Systemic risks from commercial real estate lending of Austrian banks

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The commercial real estate (CRE) market in Austria – and many other countries – has been under stress at least since interest rate increases began in 2022. Consequently, the evaluation of financial stability risks in the CRE segment is of high relevance for supervisory authorities and policymakers. This study contributes to this goal by providing an integrated approach to gauge systemic risks associated with CRE financing. Combining macroeconomic information with data on the loan, firm and bank level, we estimate the effect of adverse macroeconomic conditions on CRE loan portfolios of Austrian banks. We find that in an adverse scenario, nonperforming loan (NPL) ratios could increase to levels seen in international historical crises and a sizable share of bank capital could be depleted. Thus, we conclude that CRE loans, in the event of a further deterioration of the economic environment, pose an increased risk to financial stability in Austria. This is in line with the assessment that Austria's Financial Market Stability Board (FMSB) made in its 41st meeting.

JEL classification: G01, G21, G28, R33
Keywords: commercial real estate, systemic risk, financial stability

Commercial real estate (CRE) funding has been at the forefront of worries of financial journalists, analysts, policymakers and investors since the start of interest rate increases in 2022 and even earlier. In the macroprudential sphere, the European Systemic Risk Board (ESRB) has issued a warning on vulnerabilities in CRE markets in Europe, following its recommendations on closing data gaps in 2016 and 2019 (ESRB, 2016, 2019, 2023). Austria's Financial Market Stability Board (FMSB) has regularly warned about risks of CRE funding in Austria, as have the Financial Market Authority (FMA) and the OeNB nationally, as well as the ESRB, the European Central Bank (ECB) and the International Monetary Fund (IMF) internationally. In its 41st meeting, the FMSB concluded that "potential losses from commercial real estate loans, in the event of a further deterioration of the economic environment, can pose an increased risk to financial stability in Austria." This paper constitutes a follow-up to the work of Liebeg and Liegler (2022).

We start our paper with a short introduction on insights from past CRE crises, then present the data available for our systemic risk assessment, describe our empirical strategy, lay out the scenarios we use and the results we obtain, and finally conclude.

1 Insights from CRE crises of the past

CRE crises occur with some regularity and are usually part of a wider real estate crisis or downturn in the economy as the CRE segment is strongly interconnected with both the real economy and the financial system (ESRB, 2023). A crisis in the

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CRE segment has both been a trigger (Deghi et al., 2021) and a consequence (Davis and Zhu, 2011) of a wider economic downturn. For our assessment, we have analyzed 12 CRE-specific crises since the early 1980s from the literature, some of which transcended national borders and affected a wider region.

Crowe et al. (2013), while concluding that CRE crises are difficult to pin down due to their interweaving with residential real estate (RRE) crises, find that CRE played an important role in the savings and loans crisis in the US in the early 1980s, in Japan from the late 1980s onward, in the Nordic crisis and in Australia in the early 1990s, in the Asian crisis in the late 1990s, and in Ireland and Spain in the late 2000s. Davis and Zhu (2011) employ a similar sample but add France, the UK, and the United States in the late 1980s and early 1990s to the list of property crisis episodes. Ellis and Naughtin (2010) add Australia, the UK and the US to the list of countries with CRE crises during the global financial crisis of the late 2000s. Herring and Wachter (1999) offer deeper insights into the CRE crises of the early 1980s in the US, the early 1990s in Japan and Sweden, and the late 1990s in Thailand. The Danish Systemic Risk Council (2023) finds that in the crisis of the late 2000s, lending to the corporate sector "real estate activities" has given rise to significant impairment charges for credit institutions.

