

### 3. STRESS TESTS

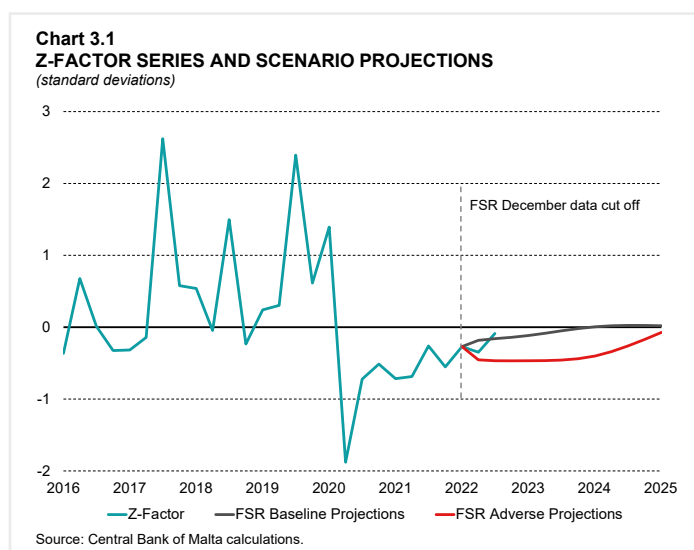
The following sections present the updated results for June 2023 of the solvency and liquidity stress testing frameworks presented in the FSR 2022. These consist of an assessment of classification of the loans portfolio based on the [Top-Down Expected Credit Loss module](#), the credit quality deterioration assessing bond holdings, three liquidity frameworks and the interest rate risk in the banking book (IRRBB) framework. Overall, results show that the banking system can still withstand the severe, yet plausible, hypothetical shocks adopted in the respective frameworks. The post-shock Tier 1 capital ratios and liquidity buffers of the core domestic, non-core domestic and international banks remained comfortably above the respective regulatory thresholds.

#### 3.1 Scenario-based solvency stress tests

##### 3.1.1 Credit risk in the loan portfolio

In the FSR 2022, the Bank introduced a *Top-Down Expected Credit Loss module* that utilizes a one-factor representation, referred to as the “Z-Factor” to analyse transitions across different credit risk stages (i.e. Stage 1, Stage 2, and Stage 3). The Z-Factor summarises the composition of the transition matrix and allows for a comparison on how changes in risk factors, notably macroeconomic conditions such as inflation and interest rates, impact the likelihood of loans transitioning across different credit risk stages. The Z-Factor can be interpreted as representing one standard deviation of stage transitions from the historical average of stage transitions. The Z-Factor is negative during economic downturns due to downgrades between Stages 1 and 2 or defaults into Stage 3. Conversely, the Z-Factor is positive during economic upturns when the transition probabilities referring to the downward movement of loans stand below their long-term average, corresponding to loans reverting to previous stages. The Z-Factors for March and June 2023 have been calculated on newly available loan portfolio data to assess the transitions across IFRS 9 stages. These are then compared to the projected paths for Z-Factors for 2023, 2024 and 2025 with December 2022 data cut off point conditional on the EBA 2023 EU-wide stress test’s baseline and adverse paths as reported in the FSR 2022 (reproduced in Chart 3.1).

The updated Z-Factors for the first half of 2023 reflect the observed transitions across IFRS 9 stages and proceed along the upward trend observed following the pandemic. Moreover, the Z-Factor for June 2023 remains in line with the FSR’s projected baseline forecasts. Thus, the results and conclusions drawn for the macro-stress testing framework in the FSR 2022 are still relevant, demonstrating that banks have strong capital buffers to absorb the scenario-based losses and meet the respective capital requirements.



##### 3.1.2 Credit quality deterioration in the bond portfolio

Compared to December 2022, banks retained the same elevated proportions of their bond holdings at investment grade, amounting to 94% for non-core domestic banks and 100% for both core domestic and international banks. The share of bonds purchased with the intent of collecting contractual cashflows remains high with bonds accounted for at amortised cost (AMC) amounting to 82% for core domestic banks, 94% for non-core domestic banks and 31% for international banks, respectively or 83% overall. Thus, credit risk is also the predominant risk factor for the bond portfolio.

