

### 3. STRESS TESTS

Stress tests play a pivotal role in banks' risk management practices in assessing and quantifying the resilience of banks to severe yet plausible shocks. These exercises serve as a line of defence to detect any idiosyncratic or systemic risks that could propagate through the financial system and cause distress especially if vulnerabilities are left unchecked and unaddressed.

Within the context of recovering profitability and buoyant liquidity buffers, the stress testing frameworks have been re-oriented with the aim of assessing the resilience of the main contributors to profitability and emerging trends in business activities. This year's MST framework contemplates an adverse scenario characterised by stagflation and the narrowing of interest rate margins to focus on an alternative state of play where banks are modelled to operate with a higher interest rate pass-through on deposits. The Bank's toolkit has been enhanced further, with a new link to solvency from one of the liquidity frameworks. This is done to look at scenarios where banks are assumed to dip into their investment portfolios for liquidity and hence increase the dose of stress in the tests reported herein. The chapter is complemented by dedicated subsections with details on emerging trends.

In particular, the chapter features the results from a sensitivity analysis which sheds light on the importance of overnight deposits with the Central Bank of Malta and the DFR paid on these deposits for banks' profitability levels. Another feature of this edition is the enhancement of the PDW framework. This introduces a liquidity-to-solvency module that quantifies the impact of a bank-run on both the liquidity buffer and its effects on banks' solvency position. The solvency impact depends on how deep into the assumed hierarchy for liquid assets each bank is pushed, to meet the scenario-based withdrawals. This boxed article looks deeper into the hierarchy and composition of liquid assets to build the counterbalancing capacity (CBC) for the respective three categories of banks. It also provides a deeper assessment of bonds held by banks and assesses the composition of deposits, including the extent of deposits sourced from online deposit platforms (ODPs), to ensure relevance of the scenario and the assumed withdrawal rates. Although the Bank's stress testing frameworks are macro in nature and are not intended to apply differing scenarios tailored to banks' diverse business models, these deep-dive assessments have the benefit of identifying any idiosyncratic weaknesses that would otherwise remain undetected under a top-down consistent scenario.<sup>1</sup>

The chapter also includes the results from the liquidity frameworks based on the LCR and NSFR, as well as the interest rate risk in the banking book (IRRBB) framework which features scenarios assuming both increases and decreases in short-term rates.

#### 3.1 Scenario-based solvency stress test

##### *Outlook and scenario design*

While the persistent rise in inflation has subsided and the restrictive monetary policy stance is starting to moderate, it remains essential to continue to detect any lingering or emerging vulnerabilities. The MST framework is one such tool that forms part of the Bank's toolkit to detect any weaknesses under a baseline scenario and a severe but plausible hypothetical adverse scenario. The baseline scenario draws from the Banks' [economic projections](#) of February 2024. The adverse scenario aims to identify and quantify any systemic weaknesses within the domestic banking sector, designed to highlight vulnerabilities that are both idiosyncratic and systemic under "what if" analyses.

The scenario narrative applied in the adverse scenario draws from the [2023 IMF Global Financial Stability Report](#) and the [2023 EBA EU-wide Stress Test](#) and considers an environment characterized by stagflation, i.e. high inflation in low economic growth and high unemployment.

<sup>1</sup> The Bank does not comment on stress test results for individual banks as the aim is to assess the overall resilience of the system. Individual bank findings are discussed with the relevant authorities. Moreover, the number of banks considered for each category may vary as some banks may fall out of scope of specific stress tests. In particular, this is the case for branches of foreign banks, given that they do not hold capital locally, and other banks that would not hold the specific classes of instruments being assessed in any given framework.

Inflationary pressures are assumed to continue to weigh in on the macro-economic environment in the initial years of the stress test horizon; however, the rate at which inflation grows is assumed to subside but remain high. Although economic theory suggests that an outlook for inflation in the medium term that is in line with the Central Bank’s target would call for reversal of restrictive monetary policy and therefore drops in interest rates, adverse shocks may delay this reversion in the monetary policy stance, thus maintaining high interest rates for longer. Indeed, if a soft landing fails to materialize amid high inflation, interest rates may remain high for longer. While inflation remains well above the medium term-target of 2%, further adverse supply shocks may result in inflation remaining elevated for longer, which in turn adversely affects financial stability through several channels. First, increased supply shocks, arising from geopolitical tensions, can rekindle inflationary pressures, which in turn increases the risk related to debt-servicing for both households and corporates. These effects put further pressure on banks’ financial position via higher loan defaults. Thus, although wider interest rate margins can improve banks’ profitability, extended periods of high rates can also be associated with more loan losses as corporate and household borrowers face heavier debt-servicing burdens. This less favourable economic backdrop is further conducive to a volume effect emanating from lower credit demand including for investment purposes as well as a higher level of unemployment. This may impact banks’ asset quality negatively as well as their profitability position. Furthermore, geopolitical risks could destabilise financial markets. Such scenario has the potential to trigger an abrupt sell-off in financial markets, especially risky and overvalued asset classes.

Also, heightened uncertainty may lead to banks holding on to relatively more secure sources of funding, such as through customer deposits. Thus, in order to attract or maintain current levels of deposits, bank pass through higher rates on deposits when compared to loans, also because, in an environment of high for longer interest rates, market funding can be even more costly. In addition, alternative investment opportunities may reduce placements with the banks. The narrower loan to deposit margin rates, and weaker loan demand, paired with higher non-interest expenses (linked to inflation) continue to put pressure on banks’ future profitability.

Under such a scenario, a reduction in deposits would also be registered from dissaving clients seeking to smoothen their consumption. The overall deterioration in credit quality amidst rising interest rates would result in a sharp downward repricing of marketable instruments given the inverse relationship between prices and yields, as well as increased impairments for heightened risk of default by their issuers.

The magnitudes of the shocks are sourced from the 2023 EBA EU-wide stress test, by applying the EBA adverse scenario’s deviations from the EBA baseline projections for 2023 to 2025 to the updated baseline as estimated by the Bank for 2024 to 2026. These are in general consistent between the two baseline scenarios except for short-term interest rates which are now projected to dip after peaking in 2023. In this regard, under the adverse scenario, MT inflation in 2024 is assumed to remain at the level recorded in 2023, and gradually converge to the baseline projections in 2026, while an alternative path for short-term rates was applied to delay the dip towards the end of the stress-test horizon to reflect inflation expectations, as shown in Table 3.1.

**Table 3.1**  
**SCENARIO-BASED MACROECONOMIC PROJECTIONS FOR 2024 TO 2026**

	Baseline scenario			Adverse scenario		
	2024	2025	2026	2024	2025	2026
MT GDP	4.4	3.6	3.3	0.2	-5.3	0.2
MT Inflation Rate	2.9	2.2	1.9	5.6	3.9	2.6
€STR	3.0	2.2	2.2	4.5	3.9	3.4
Sovereign spread	1.1	1.1	1.0	2.1	1.5	1.4

Source: Central Bank of Malta.

Under the baseline scenario, GDP is expected to grow by 11.7% cumulatively over the test horizon while inflation is expected to continue to increase by 7% as the markets expect short-term rates to ease to reach 2.2%. Under the adverse scenario, GDP is expected to contract by 4.9%, with inflation soaring to 12.1% over the test horizon. At the same time adjustments to short-term rates take longer to materialise, increasing to 4.5% in 2024, returning to the rate observed at the end of 2023 of 3.9% in 2025 and decrease further to 3.4% in 2026.

### Methodology

The MST framework adopts the same methodology of the previous exercise, applied on two scenarios, a three-year horizon and a static balance sheet assumption to assess the impact of macro-economic shocks onto the balance sheets of core and non-core domestic banks.<sup>2</sup> Losses by risk type are projected via dedicated satellite models or modules.

