Portfolio Management: Mock Exam 1 - Session 1 - Answers

Passage for Questions 1.1–1.3

TOPIC: PERFORMANCE MEASUREMENT
TOTAL POINT VALUE OF THIS QUESTION SET IS 12 POINTS

Last year, Celia Horne launched the Longacre Fund with a mandate to invest in companies that are perceived to be trading significantly below their intrinsic value. Over its first year, the fund generated a 14% return, which was 1.6% above the return on Horne's benchmark.

As the general partner in a limited partnership structure, Horne's compensation package is centered around a standard fee of 0.50% of assets under management (AUM). Horne's base fee is 0.20%, which she receives regardless of the fund's performance, and she earns a 25% share of the fund's excess return above its benchmark net of her base fee. Horne's annual compensation is capped at 0.80% of AUM and her incentive fee is subject to a high-water mark provision. When describing her compensation package to the fund's limited partners, Horne uses the analogy of call option positions.

Question 1.1

4 points

Discuss *one* benefit and *one* drawback of the Longacre Fund's high-water mark provision from the perspective of its limited partners.

Model Solution

After a decline in a fund's value, a high-water mark provision prevents the manager from earning incentive fees until the fund has returned to its previous peak.

Investors benefit from this because they are not obligated to pay more than once for the same performance. The manager must overcome the impact of negative returns before being eligible to earn new incentive fees.

The drawback of this provision is that managers who are significantly below their high-water mark have an incentive to return funds to investors, who miss out on the opportunity to recover their prior losses without having to pay incentive fees on these gains.

Grading Guide

- 2 points for noting the protection against paying for the same performance
- 2 points for noting the potential inability to recoup losses without paying incentive fees

Question 1.2

4 points

Describe the call option positions that the Longacre Fund's limited partners have effectively taken with respect to Horne's fee structure.

Note: No calculations are required. Ignore the potential impact of the high-water mark.

Model Solution

Horne's compensation package ensures that she will receive her base fee at a minimum, regardless of the fund's performance. Using the analogy of options, the limited partners have effectively sold a call with a strike price of the 0.20% base fee.

However, because Horne's fees are subject to an upper limit, investors have effectively combined their short 0.20% call position with a long position in a call with a strike price of 0.80%.

Grading Guide

- 2 points for describing the investors' short 0.20% call position
- 2 points for describing the investors' long 0.80% call position

Question 1.3

4 points

Determine the minimum amount by which Horne must outperform the Longacre Fund's benchmark in order to maximize her annual compensation.

Model Solution

Horne's maximum total annual compensation is limited to 0.8% of fund assets, of which 0.2% comes in the form of a base fee. This allows for a maximum incentive fee of 0.6%.

With Horne's 25% sharing rate, the excess return that would maximize her incentive fee is:

$$\frac{0.6\%}{25\%} = 2.4\%$$

The 25% sharing rate is applied to excess returns net of the base fee. Therefore, in order to maximize her annual compensation, Horne would need to **outperform the fund's benchmark by 2.6%**.

Grading Guide

- 1 point for identifying the 0.6% maximum incentive fee
- 2 points for determining the 2.4% excess return that maximizes Horne's incentive fee
- 1 point for arriving at the overall required excess return of 2.6%

Passage for Questions 2.1–2.4

TOPIC: PORTFOLIO MANAGEMENT
TOTAL POINT VALUE OF THIS QUESTION SET IS 12 POINTS

Tina Halverstrom manages the Magnolia Fund, which holds various combinations of long and short positions. Halverstrom's investment decisions are based on the premise that correlations revert to their long-term average. For example, if the correlation between two stocks with a historical correlation of 0.9 falls to 0.6, she will go long the underperforming stock and sell the other stock short. All of her decisions are made within the parameters of formal constraints, including value at risk (VaR) and conditional value at risk (CVaR).

Currently, Halverstam has taken three positions in the Magnolia Fund. Asset weights and return covariances are shown in the exhibits below.

Exhibit 1: Asset weights

	Portfolio	Benchmark
Asset A	47%	31%
Asset B	69%	55%
Asset C	-16%	14%

Exhibit 2: Return covariances

	Asset A	Asset B	Asset C
Asset A	0.021459	-0.003649	0.001415
Asset B		0.003706	-0.001336
Asset C			0.003626

Question 2.1

3 points

Halverstrom’s strategy is *most* accurately described as:

A. factor timing.

B. a short squeeze.

C. statistical arbitrage.

Written Solution

Statistical arbitrage is a strategy that seeks to profit from perceived temporary deviations from long-term historical correlations. This is a highly quantitative form of pairs trading.

A short squeeze occurs when an investor takes a short position and is required to post additional collateral as the stock's price rises. The investor may ultimately be forced to repurchase the stock at a significantly higher price than the amount that was borrowed. This is not an investment strategy but rather a situation that investors taking short positions seek to avoid.

A factor timing strategy seeks to adjust a portfolio’s exposure to rewarded factors based on expectations about which ones will outperform.

Question 2.2

3 points

For the same time period, which of the following measures is *most likely* highest for the Magnolia Fund?

A. 1% VaR

B. 1% CVaR

C. 5% CVaR

Written Solution

Value at risk is the minimum loss that can be expected X% of the time over a specific period. If 5% VaR is $100 million, 1% VaR will be greater than $100 million because losses that are expected only 1% of the time are more catastrophic than losses that are expected more frequently.