The credit quality deterioration framework was run for June 2023 to assess for changes in the risk profile of banks’ bond holdings. The methodology distinguishes between bonds acquired with the intention

of collecting contractual cashflows till maturity and accounted for at AMC from those acquired with the intention of selling and accounted for at FV. Debt securities held at AMC are assessed against a three-notch downgrade in their official credit rating, while sovereign and non-sovereign FV debt securities are assessed via a widening of the credit spread and the application of valuation haircuts, respectively. Banks which do not hold any debt securities, are naturally excluded from this test given that such banks are not affected by these shocks.

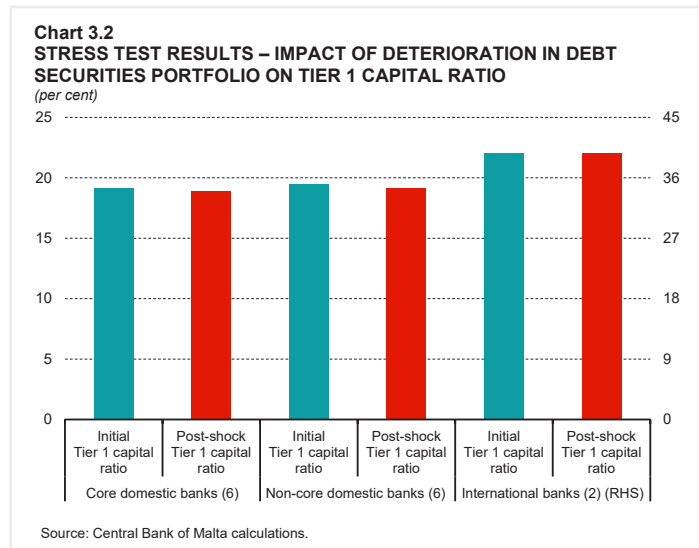
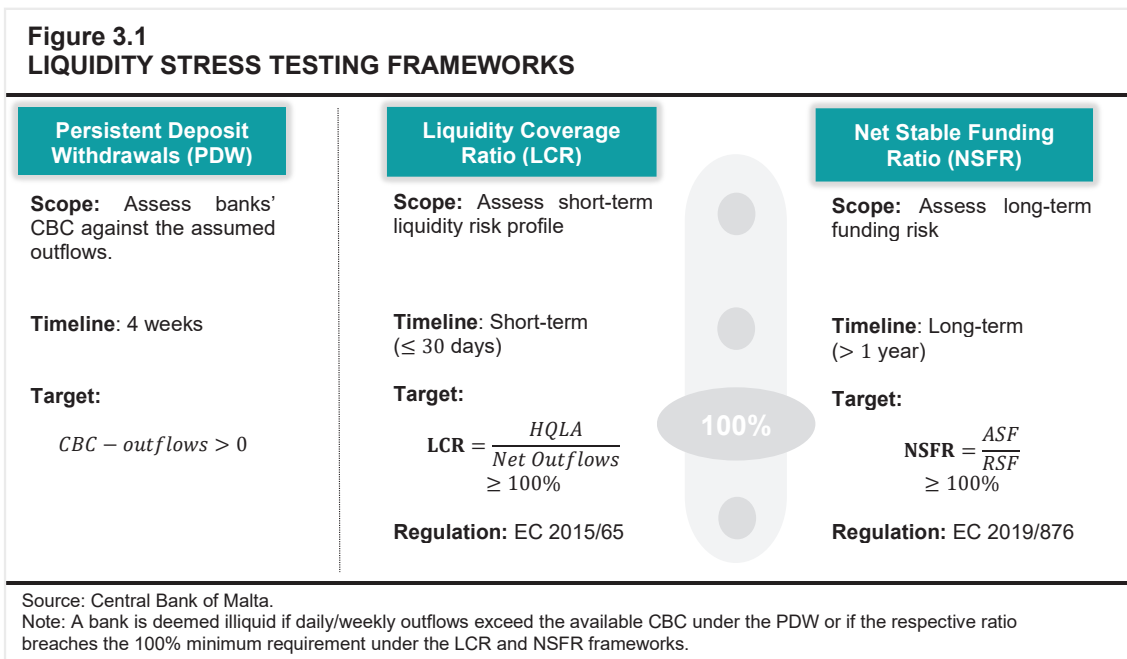


