Impairment of loans and advances to customers

Highlights:

- This year management have incorporated the forward-looking rating (FLR) model into their IFRS 9 provisioning process. Until last year, this was only used to inform the Covid-19 overlay. The impact of introducing FLR is an increase in ECL of £3.4m (Property) and £0.05m (Trading). The purpose is to improve the PD and LGD output (as generated by Moody's models) by adding more granularity to a number of metrics such as Loan to Value (LTV), Interest coverage ratio (ICR) and Debt Service Coverage Ratio (DSCR) etc. which are used as key inputs into Moody's model. The LTV metrics were split by type of property (Detached, Semi-Detached and Flats) for the Residential book. This additional granularity is deemed to be more reflective of OakNorth risk profile compared to YE20 approach.
- The YE20 overlay provision of £17.4m is now factored in as modelled provision for stage 1 and 2 loans and individually assessed provision for stage 3 loans.
- A post model adjustment (PMA) of £1.27m has been recognised to reflect the challenges from the use of Moody's baseline scenario PD.
- Our work principally focused on key risk areas such as methodology and assumptions used for existing PD/LGD models; appropriateness of the new FLR model, and the specific provisions assessed on Stage 3 loans.
- We have included the key findings and recommendations for improvements based on our work to date.

Impairment on loans and advances to customers

As at 31 December 2021, the Bank holds an IFRS 9 impairment provision of £29.01m (2020: £32.8m) against loans and advances to customers of £2,915m (2020: £2,525m). Of the impairment provision recognised:

- £1.27m relates to a PMA which has been recognised to reflect the challenges from the use of Moody's baseline scenario PD.
- £0.2m relates to PMA held for accounts which are not using the latest Moody's parameters viz. Qualitative PD adjustment factors. There were 44 such cases identified. The PDs of these accounts were increased by 20% to reflect this adjustment.

An overlay of £17.4m was held at YE20 to reflect the uncertainty in the economy arising as a result of the Covid-19 pandemic. The new approach using FLR has removed the need for a Covid overlay, with the provision instead being generated by the models.

Stage	Loans and advances to customers (£m)	Expected credit loss (£m)
1	2,783	8.93
2	69	6.48
3	63	13.6
Total	**2,915**	**29.01**

We focused our work on the following areas to address the significant risk in relation to impairment of loans and advances:

- Methodology and assumptions used in Moody's PD/LGD model;
- Appropriateness of assumptions in FLR model during the year; and
- Measurement of stage 3 loans and consideration of alternative possible scenarios.

In addition, we have also performed audit work over the presentation and disclosure under IFRS 9 in the financial statements, including:

- Reviewing and challenging management's disclosures.
- Testing that the IFRS 9 disclosures in the financial statements meet the required standards, as set by FRS 102.

Based on the evidence obtained, we did not identify any issues with management's classification of financial instruments or their presentation and disclosure as at 31 December 2021.

We have raised number of recommendations to management in relation of their overall ECL methodology and assumptions used. These are specified in detail in the next pages.

Impairment of loans and advances to customers (cont'd)

Modelled ECL (stage 1 and 2) methodology assessment

Management continue to use the PD/LGD models for the 2021 year end, using externally generated credit data from Moody's CRE Europe and Riskcalc which is adjusted for the unique nature of the Bank's loan book.

Consistent with the previous year, we engaged our PwC credit modelling experts to critically assess the model against the IFRS 9 requirements and noted the following.

The weighted annual portfolio PD as at YE21 is 3.1% (vs. 2.2% previously which was time adjusted PD) and the weighted average LGD across stage 1 and 2 is 16.8% (vs. 16.9% previously).

The increase in PD over the year is mainly driven by:

- The introduction of the FLR model as discussed below;
- Movements in the macroeconomic forecasts and change in scenario weights (Covered in page 8 below); and
- Adopting Moody's roll rates for Stage 2 provisions.

Overall, based on our testing, we have identified a number of methodology findings on the staging criteria, conservatism within the LGD model and the forward-looking approach. See next page for further details.

However, we have concluded that the output of the model is reasonable as explained in more detail below.

Reasonableness of Moody's output

There have only been 12 defaults on the book since inception with 100% recoveries being made on cases that have been fully exited. As such, given the low default nature of the portfolio, we find it reasonable that the Bank's coverage ratio is at the lower end of the reasonable range.

