

The University of North Carolina at Chapel Hill

Kenan-Flagler Business School



MBA792A - Sample Exam

Spring 2023

Professor Gill Segal

Instructions:

Write your name and student ID in the space provided below. By writing your name, you pledge your honor that you will not violate the Honor Code during this examination. There are eighteen questions in this exam. Please answer all questions. The questions are multiple-choice: choose the correct answer, and guess if you do not know the answer. Write your final choice to each question in the table on the next page. You are allowed to have one cheat sheet (written on both sides), and a calculator (of any type).

You have three hours to complete the exam. Good Luck!

Name: _____

Student ID: _____

Question	Your Answer
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Question 1 (5 points)

Which of the following is typically not part of the money market?

- A. US T-bills
- B. Eurodollar accounts
- C. Municipal bonds
- D. Commercial paper
- E. Certificate of deposits

Question 2 (6 points)

You short sell X shares of Apple. The initial price of stock X is P_0 . The initial margin is 50%. Let P_1 the price of the stock when you get a margin call. The price when you receive a margin call is 35% higher (that is, $\frac{P_1}{P_0} - 1 = 35\%$). What is the maintenance margin?

- A. 10%
- B. 11.11%
- C. 12%
- D. 15%
- E. 15.38%

Question 3 (5 points)

Given the following information:

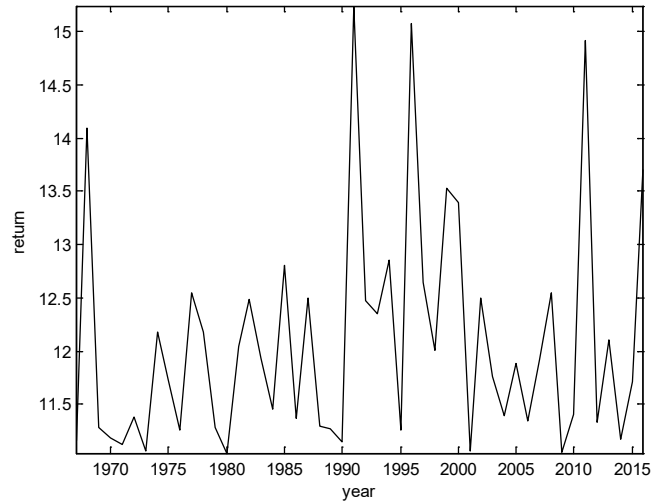
Stock	Initial Price	Final Price	Shares (million)
Meta	10	16	30
Home Depot	20	16	100

What is the percentage change in an index of these two stocks, assuming the index is computed like the S&P 500 Index?

- A. -20.00%
- B. -9.57%
- C. 6.67%
- D. 20.00%
- E. 30.00%

Question 4 (5 points)

Consider a stock whose returns over time are plotted below:

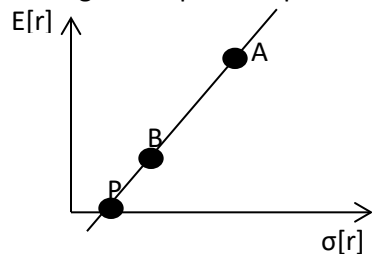


Which statement is correct?

- A. The skewness of the asset is positive, and the excess kurtosis is positive
- B. The skewness of the asset is negative, and the excess kurtosis is positive
- C. The skewness of the asset is positive, and the excess kurtosis is negative
- D. The skewness of the asset is negative, and the excess kurtosis is negative
- E. The skewness and the excess kurtosis are both zero

Question 5 (6 points)

There are two stocks: A and B. The investment opportunity set from these two stocks is depicted below, along with a possible portfolio P:



Complete the sentence:

“The correlation between the return on A and B must be ____, and to achieve portfolio P you need to ____ stock A, and ____ stock B.”

- A. 1, buy, buy
- B. 1, buy, short-sell
- C. 1, short-sell, buy
- D. -1, buy, buy
- E. -1, buy, short-sell

Question 6 (6 points)

You can only invest in the S&P500, whose expected return for the next year is 9%. Your goal is to obtain an expected return of 30% over the next year. You have 800 dollars that you intend to invest. Your broker is willing to lend you money at an interest rate of 2% (without a limit, no margin requirement). How much do you need to borrow from the broker?

- A. 240 dollars
- B. 400 dollars
- C. 1600 dollars
- D. 2400 dollars
- E. 4000 dollars

Question 7 (6 points)

There are two risky assets whose standard deviations are 4% and 8%, respectively. The returns on the two assets are uncorrelated (correlation = 0). There is no risk-free asset available. The minimum standard deviation of any portfolio in this economy must be:

- A. 0%
- B. 3.57%
- C. 4%
- D. 6.45%
- E. The answer is unknown without knowing the expected return of the two risky assets

Question 8 (6 points) [A bit more challenging]

There are only two risky assets in the economy with the following properties:

Asset	Expected Return	Standard Deviation
Alphabet	6%	5%
Berkshire Hathaway	10%	10%

The correlation between the assets is zero. The risk-free rate is 2% for both borrowing and lending.

