KTH Real Estate and
Construction Management

Examination
Course: Financial Economics with Real Estate Applications,
Course code: AI2153

Date:	January 15, 2023
Time:	14 – 18 + 0.5 hour extra time for everybody. **FUNKA** students: 14 – 20 + 0.5 hour extra time.
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Allowed aid
- Take-home examination without monitoring, that can be revised with an oral examination if necessary.
- Open textbook/open note/online material exam: that is, all material and software, such as textbook, online notes, Excel, R, Python, are allowed.
- Naturally, according to standard student code of conduct, you agree to the following text:

I assure that:
- I will go through with the exam according to the exminer's instructions.
- I have not used any prohibited aids or co-operated with any one.
- During the examination I have not had any contact and/or communication (personal or otherwise, like via internet, phone, chat, etc) with living beings or artificial intelligence (including internet searches) that is not allowed during the examination.
- I have done the exam by myself in solitude.

Answers
- Mark with yellow or **bold** text your MCQ answers. Your answer to the essay question can be written directly in the exam document.
- Upload this exam document with your answers on Canvas or send your answers to han-suck.song@abe.kth.se. **FUNKA** students, send your answers to han-suck.song@abe.kth.se

Number of questions, points and grading scale
- This exam consists of **6** MCQs and **1** essay question.
  - Correct MCQ answer 1 point. Only one alternative can give 1 point per MCQ.
  - No, wrong or several answers per MCQ give 0 points.
  - The essay question can give up to 4 points.
  - Maximum number of points: 6 + 4 = 10 points.
- Grading scale (preliminary): percentage needed of maximum points:
  A: 90%
  B: 80%
  C: 70%
  D: 60%
  E: 50%
  Fx: 45%. Student has an opportunity to hand in an assignment to get grade E.
  F: Failed.

Good luck!

1) You analyze the evolution of cap rates (initial yields) in the real estate market by breaking down the cap rate into its core determinants (ignoring the depreciation effect). Suppose that the real risk-free on government bonds is 2.0%, the expected inflation rate is 2.5%, the risk premium is 3.5%, and the cap rate (initial yield) is 3.5%. Then the real growth rate of property income (e.g. the net operating income) is closest to

A) 0.0%.
B) 7.5%.
C) **2.0%.**
D) –2.0%.
E) None of the above (A, B, C, D) is close to be correct.

MCQs 2-3 are based on the following text:

Corporate bonds and interest rates are highly important for real estate companies. Suppose that you invest in corporate bonds issued by a real estate company today with 10 years to maturity. The coupon rate is 5% and coupons are paid annually. The face value is $1,000 (One thousand). The yield to maturity (YTM) is currently 5%.

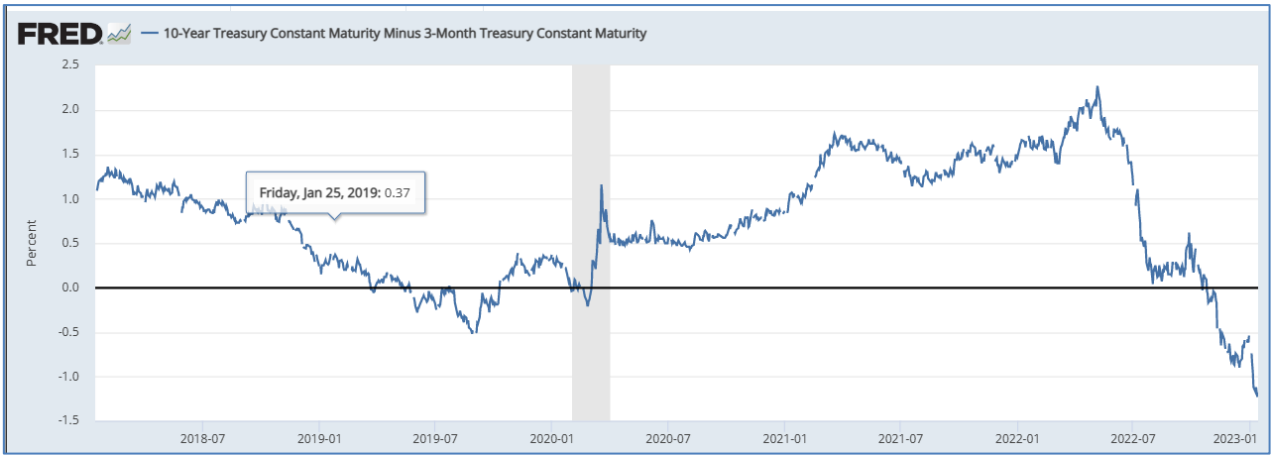
2) When you buy the bond today, its price is

