ASSESSING THE RESILIENCE OF FINANCIAL INSTITUTIONS

Stress testing is an integral component of the Bank's financial stability framework, used to assess and manage risks to financial stability. The Bank's annual stress tests adopt both a top-down and bottom-up approach[12] to stress testing to detect and assess vulnerabilities in individual financial institutions and the broader financial system. Typically, the stress tests are designed to capture adverse scenarios that incorporate extreme shocks that are plausible but have a low probability of occurring. This allows the Bank to assess the ability of financial institutions to withstand large shocks, and determine how this interacts with, and could affect, the broader financial system.

The initial economic disruptions from COVID-19 were more severe than that assumed in the Bank's macro stress test released earlier this year. However, with the gradual improvement in economic activities since May, the overall impact on financial institutions is now expected to fall within the range of outcomes anticipated under the adverse scenarios in the earlier stress test. Given that the current environment already reflects stressed conditions, applying further shocks to these adverse scenarios would not provide useful information to assess the resilience and capacity of the banking system to support the economy at the present time.

Therefore, the Bank's latest macro stress test examines the potential losses to the banking system from the assumed impact of a recovery path that is derived with reference to the Bank's updated macroeconomic outlook.[13] Under this scenario, growth is assumed to have troughed in 2Q 2020. With the re-opening of the economy in early May, the economy is then assumed to gradually recover in the latter half of 2020 and register a rebound in 2021 amid global growth recovery and aided by the series of stimulus and financial relief measures introduced by the Government and the Bank. While the scenario does not specifically consider the reintroduction of a nationwide lockdown, it should, however, be noted that modelled impacts from the economic variables applied (such as the impact on household and business defaults and the corresponding credit costs) have retained some degree of conservatism (further elaborated in the information boxes below). This is consistent with the aim of assessing if banks can withstand stress conditions that are not only more plausible, but also potentially even more severe.

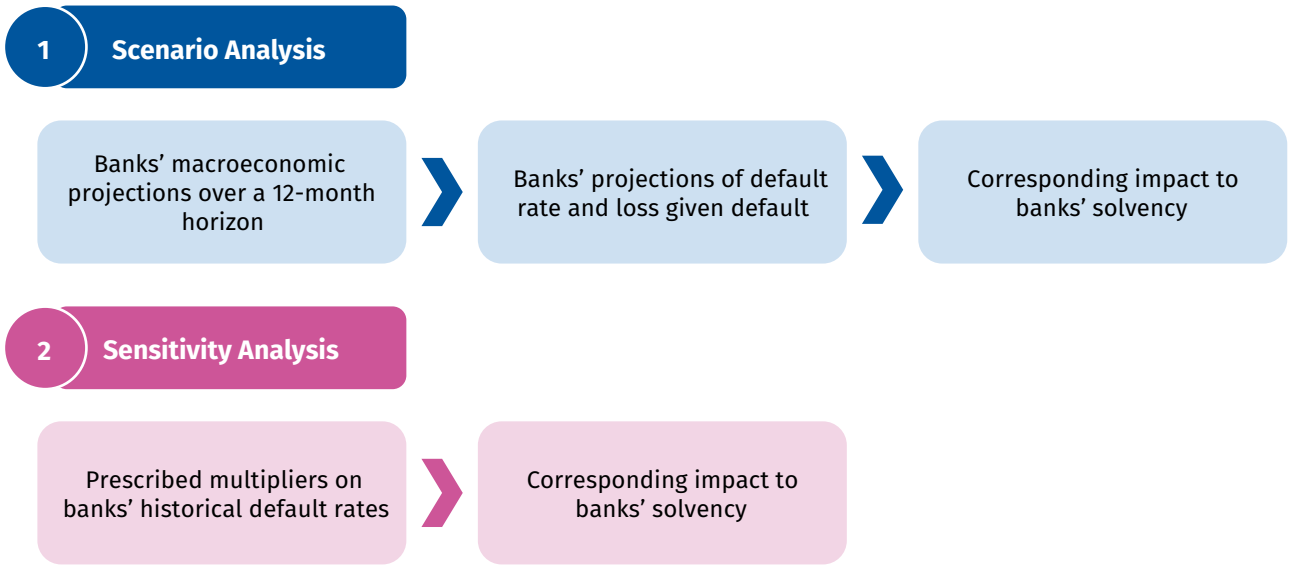
A bottom-up approach was also used to provide an additional perspective on individual banks' resilience. This built on banks' own updated internal stress tests[14] and historical default experience. The internal stress tests were further subjected to a sensitivity analysis conducted on the credit loss estimates projected by individual banks based on factors prescribed by the Bank (Diagram 2.1).

[12] For details of the Bank's approach to stress testing, refer to the box article 'Macroprudential and Microprudential Applications of Stress Testing in Malaysia' in the BNM Financial Stability and Payment Systems Report 2012.

[13] For details of the Bank's macroeconomic outlook, refer to the BNM Quarterly Bulletin 2Q 2020.

[14] Used by banks to inform the setting of internal capital targets as part of the Internal Capital Adequacy Assessment Process (ICAAP).

