# Annexes: Selected Issues

1. Whether Vietnamese Banks Can Pass Credit Stress Test [64]

Vietnam is among the ASEAN countries with the highest non-performing loan (NPL) ratio in 2023. Weakened economic conditions and the real estate downturn contributed to the increase in the NPL ratio. If a tail-risk scenario of a prolonged real estate downturn happens, bad debts may increase significantly in the future. This Selected Issue aims to assess the resilience of the banking sector under such scenarios.

Deteriorating Asset Quality

1. NPL ratios have been increasing. NPL ratios in Vietnam have increased over the past two years, surging to levels significantly higher than in many other ASEAN countries (Figure A1.1). The NPL ratio reached 4.8 percent at the end of July 2024, compared to 2.2 percent at the end of 2022. Many individual banks have experienced significant increases in NPL ratios (Figure A1.2**)**. This trend is largely attributed to weakened macroeconomic conditions and growing distress in key sectors, particularly real estate. Additionally, the NPL ratio is expected to increase further if more property developers become financially distressed. The expiration of loan moratoriums[65] by the end of 2024 may also lead to an increase in NPLs at some banks.[66]

Figure A1.1. NPL Ratio by Country
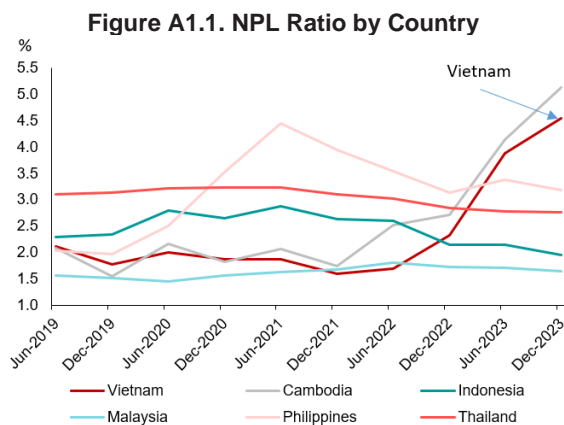
Source: Monetary Authorities; IMF via Haver Analytics

Figure A1.2. NPL Ratio of Selected Banks
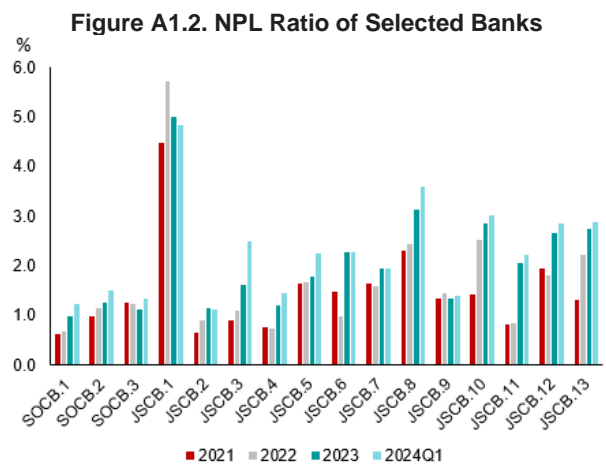
Source: FiinPro; AMRO staff calculations

2. Thin capital buffers will affect banks' ability to absorb losses as NPLs rise. Vietnam's capital adequacy ratio (CAR) is lower than in many regional peers, suggesting that its banking system may have less capacity to absorb future losses (Figure A1.3). Although banks can maintain CARs above the minimum regulatory requirement of 8 percent, some banks have CARs close to the minimum requirement level. In particular, state-owned commercial banks (SOCBs) have lower CARs than some joint-stock commercial banks (JSCBs)[67], making them more vulnerable to further asset quality deterioration. In response to weakening credit quality, banks have set aside larger amounts of loan loss provisions. As of Q4 2023, most listed banks have increased their provisions, with SOCBs and a few medium-sized JSCBs maintaining higher levels compared to other banks. (Figure A1.4).