While international CRE price data are comparably more widely available, data for CRE credit risk indicators, such as nonperforming loans (NPLs) and loan loss provisions from historical CRE crises, are scarce. In their overview, Deghi et al. (2021) show that CRE prices tend to reach their troughs roughly two years after their peaks, dropping by 20% to 56% in that time span. Some price drops last longer and are deeper – Ireland saw a decline by about two-thirds over five years. Ellis and Naughtin (2010) demonstrate that CRE price drops are usually larger than RRE price drops. As for risk indicators, the US Federal Deposit Insurance Corporation (FDIC) offers time series data on loan portfolio performance that are available for all FDIC-insured institutions from 1984 onward and for various aggregates of real estate loans.[4] Noncurrent rates[5] of US real estate loans increased from 0.9% in Q1 2007 to 7.6% in Q1 2010. In construction and development loans, there was an increase from 1% to 16.8% in the same time span. Banco de Espana's BIEST[6] dataset offers time series data on real estate loan quality from 1992 onward. The NPL ratio in Spain increased from 0.7% in Q4 2007 to 34.3% in Q4 2013 for loans to the construction sector. In loans to the real estate activities sector, the ratio rose from 0.7% to 38% in the same period of time. The loan loss provisions ratio for loans to the construction sector increased from 0.3% to 18% during this six-year period. Finally, Danmarks Nationalbank has provided us with data on loan loss provisions for real estate activities loans: They grew from 0.5% in 2007 to 9.4% in 2013.

2 Data

Defining CRE loans from a risk perspective is a challenging task. Depending on the scope, data sources and the applied perspective, the size of banks' CRE exposure may vary significantly. For our systemic risk assessment, we use a sectoral perspective

[4] *https://www.fdic.gov/analysis/quarterly-banking-profile/index.html*

[5] *According to the FDIC, noncurrent loans are those that are 90 or more days past due or are on nonaccrual status. The noncurrent rate is the sum of noncurrent loans to total loans.*

[6] *https://app.bde.es/bie_www/faces/bie_wwwias/jsp/op/Home/pHome.jsp*

that includes all loans to domestic non-financial corporations in the "real estate activities" (ÖNACE 2008 sector L.68), "construction of buildings" (ÖNACE 2008 sector F.41) and "specialised construction activities" (ÖNACE 2008 sector F.43) sectors.[7] The interconnectedness of these sectors is shown by the high correlation of NPL ratios as well as the mutual reliance on intermediate consumption of goods from the sectors L "real estate activities" and F "construction" in the gross value added in the Austrian economy.[8] Furthermore, this definition of CRE loans allows us to focus on a homogenous group of corporations and thereby follow a targeted approach in modeling sensitivities of corporates to macroeconomic shocks. Recently, the European Central Bank (Ryan et al., 2023; ECB, 2024) and Danmarks Nationalbank (Danish Systemic Risk Council, 2023) have used a similar approach to assess risks from CRE financing. Following this definition, the total loans associated with CRE amount to EUR 127 billion as of December 2023, of which the majority (EUR 102 billion, 80%) fall under the "real estate activities" sector (see chart 1).

Chart 1

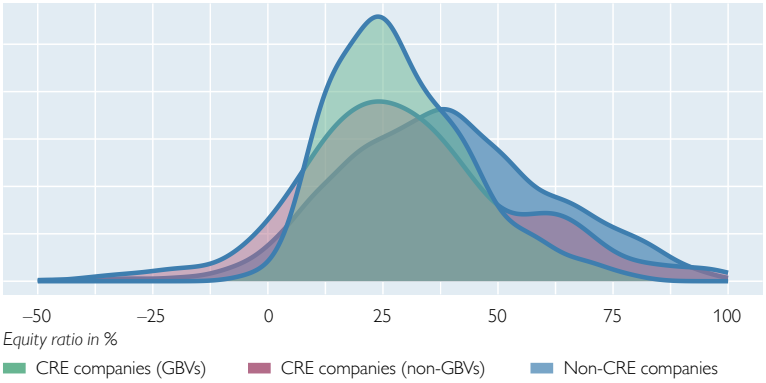
Domestic CRE exposure by economic sectors

Source: OeNB.

Note: Data as at December 31, 2023.

Chart 2

Equity ratio distribution of CRE companies



Source: SABINA database, OeNB.

Note: Data as at December 31, 2021.