Diagram 2.1: Overview of the Bottom-up Stress Test Exercise

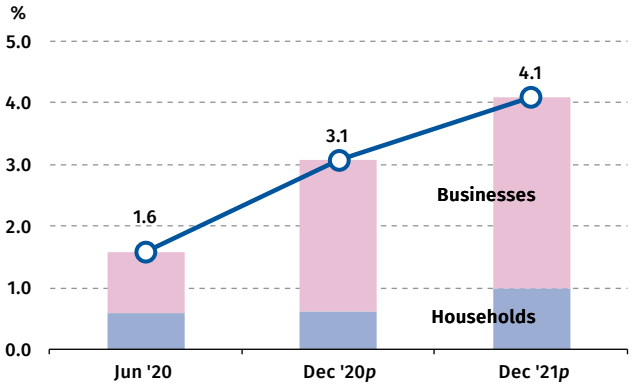


Source: Bank Negara Malaysia

Results from the Bank's stress tests affirm the resilience of banks to an expected increase in credit losses under more adverse economic conditions

Under the assumed scenario of economic and financial shocks arising from the pandemic, overall impairments are projected to rise above 4% of loans by end-2021, mainly driven by higher business impairments (Chart 2.24). This takes into account the effects of the blanket moratorium implemented in April and subsequent targeted repayment assistance for individuals that was announced by banks in August. Business impairments are expected to be driven by defaults of maturing bullet repayments of firms operating in vulnerable sectors, mostly in the services industry which is expected to experience a slower recovery, as well as exposures to several large borrower groups with weaker financials (Diagram 2.2).[15] Meanwhile, household loan impairments are projected to double,[16] albeit from historically low levels. Higher household impairments[17] are expected to emerge in the second half of 2021 given the extended repayment assistance programmes that will remain in place through 1Q 2021 for individuals who have experienced a loss in income (Diagram 2.3).

Chart 2.24: Macro Simulation: Banking System – Impaired Loans Ratio



p: projected

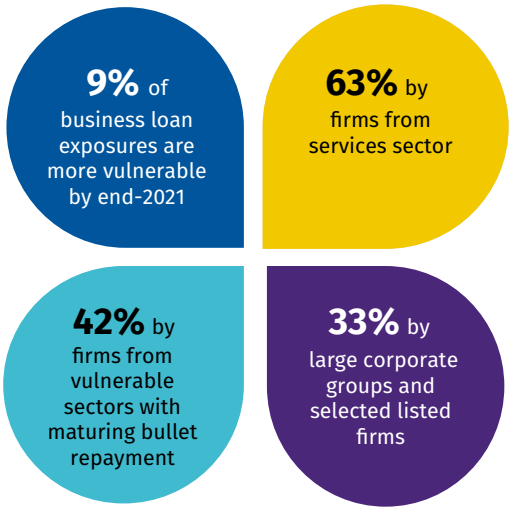
Source: Bank Negara Malaysia

[15] For details of the estimation methodology, refer to the Information Box 'Forecasting Business Impairments: Two-pronged Approach'.

[16] With no assistance measures, some countries have experienced up to a quadrupling level of impairments during a crisis. ECB (2013) "What Matters in Addition to the Economic Cycle?" and IMF (2019) "The Dynamics of Non-Performing Loans During Bank Crises".

[17] For details of the estimation methodology, refer to the Information Box 'Forecasting Households' Time to Default – Enhancements to the Financial Margin Framework'.