Chart 3.2 presents the impact on the three bank categories, with the number in brackets being the number of banks in scope of the test. The Tier 1 capital ratio would drop from 19.17% to 18.91% for the core domestic banks, from 19.47% to 19.17% for the non-core domestic banks and from 39.68% to 39.67%, for the two international banks in scope. The drop in the Tier 1 capital ratio is negligible and equivalent to 0.26, 0.30 and 0.01 percentage points for the three bank categories, respectively. When compared to December 2022, the impact is lower for core domestic banks and comparable for the other two bank categories. Thus, risks arising from the bond portfolio are contained and contribute positively to the liquidity position of banks (further details provided under the liquidity stress test results).

### 3.2 Liquidity stress tests

The following sections provide an overview and results of the three liquidity stress testing frameworks as reported in the FSR 2022, updated for June 2023. The three frameworks, summarised in Figure 3.1, provide a complementary assessment to liquidity by looking at either the short-term or long-term funding of banks and the adequacy of these buffers to absorb the assumed losses.



### 3.2.1 Persistent deposit withdrawals

The persistent deposit withdrawals (PDW) framework assesses banks' CBC consisting mainly of cash, excess on the reserves placed with the Bank and funds raised from pledging or selling bonds, in a four-week bank-run type scenario. Against the same magnitude of deposit withdrawals, three scenarios for determining the CBC are considered. Under the first adverse scenario, banks can obtain funding from Eurosystem monetary operations only against ECB eligible debt securities which have already been pledged with the Bank as at reference date – June 2023, while the

remaining unencumbered FV debt securities can be sold at fire sale prices. Under the second scenario, all unencumbered and eligible debt securities may be pledged for standard Eurosystem monetary operations and the remaining unencumbered FV bonds may be sold at fire sale prices. Finally, under the third scenario, banks are assumed to satisfy the requirements to be able to also sell unencumbered and ineligible bonds held at AMC in order to boost their CBC.

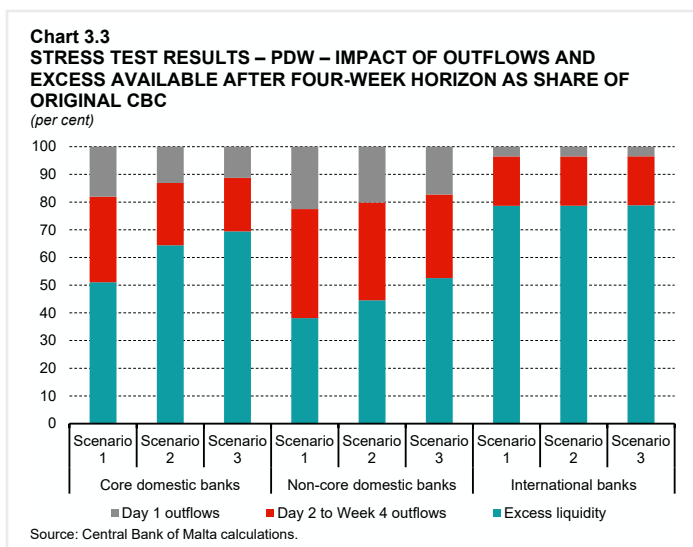
As at June 2023, banks still retain 83% of aggregate bond holdings as hold-to-collect which are valued at AMC. Despite the recent market adjustments in view of increases in yields, the discrepancy between the AMC and the current market value remains contained. Therefore, these adjustments to market prices do not impact substantially on the volume of liquidity banks could obtain from standard monetary policy operations.<sup>1</sup>

Chart 3.3 shows the reduction in CBC from the assumed outflows in the first day (grey bar) and the subsequent time periods in the four-week test horizon (red bars). None of the banks deplete their entire CBC with the results of the PWD in June 2023 for all three bank categories showing excess liquidity buffers under all adverse scenarios, that would allow them to withstand further withdrawals beyond the four-week stress horizon.