One particularity of the Austrian CRE segment is the importance of limited-profit housing associations (GBVs).[9] GBVs account for 22% of domestic CRE loans, and the largest share is in the "real estate activities" sector. The risk structure of GBVs differs significantly from profit-oriented debtors (non-GBVs). As of year-end 2023, the NPL ratio stood at 3.7% for profit-oriented debtors, whereas it was 0% for GBVs.[10] Furthermore, we also use information from the Bureau van Dijk SABINA database

[7] *Note that for the monitoring of CRE-related risks, we focus on domestic and foreign loans to legal persons (including nonfinancial corporations) in the sectors L.68, F.41 and F.43 as well as loans that fund the constructing, developing or acquiring of (commercial or residential) properties. For an overview of the exposure and risk structure based on this definition, see Financial Stability Report 47.*

[8] *Statistics Austria: input-output statistics.*

[9] *In German: gemeinnützige Bauvereinigungen.*

[10] *Note that the NPL ratio is based on data from AnaCredit and uses a sectoral perspective to define CRE. This differs from the CRE definition based on FINREP data.*

to investigate the balance sheet structure of CRE companies. As of year-end 2021, CRE companies had on average a lower capitalization than companies from other sectors irrespective of profit orientation (see chart 2).[11] However, compared to profit-oriented debtors in the CRE sector, the number of GBVs with negative equity is much lower and close to zero. Moreover, with respect to the availability of liquid assets, we find that GBVs generally have stronger liquidity positions (cash and bank balances) than non-GBVs. Since better capitalization and liquidity as well as legal provisions effectively shield GBVs from market stress, we treat them separately in our assessment of systemic risks in the CRE segment.

3 Empirical strategy

Our systemic risk assessment follows a two-step approach. First, we estimate the sensitivity of individual borrowers' probability of financial distress to a selection of macroeconomic drivers, which we then use to project expected probabilities of stress for a given set of macroeconomic scenarios. Second, we employ the projected probabilities and a dataset of lender-borrower interlinkages to conduct a simulation exercise to map simulated balance sheet stress of borrowers into banks' portfolio losses. Our simulation approach follows the methodologies in Harrison and Mathew (2008) and Górnicka and Valderrama (2020), adapted to the distinct requirements of CRE lending, and allows us to track default probabilities (PDs) and losses given default (LGDs) for individual banks as well as the aggregate banking system.[12] Figure 1 illustrates the two main steps and their respective substeps, with a more detailed description given below.

3.1 Step I – Projecting CRE companies' probability of financial distress

Earlier studies on systemic risks from real estate financing have primarily focused on households. However, CRE companies are fundamentally different: Their debt servicing capacity depends, at least to some degree, on price developments in real estate markets. That is, both the first and second lines of defense of the banking system's loan book depend on the same macroeconomic drivers. Therefore, and due to the gap in the existing literature, the modeling of borrowers' probability of financial distress conditional on macroeconomic states is a key contribution of our study.

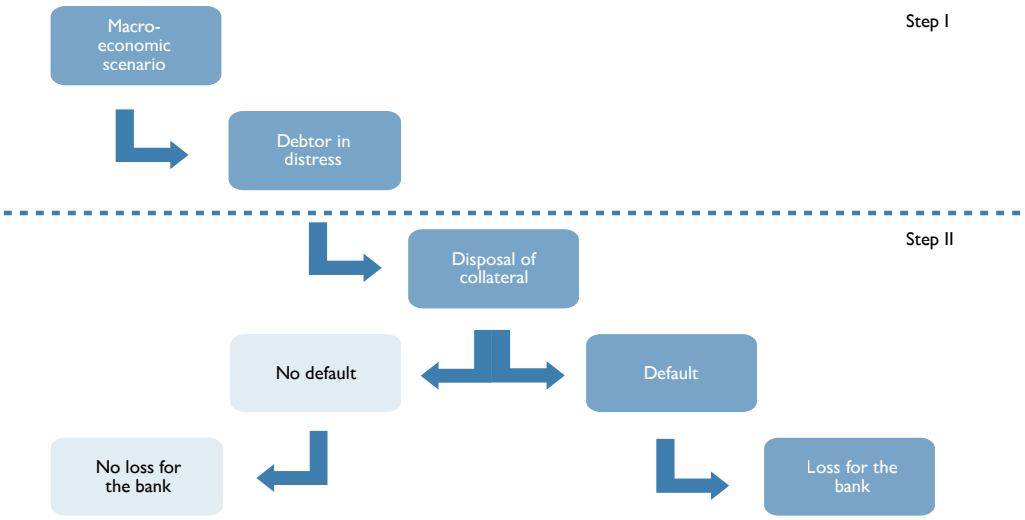
We use a two-step approach to map changes in macroeconomic state variables into shifts in probabilities of firm balance sheet stress. First, using data from the Banque de France's BACH database, we estimate the impact of changes in macroeconomic variables on within-country aggregate revenue changes in the construction and real estate sectors. In the second step, following the micro-simulation approach of Ryan et al. (2023), we employ Bureau van Dijk SABINA data on firm-level balance sheets in the construction and real estate sectors to assess liquidity and solvency stress for a large number of historically plausible shocks to revenues and interest rates. In determining the thresholds for a corporation to fail, we rely on

