BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI - K. K. BIRLA GOA CAMPUS
Second Semester 2022-23, Mid-Term Examination
Security Analysis and Portfolio Management (ECON F412, FIN F313)
(Answer all questions)
Examination Date: 18th Mar, 2023. Duration: (4pm – 5.30pm) 90 Min. Max Marks: 70 (35% weight)

Instructions: This is a CLOSED book examination. Only calculators are allowed. Answer in the required format wherever mentioned to be considered for evaluation.

Question I: (20 MARKS)
"King Charles appoints Rishi Sunak as UK's 57th Prime Minister"....ET Online, October 25th 2022
With Rishi Sunak As PM, Stability Will Help India-UK Trade Talks": Experts...India News, October 25th 2022.

Experts suggest that with Rishi Sunak as PM of the UK, stability will help India-UK Trade talks and the Implementation of the proposed India-UK free trade agreement will help to boost the country's exports sector like medical transcription, legal, accounting and auditing and other large sectors like textiles, leather goods and footwear.
As an analyst, you are trying to analyze the impact of the appointment of the UK's New Prime Minister on the companies with export businesses such as textile and footwear.
You wanted to analyze the impact on two companies; Grasim Ltd.(**GR**) and Bata India Ltd. (**BA**). The event day is **25th October 2022** when Rishi Sunak is appointed as UK's PM.

You fitted the Fama French 3-factor model (equation 1) to find the estimates of the sensitivity of returns for the estimation period (-220 to -20 days from event day) for the two firms (TM and MH).
$$Ri - Rf = \alpha i + \beta 1i\,(Rm - Rf) + \beta 2i\,(SMB) + \beta 3i\,(HML) + ei \ ....(1)$$
Following Table 1.1 are the results of the Fama French 3 factor model of asset returns
Table 1.1 : Estimates of Fama French 3 factor model

Company	$\beta 1$	$\beta 2$	$\beta 3$	alpha
GR	30% less volatile than market	-0.3	0.6	Insignificant
BA	60% less volatile than market	-0.5	0.4	Insignificant

You have the following information Table 1.2 on the Adjusted Closing Prices of the two associated company, and of a Market Index.

Table 1.2: Adjusted Closing Prices

Trading Date	Adjusted Closing Prices (INR)		
	GR	BA	Market Index
21-10-2022	1677	1977	17576
24-10-2022	1699	1883	17731
25-10-2022	1714	1978	17656
27-10-2022	1724	1906	17737
28-10-2022	1684	2020	17787

The returns data for stocks based on market-to-book ratio and market capitalization are provided in Table 1.3. The returns of the below stocks based on market-to-book ratio and market capitalization in Table 1.3 can be considered constant for the three event window days (-1 to +1)

Table 1.3 : Returns information

Returns	High Market to Book ratio stocks	Neutral Market to Book stocks	Low Market to Book ratio stocks
Low Market cap stocks	0.21%	0.28%	0.41%
High Market cap stocks	0.25%	0.24%	0.11%

Question II: (10 MARKS)
Each blank carries 1 mark

2.1 The efficient line where riskless lending and borrowing are allowed and where the tangent portfolio on the efficient frontier of risky assets is the market index is called the ----------------market line

2.2 ---------------is a conditional market order to sell stock if it drops to a given price.

2.3 A short ---------- occurs when a stock moves sharply higher, prompting traders who bet its price would fall to buy it in order to avoid greater losses.

2.4 The tendency of winning stocks to continue performing well in the near term which is also one of the factors in the 4 factor Fama-French model or the *Carhart* 4 factor model of asset pricing is ------------------.

2.5 Variance of a portfolio with equi-proportionate investments in each security is approximately equal to the average ------------------as the number of securities becomes very large.

2.6 The ------------risk of the firm is diversifiable.

2.7 Researchers came up with the Single index model to reduce the ----------------errors in the Mean-variance model.

2.8 CAPM is a market --------------model.

2.9 On any type of order, instead of paying 100% cash, investors can borrow a portion of the transaction and use the stock as collateral, which is called --------------------transactions.

2.10 The name of the economist who developed the Arbitrage Pricing Theory (APT) model is --------------------

Question III: (10 marks)

"Arbitrage human nature. It's not going to change any time soon."