Compared to December 2022, the resulting excess CBC at the end of week 4 is comparable for all three bank categories and the three scenarios tested. Even in June 2023, the majority of banks in all three categories would be able to withstand the assumed outflows with robust excess CBC already under Scenario 1 (with restricted access to standard monetary policy operations and no sale of AMC bonds). Therefore, while Scenario 2 is deemed more plausible due to the ECB's ongoing commitment to provide liquidity, the strong liquidity buffers already observed in Scenario 1 makes the option for banks to resort to liquidate their AMC portfolio even more remote.

### 3.2.2 Liquidity Coverage Ratio stress test

The LCR framework is run on a baseline and three adverse scenarios targeting outflows. The baseline scenario considers the benchmarks haircuts for high-quality liquid assets (HQLA) and inflow/outflow rates set out in the European Commission (EC) Delegated Regulation (EU) 2015/61 (hereafter, LCR Delegated Regulation), to serve as a monitoring tool for the LCR reported by banks.<sup>2</sup> Adverse Scenario 1 applies



<sup>1</sup> The volume of liquidity provided by standard monetary policy operations is based on the current market value of pledged securities and the applicable haircuts.

<sup>2</sup> The baseline scenario is the minimum level of severity based on the LCR Delegated Regulation and is common across all banks. This also serves as a cross-check against information provided by banks, as well as serving as a reference for the adverse scenarios.

**Table 3.1**  
**DESCRIPTION OF LCR FRAMEWORK'S BASELINE AND ADVERSE SCENARIOS**

Scenario	Description
Baseline	Haircuts and outflow/inflow rates as prescribed by the LCR Delegated Regulation
Adverse:	
Scenario 1	Higher outflows compared to the LCR Delegated Regulation
Scenario 2	Scenario 1 with additional withdrawals from both resident and non-resident time deposits
Scenario 3	Baseline scenario with full withdrawal of committed facilities to NFCs and households

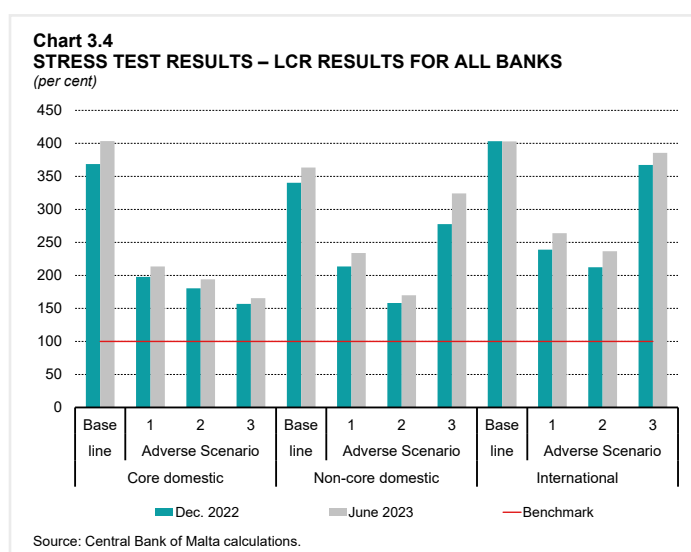
Source: Central Bank of Malta.

higher outflow rates compared to the minimum prescribed in the LCR Delegated Regulation, while Adverse Scenario 2 builds on the former by pairing it with higher withdrawals from both resident and non-resident term deposits fixed for a period of at least 30 days. Adverse Scenario 3 instead assumes a full realization of commitments to NFCs and households. The HQLA buffer remains unchanged in all three adverse scenarios. Table 3.1 provides a summary of all the scenarios considered.