Credit risk in the household and NFC loan portfolios is projected in reaction to the paths for short-term interest rates, inflation, and spreads under the respective scenario using the expected credit loss model presented in [Box 3 of the 2022 FSR](#). In addition, projected NPLs and the existing stock of NPLs are assessed in line with the supervisory minimum coverage expectations, which, depending on the extent of collateralisation, require higher provisions the longer a loan has been classified as NPL.<sup>3</sup> The projected impact from additional provisions is reported under credit risk in Charts 3.1 to 3.4. Moreover, in addition to the impact arising from increasing loan loss provisions, the income stream is reduced due to missed monthly repayments from newly classified NPLs and is reflected in the contribution of NII. Similarly, the increase in RWAs from the additional risk-weight on newly classified NPLs is shown separately in the charts with results.

Securities held by banks (both bonds and equities) are assessed for market risk in the dedicated module. The module mainly assesses the impact arising from changes in interest rates, which have an inverse relationship with the valuation of marketable instruments. Specifically, bonds held at fair value are repriced at the scenario-based market prices, with unrealised gains or losses charged to the Statement for Profit and Loss for bonds accounted for at fair value through profit and loss (FVTPL) or directly to capital for bonds accounted for at fair value through other comprehensive income (FVOCI). For the remaining bonds there is no repricing since these are valued at amortised cost (AMC).<sup>4</sup> The risk module also quantifies the impact on banks' income stream after adjusting interest earned on floating rate notes, as well as adjusting coupons at the prevailing market rates for the roll-over of maturing instruments, while it applies an exogenous shock of 24% for equities issued by non-affiliated companies. These impacts are reported under the market risk component in Charts 3.1 to 3.4.

Furthermore, the market risk module feeds back into the credit risk module by revising the Loss Given Default (LGD) parameter that features in the estimation of expected credit losses for AMC bonds. This is to reflect the discrepancy between the book value (AMC) of these bonds and the scenario-based market value. Thus, although the valuation of bonds at AMC is unaffected from changes in market prices, upward or downward revaluations are considered for the assessment of expected credit losses. Indeed, such discrepancy in valuation would result in realised gains or losses that banks would incur only upon sale or default of AMC bonds. The impact of these additional impairments and any forgone coupons from defaulted bonds held at AMC are reported in the charts under credit risk and NII, respectively.

The NII and net non-interest income (NNII) module incorporates the changes in income stream arising from floating rate notes, forgone income from NPLs and defaulted bonds from the credit and market risk mod-

<sup>2</sup> The static balance sheet assumption ensures ease of comparison across banks results by requiring banks to retain the same composition of assets and liabilities over the test horizon. In practice, this is achieved by replacing instruments which mature between 2024 and 2026 with similar instruments in terms of type, credit quality and residual maturity as observed in December 2023, adapted to the prevailing market conditions assumed in each scenario.

<sup>3</sup> These are set out by the respective supervisor, with a [communication](#) issued by ECB banking supervision, applicable to the three domestic Significant Institutions (SIs), and [Banking Rule 09](#) applicable to the Less Significant Institutions (LSIs) supervised by the MFSA.

<sup>4</sup> For more details on the accounting treatment and valuation of bonds, refer to [Box 4 of the 2022 FSR](#).

ules, and adjusts the income earned and expenses incurred from the remaining stock of assets and liabilities. Interest-bearing instruments are adjusted to reflect the scenario-based changes in interest rates in line with the recently re-estimated pass-through rates.<sup>5</sup> Under this adverse scenario, interest rates increase for both interest-bearing assets, which are loans in the main, and interest-bearing liabilities which are mainly retail and wholesale deposits. However, the rate on interest expense is assumed to increase at a higher rate than on loans, resulting in a narrower loan-to-deposit interest margin. In other words, the interest rate charged on deposits is higher both due to a higher rate applied and also because a higher pass-through rate is assumed when compared to that applied on loans. Non-interest-bearing instruments are instead adjusted in line with the scenario-based paths for inflation. The shocks applied draw from the 7.2% and 12.1% cumulative increase in inflation under the baseline and adverse scenario respectively and include further adjustment to reflect indirect pressures from rising interest rates. This is assumed to result in higher costs including demand for higher wages, leading to an increase in administrative expenses of 7.5% and 15% relative to the costs incurred in December 2023, for the respective scenario. Similarly, a 7.5% and 15% decline in both dividend income earned, and net fee and commission income is assumed to emanate from slower economic activity.

The net trading income (NTI) module quantifies market risk on derivatives and economic hedges and is based on the simplified approach of the market risk methodology adopted in the 2016 EBA EU-Wide Stress Test (described in Section 3.6 of the 2016 methodological note).

Finally, the operational risk module assumes a materialisation of risk equal to a share of the capital requirements set aside for operational risk. These capital requirements are calculated according to the Capital Requirements Directive (CRD)'s Basic Indicator Approach (BIA) and the loss events are assumed at 40% of the requirement under the baseline and 100% under the adverse scenario. The impact of these events is equally distributed over the three years of the test horizon.

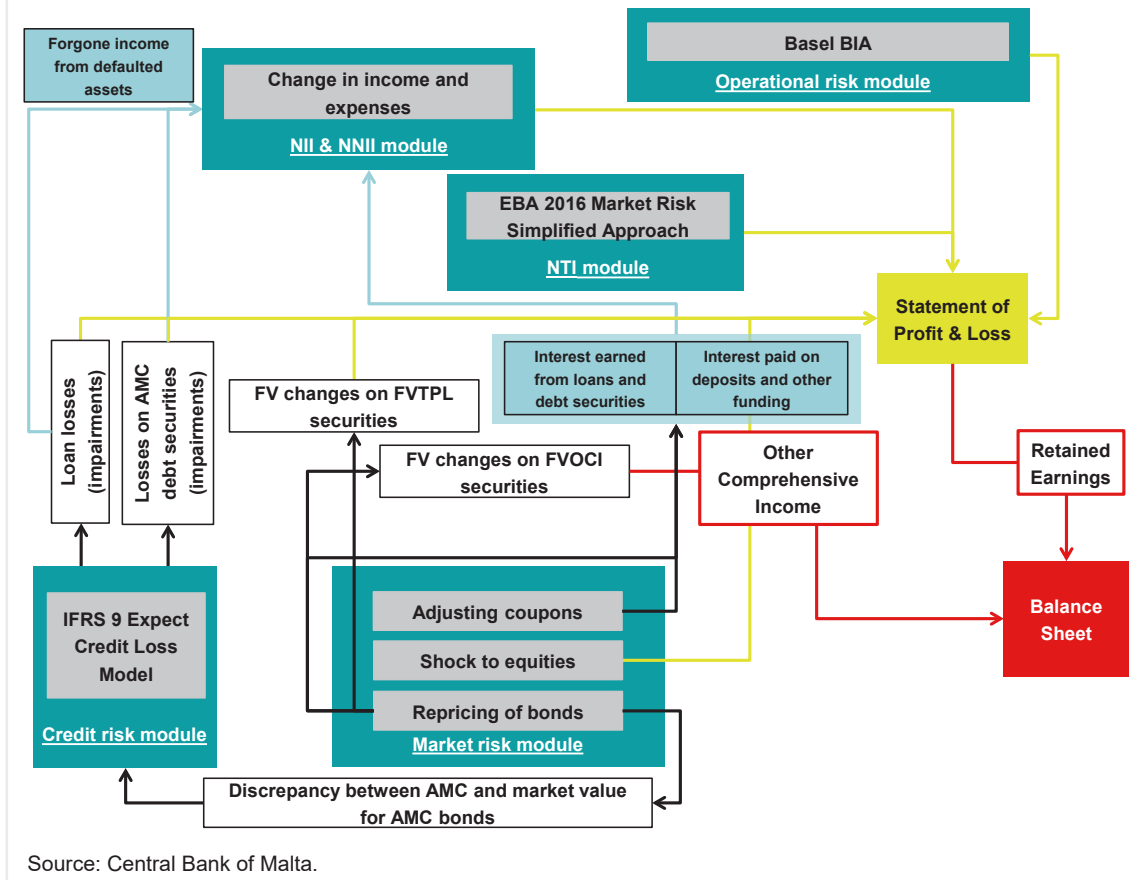
The impact arising from the NII & NNII, NTI and operational risk modules are all charged to the P&L and shown in the respective items on Charts 3.1 to 3.4.