(10 MARKS) You are hired as an intern at *BlackRock Associates* hedge fund (BAH). Your task is to figure out if there exist a riskless pure arbitrage opportunity in the market. There are no restrictions on short selling in the market. The Hedge fund BAH had allocations in the renewable energy funds. Prior research by fund managers showed that returns were explained by a two factor model with the factors being the unanticipated changes in the energy policy (λ_1) and the unanticipated changes in GDP growth rate (λ_2).
Following information on the sensitivities of returns (b_{i1} & b_{i2}) of the fund to the two factors (λ_1 and λ_2) are provided in addition to their expected returns: -

Fund	Expected Return E(R)	b_{i1}	b_{i2}
National Hydro fund (H)	11%	1.5	0.8
National Solar fund (S)	16%	2	0.3
National Wind fund (W)	13%	0.2	-0.5

3.1 (4 marks) Find the equation of the plane ($E(R) = \lambda_0 + b_{i1}\lambda_1 + b_{i2}\lambda_2$) that must describe equilibrium returns.

3.2 (6 marks) You had been following the Green fund (GF). The sensitivity of GF fund returns to the first factor was $b_{gf1} = 0.9$ and second factor was $b_{gf2} = 1.2$ The estimated return of GF fund is 11%. Is there a riskless pure arbitrage opportunity existing, **show all steps and conditions for** a riskless pure arbitrage, with the long short strategy?

Q.4) Based on the following stock price and shares outstanding information, compute the beginning and ending values for a price-weighted index and a market-value-weighted index.

	DECEMBER 31, 2002		DECEMBER 31, 2003	
	Price	Shares Outstanding	Price	Shares Outstanding
Stock K	20	100,000,000	32	100,000,000
Stock L	80	2,000,000	45	4,000,000[a]
Stock M	40	25,000,000	42	25,000,000

[a]Stock split two-for-one during the year

a) What is the percentage change in the value of price-weighted index? (3 Marks)
b) What is percentage change in the value of market value-weighted index? (3 M)

Q.5) Consider a world with only two risky assets, A and B, and a risk-free asset. Stock A has 200 shares outstanding, a price per share of $3.00, an expected return of 16% and a volatility of 30%. Stock B has 300 shares outstanding, a price per share of $4.00, an expected return of 10% and a volatility of 15%. The correlation coefficient $\rho_{AB} = 0.4$. Assume CAPM holds. (4 Marks)

(a) What is expected return of the market portfolio?

(b) What is volatility of the market portfolio?

(c) What is the beta of each stock?

(d) What is the risk-free rate?

Q.6) **Briefly answer the following** (3*3 = 9 marks)

A) What are the similarities and differences between the CML and SML as models of the riskreturn trade-off?

B) Define and discuss the weak-form EMH. Describe the two sets of tests used to examine the weak-form EMH.

C) Define Market order and Limit order with example.

Q.7) Fill in the blanks (11*1 = 11M)

1. Beta is the slope of SML (True/False) _____

2. The beta, of a security is equal to the covariance between the security and market returns divided by the variance of the market's returns (True/False) _____

3. _____ is the difference between the performance of an indexing scheme and the benchmark index

4. You believe that stock prices reflect all relevant information including historical stock prices and current public information about the firm, but not information that is only available to insiders. Which form of the EMH you believe?

5. You want to purchase IBM stock at Rs.80 from your broker using as little of your own money as possible. If the initial margin is 50% and you have Rs.2000 to invest, you will buy 25 shares (True/False) _____

6. In CAPM, is there any way to identify the investors who are more risk averse? (Yes/No) _____

7. _____ is on the horizontal axis of the Security Market Line?

8. You are considering two assets with the following characteristics.
$E(R1) = 0.15$ $E(\sigma 1) = 0.10$ $w1 = 0.5$
$E(R2) = 0.20$ $E(\sigma 2) = 0.20$ $w2 = 0.5$
if $r1,2 = 0.40$, Compute the mean of two portfolios _____

9. Assuming the prevailing initial margin requirement is 40%, commissions are ignored, and Bata is selling at Rs. 35 per share, Shayam purchases 3571 shares using the maximum allowable margin. If the maintenance margin is 30%, to what price can Bata's share fall before Shayam will receive a margin call? _____

10. Stock A has a beta of 1.20 and Stock B has a beta of 0.8. Suppose rf = 2% and RM = 12%. According to the CAPM, what are the expected returns for each stock? _____

11. The volatility of a stock price is 30% per annum. What is the standard deviation of the percentage price change in one trading day? (260 trading days) _____

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