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[65] The loan moratoriums were introduced in Circular 02/2023/TT-NHNN. On June 18, 2024, the SBV issued Circular 06/2024/TT-NHNN revising and supplementing Circular 02/2023/TT-NHNN, in which the SBV allows a six-month extension of Circular 02 until the end of 2024, instead of expiring on June 30, 2024.
[66] Total restructured loans under Circular 02/2023/TT-NHNN amounted VND114 trillion in July 2024, accounting for 0.5 percent of the total system outstanding loans.
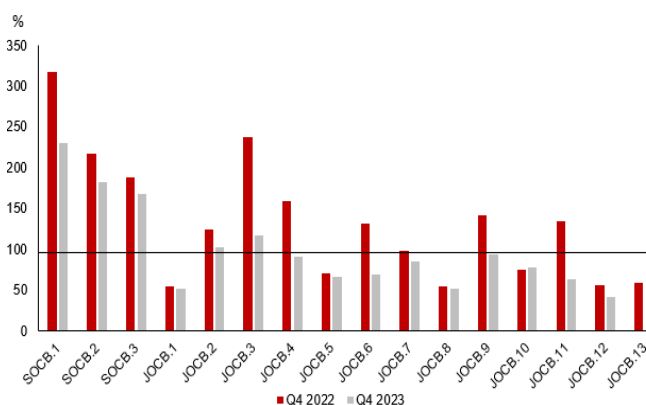[67] The average CAR of SCOB was 10 percent while the average CAR of JSCBs was 12 percent at the end of 2023.

Figure A1.3. Average CAR of banks by Country
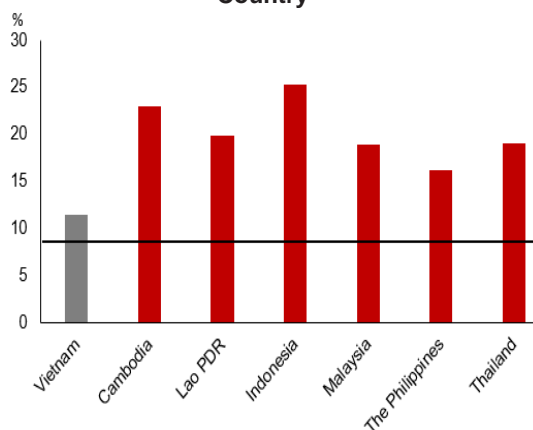

Source: IMF via Haver Analytics

Figure A1.4. Loan Loss Coverage Ratio

Source: SBV; AMRO staff calculations

3.   The real estate downturn poses risks to financial stability. Lending to real estate-related activity has expanded rapidly over the past several years, reaching over VND3,000 trillion by Q2 2024. As of July 2024, it accounts for 21 percent of total outstanding loans, of which lending to real estate developers is about 8 percent (Figure A1.5). Meanwhile, the NPL ratio associated with the real estate sector reached 3.7 percent in July 2024, compared to 2.8 percent at the end of 2023, reflecting the growing exposure of banks to the real estate sector and increasing financial pressures faced by real estate developers. Many large developers are heavily indebted and have a weak liquidity position, as reflected in low quick ratios[68] (Figure A1.6), signaling potential future defaults that could further strain the banking sector.

Figure A1.5. Lending to Real Estate
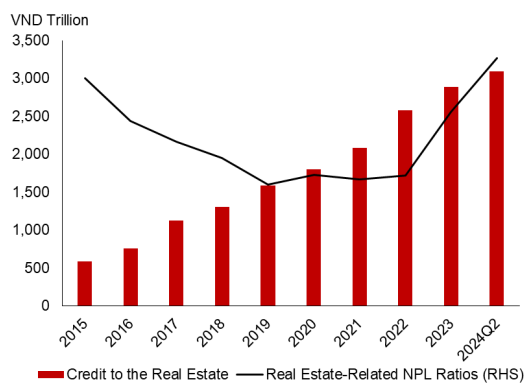
Source: SBV

Figure A1.6. Real Estate Developers' Debts
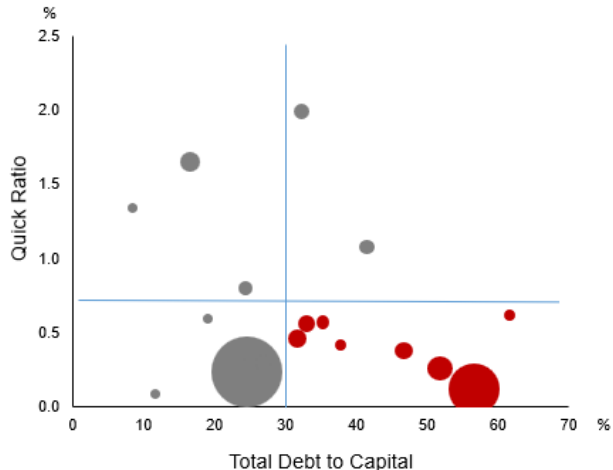
Source: Bloomberg
Note: The quick ratio measures a company's ability to meet its short-term obligations with its most liquid assets. A quick ratio of lower than 1 can mean that the company is relying heavily on inventory or other assets to pay its short-term liabilities. The size of the bubble represents the relative asset size of a developer. The vertical and horizontal lines represent the sample average. Data are as of Q1 2024. Red bubbles represent those who have high debt to capital and low quick ratios.