Figure 3.1 provides a schematic overview of the contribution of each risk module in translating the scenario-based macro-economic environment onto the relevant instrument classes of banks, and thus, the interactions among the various risk modules and the ultimate impact on profit and loss and capital. The market risk module provides input to the credit risk module and in turn both provide input to the NII&NNII module. Apart from unrealised revaluations on FVOCI bonds which are charged directly to capital via other comprehensive income, each module's outcome affects the composition of the statement of Profit & Loss. The combined gains or losses ultimately determine if the bank generates profits, which are transferred to capital via retained earnings after deducting taxes and any dividend payouts, or losses which would need to be compensated by the release of retained earnings, accumulated from profits set aside in previous years.

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<sup>5</sup> The pass-through rates estimated by Nathaniel Debono are available in the [Policy Note](#) entitled "The Transmission of Monetary Policy in Malta: A focus on retail bank interest rates" of April 2024. The empirical analyses shows that the transmission of monetary policy onto lending rates in Malta has been weaker than other countries in the euro area while the transmission onto deposit rates other than those to non-financial corporates has generally been in line with other euro area countries. For the adverse scenario, the pass-through rates for all segments have been aligned to the empirical estimates for Malta, except for the pass-through rate for NFC deposits which instead has been aligned to other euro area countries.

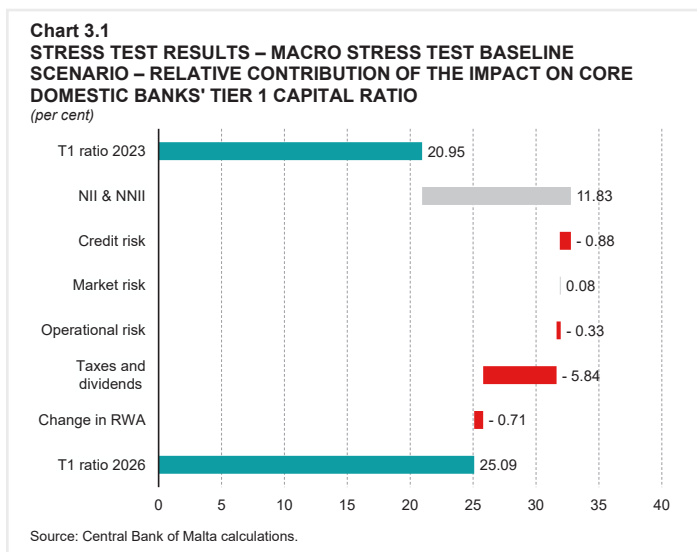
**Figure 3.1**  
**SCHEMATIC OVERVIEW OF THE MST FRAMEWORK**



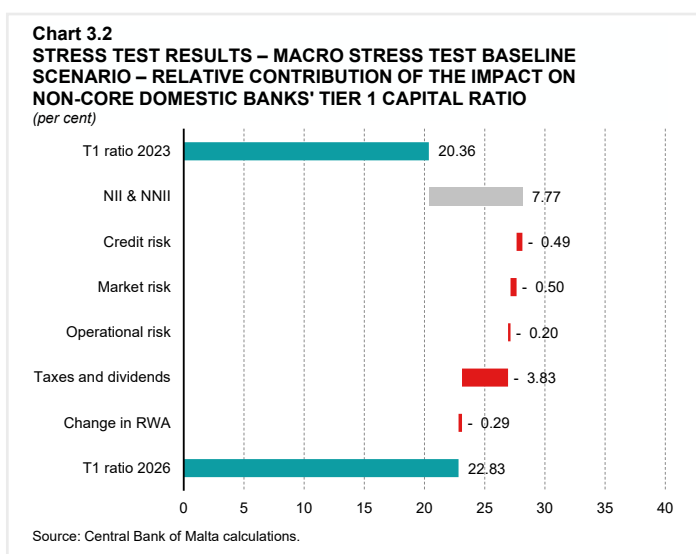
**Results**

Charts 3.1 and 3.2 present the three-year cumulative contributions of the various risk modules on the Tier 1 capital ratio for core and non-core domestic banks under the baseline scenario.

Although it is customary for NII & NNII to have a positive contribution to the Tier 1 capital ratio, the results for this run are even more positive than usual. This is largely due to the improved profitability observed in 2023, which is estimated to broadly continue over the test horizon given the static balance sheet assumption. This contribution is estimated on banks' potential to generate income (for example non-defaulted loans and market instruments continue to generate income) and incur expenses based



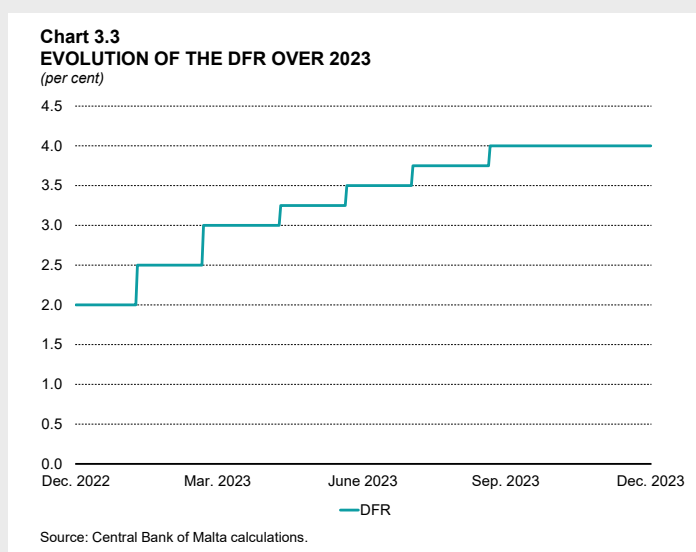
on the composition of assets and liabilities as at the reference date, with specific hinderances from achieving the potential depending on the scenario based macro-economic parameters. In particular, remuneration from placements in the overnight deposit facility, which was banks' major source of income as at the reference date, is expected to continue to contribute positively to the income stream under the baseline scenario, while only a slight reduction is experienced from the missed repayments on newly classified NPLs and the 7.5% shock to NNII components. The following subsection sheds light on the sensitivity of NII to placements in the overnight deposit facility.



### *Sensitivity analysis for placements in the overnight deposit facility*

Following a prolonged period of low and negative interest rates, in July 2022, the Governing Council of the ECB announced the decision to restore the key interest rates into positive rates starting at 0.5% for the MRO, 0.75% on the Marginal Lending Facility (MLF) and 0% for the DFR, with gradual increments thereafter. To date, these rates have increased to 4.5%, 4.75% and 4.0%, respectively, in line with Governing Council Decision of September 2023.

Within the local context, banks found an opportunity to place their excess liquidity in overnight placements with the Central Bank to earn interest at the DFR. Chart 3.3 shows the evolution of the DFR during 2023 starting at 2.0% and increasing in six steps to reach 4.0% by September of the same year. Over this period, banks have adjusted their placements with the Central Bank from excesses on the Minimum Reserve Requirement (MRR) to holdings in the overnight deposit facility, locking in an annualised WAIRS of 2.95%, 2.98% and 3.24% respectively. The earnings on these placements create a sensitivity of 9.3, 31.7 and 9.7 percentage points of the pre-tax profits registered in December 2023 by the three bank categories respectively for every percentage point change in the DFR. As the most recent announcement, [the ECB Governing Council decision of 6 June 2024](#) adjusted the DFR downwards to 3.75% applicable from 12 June 2024. This reduction of 0.25pp in the DFR for the second half of the year would correspond to a drop in each bank category's pre-tax profits registered in December 2023 of 1.2%, 4.0% and 1.2%, respectively.