Which statement is correct?

- A. The portfolio $w_f = 0.5, w_{Alphabet} = 0.428, w_{Berkshire} = 0.071$, is efficient.
- B. The portfolio $w_f = 0.4, w_{Alphabet} = 0.500, w_{Berkshire} = 0.100$, is efficient.
- C. The portfolio $w_f = 0.3, w_{Alphabet} = 0.560, w_{Berkshire} = 0.140$, is efficient.
- D. The portfolio $w_f = 0.2, w_{Alphabet} = 0.533, w_{Berkshire} = 0.267$, is efficient.
- E. The portfolio $w_f = 0.1, w_{Alphabet} = 0.675, w_{Berkshire} = 0.225$, is efficient.

Question 9 (6 points)

Assume CAPM holds. The ETF TQQQ is has no idiosyncratic variance, $var(e_{TQQQ}) = 0$. The asset's total risk is nine times as large as the market's ($\sigma_{TQQQ}^2 = 9\sigma_M^2$). What is the beta of TQQQ?

- A. 0.11
- B. 0.33
- C. 3
- D. 9
- E. The answer is unknown without knowing the correlation between TQQQ and the market.

Question 10 (6 points)

Assume the CAPM model holds. The risk free rate is 3%. The market *risk premium* is 6%. The betas of stocks Walmart and Exxon are 0.2 and 0.8, respectively. What is the expected rate of return of a portfolio whose weights are 50% in Walmart and 50% in Exxon?

- A. 1.5%
- B. 3%
- C. 4.5%
- D. 6%
- E. 7.8%

Question 11 (5 points)

The table below summarizes the predictive power of various variables for future market excess returns:

Table 3: Univariate Return Predictability

Table 3 shows univariate return predictability regressions for the U.S. equity market, controlling for other known predictors. January 1975 to December 2013, 468 monthly observations. The regression is:

$$\frac{12}{h} \sum_{i=1}^h \log R_{t+i} - \log R_{t+i}^f = \beta_0 + \beta_1 X_t + \epsilon_{t+h}$$

The left hand variable is the excess log return of the CRSP value-weighted index return, annualized by the horizon h . The right hand predictor is $\log GP$. Returns are calculated from overlapping monthly data, and t-statistics use Newey and West (1987) HAC robust standard errors. R_{adj}^2 is the adjusted R^2 statistic. X_t is a return predictor, including $\log GP$.

	1 month horizon			3 month horizon			1 year horizon			5 year horizon		
	Coef.	t-stat.	R_{adj}^2	Coef.	t-stat.	R_{adj}^2	Coef.	t-stat.	R_{adj}^2	Coef.	t-stat.	R_{adj}^2
$\log GP_t$	0.237	2.82	0.10	0.246	3.14	0.10	0.243	2.76	0.09	0.129	4.77	0.10
$\log PD_t$	-0.067	-1.19	0.00	-0.066	-1.39	0.00	-0.065	-1.30	0.00	-0.064	-2.94	0.00
$\log PE_t$	-0.045	-0.86	0.00	-0.045	-1.00	0.00	-0.050	-1.04	0.00	-0.049	-1.99	0.00
$\log PNY_t$	-0.096	-0.84	0.00	-0.084	-0.86	0.00	-0.122	-1.29	0.00	-0.095	-3.52	0.00
ICC_t	0.019	1.98	0.00	0.014	1.75	0.00	0.015	2.33	0.00	0.013	2.86	0.00
$DFSP_t$	0.013	0.18	0.00	0.016	0.25	0.00	0.035	0.88	0.00	0.032	1.07	0.00
$TMSP_t$	0.015	0.77	0.00	0.013	0.77	0.00	0.025	1.80	0.00	0.017	2.15	0.00
$INFL_t$	-0.071	-0.87	0.00	-0.008	-0.10	0.00	-0.081	-1.93	0.00	-0.013	-0.68	0.00
CAY_t	0.566	0.46	0.00	0.743	0.66	0.00	1.158	1.10	0.00	1.970	3.43	0.00
VRP_t^*	5.011	4.32	0.12	4.370	6.27	0.12	1.265	2.60	0.00	-0.487	0.99	0.00

Where GP is Gold to Platinum, PD is price-dividend ratio, PE is price-earning ratio, PNT is payout yield, ICC is implied cost of capital, DFSP is default spread, TMSP is term structure spread, INFL is inflation, CAY is consumption to wealth ratio, and VRP is the variance risk premium.