Diagram 2.2: Macro Simulation: Business Sector – Impairment Profile

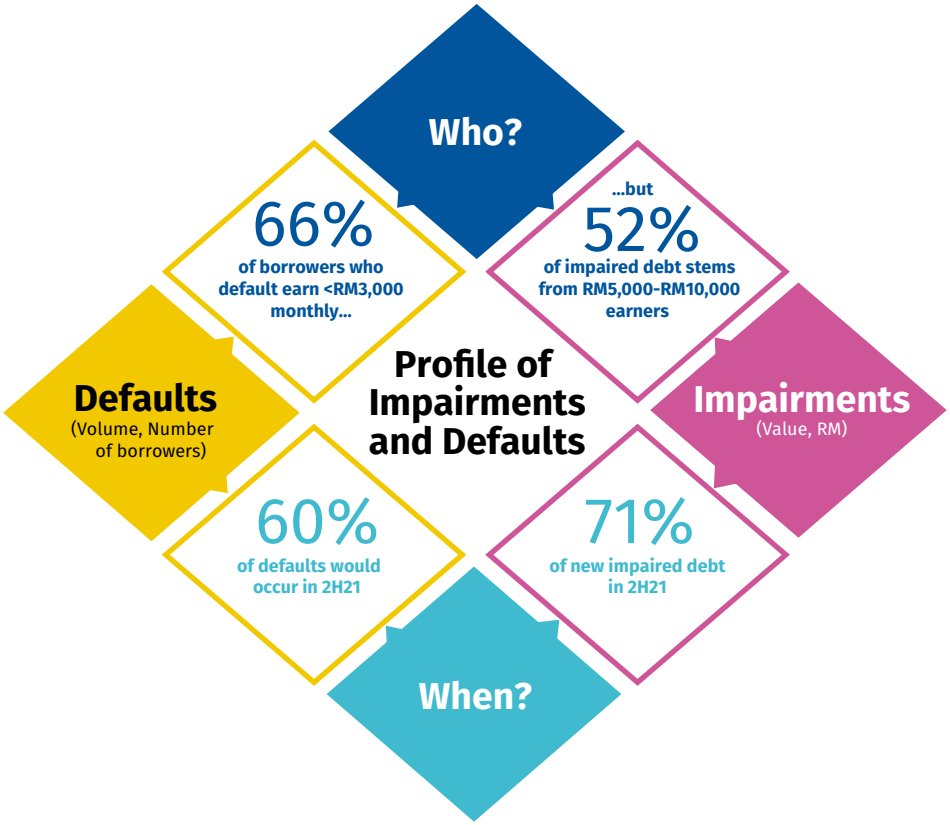


Source: Bank Negara Malaysia

Overall, credit costs to banks could rise to RM29 billion (1.4% of total loans) over 2020 and 2021 (Diagram 2.4). These projections assume conservative estimates of the share of loans under bespoke targeted repayment assistance (mainly for businesses) based on restructuring and rescheduling (R&R) trends observed at the onset of the pandemic.[18] With uncertain conditions persisting, banks have been much more proactive in extending repayment assistance, as seen in recent months. This was not taken into account in the simulations. Since July, the number of businesses receiving repayment assistance from banks has increased seven-fold. This would improve debt serviceability and mitigate credit losses.

In anticipation of higher credit losses, banks have been shoring up their buffers, adding RM2.7 billion to provisions in 1H 2020. At an individual bank level, additional provisions by banks have already risen to an average of 16% of banks' projected stressed credit

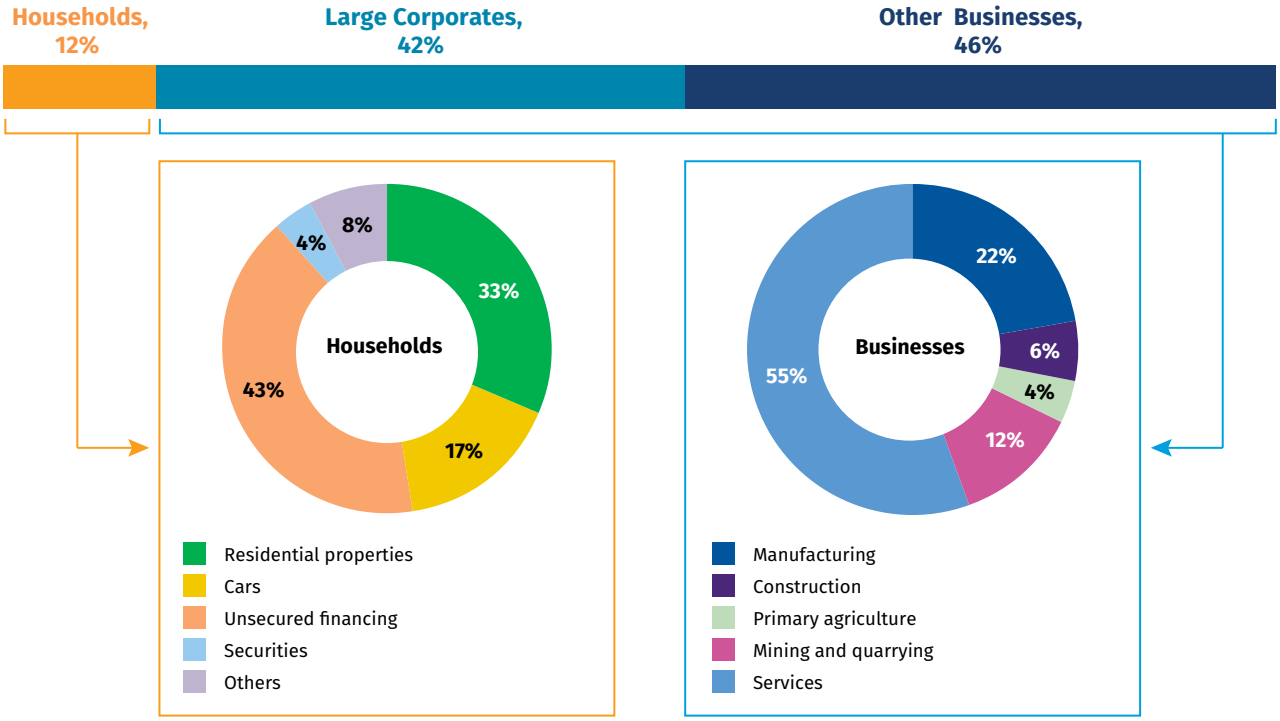
Diagram 2.3: Macro Simulation: Household Sector – Impairment Profile



Source: Bank Negara Malaysia

[18] The R&R rates used are computed by banks and sectors, based on data submission from banks from April to June 2020. During this period, R&R activity was mainly for non-SMEs as SMEs were covered under the automatic loan moratorium.