*Banking Resilience: Pass the Stress Test?*

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[68] Furthermore, the financial conditions of real estate developers have deteriorated, with the interest coverage ratio declining steadily to 0.7 by the end of Q2 2024, down from 1.8 at the end of 2022.

4. Credit risk stress tests were conducted to assess the resilience of the banking sector. The stress tests covered 27 banks, which account for 73 percent of the total banking system. Two separate tests were conducted:

- *Sufficient provisioning against declining collateral values*: The first test evaluates whether banks have set aside enough provisions to absorb potential losses resulting from a situation where the full recovery of loan value is affected by declining collateral values. This test is crucial because, as collateral values decrease, the likelihood of covering the loan losses diminishes, increasing the need for adequate provisioning to safeguard against defaults. Two assumptions for this test are considered: one assumes a moderate decline (50 percent) in collateral values, and another assumes a more severe decline (75 percent).

- *Capital adequacy given increase in NPL ratio*: The second test focuses on whether banks' CAR remain above the regulatory minimum in the face of rising NPLs under three scenarios: baseline, adverse, and severe (Figure A1.7). The baseline scenario projects a recovery of the real estate sector, where the NPL ratio of the sector is projected to increase to 5.98 percent from the 4.7 percent observed in March 2024. The adverse scenario projects a prolonged real estate downturn, where the NPL ratio of the system is projected to increase to 9.44 percent. The severe scenario projects default in the real estate sector, where the NPL ratio of the system is projected to increase to 11.88 percent (Appendix A1.1). Among the three scenarios, the severe scenario is the tail-risk scenario least likely to happen, while a baseline scenario is most likely to happen based on current economic trends and conditions.

- The methodology employed for this test followed the approach outlined by Čihák (2014), along with a reverse stress test[69] (Appendix A1.1). Satellite models, particularly panel regression (Wezel, Canta, and Luy, 2011), were used to connect the macroeconomic variables to the financial variables, project the NPL ratio for the next period, and build up scenarios.

Figure A1.7. Projected NPL Ratios under Scenarios for Stress Test
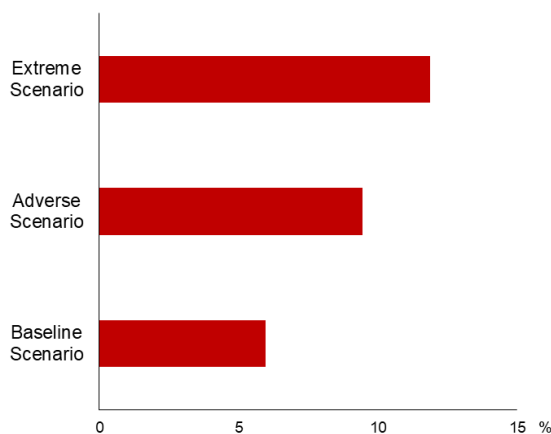
Source: FinPro; AMRO staff estimates
Note: The increases of NPL in three scenarios are projected based on the estimated results of the panel regression (Appendix A.1.1).

Figure A1.8. CAR by Bank
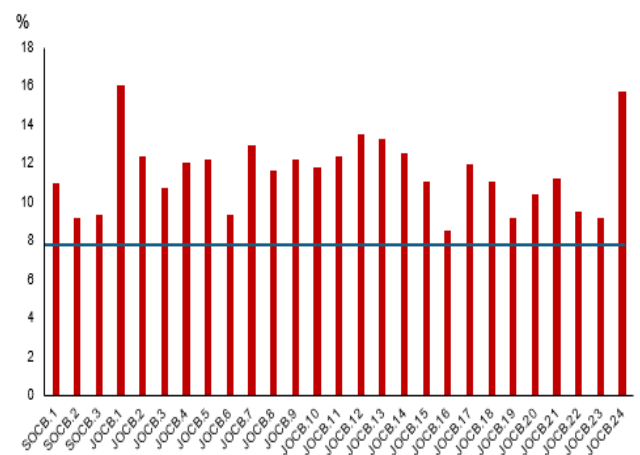
Source: FinPro; Bloomberg; BankFocus
Note: The horizontal line represents the minimum requirement of 8 percent.