We have assessed the model's sensitivity to the final LGD / PD values by applying up to 20% relative stress in either direction. This shows that the model is relatively insensitive to moderate stresses on the parameters. E.g. Applying a 20% relative stress in either direction on the PD output produces an ECL impact below our materiality threshold.

Overall, given the results of our testing we have concluded that the latest model output as produced by Moody's is reasonable.

Forward-looking rating (FLR) Model

OakNorth has used the Forward Looking Rating (FLR) approach to stress the input variables running through the Moody's model. Until last year, this was only used to inform the Covid-19 overlay. The impact of this change is £3.4m additional provision on the Property book and £0.05m on the Trading book (when compared to the Moody's model without FLR).

We have assessed the appropriateness of the FLR model by performing detailed procedures. We are of the view that FLR model is an improvement to the provisioning process since last year. The ECL calculated using this FLR model is more reflective of OakNorth's risk profile. in particular, OakNorth has made adjustments to reflect the differences in HPI growth historically between (1) London vs UK (2) detached vs flats property types. While the rationale used to introduce qualitative adjustments to the HPI forecasts is reasonable, there is limited evidence available to assess how the magnitude of these adjustments were calculated.

Model Implementation

We performed testing around the application of modelled ECL and inputs (stage 1 and 2). Based on our testing, we identified an error in the calculations of the 12M+ PDs for the trading book. However, there was no impact of correcting this given there are zero exposures in Stage 2 at YE21 for the trading book.

Post Model Adjustment (PMA)

An post model adjustment of £1.47 recognised at year end which relates to £1.35m for stage 1 loans and £0.12m for stage 2 loans.

Management has performed a granular assessment to determine the PMA during the year. We understand that the key reasons for the need for provision include:

- Capture the risks to not fully factored within the FLR inputs and Moody's baseline model (**£**1.27m)
- Capture the most up-to-date PD parameters for certain 44 accounts /cases. (**£**0.2m).

PMA: FLR Model

This adjustment is calculated by giving 50% weight each to:

- ECL arising from the original approach (i.e. running stressed FLRs through Moody's base scenario).
- ECL arising from the alternate approach (i.e. running stressed FLRs through corresponding Moody's scenarios) and

We note that even by moving the weights to 100% to the alternative approach (the worst case scenario), it only moves the ECL by £1.1m which is not material.

Impairment of loans and advances to customers (cont'd)

PMA: FLR Model (Cont'd)

We recommend management to update the compatibility issues between the FLR model and the Moody's models as explained above. Given our sensitivity testing and benchmarking results as explained in "Reasonableness of Moody's output" sections above, we find the provision held to be reasonable for YE21 purposes.

PMA: PD adjustment

PMA of £200k is recorded to account for the "qualitative adjustment" stress in 44 cases in the Property book. It was noted that for these accounts, annual review had been completed in 2021 but these were after the Moody's model was run, thus the qualitative factors was not updated for these loans.

Management ran a stress of 20% on the existing qualitative factors for these accounts resulting in an increase in ECL of £200k. Given, the adjustment is immaterial, there will be no material impact of additional sensitivities performed on the provision or adjusting the qualitative factors applied by management.

Model Documentation and Data Accuracy

OakNorth has used macro economic data to perform linear regression and apply qualitative factors to base its own specific scenarios which feed the FLR model. The FLR model stresses the borrower's data which then feeds in to Moody's PD/ LGD models as key inputs.

Management has prepared a paper for the FLR approach which includes the key assumptions taken by management to base their scenarios, however, there is no documentation of the granularity of the process and how data flows within the FLR model and then in to Moody's model. We have recommended that management document the end to end process including:

- How the macro-economic variables feed the FLR model;
- Specifics on how the borrower's data stressed in FLR model which feed the Moody's model;
- Documenting the calculations performed in the FLR model and incorporating validation checks on these calculations;
- Implementing controls on the completeness and accuracy of data used in the models;
- Testing whether the FLR model outputs are similar to the inputs used in Moody's model; and
- Performing checks to ensure that the borrower data used reconciles with the loan book.

Model Governance and Recommendations

We recommend management incorporate a comprehensive model governance framework on Moody's and FLR model. We acknowledge that there have been limited defaults (12) on the book since inception, management needs to perform periodic monitoring of the ECL model performance (as well its underlying components) to ensure parameter estimates and model constructs remain fit for purpose and use when sufficient new observations are available and to ensure model assumptions remain valid.

We recommend management to undertake regular revalidation of models to track known limitations and to identify potential new issues.