Diagram 2.4: Macro Simulation: Banking System – Drivers of Projected Credit Losses in 2020 and 2021



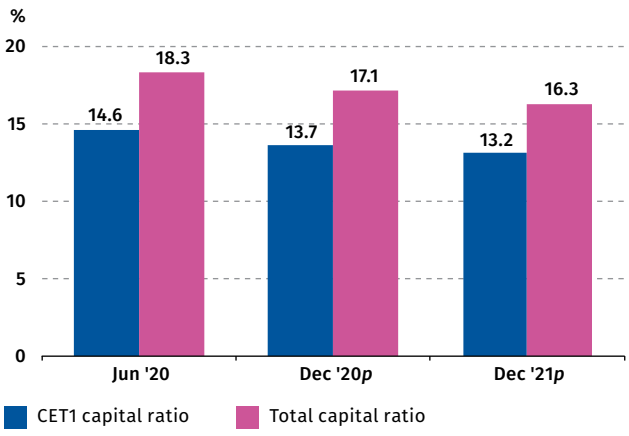
Source: Bank Negara Malaysia

losses over a 12-month horizon based on their internal stress tests. Provisions could increase further as banks obtain greater visibility on credit developments based on more informed assessments of borrowers after the end of the blanket moratorium. The gradual build-up of provisions will also ensure that banks maintain healthy buffers to absorb losses and support continued lending to the economy.

The impact of stressed credit losses on banks' solvency would result in the aggregate total capital ratio (TCR) and CET1 capital ratio declining by 2 percentage points (ppts) and 1.4 ppts, respectively, over the next 12-18 months (Chart 2.25).

Under the bottom-up scenario analysis, the aggregate TCR and CET1 capital ratio as reported by commercial and Islamic banks are projected to decline by a larger extent of 3.4 ppts and 3.1 ppts, respectively, from initial positions. Applying a sensitivity analysis to these results, individual banks are projected to have adequate buffers above the regulatory minimum capital requirement to withstand further losses associated with default rates that are 8 times higher than the banks' historical default rates. These multiples are significantly more severe than Malaysia's historical worst experience in the Asian Financial Crisis, during which overall impairments rose by 3-5 times from initial levels. The drivers of credit losses were observed to be broadly similar under both the macro simulation and the bottom-up analysis, further affirming that the financial system has adequate buffers to withstand extreme stresses that are more severe than the historical worst experienced to date.

Chart 2.25: Macro Simulation: Banking System – Capital Ratios



p: projected

Source: Bank Negara Malaysia

Actual impact on banks' capital strength over the next 12-18 months will be subject to some degree of uncertainty

While the stress tests presented here capture plausibly adverse scenarios with some degree of conservatism, the actual impact of the pandemic on banks' solvency over the next 12-18 months will depend on multiple factors, including:

- **The pace and strength of the domestic economic recovery**, which in turn is contingent upon how the pandemic continues to evolve, labour market conditions and business and consumer behaviour in the new normal;
- **The pace of economic recovery within the region**, which could affect the asset quality and profitability of overseas operations of domestic banking groups;
- **Initiatives taken by financial institutions** to support viable borrowers, which could improve debt servicing capacity and reduce potential impairments;
- **Bank management actions** to shore up buffers such as new capital issuances or capital injections from parent bank(s); and
- **Additional policy intervention** by the Bank, Government and/or other authorities to support economic recovery.

While banks can be expected to be more cautious given continued uncertainties and prospects of a more protracted recovery, it is in the collective interest of the banking industry to continue supporting viable businesses and households throughout this period. Capital buffers built up over the years are intended to support lending during times of stress and therefore can be used. Further, such buffers are vital for banks to remain resilient and reduce risk aversion. This will be critical to avert larger repercussions on economic growth and recovery prospects, which in turn will inflict much higher losses on banks.

Key Features of the Enhanced Macro Solvency Simulation for Banks

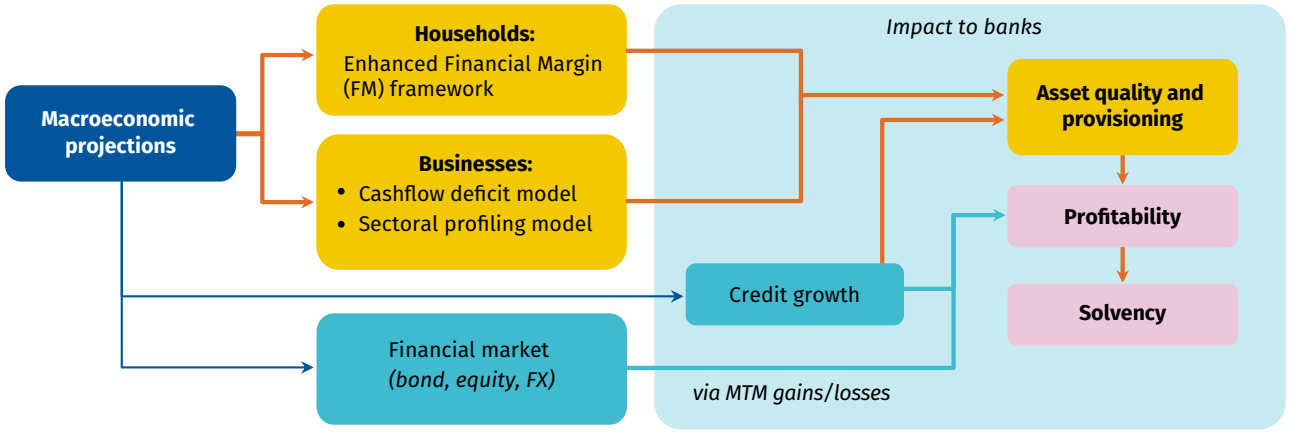
The scenario and assumptions used in the macro solvency simulation encompass a quarterly time horizon, with forward-looking projections up to end-2021. This aims to capture the effects of macroeconomic and financial shocks that could be transmitted much faster during a crisis, thus enabling the identification of emerging pockets of risk in interim periods.