Chart 3.4 shows the results produced from the LCR framework for June 2023 which suggest that banks have ample liquidity buffers and are resilient to adverse liquidity conditions. The LCR under the baseline scenario compared to December 2022 increased from 369% to 403% for core domestic banks and 340% to 363% non-core domestic banks, improving by 9.3% and 6.8% respectively, due to additional funds held with the Bank, while international banks did not present a significant variation (declining marginally by 1.1%).

Under all three adverse scenarios, the three bank categories manage to surpass the ratio of liquid assets of 100% regulatory minimum requirement, averaging 205% for core domestic banks, 213% non-core domestic banks and 247% international banks.

Adverse Scenario 1 presents the largest drop in the LCR by 190, 129 and 139 percentage points, for core domestic, non-core domestic and international banks, respectively. This highlights the general tendency for all banks to rely on short-term funding. Adverse Scenario 2, which builds on Adverse Scenario 1 and includes additional outflows from both resident and non-resident time deposits exceeding 30 days, the LCR falls by a further 20, 64 and 27 percentage points to reach 194%, 170% and 237% for the respective bank category. The relative increase reflects a partial reliance on resident fixed term deposits for core domestic banks and a stronger reliance on non-resident fixed term deposits for non-core domestic and international banks. Under Adverse Scenario 3, the LCR falls by 238, 39 and 17 percentage points to reach 165%, 324% and 386% for the respective banking category. This scenario tends to be very conservative as it is not possible to determine the extent of commitments which could be revoked by the banks or those which belong to prospective clients that were seeking the best rates and loan conditions and were issued with sanction letter from multiple banks prior to committing



with one bank. Notwithstanding these two data caveats, the adverse scenarios assume that all committed funds are available for withdrawal and highlight a higher share of loan commitments by core domestic banks as the main providers of credit, especially mortgages. Nevertheless, the ratios remain well above the 100% regulatory requirement.

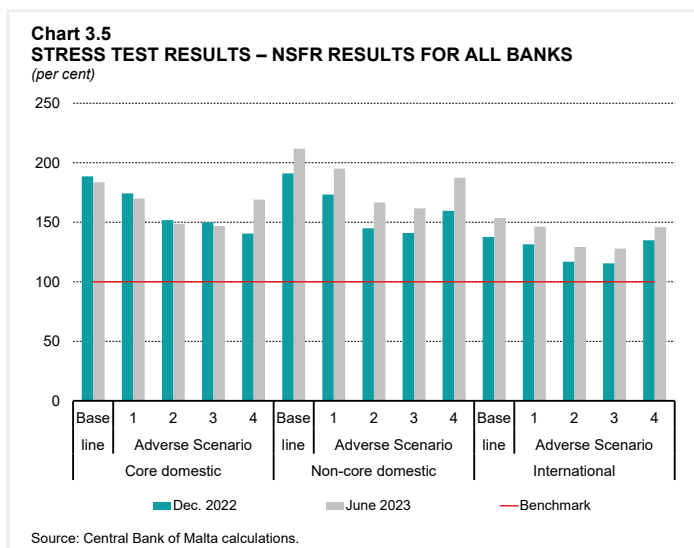
At an individual bank level, weaknesses still can be observed across the three adverse scenarios with some small banks falling below the 100% requirement, particularly adverse scenarios 2 and 3 which feature increments in the volume of outflows for retail and operational deposits. Notwithstanding the assumed severity, should such adverse scenarios occur, the LCR Delegated Regulation allows banks to temporarily operate below the 100% minimum but requires the bank in question to provide a plan detailing how the LCR will be restored back to 100%. Compared to December 2022, the increase in baseline LCR figures allows banks to absorb a similar volume of outflows and result in overall higher LCR ratios at the end of each scenario.