[11] *Unfortunately, balance sheet information in Bureau van Dijk SABINA database is available with a significant time lag. Thus, we rely on data as of year-end 2021.*

[12] *CRE lending differs from RRE insofar as both lenders and borrowers are heterogeneous and the latter may have multiple loans outstanding. Therefore, we depart from the representative bank approach employed in prior literature and instead simulate and resolve borrower defaults for the entire network of CRE loans in the Austrian banking system.*

Figure 1

Steps in systemic risk assessment



Source: Authors' compilation based on Harrison and Mathew (2008) and Górnicka and Valderrame (2020).

Guth et al. (2020) and Puhr and Schneider (2021): A firm is insolvent when either its cash and bank reserves are below –10% (e.g. bank lines are overdrawn) or its equity ratio is below –30%.[13] Taken together, the combined sensitivities obtained from these two exercises allow us to project any macroeconomic scenario, be it historical or hypothetical, into a shift of borrowers' probabilities of solvency or liquidity stress.[14] To ensure that our projection method returns only real probabilities, we constrain output values of stressed borrower PDs, i.e. base PDs from the lender-borrower level data plus shifts, to the interval of [0.05%, 100%].

Taken together, let β_{NACE} denote a vector of sectoral sensitivities to the vector of macroeconomic changes, ΔZ, including the particular element $\Delta NFCrate$ for the change in corporate lending rates. Let α_S and α_R be the sensitivities obtained from the micro-simulation in the second step and let PSS_i and $ShareVariable_i$ be the ex ante probability of stressed sales by firm i and its share of variable rate loans. Then the projected probabilities of CRE companies' financial distress in our model are given by

$$PSS_i^* = \max\{\min\{PSS_i + \alpha_S \times \Delta Sales_i(\boldsymbol{\beta}_{NACE}, \Delta \mathbf{Z}) + \alpha_R \times ShareVariable_i \times \Delta NFCrate, 100\%\}, 0.05\%\},$$

where the lower bound of projected stress probabilities of 5 basis points is aligned with the lower bound guidance in the capital requirement regulation (CRR) version III.

[13] *The overindebtedness threshold is justified by cross-country empirical studies that show that the equity ratio commonly associated with insolvency ranges from –30% to –35% (see Davydenko, 2007). The foundation for the illiquidity threshold is weaker. As by Puhr and Schneider (2021), we use a negative liquidity threshold to account for the firms' possibility to rely on undrawn credit lines from banks.*

[14] *A firm experiencing solvency and/or liquidity stress will attempt to rebalance its accounts by selling assets. If the proceeds from a sale are deemed insufficient to cover the firm's needs, it will default on its obligations, thereby appearing as default in the lending bank's loan books.*

3.2 Step II – Simulation of banks' portfolio losses from real estate financing

Using our projection method for borrowers' probabilities of financial distress and the macroeconomic scenarios detailed below, we conduct a simulation exercise to gauge the conditional loss distributions of Austrian banks' CRE credit portfolios. To this end, we construct a large sample of lender-borrower relationships where we track the total exposure amount, the loan's conditional net present value (NPV), the risk premium and the available loan collateral in the form of residential and commercial real estate as well as other, non-real estate, assets. For each out of a sample of $S = 2000$ simulations, we draw a vector of financial distress indicator variables for the population of borrowers, where an outcome of 1 indicates financial distress and the probability of such an event is governed by the projection method detailed in step I above.