Accordingly, the models and assumptions underpinning the macro simulation have been refined to improve the Bank's estimations and vulnerability assessments (Diagram 2.5 and Table 2.2):

- Enhanced versions of existing macro credit risk models for household and business borrowers were used to assess the impact of weaker macroeconomic conditions on credit risk arising from loan migrations and higher impairments.
- To estimate the impact on provisioning from the deterioration in asset quality, the simulation drew upon existing institution-specific loan loss coverage ratios[19] for different loan purposes and stages of loan performance based on loan classification under MFRS 9. This aims to better represent banks' actual credit risk models (Diagram 2.6).
- Remaining parts of banks' income and expenses also takes into account the impact arising from financial market volatility, slower credit growth in 2020, modification losses and lower interest rates.

[19] Coverage ratios are defined as the ratio of provisions to loans of that stage defined under MFRS 9. For example, Stage 3 coverage ratio is the ratio of Stage 3 provisions to Stage 3 loans.

Diagram 2.5: Schematic of Macro Simulation Framework



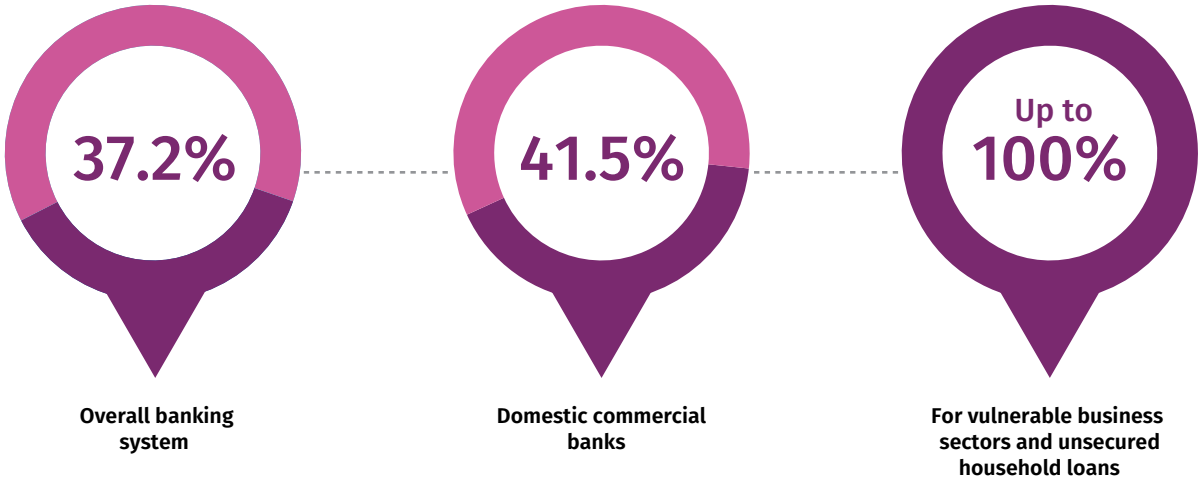
Source: Bank Negara Malaysia

Table 2.2: Key Assumptions

Section	Key Assumptions
Credit risk models	• Loan migration across stages under MFRS 9 are estimated using macro models linking macroeconomic conditions to borrowers' debt servicing capacity • New loans approved and disbursed during the simulation horizon are assumed to remain performing
Credit cost	• Coverage ratios are derived for each individual bank, by (i) stages under MFRS 9, and (ii) loan sector/ purpose, and adjusted upwards to account for additional provisions made due to management overlays • Banks are assumed to maintain coverage ratios throughout the simulation horizon
Net interest income	• Estimations incorporate the impact from lower interest rates (OPR declined by 125 bps year-to-date), slower loan growth and modification losses
Non-interest income	• Credit-related fee and commission income projected to grow in line with credit growth • Cost-to-income ratios are assumed to remain stable throughout the simulation horizon, i.e. operating costs to move in tandem with income
Capital	• Profits are recognised on a half-yearly basis. Dividend payment is assumed to be at 50% of half-year profits