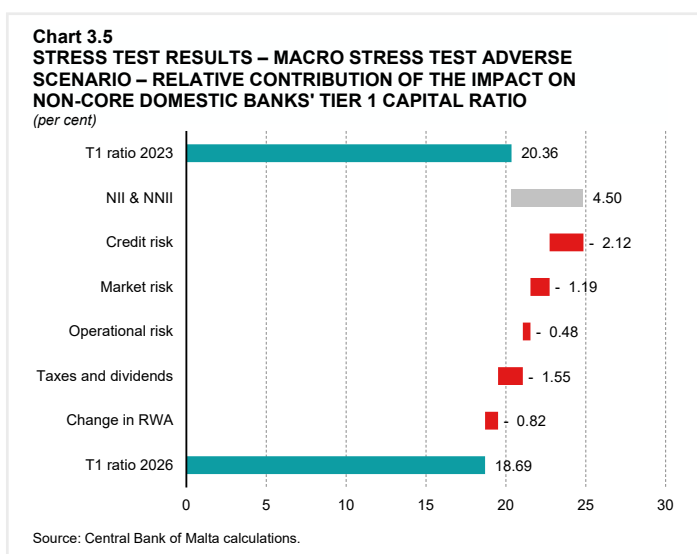
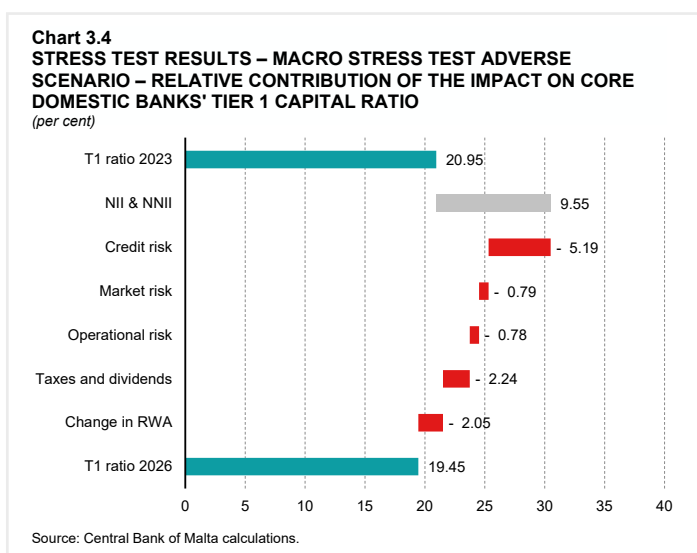


In contrast to the positive impact from the NII and NNII module, the other modules generate some losses under the baseline, but these are rather contained. This is primarily the case for credit risk whereby the share of Stage 2 and Stage 3 loans, that is those loans requiring provisions calculated under the lifetime expected credit loss approach, increase by 2.7 percentage points, from 9.0% in December 2023 to 11.7% at the end of the test horizon. Nevertheless, the International Financial Reporting Standard 9 (IFRS 9) loan provisions corresponding with this increase in downward transitions of loans to Stages 2 and 3, and incremental coverage requirements under BR09, are small, in part due to the improved quality of the loan portfolio compared to the previous year. This was mainly achieved via a write-off exercise which has lowered the stock of NPLs and consequently the volume of legacy NPLs – i.e. those that have been classified as NPLs for a long period of time.

Moreover, the contribution of market risk is low in the baseline scenario given that banks have increased their share of instruments accounted at AMC. Moreover, the scenario features a drop in short-term interest rates which would result in an appreciation of bonds at fair value having a short remaining term to maturity, as is the case for core domestic banks with an average maturity of three years. For non-core domestic banks, the average term to maturity on fair value bonds is 16 years and thus are valued according to the adjustment of the longer end of the yield-curve.

Despite the losses arising from market, credit and operational risk, the contribution of NII and NNII remains strongly more positive leading to an increase in capital from the transfer of retained earnings, after being subject to the corporate tax rate of 35% and the assumed dividend pay-out ratio of 30%. The Tier 1 capital ratio of core domestic banks increases by 4.14 percentage points from 20.95% to 25.09%, while that of non-core domestic banks increases by 2.47 percentage points from 20.36% to 22.83%.

Conversely, Charts 3.4 and 3.5 show the resulting relative contributions to banks' Tier 1 capital ratio under the adverse scenario. Elevated inflation and market expectations for a delay in lowering of short-term interest rates give rise to elevated costs and higher insolvencies across households and NFCs. Both of these elements are visible in the less positive contribution of NII and NNII, as well as the larger provisioning needs captured under credit risk and the increase in RWAs, when compared to the baseline results. Indeed, provisions for credit risk offset almost half of the positive impact of NII and NNII, given that, under the prolonged inflationary pressures and high





interest rate environment, the share of Stage 2 and Stage 3 loans increase by 8.7 percentage points to reach 17.7%, 6.0 percentage points higher than the baseline. Interest expense is assumed to increase at a faster rate than interest income due to higher rates and pass through rates charged on deposits leading to a higher cost of funding. This higher cost also arises from the rolling over of maturing bond instruments issued by the banks at a higher rate. Moreover, the parts of the test horizon that include increase in interest rates, affect profits negatively in case of the unrealised revaluation losses on fair value instruments, and positively from higher coupon earnings on floating rate bonds or maturing bonds that are rolled over. Under this scenario, higher operational risk costs, as well as non-interest income expenses are assumed. The Tier 1 capital ratio for core domestic banks falls by 1.50 percentage points to reach 19.45%, while that of non-core domestic banks falls by 1.67 percentage points to reach 18.69%.

The results that are quantified via the MST framework, are benchmarked against banks' supervisory and regulatory capital requirements, so as to determine the extent of erosion in banks' management buffers. In cases where the management buffer is insufficient, banks will be constrained to dip into their combined buffer requirements (CBR) which trigger dividend restrictions. The test assumes that banks do not enjoy any deferred tax assets, and dividend payouts can only take place for banks having positive profits.

Under the baseline, the Tier 1 capital ratio is benchmarked against the overall capital requirement (OCR) which consists of a common 6% Pillar 1 requirement, an institution-specific Pillar 2 requirement and the combined buffers, including the fully phased-in [sSyRB](#), but excludes the Pillar 2 Guidance. Under the adverse scenario, the results are also benchmarked against the total SREP capital requirement (TSCR) with a similar composition as the OCR except for the exclusion of the combined buffers. At the individual bank level, all the core domestic banks surpass the respective capital requirement thresholds under both the baseline and the adverse scenarios. All the non-core domestic banks surpass the respective capital requirement thresholds under both scenarios, with the exception of one which initiated the test with a loss.

## 3.2 Liquidity stress tests

This section presents the findings of three complementary frameworks stress testing the liquidity position of banks. The first is the PDW framework which shocks the liquidity position of banks against a bank-run type scenario over a survival period of four weeks. This framework has been enhanced to include a liquidity-to-solvency dimension whereby the impact of the bank-run translates also into an impact on capital. The second framework is based on the LCR and entails a baseline and three adverse scenarios simulating high outflows during its 30-day horizon while the third framework is based on the NSFR framework and assesses four adverse scenarios affecting longer-term liquidity.

