Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

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Mock Exam – "Banking"

Name: _____

Student ID number: _____

- Write down your name and your student ID number on this cover page.

- Please check that the exam contains 3 numbered pages (including this cover page).

- On average you should spend about 1 minute per point.

- You may use a **non-programmable pocket calculator** without a text memory function.

- You may answer all questions either in English or in German. Within each of the main questions, you should not switch languages.

- Use the indicated space below the questions to answer them. Write in a legible way and leave a margin of 3 cm. Raise your hand if you need additional answer sheets. Write down your name and your student ID number on all additional answer sheets.

- Only write on the front sides of the sheets. **Answers on the back sides will not be graded.**

- Please **hand in all question and answer sheets** after the exam. If only parts of the question and answer sheets are submitted, this will be treated as an attempt of deception.

- Calculate within **four digits after the decimal point**. This also holds for intermediate results.

- You are not allowed to carry **cell phones, smart phones, or other mobile devices** with you during the exam; any device that you carry with you (no matter whether switched on or off) will be treated as an **attempt of deception**.

- Note: Questions may cover the content of guest lectures. Guest lectures are relevant for the exam and change from year to year.

Good luck!

Do not write below this line.

1	2	Total
/ 15	/ 15	/ 30

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1. **Duration** (15 Points)

   Securities A and B have the following cash flows:

	Period 1	Period 2
A	–	$100
B	$50	$50

   (a) Briefly define the concept of duration. (2 Points)

   (b) Calculate the securities' durations if the interest rate of a zero bond is 4% for all maturities (zero bond yield curve). (6 Points)

   (c) Explain why the present value of the asset with the highest duration reacts most sensitive to interest rate changes. (3 Points)

   (d) What does it mean if the curvature of the interest rate curve changes? Is this risk captured by the concept of duration?. (4 Points)

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2. **Asymmetric Information and Credit Rationing** (15 Points)

   (a) Name and briefly explain information asymmetries (in order of their chronological occurrence). Also name a possible solution for each information asymmetry.
   (6 Points)

Consider the assumptions of Stiglitz and Weiss (1981). There are five investors, each investor can realise one project j (P1 - P3). To do so, every investor needs a loan of $K = 200$. Table 1 shows the revenue of each project for the different states s_i. Each state occurs with the same probability of: $p_s = \frac{1}{3}$

Tabelle 1: Project revenues y_j for $s_1 - s_3$

	P1	P2	P3
s_1	200	150	190
s_2	300	250	350
s_3	400	440	450

   (b) Calculate the expected revenues for each project. (1.5 Points)

   (c) Calculate the variance for each project. Which is the most risky one? (1.5 Points)

The investment amount for each project realization is $K = 200$. The alternative market interest rate is $i = 20\%$. The regulation defines that the repayment amount can be $R = 250$ at most.

   (d) Which is the the collateral's minimum value C the borrowers must offer the bank such that it is willing to finance all projects? (3 Points)

   (e) Will the bank (in general) increase or decrease the interest rate, if the amount of the borrower's collateral increases? Briefly explain your answer. (3 Points)