A) **equal to the face value.**
B) lower than the face value.
C) higher than the face value.
D) Since the YTM is equal to the coupon rate, it is not possible to compute the price of the bond.
E) None of the above (A, B, C, D) is close to be correct.

3) One year later, the yield to maturity on your bond investment has declined to 4%. After one year, the total rate of return of your bond investment is closest to

A) 0.0%.
B) 4.3%.
C) –9.3%.
D) 9.3%.
E) **None of the above (A, B, C, D) is close to be correct.**

4) The following diagram from FRED shows the spread between US 10-Year Treasury Constant Maturity and the US 3-Month Treasury Constant Maturity. The following diagram from FRED shows the spread between US 10-Year Treasury Constant Maturity and the US 3-Month Treasury Constant Maturity. What can you tell about the current shape of the US treasury yield curve?



A) flat.
B) upward sloping.
C) **downward sloping.**
D) not inverted
E) None of the above (A, B, C, D) is close to be correct.

5) If 1-year interest rates (proxy for short-term interest rates) for the next five years are expected to be 5.5, 5.0, 4.5, 4.0, and 4.0 percent, and the 5-year term premium (aka the liquidity premium) is 1 percent, then the 5-year bond rate will be closest to

A) 4.6 percent.

B) 3.6 percent.

C) 5.6 percent.

D) 4 percent.

E) None of the above (A, B, C, D) is close to be correct.

6) A property is expected to have NOI of $500,000 the first year. The NOI is expected to increase by 2 percent per year thereafter. The appraised value of the property is currently $8 million, and the lender is willing to make a $5,600,000 participation loan with a contract interest rate of 7 percent. The loan, a constant (or fixed) payment mortgage) will be amortized with monthly payments over a 25-year term. In addition to the regular mortgage payments, the lender will receive 40 percent of the NOI in excess of $500,000 each year until the loan is repaid. The lender also will receive 60 percent of any increase in the value of the property. The loan includes a substantial prepayment penalty for repayment before year 5, and the balance of the loan is due in year 10. (If the property has not been sold, the participation will be based on the appraised value of the property.) Assume that the appraiser would estimate the value in year 10 by dividing the NOI for year 11 by a 5 percent capitalization rate. The effective cost (to the borrower) of the participation loan assuming the loan is held for 10 years will be closest to

A) 10.22 percent.

B) 3.6 percent.