Source: Bank Negara Malaysia

Diagram 2.6: Selected Stage 3 Coverage Ratios



Source: Bank Negara Malaysia

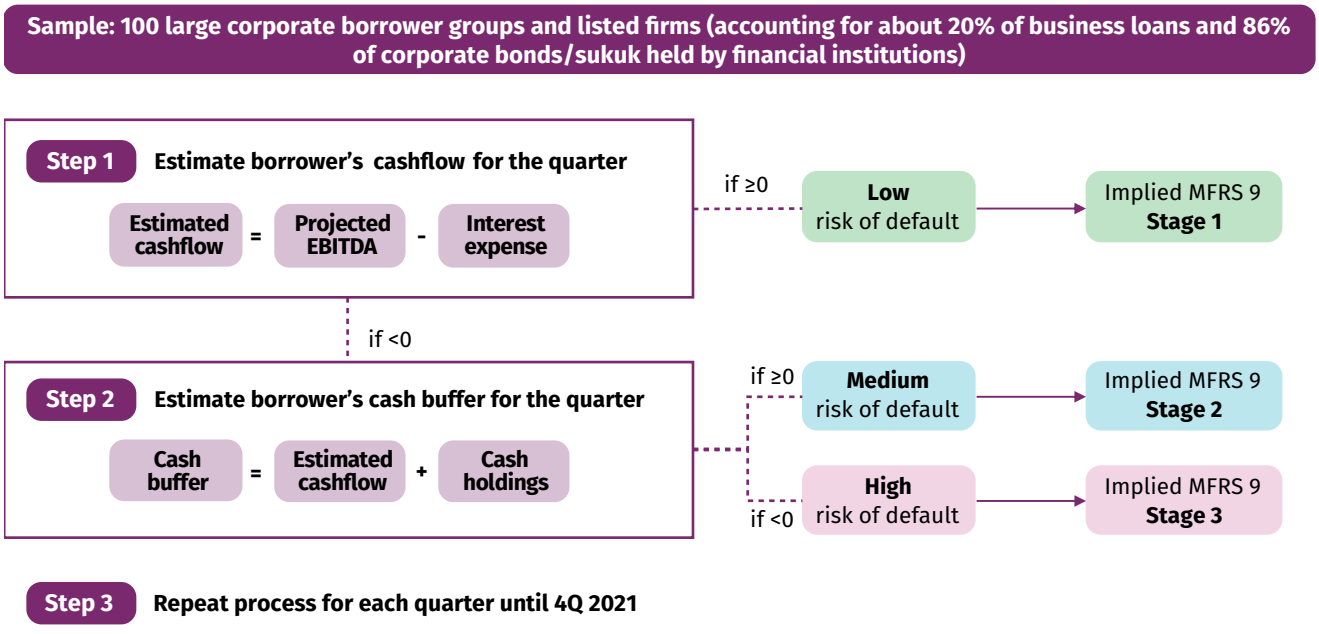
Forecasting Business Impairments: Two-pronged Approach

To simulate the potential trajectory of business sector impairments in the banking system for the macro simulation exercise, the Bank used two approaches, a cashflow deficit model for a sample of firms[20] with more accessible financial data and a sectoral profiling model for the remaining business exposures. This assessment also accounts for the risk profile of borrowers or borrower segments, repayment assistance extended by individual banks (based on experience during the early stages of the pandemic), and the effect of explicit government guarantees in mitigating losses.

(A) Cashflow Deficit Model

The cashflow deficit model determines a firm's risk of default by estimating whether it has sufficient earnings or cash buffers to repay its interest obligations (Diagram 2.7). Quarterly earnings[21] of a firm are projected up to end-2021 based on relationships established between sectoral GDP projections and firm-level financial data. These earnings are assumed to be used to service quarterly interest obligations during the period. In quarters where earnings are insufficient, the model assesses whether firms have sufficient cash buffers to draw on to honour interest obligations. Firms with sufficient earnings to service interest obligations are classified as "low risk of default" (MFRS 9 Stage 1), while firms that have to dip into their cash buffers are classified as "medium risk of default" (MFRS 9 Stage 2). This adds some degree of conservatism given that in practice, banks may continue to classify such exposures under Stage 1 if the borrowers have continued to service interest and coupon payments and there are no other evidence of a significant increase in credit risk. Finally, firms that have insufficient earnings and cash buffers are classified as high risk of default (MFRS 9 Stage 3). Stage 3 firms are assumed to default on all their exposures with financial institutions. Another layer of conservatism is applied to the model by assuming no reversion in the staging of firms, even if improvements in a firm's earnings or cash buffers were observed in subsequent periods after it defaults.

Diagram 2.7: Cashflow Deficit Model



Source: Bank Negara Malaysia

[20] 100 large non-financial corporate borrower groups and listed firms. Large non-financial corporate borrower groups represent corporations with aggregate credit exposures (include direct financing and holdings of corporate bonds and sukuk) exceeding RM1 billion with Malaysian financial institutions.

