

#### Course: Banking [2206]

Fall Semester 2023

Mid-term test

October 13, 2023

Student number: \_\_\_\_\_

#### Instructions for the exam:

- Start by putting your number on this first page.
- You have 1h20 (one hour and twenty minutes) to complete the exam
- The exam is worth 20 points.
- The score for each group is divided equally between the questions in that group.
- You should answer all groups in the answer sheets provided.
- For Group II, please reply to the questions chosen in a maximum of 20 lines per question.
- At the end of the exam, please hand in both this statement and the answer sheets.
- You are not allowed to have anything with you except for pen/pencil, drinks/snacks and a non-graphic calculator.
- Points can only be provided for material that can be read, understood and interpreted. Consequently, you should try your best to express your ideas clearly and concisely, and to highlight key arguments. Also, please make sure your handwriting is clear and understandable.

## Part I [12/20]

In this first part of the mid-term test, you need to select a <u>single</u> answer (identified as a, b, c or d) in each of the 12 questions presented below. You will not be penalized for a wrong answer.

1. The Banking Union - the current banking framework at the European Union level - has several distinctive features when compared to the previous framework. Which of the following sentences correspond to a (true) feature of the Banking Union?

- a) The single rulebook is a set of prudential standards for individual financial institutions that applies to all European Union countries.
- b) The Banking Union ensures that the single rulebook is implemented consistently across the whole European Union (not merely across the Euro Area).
- c) The single resolution mechanism (SRM) applies just to the significant banks covered by the single supervisory mechanism (SSM).
- d) If approved by the national supervisor, the ECB can directly supervise any one of "less significant" institutions, ensuring that high supervisory standards are applied consistently.

**2.** Still on the Banking Union, which of the following sentences correspond to a false feature?

- a) The European System of Financial Supervision (EFSF) covers both macroprudential and micro-prudential supervision.
- b) Micro-prudential supervision refers to the supervision of individual institutions, such as banks, insurance companies or pension funds.
- c) The disclosure of information to clients is under the remit of conduct supervision.
- d) The SSM responsibilities include anti-money laundry and terrorism financing therefore including financial markets and insurance companies under its remit of responsibility.

- **3.** When you make a deposit:
- a) There is immediate money creation as this operation expands the quantity of money available in the economy.
- b) As the bank must comply with capital requirements, there is no money creation.
- c) As the bank must comply with liquidity requirements, there is no money creation.
- d) None of the above.

**4.** Which of the following loan applicant characteristics is not relevant in the credit approval decision?

- a) Leverage position of the borrower.
- b) Borrower income.
- c) Value of collateral.
- d) None of the options.
- **5.** Concerning credit, which of the following sentences is false?
- a) Credit risk is the risk that promised cash flows from loans and securities held by banks may not be paid in full.
- b) Non-performing loans refers to the loans which have defaulted and have not yet been totally written off; loans that are on the hedge of defaulting are excluded from this concept.
- c) Second stage loans present different signs of underperforming but are not yet non-performing.
- d) Credit risk materialization is expected to increase in an economic downturn.
- **6.** Which of the following sentences is false?
- a) The Countercyclical Capital Buffer (CCyB) can help dampen excessive credit growth during the upswing of the financial cycle.
- b) If a bank's Capital Conservation Buffer (CCoB) falls below the requires level, automatic safeguards apply which limit the amount of dividend and bonus payments the bank can make.
- c) The level of the Systemic Risk Buffer (SyRB) may vary across institutions or sets of institutions as well as across subsets of exposures. There is no maximum limit for this buffer.
- d) Global systemically important institutions (G-SIIs) must fulfil supplementary requirements concerning the amount of Total Capital they must hold as a buffer.

**7.** Consider a bank with the following financial indicators: Core Equity Tier I of 200 m€, Total Capital of 400 m€, Risk-Weighted Assets of 4000 m€ and Assets of 5000 m€. From a prudential perspective, what can you conclude about the compliance with the Pilar 1 requirements plus the buffer requirement (i.e., the Combined Buffer Requirement - CBR)?

- a) The current CET1 is not sufficient for compliance as the Capital Conservation Buffer (CCoB) is 2.5% and must be made of CET1. [4.5%+2.5%>5%]
- b) The current Total Capital is not sufficient for compliance as the Capital Conservation Buffer (CCoB) is 2.5% that and must be made of total capital.
- c) Sentences a) and b) are both correct.
- d) Sentences a) and b) are both incorrect.

**8.** The risk that a German investor who purchases British bonds will lose money when trying to convert bond interest payments made in pounds sterling into euros is called:

- a) liquidity risk.
- b) credit risk.
- c) foreign exchange rate risk.
- d) off-balance-sheet risk.
- 9. What type of risk focuses upon future contingencies?
- a) Liquidity risk.
- b) Credit risk.
- c) Foreign exchange rate risk.
- d) Off-balance sheet risk.
- **10.** Which of the following observations about the repricing model is correct?

a) It accounts for the problem of rate-insensitive asset and liability runoffs and prepayments.

