	0	0	0	0	0	2

Source: OeNB.

<sup>1</sup> Liquidity transfers from participants' domestic accounts to their own TARGET2 accounts are no longer included under domestic transactions.<sup>2</sup> Free-of-payment (FOP) transactions were first included in the value of transactions in 2017.