5. Most banks maintain sufficient provisioning rates for delinquency loans[70] even after collaterals lose value. Under the assumed haircuts of 50 percent and 75 percent on

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[69] The reverse stress test (RST) is based on the balance sheet-based approach, in which the balance sheet information of banks is the main data input. It estimates the breakeven NPL level of individual banks—the amount of NPLs that would reduce a bank's capital adequacy ratio (CAR) to the regulatory capital minimum, below which recapitalization would be necessary.
[70] Delinquency loans refer to total loans that have payments overdue for more than 10 days.

collateral values, most banks, particularly large SOCBs, appear to have a sufficient level of provisioning[71] (Table A1.1). Although SOCBs have lower capital buffers than other JSCBs (Figure A1.8), they set aside more loan loss provisions, which help them better withstand loan defaults. However, the test reveals that two JSCBs would be under-provisioned[72] in the event of 75 percent haircuts on collateral values, highlighting potential weaknesses in certain parts of the banking system.

Table A1.1. Result of the Stress Test on Provisioning Sufficiency

|	Assumption 1	Assumption 2
Haircut on collateral	50%	75%
Number of banks that are under-provisioned	0	2
SOCBs	0	0
Medium-sized JSCBs	0	1
Small-sized JSCBs	0	1

Source: AMRO staff calculations
Note: Medium-sized JSCBs refer to those whose share is between 3 to 9 percent of the total system's assets. Small-size JSCBs refer to JSCBs whose share is smaller than 3 percent of the total system's assets.

6. **Systemically important and medium-sized banks pass the capital adequacy stress test under adverse and severe scenarios.** The adverse and severe scenarios project significant increases in NPL ratios across all banks. Although it is unlikely to happen, in a tail-risk severe scenario where the NPL ratio of the banking system increases to 11.88 percent, systemic important banks (large SOCBs) and medium-sized JSCBs are shown to maintain their post-shock CAR above the 8 percent regulatory minimum (Figure A1.9). Although they have relatively lower CARs, SOCBs demonstrate resilience in adverse and severe stress scenarios due to their ample loan loss provisions and low pre-shock NPL ratios. These provisions serve as an effective buffer, enabling SOCBs to withstand potential loan losses even when capital ratios are close to the regulatory threshold. However, not all banks demonstrate the same level of resilience. Two small-sized banks, accounting for about 1.3 percent of the total banking sector's assets, fail to pass the capital adequacy stress test under the severe scenario. Additionally, although some large SOCBs can pass the test, their post-shock CARs are closer to the regulatory threshold, indicating less shock-absorption capacity. This reflects potential vulnerabilities in their ability to weather prolonged or more severe economic crises, despite their systemic importance. Given their policy mandates, SOCBs may need to increase their CARs by retaining a larger portion of earnings.

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[71] The stress test applied provisioning rates as outlined in Decree 86/2024/ND-CP. For loans with payment overdue for less than 10 days, classified as pass loans, the provisioning rate is 0 percent. Special mention loans, with payment overdue for between 10 and 90 days, are provisioned at 5 percent. Substandard loans, spanning 91 to 180 days, require a 20 percent provision, while doubtful loans, with payments overdue for between 181 and 360 days, necessitate a 50 percent provision. Loans classified as loss loans, with payment overdue for more than 360 days, are provisioned at 100 percent.
[72] A bank is considered under-provisioned if, after a decline in collateral value, its CAR falls below the minimum regulatory requirement of 8 percent. This indicates that the bank has not set aside enough provisions to cover potential loan losses, leaving it vulnerable to further deterioration in asset quality.