- b) It accommodates cash flows from off-balance-sheet activities.
- c) It helps to determine a bank's profit exposure to interest rate changes.
- d) It considers market value effects of interest rate changes.

**11.** Bank XPTO finances a \$250,000 2-year fixed-rate loan with a \$200,000 1-year fixed-rate deposit. Use the repricing model to determine (a) the bank's repricing (or funding) gap using a 1-year maturity bucket, and (b) the impact of a 100 basis points (0.01) decrease in interest rates on the bank's annual net interest income?

- a) \$0; \$0.
- b) -\$200,000; +\$2,000.
- c) -\$200,000; -\$2,000.
- d) +\$50,000; -\$500.

Feedback: 1-year GAP = RSA - RSL = 0 - 200,000 = -200,000  $\Delta NII = (CGAP) \times \Delta R$  $\Delta NII = (- 200,000) \times (-0.01) = +2,000$ 

**12.** Consider the following information on CGD balance sheet and Income Statement (available in the CGD Annual Report 2022).

| CGD Balance          | 2021    | 2022    |
|----------------------|---------|---------|
| Sheet (EUR millions) |         |         |
| Net assets           | 104,018 | 102,503 |
| Cash and             | 26,655  | 25,803  |
| loans and            |         |         |
| advances to          |         |         |
| credit               |         |         |
| institutions         |         |         |
| Securities           | 21,151  | 18,689  |
| investments          |         |         |
| Loans and            | 49,701  | 50,778  |
| advances to          |         |         |
| customers            |         |         |
| (net)                |         |         |
| Others               | 6,511   | 7,232   |
| Liabilities          | 94,731  | 93,020  |
| Central banks'       | 6,755   | 338     |
| and credit           |         |         |
| institutions'        |         |         |
| resources            |         |         |
| Customer             | 79,031  | 83,972  |
| resources            |         |         |
| Debt securities      | 2,908   | 2,487   |
| and                  |         |         |
| subordinated         |         |         |
| liabilities          |         |         |
| Others               | 6,037   | 6,223   |
| Shareholders'        | 9,287   | 9,483   |
| equity               |         |         |

| CGD Income               | 2021  | 2022  |
|--------------------------|-------|-------|
| Statement (EUR millions) |       |       |
| Net interest income      | 979   | 1,428 |
| Net fees and             | 749   | 882   |
| commissions              |       |       |
| Non-interest income      | 562   | 606   |
| Total operating income   | 1,741 | 2,304 |
| Net operating income     | 982   | 1,101 |
| before impairments       |       |       |
| Net operating income     | 837   | 1,130 |
| Net income               | 538   | 843   |

Based on the information provided, select the correct sentence:

# a) The Net Interest Margin increased between 2021 and 2022.

- b) The Return on Assets decreased between 2021 and 2022.
- c) The Leverage decreased between 2021 and 2022.

d) The Net Interest Margin decreased between 2021 and 2022, driven by the increase in the Net Interest Income.

## Group II [8/20]

In this second part of the exam, <u>you must answer two questions out of the three</u> <u>below</u>. You are free to choose the two you want to answer to. Each question is worth 4 out of the 8 points assigned to this group. If you reply to more than two questions, only the first two answered will be considered for grading purposes. Please answer the questions chosen in a <u>maximum of 20 lines per question</u>.

**1.** The current banking framework at the European level - the **Banking Union** - is currently fully equipped with two pillars: the Single Supervisory Mechanism (SSM) and the Single Resolution Mechanism (SRM). These two pillars rest on the foundation of the single rulebook. There is also the **European System of Financial Supervision** (ESFS), that is a network centered around three European Supervisory Authorities (ESAs), the European Systemic Risk Board (ESRB) and national supervisors.

Please elaborate on the main features and objectives of the Banking Union, with a focus on the resolution framework and if (and how) moral hazard impacted its design. Please also refer to the ESFS including its scope and mandate.

**SSM:** system of banking supervision for Europe (since Nov. 2014).

- ECB and national supervisory authorities of participating countries.
- Significant institutions directly supervised by the ECB; the "less significant" institutions by their national supervisors, in cooperation with the ECB.

**SRM:** applies to banks covered by the SSM and ensures that a bank failure does not harm the broader economy or cause financial instability.

- Moral hazard refers to a situation where individuals or entities can engage in risky behavior because there is other party that is contractually (or expectedly) bound to assume the negative consequences.
- To circumvent this concern, the SRB ensures swift decision-making procedures for bank resolution which is carried out without recourse to national taxpayers' money.
- Resolution costs first borne by the bank's shareholders and creditors, and only then by the Single Bank Resolution Fund (funded by banks) (if needed)

**Single rulebook:** set of prudential standards for banks in all EU countries. Ensured by the banking union thus creating a level playing field.

**ESFS:** The ESFS is a network centered around three European Supervisory Authorities (ESAs), the European Systemic Risk Board (ESRB) and national supervisors.

