BOX 3: MEASURING THE COST OF EQUITY OF MALTESE BANKS[1]

Introduction

The CoE reflects the return that shareholders require to hold a bank's equity. From a financial stability perspective, a persistently elevated CoE may increase the cost of raising capital. This can potentially constrain banks' capacity to expand lending or rebuild capital buffers following periods of stress. However, the CoE is not directly observable, and its estimation is particularly challenging in Malta's small and relatively illiquid equity market.

This box presents market-based CoE estimates for domestic banks listed on the Malta Stock Exchange (MSE) using a range of capital asset pricing models (CAPMs). The analysis considers three listed core-banks and one non-core bank. It then examines the relationship between these estimates and bank-specific characteristics, including asset quality, capitalisation, funding structure and bank size, to derive indicative CoE measures for other non-listed domestic banks. Since the CoE of banks is not directly observable, the resulting measures are sensitive to the model specification adopted. Hence, the results presented should be interpreted as indicative model-based estimates rather than as precise measure of banks' actual required ROE.

Market-based cost of equity estimates

The market-based analysis uses monthly equity returns for listed core and non-core banks from January 2018 to May 2026. Estimating the CoE of Maltese banks is particularly challenging owing to the small and less liquid domestic equity market, in which individual bank share prices may not always closely reflect broader market developments. Hence, changes in share prices do not always reflect closely with broader market developments, making estimates based on any single model potentially unreliable. To address this limitation, the analysis considers several alternative capital asset pricing approaches rather than relying on one model.

Capital asset-pricing frameworks

The starting point of this analysis is the standard CAPM, estimated from excess bank returns:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ is the monthly ROE of bank i, $R_{m,t}$ is the market return and $R_{f,t}$ is the risk-free rate. The estimated beta measures the sensitivity of the bank's equity return to market movements.

The corresponding CoE is constructed as:

$$k_{i,t} = R_{f,t} + CRP_{(MT,t)} + \beta_{i,t} \times ERP \quad (2)$$

where $k_{i,t}$ denotes the estimated CoE, $R_{f,t}$ is proxied by the German Bund ten-year yield and $CRP_{(MT,t)}$ is Malta's country-risk premium measured using the Malta–Germany sovereign yield spread. The ERP denotes Malta's mature-market equity risk premium (ERP), derived according to Damodaran (2013).[2] This decomposition allows the headline estimate to vary with the risk-free rate, country risk (as measured by the sovereign yield spread) and the bank's exposure to systematic equity-market risk.

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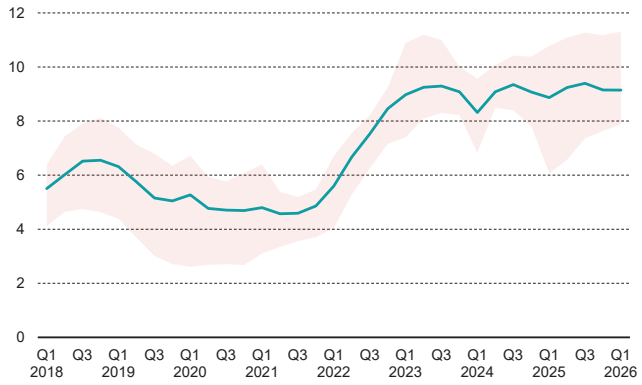
[2] Damodaran, Aswath (2013), "Equity risk premiums (ERP): Determinants, estimation and implications — the 2012 edition."*In Managing and measuring risk: Emerging global standards and regulations after the financial crisis*, pp. 343–455, World Scientific.

After estimating the baseline CAPM, a range of alternative CAPMs are estimated separately for each bank to allow for time variation in market sensitivity, additional sources of systematic risk and to cater for banks' different business models. These include rolling and shrunk rolling CAPM models, Constant Conditional Correlation and Dynamic Conditional Correlation (DCC) models, as well as richer Fama–French (1993) and sovereign-credit specifications.[3] Each model is then evaluated for each bank based on statistical performance, economic plausibility and stability.[4] The three highest-ranked models for each bank are then combined to obtain a more robust headline estimate. This approach follows the principle that there is considerable volatility surrounding any individual estimate of the CoE.

Chart 3a
MARKET-BASED AVERAGE CoE ESTIMATES
(percentage)



Source: Central Bank of Malta calculations.
Notes: The series represents the average of the three highest CoE estimates implied by the various asset-pricing models for each selected banks. The shaded region represents the minimum-to-maximum range of these three bank-level models across the selected banks.