Figure A1.9. Result of the Stress Test on Capital Adequacy (Severe Scenario)
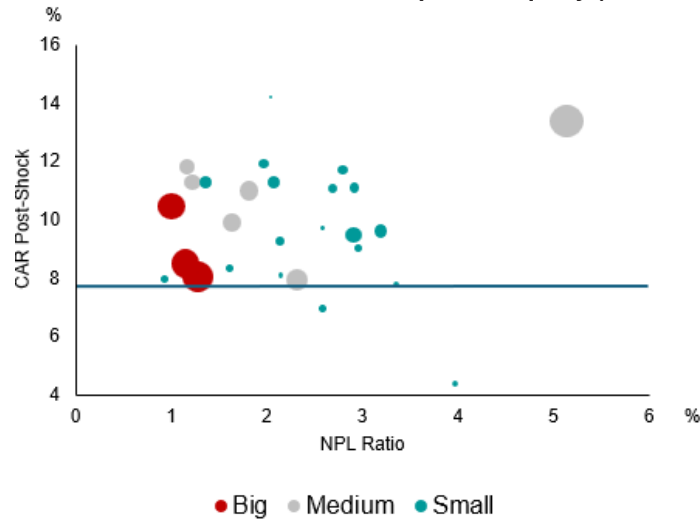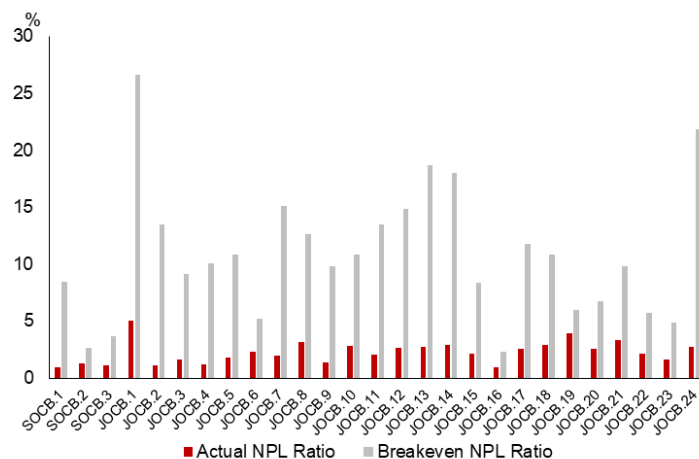

Source: FinPro; BankFocus; AMRO staff estimates
Note: Data are as of December 2023. Red dots refer to SOCBs whose share is larger than 9 percent of the total system's assets. Green dots refer to medium-sized JSCBs whose share is between 3 to 9 percent of the total system's assets. Grey dots refer to small-sized JSCBs whose share is smaller than 3 percent of the total system's assets.

7.   The reverse stress test reveals uneven NPL breakeven across banks, suggesting differences in their resilience levels. While most medium-sized JSCBs are found to have relatively high breakeven NPL ratios, with some exceeding 15 percent, SOCBs and small-sized JSCBs have lower breakeven NPL ratios, generally under 10 percent (Figure A1.10). This means that most medium-sized JSCBs could tolerate significant increases in NPLs before their CARs dip below the regulatory minimum, reflecting their stronger capital buffers. In contrast, SOCBs display lower breakeven NPL ratios, withstanding only a small increase in NPLs, primarily due to their lower initial CARs. This finding aligns with the earlier stress test results, which indicated that SOCBs are more vulnerable to asset quality shocks due to their lower capital buffers. Therefore, the reverse stress also underscores that SOCBs and small-sized JSCBs may need to raise additional capital buffers to better protect against adverse economic conditions.

Figure A1.10. Breakeven NPL Ratios

Source: FinPro; BankFocus; AMRO staff estimates
Note: Data are as of December 2023. The JSCBs are organized in descending order based on their share of total system assets, with JSCB.1 being the largest, followed by JSCB.2, and so forth.

Policy Considerations

8. It is essential to strengthen capital buffers to ensure the resilience of banks in the face of rising NPLs. The results from both standard and reverse stress tests underscore the need for banks to maintain sufficient capital buffers to absorb potential losses. For domestic systemically important banks, additional capital requirements should be imposed to safeguard their soundness under adverse and severe conditions. One strategy to bolster capital buffers is to introduce higher-quality capital, such as Tier-1 capital, which can be achieved by retaining profits, reducing dividend payouts, and raising equity through public offerings. Furthermore, encouraging foreign strategic investment in local banks would not only provide necessary capital but also offer expertise in corporate governance, risk management, and innovation. These steps will help strengthen the banking sector's ability to withstand future shocks.