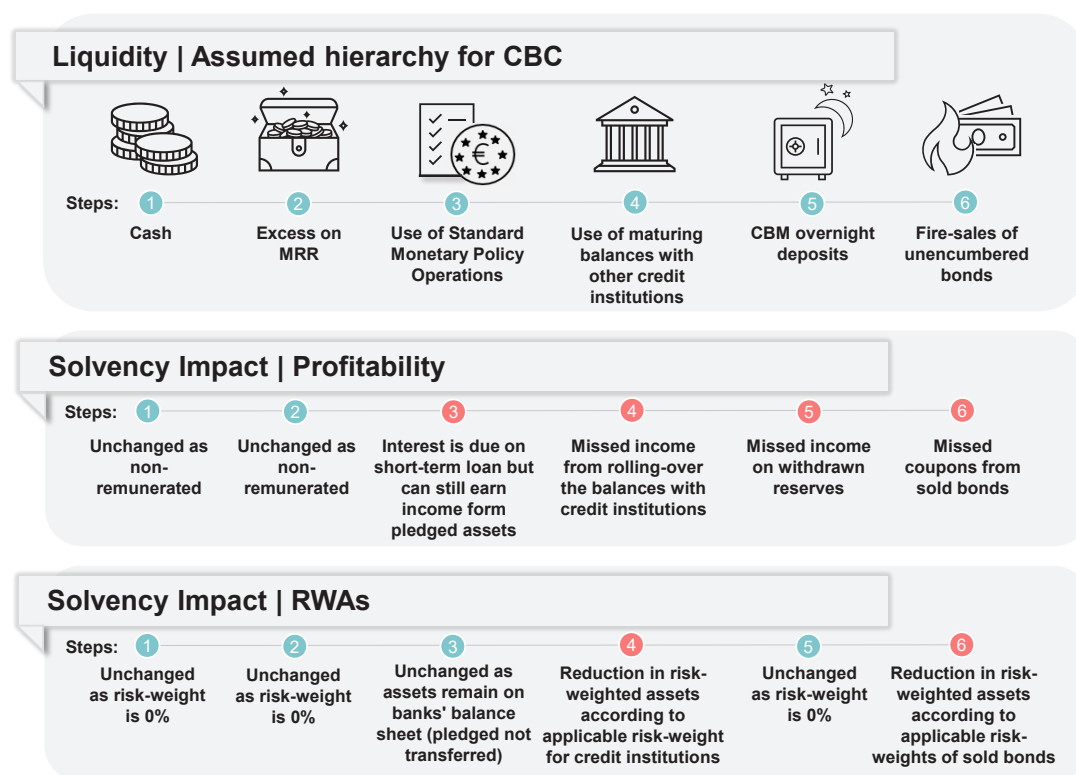
### 3.2.1 PDW framework

#### *Interaction between liquidity and solvency*

The PDW framework has been revised to incorporate a solvency impact arising from the assumed deposit withdrawals. Should the assumed outflows exceed the banks' CBC, not only does a bank become illiquid but also experiences a shortfall that would need to be met directly through capital. Moreover, depending on the banks' strategy for liquidating assets, banks could incur reduced profitability from forgoing any income generated from liquidated assets, and a change in RWAs from off-loading certain asset classes. Under such a scenario, the balance sheet composition would be severely affected, starting with a run-off of liabilities commensurate with the deposit outflows and a potentially larger offloading of assets to generate the necessary CBC. Based on these considerations, Figure 3.2 presents an assumed hierarchy for the composition of CBC giving preference to the least costly options to generate CBC before liquidating the next class of assets. The figure also highlights in red the asset classes which have a solvency impact from either profitability or RWAs.



**Figure 3.2**  
**INTERACTION BETWEEN LIQUIDITY AND SOLVENCY**



Source: Central Bank of Malta.

At the top of the hierarchy is cash, followed closely by any excess on the MRR, as these are both non-remunerated and have a 0% risk-weight for calculating capital requirements, thereby allowing banks to seamlessly meet outflows without repercussions in terms of profitability and capital.

Ranking third is the option for banks to pledge any eligible and unencumbered assets as collateral to obtain short-term liquidity from Eurosystem of Central Banks (ESCB) standard monetary policy operations.<sup>6</sup> Banks can opt for one-week loans under the MRO, three-month loans under the longer-term refinancing operations known as LTROs or specialised liquidity assistance under targeted long term refinancing operations known as TLTROs. Given the four-week test horizon, it is assumed that banks opt for the MRO and that the underlying collateral retains its value and eligibility thereby allowing banks to request MRO at the beginning of each week for as long as necessary. Banks would incur a cost for availing themselves of these short-term loans at the applicable rate for MRO but would otherwise be able to earn any income generated by pledged assets and would not incur any change in capital requirements as the collateral itself is not transferred but pledged, thereby remaining “on-balance sheet”.

Fourth on the hierarchy is the use of any balances with other credit institutions that are due to mature within the month. Such balances would be returned to banks and could be used to offset the outflow of deposits. In such cases, banks would forgo any interest that could be earned should such funds be placed back with other credit institutions. Moreover, since balances with credit institutions have a non-zero risk weight, overall RWAs would decrease resulting in an off-setting impact in terms of capital requirements.

<sup>6</sup> Securities pledged are subject to liquidity haircuts which are regularly updated in line with revisions to the ECB framework. Only banks that are a signatory to the Central Bank of Malta [Directive No. 8](#) can make use of these operations. Eligible debt securities refer to any marketable assets held by banks which, as at the reference date, are included in the [database of eligible assets](#) for Eurosystem monetary operations.

However, such off-setting impact is only positive in isolation, given that in the broader context of the bank-run, the balance sheet structure is being severely impacted and banks need to rebuild and tackle any mismatches arising between the remaining longer-term liabilities and residual assets.

Next on the hierarchy is the remaining Central Bank placements that are held in the overnight deposit facility. These placements are treated separately from the MRR in point 2 as these instruments are remunerated at the DFR. Utilising these placements would be rather costly for banks as they would be depleting the major contributor to the increased profitability observed for 2023. Similar to cash, these placements have a 0% risk weight and would not affect the capital requirements. However, their use would strongly affect their NII.

Finally, should banks run out of the considered assets, they may sell any remaining ineligible and unencumbered bonds on the market at fire-sale prices to generate additional CBC from the proceeds.<sup>7</sup> Upon resorting to this option, sold bonds no longer generate income and RWAs would decrease. As outlined in [Box 4 of the 2022 FSR](#), IFRS 9 defines the business models as *hold to collect*, *hold to collect and sell* and, *other* in line with the intention for acquiring bonds. On the basis of these definitions, it is assumed that banks first off-load their fair value bonds before selling bonds accounted for at AMC as sales for the latter asset class is subject to prescribed restrictions.

The following subsection investigates the composition of CBC for the three bank categories on the basis of the assumed hierarchy and liquid assets available in December 2023.

#### *Composition of CBC – An assessment of available liquid assets*

As of December 2023, all three bank categories continued to maintain high liquidity buffers. As a share of total assets, liquid assets as considered in the CBC hierarchy amount to 42% for core domestic banks and international banks and 33% for non-core domestic banks. Table 3.2 lists the assets identified in the hierarchy for the composition of CBC, expressed as a share of total CBC.

**Table 3.2**  
**COMPOSITION OF CBC FOR EACH BANK CATEGORY**

Hierarchy	Description	Core domestic banks	Non-core domestic banks	International banks
Step 1	Cash	2%	0%	0%
Step 2	Excess on MRR	0%	2%	14%
Step 3	Maximum MRO loan size	44%	14%	0%
Step 4	Maturing balances with credit institutions	17%	12%	23%
Step 5	Overnight deposits	30%	63%	63%
Step 6	Maximum proceeds from fire-sales	7%	9%	0%
	<b>Total CBC as share of Total Assets</b>	<b>42%</b>	<b>33%</b>	<b>42%</b>

Source: Central Bank of Malta.

Placements in the overnight deposit facility are a major share of banks' liquid assets, especially for non-core domestic and international banks. For core domestic banks, the major contributor to shore up CBC in times of need would be to pledge bonds for MRO short-term financing under standard monetary policy operations, given their high share of unencumbered and eligible bonds. The other liquid assets contribute to further strengthen the CBC, particularly maturing balances with credit institutions in the case of international banks and to a lesser extent for non-core domestic banks that can also resort to MRO financing.

<sup>7</sup> Fire sale prices have been calibrated on the basis of the market prices observed during the 2008 financial crisis and assessed for severity against those applied by the Single Supervisory Mechanism in the [2019 Liquidity Stress Test \(LiST\)](#).

Bank's holdings of bonds play a crucial role in the composition of CBC. With respect to the assumed hierarchy for establishing the CBC as shown in Figure 3.2, bonds can contribute either via step 3 as pledged collateral in standard monetary policy operations or via step 6 via proceeds from sale. However, restrictions apply with a requirement in either option for the bonds to be free from any encumbrance, i.e. without any legal claims from third parties. Moreover, bonds need to satisfy the ECB requirements in order to be eligible for standard monetary policy operations under step 3.<sup>8</sup> If these requirements are not satisfied, then CBC is raised via the proceeds of sales of unencumbered and ineligible bonds under step 6. The following subsection presents the main characteristics of the bank categories' bond portfolio for December 2023.

