# EXAMINATION

21 May 2021

# Subject F206 – Banking
# Specialist Applications

*Time allowed:* *Three hours and fifteen minutes, plus an additional five minutes to allow for scrolling in the ASSA Exam Platform*

*Total marks:* *100*

***INSTRUCTIONS TO THE CANDIDATE***

1. *Ensure that you are logged in and authenticated through Examity before you attempt the examination.*
2. *Questions are only available in the ASSA Exam Platform and may not be printed.*
3. *Submit all of your answers in the ASSA Exam Platform only. No uploads of answers (handwritten or otherwise) to the ASSA Exam Platform will be accepted.*
4. *You may not use any other computer program (e.g. Email, MS Word or Excel) or files, nor open any other browser during the examination.*
5. *You may not make use of a Formulae and Tables book during the examination. Any such information that may be required will be provided to you within the examination.*
6. *You are strongly encouraged to use the first 15 minutes as reading time only, however, you may commence answering the paper whenever you are ready.*
7. *Mark allocations are shown in brackets.*
8. *Attempt all questions.*
9. *Show calculations where this is appropriate. You may use blank paper to carry out rough work calculations. You may use a calculator from the approved list only.*
10. *You may return to your answers to review and amend during the allotted examination time. Once you are happy with your answers you need to **Finish all and Submit** your work. Once you have submitted you will not be able to make any more changes to your answers.*
11. *You must submit all work BEFORE the end of the allotted examination time. Take this into account when planning your review and submission. There will be no time announcements.*

**Note: Answers will be saved automatically during the examination if you are connected to the ASSA Exam Platform. However, the Actuarial Society of South Africa will not be held responsible for loss of data where candidates have not followed instructions as set out above.**

***END OF INSTRUCTIONS***

**QUESTION 1**

GreenVest Bank (GVB) is a large South African bank that offers a full suite of Retail and Non-Retail lending products, and only operates in South Africa. The CEO of GVB has become increasingly concerned with climate change and the potential impact of this on the bank's loan portfolio.

i. GVB's CRO has requested a report on how the bank can go about incorporating climate risk in its overall risk management. Specifically, the CRO wants the report to focus on risk segmentation, credit risk management, operational risk, and stress testing of the loan portfolio. Outline the points to be included in the report.

[6]

ii. GVB is considering introducing climate risk into its retail IFRS 9 models. Briefly explain the key challenges of incorporating climate risk into credit risk models.

[12]

[Total 18]

**PLEASE TURN OVER**

**QUESTION 2**

By the end of 2021, the London Interbank Offer Rate (LIBOR), one of the global benchmark rates for financial products ranging from loans and bonds to derivatives, will be replaced. LIBOR is one of the Interbank Offer Rates (IBOR) used globally to set the benchmark rate for a wide range of financial products.

South Africa will also be affected by the transition, with JIBAR being discontinued and replaced by a local South African alternative reference rate. These alternative reference rates tend to be based on overnight rates. The figures below illustrate a multi-curve pricing framework pre and post transition.