Which of the following predicts a significantly higher excess return on the market over the next 5 years?

- I. Increase in the Gold-to-platinum ratio
 - II. Increase in the variance risk premium
 - III. Increase in the Term Spread (10y-3m yield)
 - IV. Increase in the Price-to-earnings ratio
- A. I, II, III, IV
 - B. I, II, III only
 - C. I, II only
 - D. I only
 - E. None of the above

Question 12 (5 points)

According to the findings of Fama-French (1992), and our class discussions, which of the following is true?

- A. Fixing a size, portfolios' returns increase with their beta.
- B. Fixing a beta, portfolios' returns increase with their size.
- C. Higher Book to Market ratios imply higher expected returns.
- D. Controlling for book to market ratios, size does not explain expected returns.
- E. Past winners have lower expected returns 3 months ahead.

Question 13 (6 points)

Assume the three-factor model of Fama-French (1993) holds. The risk premium of the market factor is 0.43%. The risk premium of the SMB factor is 0.27%. The risk premium of the HML factor is 0.40%.

AbbVie has an exposure of 1.6 to the market factor, an exposure of 0 to SMB, and an exposure of 1.1 to HML. The actual expected excess rate of return on stock A is 1%.

Boeing has an exposure of 1.6 to the market factor, an exposure of 1.1 to SMB, and an exposure of 0 to HML. The actual expected excess rate of return on stock B is also 1%.

Therefore:

- A. Both stocks are fairly-priced
- B. You should buy both assets
- C. You should short-sell both assets
- D. You should buy AbbVie and short-sell Boeing
- E. You should buy Boeing and short-sell AbbVie

Question 14 (6 points)

Consider the multifactor model with two factors. The risk premiums of the factor 1 and factor 2 are 5% and 6%, respectively. 3M has an exposure of 1.2 to factor 1, and an exposure of 0.7 to factor 2. The expected return on the stock 3M is 17%. If no arbitrage opportunities exist, the risk-free rate is:

- A. 6.0%
- B. 6.5%
- C. 6.8%
- D. 7.4%
- E. 7.8%

Question 15 (6 points)

FedEx and Verizon have the following risk properties:

	Exposure to MKT	Exposure to SMB	Exposure to HML	Exposure to MOM
FedEx	0.8	0.7	2.1	-0.7
Verizon	1.2	0.1	-0.5	1.6

You buy \$3 of FedEx and short-sell \$2 of Verizon. Consider the following statements:

- I. Your portfolio has no market risk
- II. Your portfolio is tilted towards growth stocks
- III. Your portfolio will depreciate if the momentum factor increases
- IV. Your portfolio will appreciate if the S&P500 will outperform the Wilshire-5000

Which statements are correct?

- A. I only
- B. II only
- C. I and IV only
- D. II and III only
- E. I, III and IV only

Question 16 (5 points)

The following table is taken from the Fama-French Five-Factor Model paper:

	Intercept	RM-RF	SMB	HML	RMW	CMA	R ²
RM-RF	9.8% (4.94)		0.25 (4.45)	0.03 (0.37)	-0.40 (-4.84)	-0.91 (-7.82)	24%
SMB	4.6% (3.22)	0.13 (4.45)		0.05 (0.81)	-0.48 (-8.42)	-0.17 (-1.92)	18%
HML	-0.5% (-0.46)	0.01 (0.37)	0.02 (0.81)		0.23 (5.39)	1.04 (23.04)	52%
RMW	5.2% (5.44)	-0.09 (-4.84)	-0.22 (-8.42)	0.20 (5.39)		-0.44 (-7.85)	22%
CMA	3.3% (5.03)	-0.10 (-7.82)	-0.04 (-1.92)	0.45 (23.04)	-0.21 (-7.85)		57%

Which factor's variation is explained the most by all other factors?

- A. The market factor
- B. The size factor
- C. The value factor
- D. The profitability factor
- E. The investment factor

Question 17 (5 points)

When the Fed raises interest rates aggressively, you should tilt your portfolio towards:

- A. The technology sector
- B. The Nasdaq index
- C. Firms that invest more heavily
- D. Growth stocks
- E. Value stocks

Question 18 (5 points)

Based on sector rotation, you should consider tilting your portfolio towards utilities if you see that:

- A. The conference board leading economic index increased over the last 12 month
- B. The 3-month treasury yield-to-maturity is lower than the 10-year yield
- C. The Copper to gold ratio declined over the last year
- D. The Dow rose sharply over the last year
- E. The VIX is expected to fall over the next year