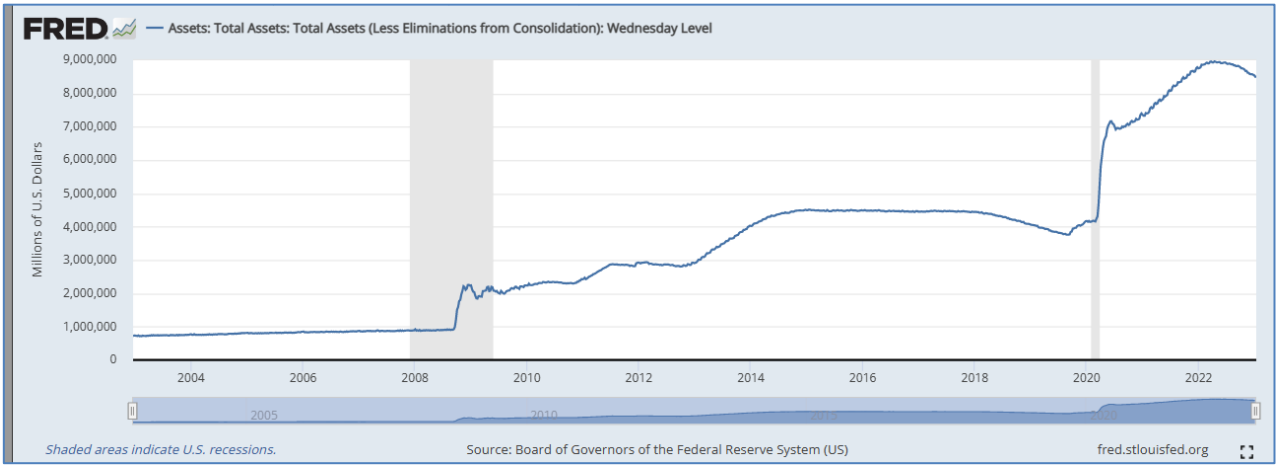
C) 7.56 percent.

D) 7.48 percent.

E) None of the above (A, B, C, D) is close to be correct. Instead it should be_____

7) ESSAY QUESTION (4 points)

Following diagram from FRED (see next page please) is very famous among professionals, practitioners and academicians interested in how monetary policy affects the global economy including the pricing and valuation of financial and real assets:



Based on your great knowledge, discuss and explain how the evolution of commercial real estate cap rates, prices and valuations of commercial real estate, and prices and valuation of financial securities such as corporate bonds and listed real estate (e.g. REITs and publicly traded real estate companies) might be related to the above diagram.

Your answer:

This diagram shows the total assets of the Federal Reserve, where securities held outright by the Federal Reserve make out the largest part. The Fed controls their own balance sheet and adjusts it to steer interest rates, meet their inflation target, and stable the currency of the United States (USD). They can either buy or sell assets as measures to control their balance sheet. The largest assets held by the FED are Treasury notes and bonds, and mortgage-backed securities, which are debt instruments used to raise capital. When the FED buys large amounts of these assets (Quantitative Easing) the prices of these assets go up, and long-term interest rates fall (yields on government bonds decrease), as a result, loaning and investing are incentivized. This is done to support a weak economical situation, such as the financial crisis of 2008 or during the pandemic starting in 2020, which can be seen in the diagram above.

Since the availability of money increases due to Quantitative Easing (QE), the demand to invest in assets such as real estate and bonds, publicly traded real estate companies, and REITs increases for investors. Historically, this has led to higher valuations for real estate, stocks, corporate bonds, and REITs. The reason for higher valuations is that yields (cap rates for real estate) shrink as a result of lower financing costs, meaning that the investors' cashflow models can "accept" lower yields (higher purchasing prices) as the costs of financing decreases. Also, cap rate could be calculated with the yield spread formula (cap rate = yield on government bonds + risk premium – nominal growth rate), earlier I said that QE leads to lower yields for government bonds, this would imply that cap rates for real estate also decline. In a booming market (as a result of QE), this can then lead to investors racing towards a smaller and smaller spread between individual interest rates and yields, by purchasing the assets at a higher and higher valuation, as they want to acquire as much as possible to maximize their cash return.

As publicly traded real estate companies and REITs' valuations could be assessed based on their real estate portfolio (using for example the NAV discount/premium method), it is logical that the prices and valuations on them also increase as the cap rate of their portfolio declines.

To conclude, historical periods of sharp increases in the FED-held assets (financial crisis of 2008 or during the pandemic starting in 2020) have led to subsequent periods of declining yields and increasing valuations of assets in general, which in short could be explained by for example increased demand to invest.