Across banks and time, the resulting estimates based on the three best performing models per bank, range from approximately 4% to 9% (see Chart 3a). More recently, CoE has increased across listed banks, reaching an average of around 9% by March 2026, above the respective historical averages. These developments appear to be largely driven primarily by changes in the risk-free rate and the market risk premium. During 2019–2021, declining risk-free rates and lower estimated market betas contributed to lower required returns. The sharp increase during 2022–2023 is mainly associated with higher risk-free rates amid rising inflation expectations and tighter monetary conditions in key advanced economies. Overall, the results indicate that interest-rate developments are particularly important in driving the initial post-2022 increase in CoE, while greater estimated exposure to systematic equity-market risk subsequently helped sustain model-implied elevated required returns. During 2024–2025, for example, higher estimated market betas partly offset the downward impact of declining risk-free rates and country-risk premia.

Extending the analysis to unlisted banks

Following Altavilla et al. (2021), the analysis is extended to three unlisted banks because the absence of share-price data prevents direct market-based estimation.[5] However, their CoE remains relevant for loan pricing and shareholders' required returns. Regressing listed banks' estimates on their fundamentals provides a basis for inferring this otherwise unobservable funding cost for unlisted banks. In Malta, unlisted banks operate within both the core and non-core domestic

[3] Fama, Eugene F. and Kenneth R. French (1993), "Common risk factors in the returns on stocks and bonds."*Journal of Financial Economics*, 33, pp. 3–56.

[4] Model selection follows a four-step procedure. First, specifications are screened for economic plausibility, requiring an economically meaningful market beta and limited incidence of CoE floor binding. Second, model stability is assessed based on the stability of parameter estimates. For DCC models, conditional-correlation dynamics are considered. Third, eligible models are ranked according to the correlation between realised and fitted bank returns, with higher correlations indicating better statistical fit. Finally, the three highest-ranked specifications are retained for each bank. The headline CoE is calculated as their equal-weighted average.

[5] Altavilla, Carlo, Paul Bochmann, Jeroen De Ryck, Ana-Maria Dumitru, Maciej Grodzicki, Heinrich Kick, Cecilia Melo Fernandes, Jonas Mosthaf, Charles O'Donnell, and Spyros Palligkinis (2021), "*Measuring the cost of equity of euro area banks.*" ECB Occasional Paper.

banking groups, but still play a role in credit provision and deposit-taking.[6] Their inclusion therefore provides a broader and more comprehensive assessment of the CoE underpinning domestic financial intermediation activities.

A comparison of customer deposits-to-non-interbank loan ratios helps to assess the similarity of the funding structures of both listed and unlisted banks. This comparison informs and supports the application of the fundamentals-CoE relationship estimated for listed banks to unlisted banks. Customer deposits are substantial when compared to non-interbank lending both for unlisted banks and listed banks. Over 2018Q1–2026Q1, the average customer deposits-to-non-interbank loans ratio of unlisted banks is 109.5%, compared with 144.3% for listed banks. Although the average ratio is lower for unlisted banks, the difference is not statistically significant.[7] These averages indicate that customer deposits exceed non-interbank loans on average for both listed and unlisted banks in the sample. This common feature provides further support for applying the fundamentals-CoE relationship estimated for listed banks to unlisted banks.

To extend the analysis to the unlisted domestic banks, the market-based estimates derived for listed banks are regressed against their fundamentals as shown in equation (3).

$$CoE_{i,t} = \alpha + \beta_1 NPL_{i,t} + \beta_2 CET1_{i,t} + \beta_3 (Deposits/Loans)_{i,t} + \beta_4 \ln(Assets)_{i,t} + \tau_t + \varepsilon_{i,t} \quad (3)$$

The dependent variable is the quarterly average of the top-three headline market-based cost of equity ($CoE_{i,t}$) for listed banks.[8] The explanatory variables capture asset quality (the NPL ratio), common equity tier 1 (CET1) ratio, funding structure (customer deposits relative to loans) and bank size (the logarithm of total assets). The specification also includes time fixed effects (τ_t) to capture common developments across banks.

Overall, the estimates identify asset quality and funding structure as the balance-sheet characteristics most clearly associated with banks' CoE. A higher NPL ratio is associated with a higher estimated CoE, consistent with investors requiring greater compensation when asset quality is weaker. Moreover, a higher customer-deposits-to-loans ratio is associated with a lower CoE, suggesting that a more deposit-based funding structure, which tends to be stable, may be viewed favourably by investors. The coefficient on the CET1 is negative, as expected, but is not statistically significant in the preferred specification, consistent with the range of results by Altavilla et al. (2021). Bank size enters positively and significantly in this baseline regression. However, given the small number of listed banks and the sensitivity of the results to the size measures used, the coefficient should be interpreted with caution. Bank size should be interpreted primarily as a control variable and should not be viewed as a structural determinant of the CoE.[9]

Model-implied estimates for unlisted banks broadly mirror the trend observed for listed banks, although asset quality and stable deposit funding help contain differences across institutions. Applying the coefficients reported in Table 3a to the balance-sheet characteristics of unlisted banks produces estimated costs of equity ranging from approximately 4% to 10% over the sample period

[6] See Central Bank of Malta, *Financial Stability Report 2025*, Chapter 2: "Developments in the banking sector".