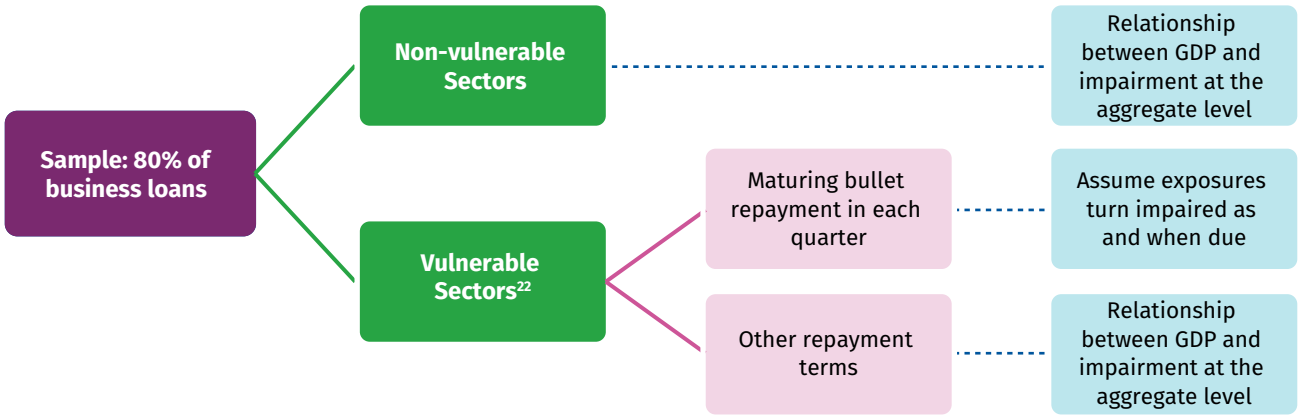
[21] As measured by earnings before interest, tax, depreciation and amortisation (EBITDA).

(B) Sectoral Profiling Model

For businesses where firm-level financial data are not readily available, the sectoral profiling model is employed (Diagram 2.8). This model is premised on three key assumptions: (i) financing exposures of firms in the vulnerable sectors[22] with bullet repayment terms will default[23] as and when they become due given the larger and immediate repayment obligations; (ii) impairments of other business exposures up to end-2021 are derived based on an established historical relationship between the annual growth of real GDP and business impairments at the aggregate level; and (iii) no SMEs are assumed to default before the end of the third quarter of 2020 due to the blanket loan moratorium in place between April and September 2020.

Reflecting a conservative approach taken in the estimations of business impairments, the model does not account for the effects of risk mitigants that could moderate the timing and magnitude of business impairments. These include (i) diversified revenue streams and available collateral for some of the larger borrowers; (ii) explicit credit guarantees by agencies such as Credit Guarantee Corporation Malaysia Berhad (CGC) and Syarikat Jaminan Pembiayaan Perniagaan Berhad (SJPP); and (iii) coordinated efforts by financial institutions, the Small Debt Resolution Scheme (SDRS) and the Corporate Debt Restructuring Committee (CDRC) to assist viable borrowers in restructuring and rescheduling loans.