For each borrower in distress, the process of distress resolution, as illustrated in step II of figure 1, may lead to economic default if the proceeds from a collateral sale cannot cover the cost of debt following Harrison and Mathew (2008) and Górnicka and Valderrama (2020). Any resulting losses are then collected at the bank portfolio level. This approach allows us to track measures like probability of economic default, loss given default and NPL ratios not only on the individual bank-level but also for within-bank subportfolios, such as lending to each of the individual economic sectors considered, as well as to distinguish between profit-oriented debtors and GBVs.

In the implementation of our simulation methodology, we place particular emphasis on the consistency of the macroeconomic channels between the projection method in step I and the resolution of credit risk in step II. That is, the same shocks that drive up distress probabilities of firms in the broader real estate sector also reduce collateral value and increase ex ante loan NPVs. This is to maintain the intuitive perspective on how this sector accumulates a systemic risk to financial stability: It is the twofold dependency of debt servicing capacity and collateral value on real estate prices and interest rates that makes the real estate sector, and thereby its lenders, particularly vulnerable to adverse shifts in the macroeconomic environment.

4 Macroeconomic scenarios

For our systemic risk assessment, we need macroeconomic scenarios for the paths of domestic GDP and property prices (both residential and commercial) as well as that of interest rates. Our macroeconomic scenarios for GDP and real estate prices[15] draw from the OeNB 2024 banking stress test exercise (see box 1 "Results of the OeNB's 2024 solvency stress test" in this report's "Recent developments and macropru-

Table 1

Macroeconomic scenarios: cumulative change over three years

	Baseline	Adverse
	%	
Real GDP	+4.1	–5.0
Risk free and corporate rate	Unchanged from YE 2023	Unchanged from YE 2023
CRE prices	+2.4	–28.4
RRE prices	+4.1	–33.2

Source: OeNB, ESRB, authors' compilation.

[15] *The underlying scenarios are based on the methodology of the European Central Bank that takes overvaluations in real estate markets into account.*

dential policy update"), while we keep the risk free and corporate interest rates at the level as of year-end 2023.

Following the usual approach in stress testing, we use a three-year horizon, which is also backed by the experiences made in historic CRE crises that roughly lasted from two to six years peak to trough. In line with the static balance sheet assumption, we assume that the banks' balance sheets do not change over time. The adverse scenario of our stress simulation assumes a severe stagflation: a period of negative GDP growth associated with elevated levels of inflation that hinders central banks from lowering their policy rates and a materialization of accumulated risks in the real estate sector that leads to an extended fall in property prices.

Cumulative GDP growth from 2024 to 2026 is 4.1% in the baseline scenario and –5.0% in the adverse scenario. CRE property prices rise by 2.4% in the baseline scenario and fall by 28.4% in the adverse scenario; RRE property prices increase by 4.1% and decline by 33.2%, respectively.[16]

5 Results

Applying the discussed methodology and the baseline as well as the adverse macroeconomic scenario to the Austrian banking system according to year-end 2023 data, we observe that CRE financing poses a heightened systemic risk to financial stability. We come to this conclusion by investigating the changes in the estimated PDs and LGDs as well as the impact on the NPL ratio and capitalization of Austrian banks.

In the adverse macroeconomic scenario, the estimated PDs and LGDs for CRE loans increase significantly. While the PD is 0.3% is the baseline scenario, it increases to 16.4% in the adverse scenario. LGDs triple from 12% in the baseline scenario to 35.3% in the adverse scenario (see chart 3).