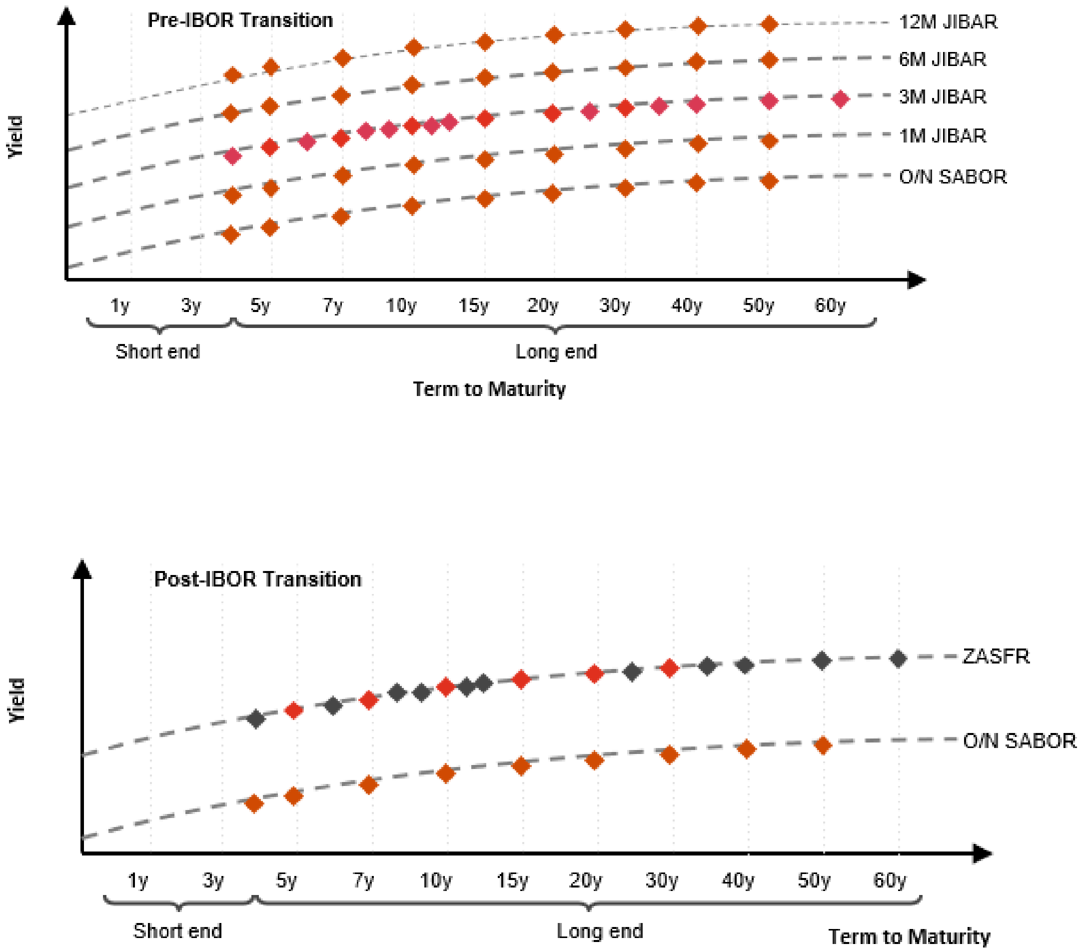


Figure: Representation of multi-curve pricing framework pre and post IBOR transition

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Where:

O/N SABOR is the South African Benchmark Overnight Rate.

JIBAR is the Johannesburg Interbank Average Rate and is the money market rate, used in South Africa. It is calculated as the average interest rate at which banks buy and sell money.

xM JIBAR is the JIBAR rate fixed for an x-month period.

ZASFR is South African Secured Overnight Financing Rate.

i. Briefly discuss the change above and the implications from a valuation process point of view.

[8]

ii. As a CRO of a large South African Bank, you are concerned about the impact on different areas of the risk function of the transition away from JIBAR to new reference rates.

Briefly discuss the potential impact of the change on the main risk areas of the bank's risk function.

[7]

[Total 15]

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## QUESTION 3

You are the CRO for the Unsecured Loans Division of Easy Money Bank, a full-service Retail Bank. As a result of Covid 19, many customers have severely reduced income or have lost their income in totality over the last year.

This has resulted in massive reductions in loan disbursements (top ups and new loans) across the Retail sector.

The Head of Sales has proposed a modified Unsecured Loan product ("Super-Flexi Loan") which would have the following adjusted product features to assist customers in the medium to longer term:

- Maximum loan term extended to 10 years (from 5 years).
- Maximum loan amount increased from R50k to R150k.
- Customers can select the repayment amount they wish to pay each month.
    - These amounts can be as little as R0 and as much as the full outstanding balance in any given month.
    - Customers are given full flexibility in this regard throughout the lifetime of the loan commitment.
    - The only requirement is to ensure the debt is settled at maturity.
- This product variation can be used for new loans, top ups of existing loans held with Easy Money and for debt consolidations.

i. Describe the credit risk and other risks inherent to this proposed product modification.