Diagram 2.8: Sectoral Profiling Model



Source: Bank Negara Malaysia

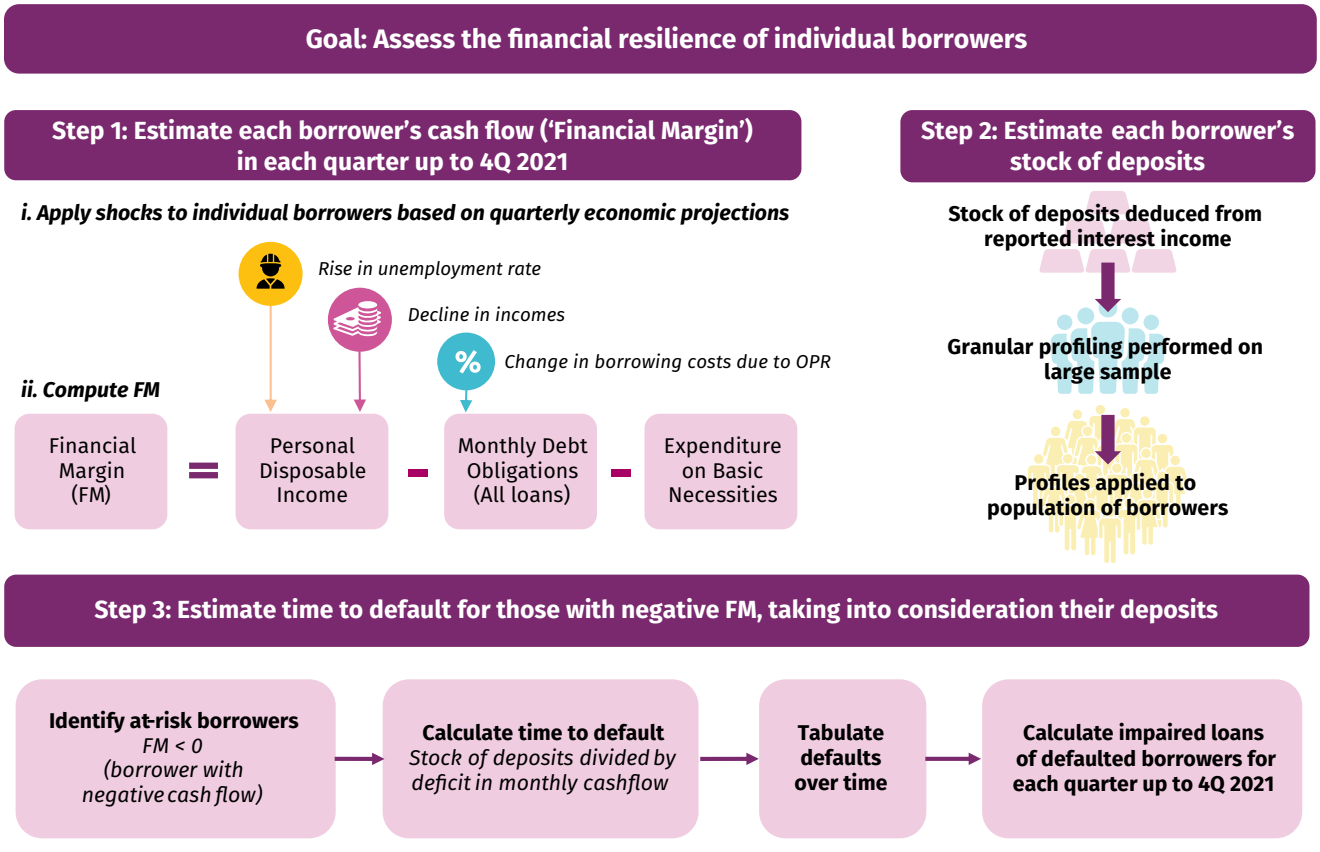
[22] Sectors that are deemed more vulnerable are those more exposed to the COVID-19 pandemic and those impacted by supply chain disruptions. These include the agriculture, mining & quarrying, manufacturing, construction, wholesale and retail trade, hotels and restaurants, transport and storage, and real estate sectors.
[23] Revolving credits are excluded as experience indicates that these exposures are typically rolled over.

Forecasting Households' Time to Default – Enhancements to the Financial Margin Framework

The financial margin framework is used in the Bank's in-depth assessments of households' financial health and resilience against hypothetical shocks, building off a rich set of individual borrower-level data. Previously, the framework ignores cumulative financial buffers that may be available to borrowers to meet shortfalls in monthly cashflows that are required to service debt and pay for essential expenditures. Borrowers are therefore presumed to default immediately when monthly cashflows are in deficit (i.e. negative financial margin), after accounting only for any positive cashflows from the previous month. This builds in a level of conservatism during normal times in order to capture tail-risks.

In the current environment, the Bank sought to further examine the ability of households to service their debt where more households may experience financial difficulties, but would be able to draw on financial buffers they have accumulated to sustain their debt repayments for a period of time. To this end, the financial margin framework was enhanced (Diagram 2.9) to account for the progressive draw down on deposits by households to meet shortfalls in monthly cashflows. Households are presumed to default only after their stock of deposits is depleted. The enhanced framework thus provides additional insights from a time dimension on the evolution of household default risk arising from income and unemployment shocks.

Diagram 2.9: Outline of the Enhanced Financial Margin Framework



Source: Bank Negara Malaysia

This framework only considers deposits as wealth. This is given the high uncertainty in estimating other forms of wealth[24] at an individual-level, and the easy accessibility to deposits in times of financial stress. A large sample of anonymised individual tax records and techniques[25] to measure wealth distribution was employed to estimate the stock of deposits held by individual borrowers.

Unlike the previous sensitivity analyses where one-off shocks were simulated, the enhanced framework simulates quarterly shocks. It also incorporates the effects of the automatic loan moratorium between April and September 2020 and the targeted assistance measures announced in July 2020.[26] During the automatic loan moratorium period, borrowers' debt obligations are set to zero. Subsequently, borrowers affected by simulated unemployment shocks are assumed to continue with zero debt obligations until end-2020, whereas all other borrowers' debt obligations are scaled by the quantum of income shocks simulated until the end of the targeted assistance period. With the gradual recovery in labour market conditions, the targeted assistance measures will continue to provide a measure of debt relief to borrowers who remain affected by the crisis. These measures are assumed to lapse after 1Q 2021. The enhanced financial margin framework does not include the impact of additional initiatives beyond the targeted assistance measures announced, such as banks' bespoke R&R efforts or programmes by the Credit Counselling and Debt Management Agency (Agensi Kaunseling dan Pengurusan Kredit, AKPK). Such additional support extended would further contain a rise in distress among households.

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[24] Other forms of liquid financial assets include investment in equities and unit trust funds (fixed and non-fixed price). Valuations for some of these assets tend to be volatile, further complicating their measurement, and hence the deliberate omission from the computation.
[25] Saez and Zucman (2014), 'Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data'.
[26] These measures include (i) an extended loan moratorium for unemployed borrowers in 4Q 2020 and (ii) a reduction in debt obligations proportionate to income declines over the period 4Q 2020 – 1Q 2021.