### 3.2.3 Net Stable Funding Ratio stress test

The NSFR is based on a baseline and four adverse scenarios. In the baseline scenario, the available stable funding (ASF) and required stable funding (RSF) factors applied are those prescribed in the Regulation (EU) 2019/876 (hereafter, the CRR2 Regulation) which the amount of ASF is composed by institution's capital and liabilities, while the amount of RSF reflective of asset's residual maturity. Table 3.2 details the respective scenario. In particular, the fourth scenario has been introduced in FSR 2022 to link to the Adverse Scenario 3 of the LCR framework which assumes a full withdrawal of commitments.

The results of the NSFR stress test in June 2023 for the three bank categories under the baseline and four adverse scenarios suggest that most banks would be able to maintain a stable funding profile under stress (see Chart 3.5).

Compared to December 2022, the baseline scenario showed that the NSFR of core domestic banks declined from 189% to 184%,



**Table 3.2**  
**DESCRIPTION OF NSFR FRAMEWORK'S BASELINE AND ADVERSE SCENARIOS**

Scenario	Description
Baseline	ASF and RSF factors as prescribed by the CRR2 Regulation
Adverse:	
Scenario 1	A higher run-off for retail and wholesale deposits impacting the availability of stable funding
Scenario 2	Adverse scenario 1 with some loans become non-performing requiring more stable funding to support them impacting the RSF
Scenario 3	Adverse scenario 2 with pressure in the market reducing the value of bonds and equities (Level 1, 2A and 2B HQLA and other securities) implying the need for further stable funding
Scenario 4	Baseline with full withdrawal of committed facilities to NFCs and households (similar to LCR adverse scenario 3).

Source: Central Bank of Malta.

while non-core domestic banks and international banks increased from 191% to 212% and 138% to 154%, respectively.

A comparison of results across banking categories shows a larger decline in the NSFR under Scenario 3 which adds on to the shocks of Scenario 1 and 2. In fact, the NSFR of the three respective bank categories falls to 147%, 162% and 128%, respectively, remaining over the 100% minimum requirement. Under adverse scenario 4, the biggest impact of a withdrawal of committed facilities generated a reduction of NSFR for core and non-core domestic banks, albeit lower than the impact for December 2022. This shows a reduction in the volume of commitments over the first half of the year. Even under this scenario, banks still surpass the 100% minimum required.

At an individual bank level, in general results show that banks are operating with a robust and ample liquidity position with a NSFR above the 100% minimum requirement over a long-term horizon by funding their activities with sufficiently stable sources of funding.

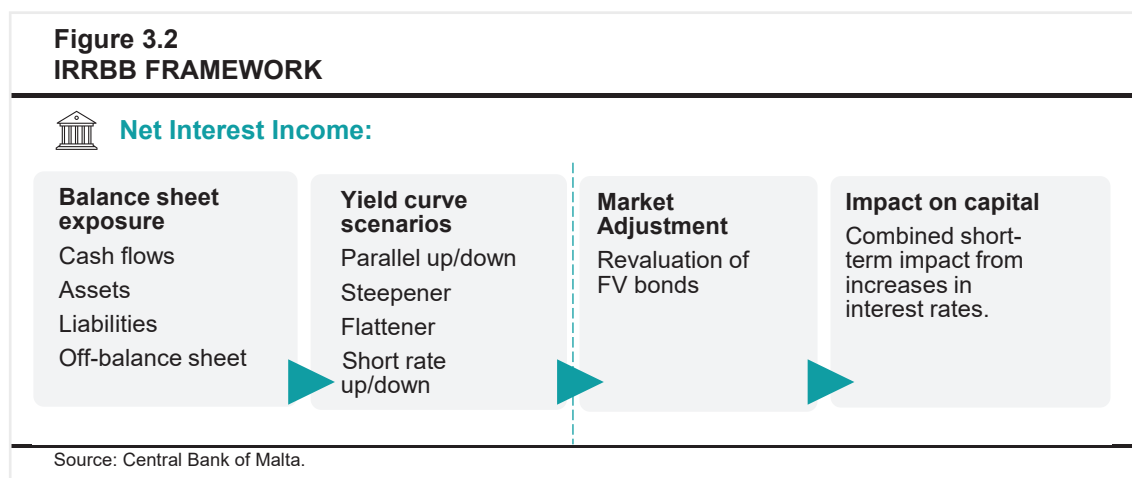
### 3.3 Interest rate risk in the banking book