[7] A two-sided t-test does not reject equal mean ratios for listed and unlisted banks at the 5% significance level so there is no strong evidence of difference between the groups ($p = 0.08$).

[8] This approach is inspired by the model-averaging framework of Altavilla et al. (2021). The authors average ten models including five factor models and five implied CoE models requiring analysts' earnings and profitability forecasts. Given the smaller set of factor models available for each bank, the headline CoE per bank is calculated as the equal-weighted average of the three highest-ranked eligible models.

[9] The results reported in the Table 3a are robust to alternative specifications of bank size, including the use of a relative-size measure based on banks' assets. Robustness checks also include retained earnings relative to loans and an extended 2014–2026 sample allowing for a structural break in 2018 due to a break in the data series. The extended specification retains the variables in the main model and additionally includes retained earnings relative to loans and ROA.

Table 3a
BANK-FUNDAMENTALS DETERMINANTS OF CoE

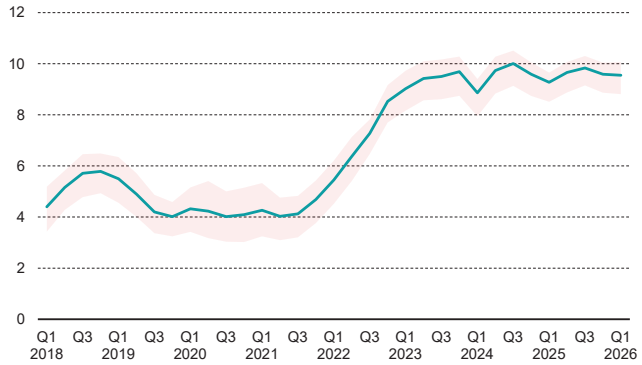
Percentage points

Economic group	Variable	Coefficient	Statistical significance
Asset quality	NPL ratio	+0.1030***	p < 0.01
Capitalisation	CET1 ratio	−0.0450	Not statistically significant
Funding structure	Customer deposits / loans	−0.0133***	p < 0.01
Bank size	Log assets	+1.2285***	p < 0.01

Source: Central Bank of Malta calculations.
Note: Pooled OLS with quarter fixed effects, 2018Q1–2026Q1; Driscoll–Kraay standard errors with four quarterly lags (to allow for heteroskedasticity, serial correlation and cross-sectional dependence);
*** denotes p < 0.01.

(see Chart 3b). The estimated cost of equity range for unlisted banks is broadly comparable to that of listed banks. This similarity may partly reflect the composition of the unlisted bank sample, which includes banks with business models broadly comparable to those of the studied listed banks. The average estimated CoE increased markedly during 2022-2023, reflecting the common upward trend observed for listed banks and captured by the time fixed effects in equation (3). Changes in bank fundamentals help explain differences across institutions. Declining NPL ratios generally exerted downward pressure during 2022–2024, while subsequent increases contributed positively for some banks. Changes in customer deposits relative to loans also moderated the estimated CoE in several periods, particularly towards the end of the sample. However, this contribution was not uniform across all banks. Capitalisation effects were generally smaller, while changes in bank size mostly contributed positively. Overall, these patterns are consistent with business models in which sound asset quality and substantial reliance on customer deposits may help to contain credit and refinancing risks. This moderated the estimated CoE for both listed and unlisted banks where the funding structure is broadly similar. Stronger CET1 ratios may provide an additional mitigating influence, although their contribution in the decompositions is generally smaller.

Chart 3b
UNLISTED BANKS: AVERAGE CoE ESTIMATES BASED ON BANK FUNDAMENTALS
(percentage)



Source: Central Bank of Malta calculations.
Notes: The series represents the average of the three highest CoE estimates implied by the various asset-pricing models for each selected banks. The shaded region shows the minimum-to-maximum range of the bank-level cost-of-equity average estimates.

Among listed banks, asset quality and funding composition are the main bank-specific contributors to year-on-year movements in the estimated CoE. Over 2019Q1–2026Q1, the NPL ratio accounts for 42.5% of average absolute contributions, followed by the customer deposits-to-loans ratio at 35.2%. Bank size and CET1 play smaller roles, accounting for 12.5% and 9.8%, respectively.