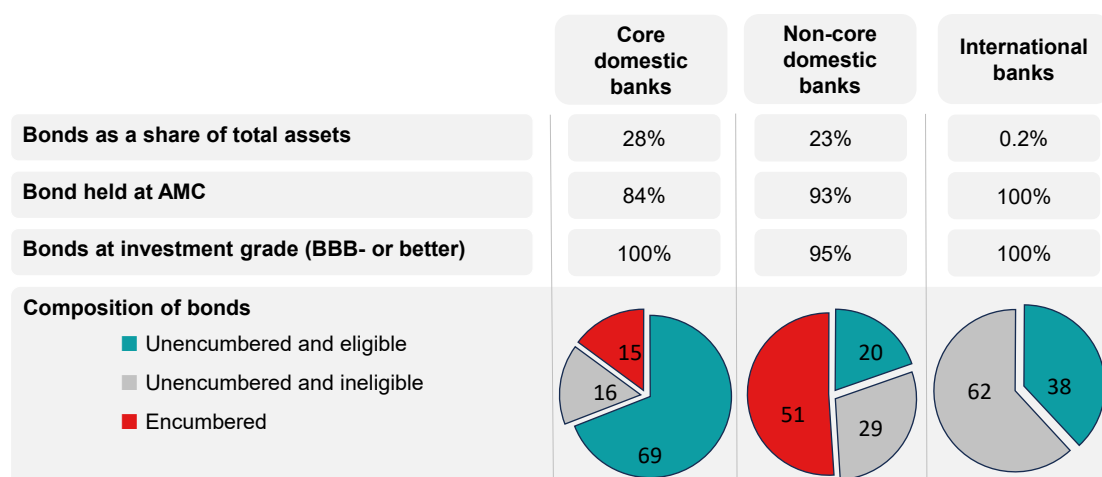
### Overview of bond portfolio

Figure 3.3 summarises the main characteristics of each bank category's bond portfolio which amounts to 28%, 23% and 0.2% of the respective total assets.

In line with recent trends, the share of bonds held at AMC continued to increase to 84% up from 70% for core domestic banks, 93% from 92% for non-core domestic banks and 100% from 54% for international banks. This preference reflects the alignment of banks' to IFRS 9 *hold to collect contractual cashflows* business model, under which bonds are acquired with the intention to be held until maturity and to earn any cashflows generated during the lifetime of the bond. These bonds are valued at amortised cost and are insulated from revaluation risk.

Banks continue to prefer to hold highly rated bonds with the share of bonds at investment grade from total investment portfolio being 95% for non-core domestic banks and 100% for both core domestic banks and international banks.

**Figure 3.3**  
**ASSESSMENT OF THE BOND PORTFOLIO**



Source: Central Bank of Malta.

<sup>8</sup> The ECB publishes on its website an updated list with [all eligible marketable assets](#).

In order to be used for CBC, bonds must be free from any active encumbrance, such as already being pledged for standard monetary policy operations or engaged in repurchase agreements. In December 2023, encumbered bonds represent 15% and 51% of bonds held by core and non-core domestic banks. Thus, core and non-core domestic banks may actively use 85% and 49% of bonds which are unencumbered. At the individual bank level, one core and three non-core domestic banks have a share of encumbered bonds exceeding 70%, with an additional 2 banks (one from each category) having a share of encumbered bonds exceeding 25%. A high share of encumbered bonds prevents banks from obtaining MRO and forces banks to go down further into the hierarchy of liquid assets and resort to scarcer and more costly options for raising liquidity in a timely manner.

As per the hierarchy, banks are assumed to first use their unencumbered bonds to obtain funding from the ESCB. As a share of total bonds, 69% of core and 20% of non-core domestic bonds are unencumbered and eligible for ESCB standard monetary policy operations. As at December 2023, the haircuts applied by the ECB on each instrument on the list of all eligible bonds ranged between -0.5% up to -47.1%, but due to the high rating of bonds held by core and non-core domestic banks, the weighted average haircut applicable to their eligible bonds is low at -3.5% and -4.1%, respectively.

The remaining bonds represent those which are unencumbered but ineligible and amount to 16% and 29% of total bond holdings. Under the assumptions of the test, these are assumed to be sold at fire-sale prices by applying haircuts that can range between 1% and 100%, depending on the rating of the bond and the sector of economic activity of the issuer.<sup>9</sup> The weighted average fire-sale haircut applicable to unencumbered but ineligible bonds held by core and non-core domestic banks amounts to -26% and -41%, respectively while only a few banks having instruments that attract a 100% haircut.

Combined, the CBC raised from bonds amounts to 23%, 8% and 0.1% of each bank category's total assets.

### *Bank-run scenario*

The bank-run scenario adopted in the PDW framework targets each bank individually and requires them to withstand the assumed outflows on their own. Thus, it features an instantaneous 100% withdrawal of all credit lines and deposits with parent/subsidiaries as well as other credit institutions. It then assumes a steady and regular outflow from sight deposits and fixed term deposits maturing within the test horizon. In general, the PDW framework assumes a run-off of 10% of sight deposits and 25% of fixed term deposits maturing within the test horizon. The framework has now been enhanced with data that distinguishes the volume of deposits held on ODPs from retail deposits allowing for specific shocks targeting these deposits. Drawing from the financial turmoil observed in early 2023, it is assumed that clients using ODPs would have more direct access to their funds and thus a higher run-off rate of 30% is applied over the four-week period.

The following subsection assesses the composition of deposits and possible outflows that banks could experience in a bank-run scenario.

<sup>9</sup> The fire-sale rates have been calibrated on the basis of the market prices observed during the 2008 financial crisis adopted in the IMF's 2014 Financial Sector Assessment Programme for Austria. For more details refer to [Box 2 of the FSR 2015](#).

### Assessment of deposits

Table 3.3 shows to composition of deposits by sector as a share of total funding.

In the case of core domestic banks, household deposits represent the major share of total funding, at 65%. Adding deposits from NFCs and Financial Institutions to those of Households would comprise 87% of total funding. In the case of non-core domestic and international banks, household deposits represent a smaller share of funding at 38% and 37%, respectively. The majority of these deposits are however sourced via ODPs which, although originating from within the eurozone, are assumed to be relatively more volatile. Moreover, at 40% of the respective funding, these two bank categories have a higher share of deposits from financial institutions. Thus, the PDW scenario merits broadening its scope to assess any weaknesses of banks attributed to these factors by including higher withdrawal rates from deposits placed via ODPs, as these are deemed to be more easily accessible, and deposits placed by financials.

**Table 3.3**  
**SECTORAL DEPOSITS AS A SHARE OF TOTAL FUNDING FOR EACH BANK CATEGORY**

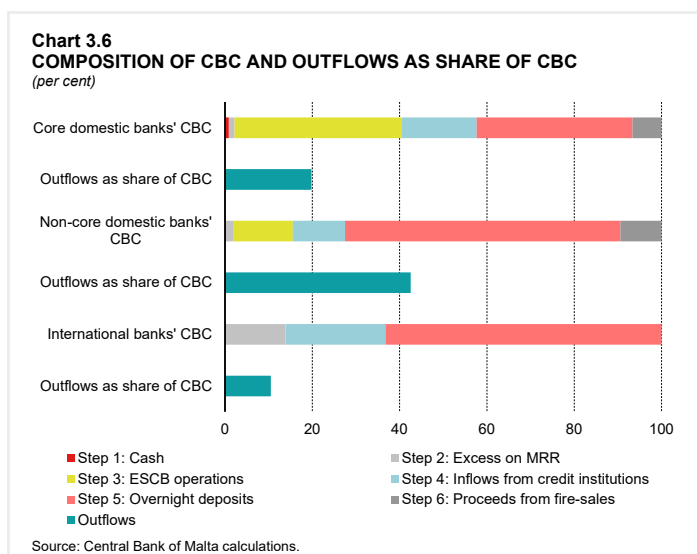
Description	Core domestic banks	Non-core domestic banks	International banks
Total deposits	91%	88%	82%
Household deposits (total)	65%	38%	37%
Household deposits via ODPs	1%	36%	37%
NFCs	13%	10%	5%
Financial institutions	8%	40%	40%
Households and NFCs	79%	48%	43%
Households, NFCs and Financial Institutions	87%	88%	82%

Source: Central Bank of Malta.

### Results

Chart 3.6 shows the share of total outflows to CBC available for each bank category. The combined outflows of the bank-run scenario for December 2023 amount to 20%, 41% and 5% of CBC available to the respective category of banks.