The modelling approach used by management requires some further refinements, we have raised the following recommendations:

- The current staging criteria does not allow for a quantitative PD threshold. This is an explicit requirement of the IFRS 9 standard. As such, we recommend that the criteria used for identifying a significant increase in credit risk (SICR) is refined to reflect this threshold, with use of analysis/sensitivity testing to support chosen criteria.
- The current LGD estimates are conservative owing the use of IRB haircuts, LGD floors prudent recovery costs etc. Further, there is no allowance for forward-looking elements within the model. Given the IFRS 9 provisions are required to be best estimate as well as forward-looking in nature, we recommend that the LGD estimates are refined to incorporate economics where feasible, and remove potential conservatism (e.g. due to floors, recovery costs and haircuts used).
- Currently, OakNorth month-end ECL process does not allow for any monitoring / validation of the underlying PD/LGD/EAD parameters as well as the final ECL output. Introduction of model monitoring would ensure that these parameters and the final provision estimate are fit for purpose and use. As such, we recommend that OakNorth implement a robust model monitoring and validation exercise in line with the principles outlined within the previous section.
- The PDs are projected quarterly for the first year of the loan, and following this are only projected annually. Further, the survival rates for Year 1 onwards are calculated using the formula (1-cumulative year 1 PD)^4. The power of 4 applied is not needed as the PD is already a cumulative annual PD by definition. This would have a potentially material impact on the 12M+ ECL; however, there is no impact at YE2021 given that the exposure in stage 2 for the Trading book is zero. We recommend that management correct this approach going forward.

Based on the analysis performed by PwC's credit risk modelling team, the improvements required would not have a material impact on the ECL as at 31 December 2021 given the low level of defaults and performance of the book (c. 96% in stage 1). Therefore we consider the stage 1 and 2 provision calculated to be within a reasonable range.

Impairment of loans and advances to customers (cont'd)

Model Governance and Recommendations (Cont'd)

We raised number of findings to management in the prior year on ECL models and note that the following have been closed in the current year:

- Moody's roll rates used in the Stage 2 PD calculation for the Property book were adjusted using inadequate data. This adjustment has now been removed at YE21 i.e. Moody's roll rates are used within the model without any adjustments. We find this to be more reasonable as Moody's estimate is based on more credible data and industry experience.
- The discount rate was applied incorrectly within the Property provisioning model in the last year. In particular, the discount rate input into the model was expressed as a percentage, This was then further divided by 100 in the model. This has now been corrected within the R code ECL engine implemented this year.
- A few other errors were also noted within the ECL calculations spreadsheet in the last year relating to double counting of undrawn provisions, formula not copied down correctly within excel and hardcoded PD values used within the calculation as opposed to looking up the value from the Moody's output. We have confirmed that these issues have been rectified in the current year models.

Macroeconomics

PwC have developed an economic testing tool which compares management's selected macroeconomic variables to the range seen from independent forecasters, as well as considering downturn scenarios in comparison with historical recessions. We performed an analysis of the macroeconomic scenarios provided by the Bank on trading book against this to identify any variables where management were outside of the observed range.

Our review found that the macroeconomic variables used over the next 4 years are outside the reasonable range when compared to ranges published in the BoE benchmarking survey for the base case other than Bank of England base rate assumption. GDP growth rate is higher than the reasonable range in three years from 2022 to 2024 with being lower in 2025.

Average HPI growth rate was within the reasonable range in 2022 and higher than the range for the next three years.

Unemployment was noted to be higher than the industry standard in the 5 year period. This is offset by Average Consumer price index which is noted to be lower than the industry standard. The macroeconomic assumptions are judgemental, we consider the impact of change in the macroeconomic assumptions within the medium range to be immaterial.

The property model contains three built-in scenarios obtained from Moody's which could not be extracted. However, we stressed probability of default and loss given default for the full loan book (+20%/-20%). This resulted in a c.£4.6m impact across both the increase and decrease in PD/LGD, in respective directions which is below our materiality threshold. This indicated that the property ECL model has a relatively low sensitivity to changes in the underlying PD/LGD, hence our view is that applying 20% stress is reasonable.

Overall, we are comfortable with management's use of macroeconomic scenarios and application of weightings. The PwC tool allowed us to assess the reasonableness of the underlying assumptions for the Bank's trading book. Stressed scenarios indicated that the property book is not materially sensitive to changes in LGD/PD.