

Credit Risk: Exam 02

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Financial Theory

Geometric Series

Q1 (1 pts) Consider a geometric succession where $a_1 = 2$. Calculate the n value for the following cases

- A) Calculate n given $a_n = 92$ and $r_1 = 1.2$
- B) Calculate n given $a_n = 8192$ and $r_2 = 2$

Q2 (2 pts) A geometric series is defined as the n -th partial sum of a geometric succession:

$$S_n = a_1 + a_1r + a_1r^2 + \dots + a_1r^{n-2} + a_1r^{n-1}$$

Rewrite the previous definition for S_n on the compact form (without the partial sums).

Note: Show your procedure!

Amortization

Q3 (2 pts) Given an annuity with the following characteristics:

- $A = 10,000.00$
- $i = 1.8$ monthly (with monthly cap.)
- $n = 6$ months

Calculate the present and future value:

- A) Present Value
- B) Future Value

Q4 (1 pts) In your own words, what does the “outstanding balance” means on the amortization table? How is it calculated? (min. 50 words).

Q5 (2 pts) Consider a loan for \$68,000.00 MXN. Calculate the following values assuming constant monthly paybacks during 12 months at 28% annual interest rate with monthly capitalization:

- A) What's the constant annuity value?
- B) What's the balance value before the last payment?

Q6 (2 pts) Consider a loan for \$22,000.00 MXN. Calculate the following values assuming constant monthly paybacks during 6 months at 32% annual interest rate with monthly capitalization:

- A) What's the "interest amount" on the 1st payment.
- B) What's the "principal amount" on the 4th payment?

Cashflows

Q7 (1 pts) Calculate the interest rate of the following investment project:

t	cashflow
0	-100
12	170

Q8 (1 pts) Calculate the interest rate of the following investment project:

t	cashflow
0	-100,000
1	80,000
2	30,000

Q9 (1 pts) Calculate the interest rate of the following investment project:

t	cashflow
0	-7,000
1	-5,000
2	14,000

Q10 (1 pts) Calculate the missing cashflow using an interest rate of 5.81% per period.

t	cashflow
0	-25,000
1	???
2	10,000

Q11 (1 pts) Assuming your hurdle rate is 12% annual, would it be convenient to invest in the following project? Use the interest rate to decide.

Project cashflows:

- Outflow: $C_0 = 7000$
- Inflow: $C_6 = 7550$
- Time units: months

Q12 (3 pts) Transform the following cashflow structure into a simple $F = P(1 + i)$ formulation.

t	cashflow
0	-5,000
1	3,200
2	3,000

- A) Calculate the present value.
- B) Calculate the future value.
- C) Calculate the interest rate.

Credit Risk Theory

Credit Risk Modeling

The following equation describes the expected loss for a credit operation:

$$EL = PD * EAD * LGD$$

Where:

- EL : expected loss
- PD : probability of default
- EAD : exposure at default
- LGD : loss given default

Q13 (1 pts) When doing a credit model, which variable are we *most* interested in forecasting?

Q14 (1 pts) What are the “units” for EL and EAD ?

Q15 (2 pts) In your own words, explain the concept of *LGD* (min 50 words).

Performance Strategies

We can use two strategies to improve modeling performance:

- **Strategy 1:** Data oriented strategy (data quality + big data techniques)
- **Strategy 2:** Model oriented strategy (non-linear models and increased complexity)

Q16 (2 pts) Explain the disadvantages of only using the **strategy 1** (min 50 words).

Q17 (2 pts) Explain the disadvantages of only using the **strategy 2** (min 50 words).

Data quality

Q18 (2 pts) Give an example of data that might be sensible to the *TIM* (Timeliness) dimension.

Q19 (2 pts) Give an example and explain the difference between the *COM* (Completeness) and *AC* (Accuracy) data quality dimensions.

Rate Estimation

Q20 (1 pts) What elements from the amortization table are needed in order to create a cashflow structure?

Q21 (1 pts) When adding the IRR column to the amortization table, what does each individual IRR (row) represents?

Q22 (1.5 pts) Explain the difference between the conditional and unconditional probability of default.

Q23 (1.5 pts) Analyze the value of the unconditional probability of default from $t = 1$ until $t = n - 1$ (before the full repayment). Does the value increase or decrease over time? Why?

Q24 (3 pts) Assuming the probability of default is a constant value D , calculate the probability of successful repayment (full loan payment) on the following scenarios:

- A) $D = 0.30$, $n = 3$
- B) $D = 0.30$, $n = 5$
- C) $D = 0.15$, $n = 5$

Q25 (2 pts) On your own words, explain why are we interested in finding the configuration (e.g. interest rate) that make the expected IRR equal to zero.

(Optional) Anonymous Feedback!

Congrats on finishing your second exam! We appreciate your effort and dedication to this lecture. Let us know if you have any comments or suggestions to improve your learning experience:

- Feedback Survey
- <https://forms.gle/bnYZUXhRSok1iR7Y6>

Your feedback is very important to us! Thanks for being part of this course.