Based on this scenario, core domestic banks would need to use cash, excess on the MRR and MRO financing (up to step 3 from the hierarchy), non-core domestic banks would dip further into overnight deposits (step 5) while international banks would draw on excess on MRR (step 2). Towards the end of the four-week



test horizon, the respective bank categories would have depleted 20%, 43% and 11% of their CBC. This means that at the aggregate, bank categories have a further 80%, 57% and 89% of their CBC available at the end of the test allowing them to potentially withstand further withdrawals beyond the envisaged horizon.

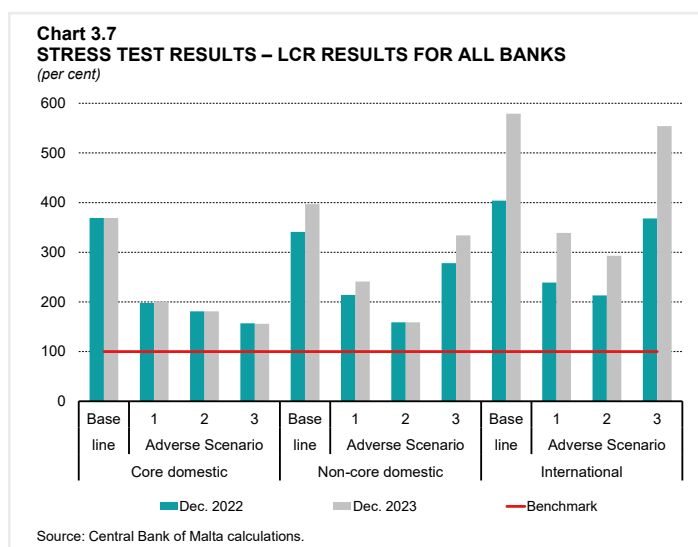
At the individual bank level, two non-core domestic banks would run out of liquidity as the assumed scenario depletes completely their CBC. This would result in a shortfall that would translate into a direct impact on capital. Moreover, as explained above, this could result in a further impact from reduced profits and adjustment of RWAs. For these two affected non-core domestic banks, their aggregate Tier 1 capital ratio would drop by 5.38 percentage points due to this shortfall. The capital would deplete further by 0.92 percentage point when accounting for the impact of profits, and would adjust upwards by 0.30 percentage point when considering the impact of RWAs to reach an overall impact of 6.01 percentage points in total. The remaining banks would have between 30% and 93% of their original CBC still available at the end of the bank-run scenario, allowing them to withstand further withdrawals beyond the four-week horizon.

### 3.2.2 LCR framework

This framework evaluates banks' capacity to withstand periods of increased liquidity pressures assessed against the 100% minimum requirement for the LCR. The LCR is defined as the ratio of the buffer of HQLA to net liquidity outflows occurring over a 30-day horizon. The baseline scenario considers the haircuts for HQLA and inflow/outflow rates set out in the European Commission (EC) Delegated Regulation (EU) 2015/61. Adverse Scenario 1 targets higher outflows from those prescribed in the Regulation, while Adverse Scenario 2 builds upon it by pairing the higher outflows with withdrawals from term deposits fixed for a term exceeding the LCR's 30-day horizon. Adverse Scenario 3 reverts to the baseline and additionally assumes the full withdrawal of committed facilities. Under all scenarios, the HQLA buffer and inflows remain constant.

Table 3.4 provides a summary of all the scenarios considered in the LCR framework.

As at December 2023, the LCR for core domestic banks stood at 369% down from 380% compared to a year earlier, while non-core domestic and international banks report an increase from 340% to 397% and 403% to 579%, respectively. The increase in LCR for the latter two categories stems primarily from a higher volume of HQLA. Chart 3.7 presents the results of



**Table 3.4**

**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.



the LCR framework for the three bank categories under the assumed scenarios for December 2023 and December 2022.

Under Adverse Scenario 1, the LCR declines by 168, 156, and 240 percentage points, to reach 200%, 241% and 338% for core domestic banks, non-core domestic banks and international banks, respectively. All three bank categories show a reliance on short-term funding due to the dip in the ratio under Adverse Scenario 1 which targets higher outflow rates for instruments within the 30-day time horizon. These outflows represent higher withdrawals which are driven mainly by retail deposits for core domestic banks, operational deposits for non-core domestic banks and non-operational deposits for international banks, representing 63%, 42% and 66% of the total volume of outflows, respectively.

Under Adverse Scenario 2, which combines withdrawals from resident and non-resident time deposits fixed for a term exceeding 30 days, the LCR dips further by a total of 188, 238, and 287 percentage points, to reach 181%, 159% and 292% for the respective bank categories.

Under Adverse Scenario 3, the LCR reaches 156%, 334% and 553% for core domestic banks, non-core domestic banks and international banks, dropping by 213, 63 and 26 percentage points, respectively. The results reflect the biggest impact on core domestic banks given their higher share of committed facilities, which represent 14.5% of total outflows in this scenario, while for non-core banks and international banks the withdrawal of all commitments represent only 5.7% and 1.4% of the respective outflows. Similar results are obtained under the NSFR's Adverse Scenario 4.

At an individual level, some banks would not be able to surpass the 100% requirement under at least one of the adverse scenarios, but this is mainly due the severity to the shocks applied to assess systemic risk. Should such a scenario materialise, the Regulation allows banks to temporarily operate below this requirement.

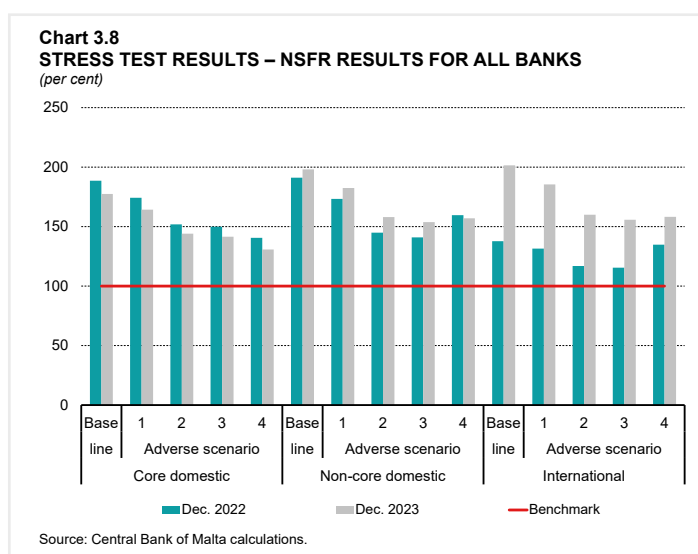
### 3.2.3 NSFR framework

This framework aims to ensure that banks have a sustainable liquidity position over a longer time-horizon. It is based on the NSFR which is defined as the ratio of the Available Stable Funding to Required Stable Funding and must exceed the regulatory minimum of 100%. Regulation (EU) 2019/876 prescribes the factors to be applied to capital and liabilities to compose the ASF that will remain with the institutions for more than one year, as well as the factors to be applied to assets and off-balance sheet exposures to compose the RSF. The framework, which was introduced in the FSR 2021 is based on a baseline and four adverse scenarios.

The baseline scenario adopts the ASF and RSF factors as set in the regulation and serves also to monitor the NSFR as reported by banks. The four adverse scenarios are composed of different assumptions and components of the banks' ASF and RSF.

Table 3.5 contains a summary of all the scenarios considered in the NSFR framework.

Chart 3.8 shows the results of the NSFR framework for the three bank categories under the baseline and four adverse scenarios as at December 2022 and 2023. Core



**Table 3.5**  
**DESCRIPTION OF NSFR FRAMEWORK'S BASELINE AND ADVERSE SCENARIOS**

Scenario	Description
Baseline	ASF and RSF factors as prescribed by Regulation (EU) 2019/876
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 becoming 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.

domestic banks reported a decrease in their NSFR from 187% a year earlier, to 177% in December 2023, while that of non-core domestic banks and international banks increased from 191% to 198%, and from 137% to 202%, respectively.