Among unlisted banks, changes in bank size and asset quality make the largest bank-specific contributions to year-on-year movements in the estimated CoE. Over the same period, log assets account for

35.4% of average absolute contributions, followed by the NPL ratio at 30.5%. The customer deposits-to-loans ratio contributes a further 21.9%, while CET1 accounts for the smallest share, at 12.2%.[10]

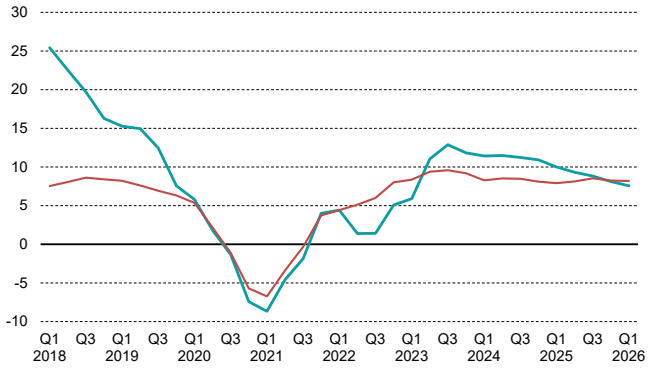
By 2026Q1, the increase moderated, with the average estimated CoE stabilising around 9% when all seven banks are weighted equally. This level falls within the range reported by many European banks. The EBA's June 2026 Risk Assessment Report indicates that approximately one-third of surveyed banks estimated their CoE at between 8% and 10%, while around 40% reported estimates between 10% and 12%.[11] The model-based estimate for Maltese banks therefore appears broadly comparable with European benchmarks, although differences in methodology, reference periods and bank characteristics make this comparison indicative.[12]

These results should not be interpreted as the actual CoE faced by unlisted banks. Rather, these represent model-implied estimates of the CoE on the assumption that unlisted banks would behave the same as listed banks, if such banks were publicly listed on the MSE. The estimates are therefore conditional on the model specification and should be interpreted with appropriate caution.

Bank profitability

For most banks in the sample, average profitability exceeded the estimated return required by shareholders, although the results varied across institutions and over time. Comparing each bank's ROE with its respective estimated CoE provides an indication of whether it generated returns sufficient to meet shareholders' required return.[13] Over 2018–2026, average ROE of approximately 8.02% exceeded the corresponding average CoE at 5.76% for the six core banks (see Chart 3c).[14] Five of the six core banks registered higher ROE than their respective CoE average over 2018–2026. Indeed, this does not imply that these banks maintained a positive gap throughout the period, as some experienced episodes in which ROE fell below their estimated CoE. Assessing the results at bank level therefore provides a more representative picture than comparing aggregate sample averages, which would be disproportionately affected by these negative observations.

Chart 3c
CORE BANKS: FUNDAMENTAL-BASED CoE VS PROFITABILITY
(percentage)



Source: Central Bank of Malta calculations.
Note: The sample contains the six Maltese core banks. Average RoE and CoE are calculated as asset-weighted averages of the corresponding bank-level measures.

Conclusion

Overall, the results point to a marked increase in Maltese banks' CoE after 2021, followed by stabilisation in early 2026. At the same time, the analysis emphasises that no single asset-pricing specification is sufficient to estimate the

[10] For each fundamental, the average size of its contribution to the year-on-year change in CoE across common time quarters and banks in each group is averaged, treating increases and decreases equally. This average is expressed as a percentage of the combined averages for all four fundamentals. Banks receive equal weight and the common time effect is excluded.
[11] European Banking Authority (2026), *Risk Assessment Report – June 2026*, Section 5, "Profitability".
[12] Only two banks are similar across this study's sample and the EBA report.
[13] ROE is calculated as the sum of quarterly profits over the latest four quarters divided by the simple average of total equity at the current quarter-end and the previous December year-end, multiplied by 100. The December balance provides a consistent calendar-year reference point. Alternative denominator averaging conventions yield very similar ratios.
[14] Average ROE and CoE are calculated as asset-weighted averages of the corresponding bank-level measures.

CoE of Maltese banks in a small and relatively illiquid market. Combining the best-performing asset-pricing specifications provides a more robust market-based measure. This approach shows that CoE increased but stabilised towards the start of 2026. The analysis further suggests that asset quality and funding structure are important correlates of the market-based estimated CoE for Maltese banks.

Against this backdrop, future work could extend the analyses to the cost of debt. This would provide a more comprehensive understanding of the factors influencing banks' funding cost and capital structures, while also capturing the role of creditors' risk perceptions and broader funding conditions.