- The ESAs are: European Banking Authority (EBA); European Insurance and Occupational Pensions Authority (EIOPA), European Securities and Markets Authority (ESMA)
- As the European banking supervisor, the ECB closely cooperates with the ESAs, especially the EBA.
- The ESRB oversees the financial system of the European Union and prevent and mitigate systemic risk.
- Hence, the ESFS covers both macro-prudential and micro-prudential supervision.
- The ESAs work primarily on harmonizing financial supervision in the EU by developing the single rulebook. They are also mandated to assess risks and vulnerabilities in the financial sector.

**2. Credit risk** and **Interest rate risk** are the two most material risks faced by banks. Please elaborate on their most important features e.g. credit risk (four) drivers, credit granting process and risk materialization; interest rate risk impact on the balance sheet and income statement, and the most used methods to measure and manage interest rate risk. Please also refer to their prospective evolution at the current juncture and its implication to the banks' financial position. In your answer, consider banks' asset/liability sensitiveness.

#### **Credit Risk**

We can approach credit risk from the perspective of its grating process, prudential treatment, and materialization.

The credit granting process relies in different phases (origination, analysis, decision, execution, monitoring, collections) and its crucial for credit risk management. An effective underwriting and loan approval process is a key predecessor to favorable portfolio quality, and a main task of the function is to avoid as many undue risks as possible.

The 4-credit risk main drivers identified in the Basel Accords are PD (the probability that the debtor fails his obligations), Loss Given Default (percent of the exposure that the bank may lose in case the borrower defaults), Exposure at default (estimate of the amount outstanding in case the borrower defaults), and maturity (estimation of the maturity of the exposure). For prudential matters, these all impact positively the credit risk of a given exposure: a higher PD, LGD, EAD or M implies a higher credit risk.

Risk materialization occurs when the possible event (e.g. default) actually occurs. A higher materialization of risk is associated with a higher *ratio of nonperforming loans* (NPL). It measures bank health and efficiency by identifying problems with asset quality in the loan portfolio. A high ratio signals deterioration of the credit portfolio. It could also be added that expected loss is supposed to be covered by

provisions, thus impacting the P&L immediately, while the unexpected loss is expected to be covered by the own funds' requirements.

### Interest rate risk

Interest rate risk refers to the current or prospective risk to a bank's capital and to its earnings, arising from the impact of adverse movements in interest rates on its banking book.

Unexpected changes in interest rates affect:

i) The value of the bank (or net worth). The net present value of future cash flows of maturity-transforming banks might <u>decrease</u> when interest rates rise, due to the higher maturity of assets compared to liabilities.

ii) The earnings (or the net interest income). The proportion of an interest rate change which is passed through on the current interest revenue earned with banks' assets is usually higher than the pass-through on interest expenses paid for banks' liabilities.

The most used methods to measure and manage interest rate risk incorporate these two impacts:

i) The repricing gap model: deals with the effect on interest margin, classifying every asset and liability by its sensitivity to interest rate fluctuations in a given period (the gap period)

ii) The duration gap model: it is an equity-based model, that takes into account the effect on the capital value due to fluctuations in interest rates, making use of the concept of duration;

iii) A third model is Value at Risk, or VaR, as the interest rate is a price.

At the current juncture, credit risk materialization may increase as the prospects are of economic slowdown; until now, credit risk has been in a downward path. Concerning interest rate risk, an increase in interest rates is typically associated with an increase in net margin, as the interest rate change passed through on the current interest revenue earned with banks' assets is usually higher than the pass-through on interest expenses paid for banks' liabilities. This may be the case even if a bank is liability-sensitive (*i.e.* its liabilities are of shorter duration or have a shorter time until repricing than its assets).

**3.** The **duration gap model** measures the impact of changes in interest rates on the market value of equity. Please describe the model and elaborate on: i) the underlying rationale of the duration gap model, on ii) whether the bank immunizes itself from interest rate risk exposure by setting the maturity gap equal to zero; and iii) the duration gap model limitations.

If usefull to illustrate your arguments, you may consider a bank with Assets = 1000; Liabilities = 800 (thus capital = 200); Duration of Assets is 2 years and Duration of Liabilities is 1,5 years.

- It is an equity-based model, that takes into account the effect on the capital value due to fluctuations in interest rates;
- It relies on the concept of **duration**, in the case, of capital;
- Duration is the "weighted average maturity" of cash flows. The maturity of each cash flow is weighted by the present value of that cash flow. In the case of a bond, it measures the impact on the value of the bond when the interest rate changes by 1%.
- Duration provides us the sensitivity to interest rates and so the level of interest rate risk!
- To have the duration for capital, we need the duration of assets and liabilities:



- Even if the Duration Gap is equal to zero, the bank may not be fully immunized as the model just works for infinitesimal change of the interest rate. It does not consider the timing of cash flows (it relies on the idea of weighted average maturity).
- Limitations:
  - i. Duration assumes **parallel shifts for all** time periods.
  - ii. Duration is a mathematical derivative, and as such it works for infinitesimal changes in interest rates.
  - iii. When changes interest rate changes are not so small, we must consider the effect of **convexity**.
  - iv. After every change in interest rates, durations must be recalculated, and all positions managed again.
  - v. We need to take "**optionality**" into account. Customers can refinance loans when rates go down or withdraw time deposits when rates go up.