The first three adverse scenarios build on each other, with Adverse Scenario 3 yielding the largest impact in December 2023 for all banks across the three categories due to the combination of shocks, particularly due to the increase in NPLs assumed in Adverse Scenario 2. Indeed, the results under Adverse Scenario 3 are only 2 to 4 percentage points lower than those for Adverse Scenario 2, with the NSFR dropping to 142%, 154% and 156% for the respective bank category.

Under Adverse Scenario 4, a full withdrawal of commitments is assumed over and above the baseline scenario. In this case, the NSFR for core domestic banks, non-core domestic banks and international banks would reduce to 131%, 157% and 158%, respectively. The stronger impact from the full withdrawal of commitments can also be noticed for core domestic banks from the results of the LCR framework under Adverse Scenario 3.

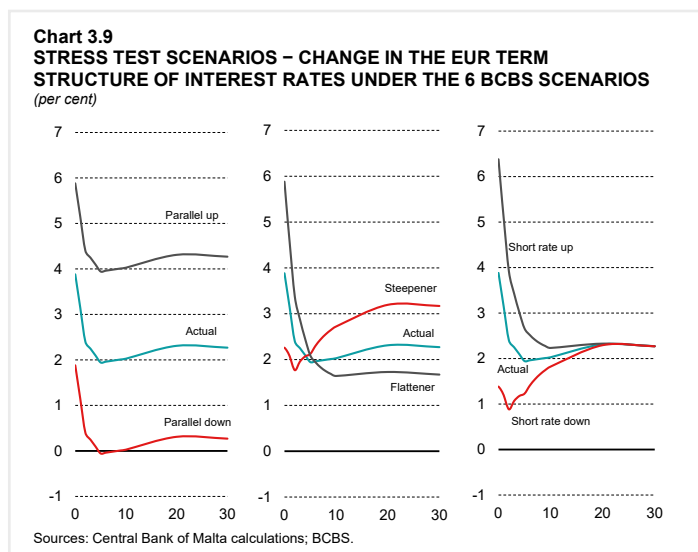
Overall, the divergence in results obtained under the NSFR adverse scenarios between December 2022 and 2023 is mainly attributed to the changes in the volume of ASF and RSF affecting the initial NSFR as reported by banks rather than the impact of the scenarios themselves. Indeed, there are only marginal variations between the impact of each scenario at the two reference dates, indicating a rather stable incremental need for RSF under the scenarios. The only exception is for the results of Adverse Scenario 4 for non-core domestic banks due to an increase in the volume of committed facilities which has more than doubled compared to the previous year, thereby adding higher needs for RSF under this scenario.

At an individual bank level, all banks are operating with excess liquidity and manage to retain an NSFR with ample margin above the 100% minimum requirement in all adverse scenarios.

### 3.3 Interest rate risk in the banking book

The IRRBB framework analyses the impact stemming from changes in the yield curve on the banks' business model. The framework assesses the immediate impact of increases in interest rates to profitability via the NII and the revaluation of bonds held by banks measured at fair value, from different shocks to the yield curve depending on its shape.

To retain a comprehensive outlook on all possible changes to the yield curve, reference is made to all six scenarios prescribed in [Annex 2](#) of the 2016 Basel Committee on Banking Supervision (BCBS) standards. These scenarios consist of a *parallel shift upwards* and *downwards* of the yield curve as at the reference date, an *increase* and a *decrease in the short rate* end of the curve and two composite shifts in the short and long-term rates referred to as the *steepener* and *flattener* scenarios. All six scenarios affect the term structure of the yield curve and differ in terms of the currency in which the instruments are denominated. The exercise focuses only on EUR, GBP and USD as the material currencies in which the banking book is denominated, the latter two being the most relevant non-EUR currencies for all three banking categories. Indeed, 99%, 98% and 88% of the banking book of core domestic, non-core domestic banks and international banks is denominated in these three currencies, with EUR being the most relevant currency representing 95%, 78% and 79% of the banking book of these three bank categories, respectively. Chart 3.9 shows the shift in the EUR term structure under the six different tested scenarios as at December 2023. The GBP and USD yield curves would experience similar shifts under the respective scenarios.



By design, the test assesses the impact of interest rate risk over a one-year horizon. A static balance sheet approach is considered whereby maturing instruments are rolled over with similar instruments having similar characteristics but at the prevailing yield, while no impact is assumed on demand for credit or deterioration in asset quality from higher debt servicing costs via additional NPLs, thus maintaining consistency in the loan portfolio composition. To note that the IRRBB framework applies the interest rate changes directly to the interest-bearing loans and deposits' reference rate. For most banks, the reference rate on loans is determined internally, i.e. a base rate as a margin over the deposit rates, while some rates, especially for NFC loans, are linked with the market rates. Nonetheless, pass through of policy rates in MT is quite limited, thus despite the increases in the ECB's key interest rates since July 2022, interest rates charged and earned on deposits and loans respectively remained rather consistent.

Table 3.6 presents the impact on the three bank categories' Tier 1 capital ratios from changes in NII and bond revaluations under the three scenarios, after applying the corporate tax rate of 35% on banks' profits.<sup>1</sup>

Based on the balance sheet composition in December 2023, the respective bank categories are reducing their holdings of bonds at fair value to 17%, 8% and 0% from 30%, 8% and 46% in December 2022. Indeed, international banks do not register any revaluation changes as they do not hold any bonds at fair value.

The scenarios featuring short-term increases in interest rates, namely: parallel up, flattener and short rate up, yield positive results for all three bank categories. The most positive impact is experienced under the short rate up scenario under which the Tier 1 capital ratio increases by +2.81 and +1.67 percentage points for core and non-core domestic banks under the short rate up, respectively and by +2.56 percentage points for international banks under the parallel up scenario. Conversely, the scenarios featuring drops in

interest rates, namely: parallel down, steepener and short rate down, yield negative results for all three bank categories. The most negative impact is experienced under the short rate down scenario under which the Tier 1 capital ratio decreases by -2.81 and -1.67 percentage points for core and non-core domestic banks under the short rate down, respectively and by -2.56 percentage points for international banks under the parallel down scenario.

<sup>1</sup> Banks may apply a lower tax rate if in previous years they have accumulated deferred tax assets; however, for the scope of this stress test, deferred tax assets are not being considered. Revaluations for FVOCI are not subject to taxes but charged directly to capital.

**Table 3.6**  
**STRESS TEST RESULTS – IRRBB FRAMEWORK – RELATIVE IMPACT OF**  
**CHANGES IN INTEREST RATES ON THE TIER 1 CAPITAL RATIO**  
*(per cent)*

		Core domestic	Non-core domestic	International banks
	Initial Tier 1 capital ratio	20.95	20.36	38.23
Parallel up	<i>NII</i>	2.49	1.59	1.92
	<i>Revaluations</i>	-0.50	-0.44	0.00
	Post-shock Tier 1 capital ratio	22.93	21.50	40.14
Parallel down	<i>NII</i>	-1.99	-1.58	-1.76
	<i>Revaluations</i>	0.59	0.73	0.00
	Post-shock Tier 1 capital ratio	19.55	19.50	36.46
Flattener	<i>NII</i>	2.35	1.39	1.82
	<i>Revaluations</i>	-0.09	0.09	0.00
	Post-shock Tier 1 capital ratio	23.21	21.83	40.04
Steeper	<i>NII</i>	-1.51	-1.13	-1.36
	<i>Revaluations</i>	0.02	-0.15	0.00
	Post-shock Tier 1 capital ratio	19.46	19.08	36.87
Short rate up	<i>NII</i>	2.95	1.74	2.28
	<i>Revaluations</i>	-0.24	-0.08	0.00
	Post-shock Tier 1 capital ratio	23.65	22.01	40.50
Short rate down	<i>NII</i>	-2.34	-1.76	-2.10
	<i>Revaluations</i>	0.27	0.09	0.00
	Post-shock Tier 1 capital ratio	18.88	18.69	36.13

Source: Central Bank of Malta calculations.

short-term interest rates yield a negative impact on NII. The least positive impact is experienced under the short rate down scenario, where the Tier 1 capital ratio drops by -2.15, -1.68 and -2.36 percentage points for the respective category of banks.