Conditional VaR is the loss that is expected in the event that a given VaR threshold is exceeded. If 1% VaR is $150 million, 1% CVaR will be greater because it is the average of all expected losses in excess of $150 million.

1% CVaR must be greater than 5% CVaR because it includes all of the same extreme losses but does not include some of the less extreme expected losses.

Question 2.3

3 points

Which of the Magnolia Fund's positions *most likely* has the highest active share?

A. Asset A

B. Asset B

C. Asset C

Written Solution

Active share is the absolute value of the difference between an asset's weight in a portfolio and its weight in the portfolio's benchmark. In this example, there is a 30% difference between Asset C's portfolio weight (-16%) and its benchmark weight (14%). This is greater than the 16% and 14% active weights for Asset A and Asset B, respectively.

Question 2.4

3 points

Asset A's contribution to the Magnolia Fund's variance is *closest* to:

A. 0.00345.

B. 0.00582.

C. 0.00603.

Written Solution

Asset A's contribution to total variance is calculated as follows:

$$CV_A = \sum_{j=1}^{n} x_A x_j C_{Aj}$$

$$= (0.47)(0.47)(0.021459) + (0.47)(0.69)(-0.003649) + (0.47)(-0.16)(0.001415)$$

$$= 0.00345$$

Passage for Questions 3.1–3.4

TOPIC: ASSET ALLOCATION
TOTAL POINT VALUE OF THIS QUESTION SET IS 12 POINTS

Mary Whitman is a portfolio manager who works for Optimal Asset Management, a large firm that advises institutions and individuals on how to best manage their assets. Whitman prepares for a series of calls with clients next week.

Whitman prepares first to respond to a couple of questions raised in a previous phone call with Arthur Piccione, a wealthy investor who seeks tailored investment advice. Piccione stated that mean-variance optimization has its shortcomings, claiming that “In mean-variance optimization, the efficient portfolios tend to have asset allocations that span many asset classes when there are many investable choices. Also, mean-variance optimization does not address the presence of liabilities, as portfolios often exist to fund specific obligations.”

In drafting her reply to Piccione, Whitman states the following about alternatives to mean-variance optimization:

- Statement 1: “Reverse optimization estimates expected returns for forecasting.”
- Statement 2: “The Black-Litterman model allows investors to combine their forecasts with those derived from reverse-optimization.”

Next, Whitman prepares her response to Natalie Colbert, a lead portfolio manager of a large property and casualty (P&C) insurer. Colbert is primarily interested in liability-relative asset allocations and she asks Whitman to compare the benefits of using surplus optimization and the two-portfolio approach. Whitman responds with the following comment: “Conservative investors should use the two-portfolio approach. However, for an investor with a multi-period horizon, it is best to use surplus optimization.”

Whitman anticipates that Colbert will also ask about how asset-liability management applies at a large insurer within the context of enterprise risk management. Whitman notes that P&C insurers often assess their risk exposure using measures such as 1% value-at-risk or conditional-value-at-risk.

Question 3.1

3 points

Are Piccione's comments about efficient portfolios under mean-variance optimization *most likely* accurate?

A. Yes

B. No, because its efficient portfolios address the presence of liabilities

C. No, because its asset allocations tend to be highly concentrated among a few asset classes even when there are many investable choices.

Written Solution

Piccione's comment about efficient portfolios under mean-variance optimization is inaccurate. Efficient portfolios created under mean-variance optimization tend to be concentrated in a few asset classes. It is accurate to say that efficient portfolios under mean-variance optimization ignore the presence of liabilities.

Question 3.2

3 points

What is the *most* accurate assessment of Whitman's statements on alternatives to mean-variance optimization?

A. Statement 1 and Statement 2 are both correct

B. Statement 1 is correct and Statement 2 is incorrect

C. Statement 1 is incorrect and Statement 2 is correct

Written Solution

Both of Whitman's statements are correct. Reverse optimization and the Black-Litterman model are two alternatives to mitigate shortcomings of mean-variance optimization.

Since reverse optimization estimates expected returns for forecasting, it lowers the estimation error associated with mean-variance optimization. The Black-Litterman model further incorporates investor beliefs into the portfolio optimization process.

Question 3.3

3 points

Is Whitman's comment about liability-relative asset allocations *most likely* correct?

A. Yes

B. No, because conservative investors should use integrated asset-liability portfolios instead of the two-portfolio approach

C. No, because investors with multi-period investment horizons should use integrated asset/liability management instead of surplus optimization

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Written Solution

Whitman's note about investors with multiple periods is incorrect. Rather than using surplus optimization, these investors should use integrated asset/liability management. Surplus optimization extends mean-variance optimization to incorporate liabilities under a single period. By contrast, integrated asset/liability management allows the analysis of multiple periods within an investor's future.

Whitman is correct in her assessment that conservative investors should use the hedging/return-seeking portfolio method. This method offers the investor the highest probability of closely matching assets and liabilities, thereby minimizing the downside risk.

Question 3.4

3 points

The measures noted by Whitman are *most likely* used by P&C insurers to quantify:

A. tail risk.

B. basis risk.

C. systematic risk.

Written Solution

Large insurers use the 1% VaR and conditional VaR measures to quantify tail risks. For example, P&C insurers seek to assess the potential impact of high-severity, rare events such as tornadoes and earthquakes.