9. Implementing macroprudential policies and enhancing bad debt management system are crucial steps in maintaining financial stability. A robust macroprudential framework should be established to mitigate systemic risks, particularly those arising from the real estate sector. This framework should include measures like statutory loan-to-value ratios and debt service-to-income ratios to curb speculative demand and address imbalances in the real estate market. It is also essential to strengthen supervision to ensure commercial banks follow prudent lending practices, especially towards property developers, by imposing loan concentration limits. Close coordination between regulators and banking institutions is necessary to monitor systemic risks and enforce concentration limits in sectors showing signs of stress, such as real estate and construction. This will help safeguard the stability of the banking system. In addition, an effective debt management system is needed to address NPLs. The government can consider reinstating the right to seize assets, helping banks to resolve NPLs more efficiently.[73]

Appendix A1.1. Panel Regression

A panel data regression is used to estimate the relationship between NPL ratios and selected macroeconomic variables and to project the NPL ratios for different scenarios. The model specification is based on the work done by Wezel, Canta, and Luy (2014)[74].

The models can be represented in the following form:

$$\ln\left(\frac{NPL_{i,t}}{1-NPL_{i,t}}\right) = \mu + \alpha \ln\left(\frac{NPL_{i,t-1}}{1-NPL_{i,t-1}}\right) + \delta loan\_growth_{i,t} + \beta X_{j,t} + \varepsilon_{i,t}$$

where the dependent variable, NPL ratio, is transformed using the logit function, in which $\text{logit(NPLt)} = \ln\left(\frac{\text{NPLt}}{1-\text{NPLt}}\right)$. In addition to the logit-transformed NPL[75] for bank *i* in period *t*, the regression includes loan growth for bank *i* in period *t,* and $X_{j,t}$ represents explanatory variables, μ is the constant, and $\varepsilon_{i,t}$ is the idiosyncratic disturbance term assumed to be independent across banks and serially uncorrelated. Explanatory variables include GDP

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[73] The new Law on Credit Institutions (No. 32/2024/QH15), approved in January 2024, strengthens the legal framework for bad debt management by incorporating provisions from Resolution 42/2017/NQ-QH14. However, the revised law excludes certain provisions in Resolution 42, such as the right to seize collateral, which could affect financial institutions' ability to manage bad debts effectively.

[74] We tried several estimations with different sets of variables for variable and model selection. The presented estimate results balance among various factors, including the availability of data, the model's performance and robustness, and Vietnam's characteristics.

[75] The logit transformation of the NPL ratio is commonly used in the literature to avoid the non-normality of the error term.

growth, lending rate, an interaction between probability of defaults (PD)[76] of listed corporates and a dummy variable for crises. Quarterly data cover the period from Q1 2019 to Q1 2024 of 23 commercial banks.[77]

Estimate results are presented in Table A1.2.

Table A1.2. Panel Regression Results

Independent variables	Coefficients
Constant	-1.935*** (0.6713)
Logit NPL (-1)	0.5887*** (0.1727)
Loan Growth	0.0219** (0.0129)
Lending Rate	0.0468* (0.0310)
GDP Growth	- 0.0958*** (0.0271)
Dummy for Crisis	0.0834 (0.1340)
Crisis and Probability of Default	0.1388* (0.0890)

Source: FinPro; AMRO staff estimates
Note: *** represents p-value < 0.05, ** represents p-value<0.1, * represents p-value<0.15. R-squared is 0.5462. The lag of loan growth, probability of default, and its lag are used as instrumental variables in the regression. The Generalized Method of Moment is used to estimate the regression.

The projected results are derived using parameters generated from the adopted panel regression models, with input data based on each scenario's assumptions. Three scenarios are based on different assumptions (Table A1.3), including:

- **Baseline:** NPL ratios are projected to increase slightly but at a slow pace, with early signs of recovery in the real estate sector. This assumption aligns with the current situation, where the Vietnamese economy shows signs of recovery. Although developers are struggling with weak buyer demand, constrained credit availability, and delayed new project launches, three new real estate laws are expected to have positive impacts by addressing legal bottlenecks and boosting market sentiments. The recovery of the real estate sector is reflected by lower PDs of developers in the next period.