[20]

ii. Detail some risk mitigants that could be put in place to help to reduce some of the risks and challenges highlighted in part (i). These can include alternative product modifications as well as other risk mitigants.

[8]

[Total 28]

**PLEASE TURN OVER**

**QUESTION 4**

i. Outline the steps, with the purpose of each step, followed to develop a probability of default ratings model for a retail portfolio with enough data points to follow a statistical approach.

[12]

ii. You are the CRO of Trust Bank. Trust Bank offers vehicle finance to all retail market segments and the management team has embarked on a project to enhance the probability of default rating models used to assess counterparty credit risk at loan application stage for use in underwriting and loan pricing. The development process has resulted in two different ratings model options and the team has provided you with a report comparing the two options.

Discuss the relative merits of the two ratings models using the information provided, as extracted from the report.

[21]

Table 1: General information

| **Aspect** | **Ratings model A** | **Ratings model B** |
|---|---|---|
| Development sample | New bookings period January 2006 to January 2016 | New bookings period January 2015 to January 2016 |
| Outcome period | 12 months on book | 15 months on book |
| Target definition | ever 3 missed instalments | ever 2 missed instalments |
| Out of time experience | Bookings in June 2018 | Bookings in June 2018 |
| Default definition for calibration | Basel 3 outcome at 12 months on book | Basel 3 outcome at 12 months on book |
| Data exclusions | Policy rule declines | Policy rule declines and all records in arrears due to insurance claim or death |
| Optimisation/ Model construction method | Logistic regression | Machine learning: Random forest |
| Number of characteristics/ features | 21 | 30 |

(Experience data from lock-down/ covid period specifically excluded)

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Table 2: Population analysis

| **2.1 Discriminatory power on target definition** | **Ratings model A** | **Ratings model B** |
| --- | --- | --- |
| In sample Gini* coefficient | 55% | 58% |
| Out of sample Gini coefficient | 54% | 50% |
| Out of time Gini coefficient | 43% | 48% |

| **2.2 Discriminatory power on default definition** | **Ratings model A** | **Ratings model B** |
| --- | --- | --- |
| In sample Gini* coefficient | 55% | 56% |
| Out of sample Gini coefficient | 54% | 48% |
| Out of time Gini coefficient | 43% | 46% |

| **2.3 % pop total applications predicted to have acceptable default rate (approval rate)** | **Ratings model A** | **Ratings model B** |
| --- | --- | --- |
| In-sample | 20% | 30% |
| Out of sample | 21% | 26% |
| Out of time sample | 22% | 33% |

| **2.4 % of previously declined applications now approved (swap-ins)** | **Ratings model A** | **Ratings model B** |
| --- | --- | --- |
| In-sample | 5% | 10% |
| Out of sample | 5% | 5% |
| Out of time sample | 7% | 15% |

*The Gini coefficient is a metric that estimates a model's discriminatory power, with higher Gini's indicating higher discriminating power/ ability to differentiate between good and bad outcomes.

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Table 3: Sub-population analysis (based on out of time sample)

| **3.1 High income sub-population** | **Ratings model A** | **Ratings model B** |
|---|---|---|
| Gini | 40% | 10% |
| Approval rate | 40% | 50% |
| Declined now approved | 3% | 20% |

| **3.2 Low income sub-population** | **Ratings model A** | **Ratings model B** |
|---|---|---|
| Gini | 40% | 60% |
| Approval rate | 10% | 11% |
| Declined now approved | 3% | 30% |

| **3.3 New customer sub-population** | **Ratings model A** | **Ratings model B** |
|---|---|---|
| Gini | 35% | 40% |
| Approval rate | 15% | 25% |
| Declined now approved | 3% | 15% |

iii. Detail possible risks associated with the implementation of a new ratings model, with associated risk mitigation measures.

[6]

[Total 39]

[Grand Total 100]

**END OF EXAMINATION**

 