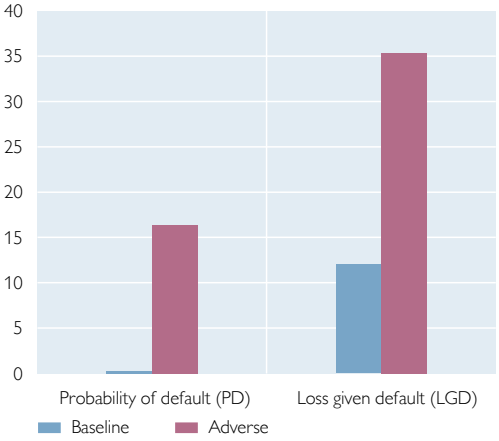
Consequently, the increase in PDs also leads to a higher share of NPLs. We find that our estimated NPL ratios in the adverse scenario are in the range of historical CRE crises: During those crisis periods, the NPL ratio stood at 8%–17% in the United States[17] and 34%–38% in Spain.[18]

Increases in PDs and LGDs subsequently also increase banks' expected credit losses. In total, bank losses are

Chart 3

Estimated PDs and LGDs by scenario

Weighted average PDs and LGDs in %



Source: Authors' compilation, OeNB.

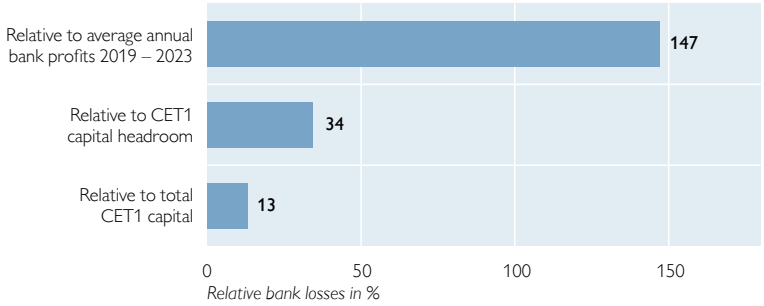
[16] *Note that the ESRB (2024) scenario allows for more severe assumptions about risk-free rates (+119 basis points for ten-year Austrian government bond yields) and corporate shocks (+288 basis points for BBB rated exposures and +435 basis points for BB rated exposures) as well as property prices (–33.1% for RRE and –43.6% for CRE over a three-year horizon). In the global financial crisis, Ireland experienced an RRE price drop of 34.2% and a CRE price drop of 56.3% within two years (Ellis and Naughtin, 2010).*

[17] *Total real estate loans and loans for construction and development loans, respectively.*

[18] *Loans to the NACE sectors "construction" and "real estate-related activities," respectively.*

Chart 4

Estimated bank losses in the adverse scenario



Source: Authors' compilation, OeNB.

estimated to amount to 13% of total CET1 capital in the adverse scenario. One third of capital headroom, i.e. the difference between CET1 capital and the required CET1 capital for fulfilling the overall capital demand (OCD),[19] could be depleted in the adverse scenario. To put the number in another perspective, estimated bank losses could be larger than the average annual bank profits between 2019 and 2023 (see chart 4). Virtually all losses (98%) stem from profit-oriented debtors (non-GBVs), thus confirming the risk-mitigating character of limited-profit housing associations in Austria. This observation is supported by the distribution of losses across banks. Banks with a high share of GBV financing have lower average losses.

In a systemwide CRE crisis, various factors that are not incorporated in our model would influence the severity of the crisis. While banks' operating profits could mitigate some effects, various aspects could amplify the impact of the crisis. These include an increase in bank funding costs, interbank contagion effects as well as negative spillovers to other industries. In our view, these observations confirm the systemic nature of risks associated with CRE financing.

6 Conclusions

Losses from commercial real estate (CRE) loans, in the event of a further deterioration of the economic environment, pose an increased risk to financial stability in Austria. We come to this conclusion by extending the approaches used by, among others, the European Central Bank and the International Monetary Fund to identify systemic risks in real estate markets. We show that in the event of an adverse macroeconomic development, a sizeable number of loans could become non-performing and a significant share of available capital in the Austrian banking sector could be depleted. Our results therefore support the view of Austria's Financial Market Stability Board (FMSB) that macroprudential measures are necessary to address systemic risks stemming from CRE loans. Accordingly, the FMSB recommended that the Financial Market Authority set a sectoral systemic risk buffer of initially 1% of risk-weighted CRE assets.[20]

[19] *OCD is calculated as the sum of the overall capital requirement (Total SREP capital requirement + combined buffer requirements) and the Pillar 2 guidance.*

[20] *For details, refer to the FMSB website.*

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