- **Adverse:** A prolonged downturn in the real estate sector is expected. This assumption accounts for the vulnerabilities in Vietnam's property market, where many developers are under financial strain, with delays in projects and rising inventories. If this persists, banks heavily exposed to real estate could face an increasing number of defaults, increasing the risk of financial instability. While some recent legislative reforms such

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[76] The data for PD are from the Credit Research Initiative, National University of Singapore. Including interaction term is to focus on how crisis amplifies the NPL ratio. It's to capture the effect of PD on the NPL ratio during a crisis. The coefficient was used to build adverse and severe scenarios, where the dummy variable for crisis is equal to one and PD reaches its historical high. In a separate estimate, we also estimate a similar model specification but using all the PD, the dummy for crisis, and the interaction term, where the coefficient for PD was found to be statistically insignificant.
[77] Due to data limit, the panel data can only include 23 banks. For the stress test, data are available for 27 listed banks. The same system shocks are applied to all banks in the stress test.

as the revised Land Law, Housing Law, and Real Estate Business Law are set to take effect in 2025, their impacts will not be immediate. The prolonged downturn in the real estate sector is reflected by the continuously high PDs of developers.

• **Severe:** This scenario reflects more severe risks, where prolonged market stagnation leads to defaults in the real estate sector. Construction, closely tied to real estate, faces significant pressure due to reduced public investment flows and sluggish project completion rates. As bank exposure to these sectors remains high, a sharp rise in NPLs would amplify systemic risks. The PD of corporate sectors increases to their historical record under such stress, threatening the stability of the entire financial system.

Table A1.3. Assumptions for Scenarios

Scenarios	Assumptions
Baseline	GDP growth: 6.5 percent Lending Rate: 6.0 percent Loan Growth: 8.0 percent Probability of Default: 19 bps (Figure A.1.11)
Adverse	GDP growth: 6.0 percent Lending Rate: 8.0 percent Loan Growth: 10 percent Probability of Default: 22.8 bps (Figure A.1.11)
Severe	GDP growth: 4.0 percent Lending Rate: 9.0 percent Loan Growth: 12.0 percent[78] Probability of Default: 50.29 bps (Figure A.1.11)

Source: AMRO staff estimates

Figure A1.11. Probability of Default
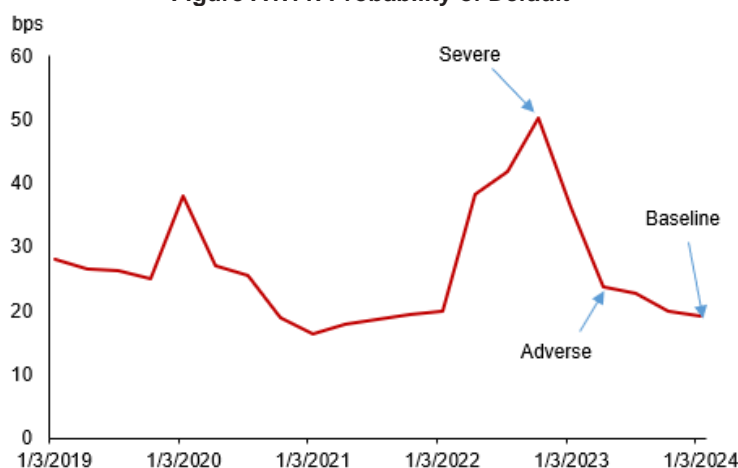
Source: Credit Research Institute, National University of Singapore

References

Cihak Martin (2014), "Stress Tester: A Toolkit for Bank-by-Bank Analysis with Accounting Data", *Chapter 3, A Guide to IMF Stress Testing, International Monetary Fund, 2014.*

[78] On the one hand, loan growth is typically expected to be low during a severe scenario, reflecting weaker demand and heightened risk aversion. However, in Vietnam's context, credit growth can still be higher during periods of low GDP growth. This is often driven by policy efforts to stimulate the economy, as seen in past instances. At the same time, banks may maintain high lending rates to safeguard profitability, despite increased risks of rising NPLs as enterprises may struggle to repay loans.

Wezel Torsten, Michel Canta, Manuel Luy (2014), "A Practical Example of the Nonperforming Loans Projection Approach to Stress Test", *Chapter 30, A Guide to IMF Stress Testing, International Monetary Fund, 2014.*