Since the FSR 2022, the ECB's Governing Council has decided to set the remuneration of minimum reserves at 0%, effective from the beginning of the reserve maintenance period on 20 September 2023. Minimum reserves, equivalent to 1% of specific liabilities, are held by credit institutions with their Eurosystem national central bank. These reserves are currently remunerated at the ECB's deposit facility rate. Nevertheless, this change is not expected to impact banks significantly, given that they are still being remunerated on the excess on the reserve requirement, which is substantial in volume. However, there has been a continued increase in interest rates by the ECB due to persistent inflationary pressures since the FSR 2022. Within this context, the importance of quantification of IRRBB framework remains significant.

The IRRBB framework evaluates the risks arising from potential changes in the yield curve on the banks' business model that affect the NII paired with the instantaneous repricing of bonds held at FV. Figure 3.2 provides a schematic representation of the framework.

The IRRBB framework assesses scenarios with increases in the short end of the yield curve by focusing on three of the six scenarios prescribed in Annex 2 of the 2016 Basel Committee on Banking System Supervision standards, namely the *parallel up*, *flattener* and *short rate up* scenarios. The extent of the impact of increases in interest rates upon banks' interest-bearing assets and liabilities is influenced by, inter alia; the interest rate type (fixed, variable or a combination of both); the currency denomination, and the reset date of these instruments.

The framework considers the impact of IRRBB on NII over a 12-month time horizon and assumes a static balance sheet. The impact on NII and the revaluation of FV bonds is combined to reflect the discounted sum of future cashflows for the pricing of bonds, following the assumed changes in the yield curve.



The results of the impact on Tier 1 capital ratios from the three bank categories and adverse scenarios after the shocks to NII, revaluation of bonds and following the application of the corporate tax rate of 35% on banks' profits is presented in the Table 3.3.

The Maltese banking system would be resilient to a severe stress scenario that assume higher interest rates. In June 2023, under the assumption of increment in the short end of the yield curve, the NII improves in all three scenarios and categories. Indeed, during the first six months of the year, banks' NII continued to improve under a period of rising interest rates given bank's balance sheet structure; also considering sustained growth in credit intermediation.

Conversely, under a scenario of rising interest rates, banks are expected to incur revaluation losses given the inverse relationship between bond prices and yields. Despite these losses, the overall impact remains positive for all three bank categories across the three scenarios. This positivity can be attributed to the structure of the banks' interest-bearing portfolios, primarily consisting of variable-rate loans and short-term, low-interest deposits. When also factoring in the revaluation of FV bonds, domestic banks experience the most favourable outcomes under the short rate up scenario. The specific characteristics of the FV portfolio, including the volume of instruments held at FV and their maturity, influence the net effect of revaluation losses on NII gains. Overall, all three bank categories enjoy higher NII compared to December 2022 in all three scenarios.

**Table 3.3**  
**STRESS TEST RESULTS – IRRBB FRAMEWORK – RELATIVE IMPACT OF**  
**CHANGES IN INTEREST RATES ON THE TIER 1 CAPITAL RATIO**  
*(per cent)*

		Core domestic banks	Non-core domestic banks	International banks
Initial Tier 1 capital ratio		20.08	19.56	41.46
Parallel up	<i>NII</i>	2.75	1.74	1.63
	<i>Revaluations</i>	-0.53	-0.34	-0.07
	Post-shock Tier 1 capital ratio	22.30	20.97	43.02
Flattener	<i>NII</i>	2.56	1.53	1.53
	<i>Revaluations</i>	-0.06	0.07	-0.02
	Post-shock Tier 1 capital ratio	22.58	21.17	42.97
Short rate up	<i>NII</i>	3.22	1.92	1.92
	<i>Revaluations</i>	-0.23	-0.06	-0.04
	Post-shock Tier 1 capital ratio	23.07	21.42	43.34

Source: Central Bank of Malta calculations.