

MBA792B – FINAL PROJECT

Instructions:

1. Answer all questions.
2. If you get stuck or unsure about what to do, use your best judgement to proceed, and explain in details your approach to the solution.
3. The project is open-book. However, you pledge your honor that you will work on the project alone, without consulting with other classmates.
4. Please upload your solution to Canvas by attaching all relevant excel file(s) and a summary of your answers in a word file.
5. Upload your solution by March 5th 8:00PM.

Only the relative performance matters for the final grade, not the absolute grade. Good luck!

Question 1

Your portfolio is made of Amazon, 3M, UnitedHealth, and Goldman. The annual interest rate for lending is 0.5%, and for borrowing is 2% annually. What is the portfolio with the highest Sharpe ratio if the target expected return of the investor is:

- (i) 39.6%?
- (ii) 54%?
- (iii) How do your answers to (i) and (ii) change if you cannot short sell stocks?

Data guidance:

- Download daily data on AMZN, 3M, UNH and GS. Your daily returns should start at 1/5/2010 and end at 12/30/2021.
- Set the daily lending rate to 0.5/360% and the borrowing rate to 2/360%. Likewise, convert the annual targets to daily frequency by dividing by 360.

Question 2

What is the expected return of the high-tech sector over 2022 based on the Carhart (4-factor) model?

Data guidance:

- Download annual factors data on MKT-RF, SMB, HML and MOM from Ken French's website for the sample of 1970-2021. Note that annual factors appear in the files after the monthly factors.
- Download historical annual returns of the high-tech sector from 1970-2021 obtained from the Fama French 10-industry portfolios, Column F. Note that annual returns appear in the files after the monthly returns.
- For the sector's risk exposures to MKT-RF, SMB, HML, and MOM use an annual regression.
- For the factors risk premia (i.e.. expected returns over 2022): $E[\text{MKT-RF}]$, $E[\text{SMB}]$, $E[\text{HML}]$, and $E[\text{MOM}]$ (or in different notation: $E[\text{WML}]$, it's the same), do a similar exercise to HW1. For each factor, regress one year ahead factor returns on the default spread, the term spread, gold-to-

platinum, inflation, CAY and P/E, from 1970-2020. Then use the fitted value in 2021 as your estimate for each factor's expected return.

Question 3

You can only pick one security out of Boeing, Duke Energy, or Expedia.

- (i) Which security would you pick if you believe in momentum style?
- (ii) Which security would you pick if you believe in value style?

Data guidance:

- Download monthly data on BA, DUK and EXPE. Your monthly returns should start at 2/1/2017 (end of January of 2017) and end at 1/1/2022 (end of December of 2021).
- Download monthly returns of MKT-RF, SMB, HML, MOM from 201701 to 202112.
- Use the data to recover exposures to the appropriate factors and base your answer on these exposures.

Question 4 (Qualitative)

- (i) Please provide a qualitative discussion on whether you would invest in VXX or SVXY over the next 2 weeks. Justify your answer with recent news items.
- (ii) Consider the following statements
 - I. A drop in the price-dividend ratio predicts a significantly higher excess return on the market over the next 5 years
 - II. An increase in the yield-to-maturity spread between BAA and AAA rated bonds predicts a significantly higher excess return on the market over the next year
 - III. The price-to-earning ratio is a better predictor for future market excess returns in short horizons than long horizons
 - IV. Gold-to-platinum is a better predictor for the next month market excess return than the variance risk premium

Which statements are correct? Explain.

Refer to File>Slides>Market Predictors.pdf for the table that your answer should be based on.