

Financial Exam Help 123™

2027 Level III Mock Exam Portfolio Management Pathway

Morning Session Sample Exam Full Guideline Answers

Question 1 relates to Derivative Securities – Core Curriculum**AJBWU Case Scenario**

- 1.1 To achieve Degenek's target asset allocation and target betas, **determine** the action (buy or sell) and the number of small-cap equity futures contracts required.

Degenek wants to reallocate 30% of AUD 200,000,000 – AUD 60,000,000 – from large-cap equity to small-cap equity. To do this, he will, in essence, convert AUD 60,000,000 from large-cap equity to cash (with a beta of zero), then convert AUD 60,000,000 of cash to small-cap equity. He also wants to increase the beta on the small-cap equity allocation from 0.90 to 1.25.

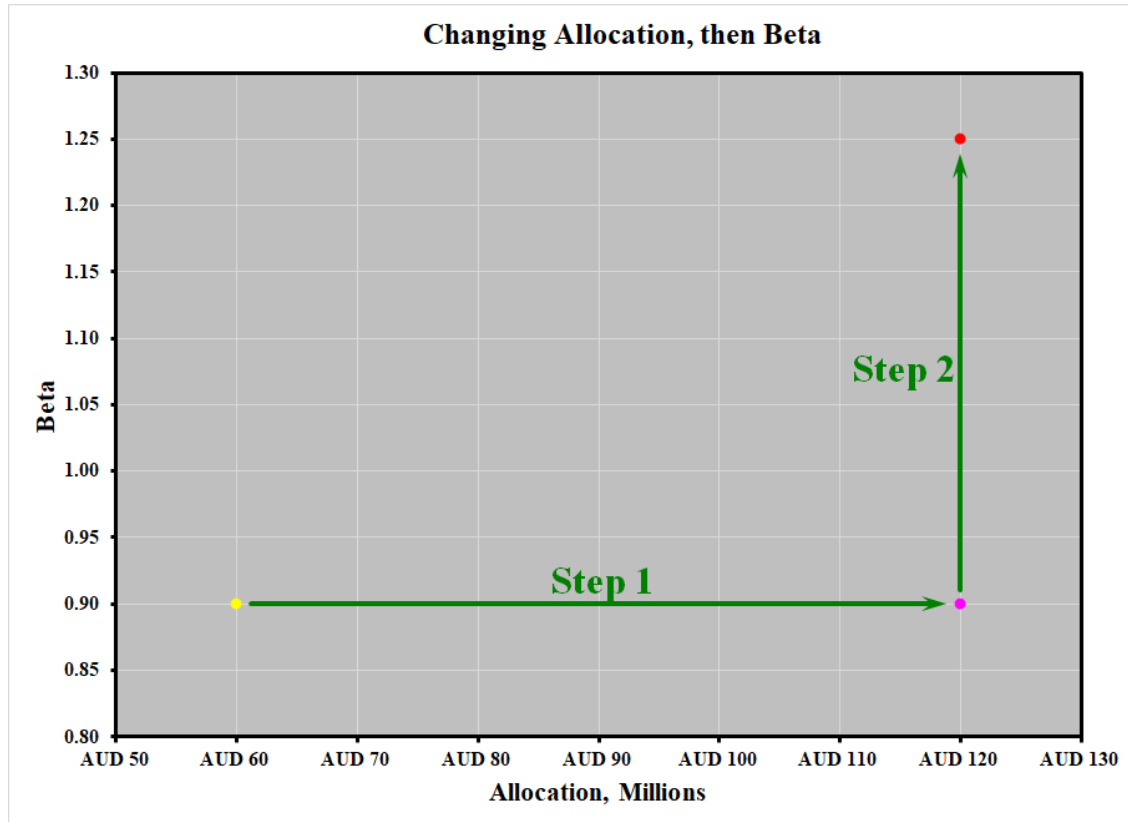
To accomplish this, there are broadly three approaches Degenek can follow:

1. First reallocate the portfolio, then increase the beta of the resulting small-cap equity portfolio.
2. First increase the beta of the existing small-cap equity portfolio, then reallocate the portfolio.
3. Increase the beta of the existing small-cap equity portfolio and reallocate the portfolio simultaneously.

I'll cover all three approaches.

Reallocation, then Beta

Graphically, changing the allocation, then changing the beta, looks like this:



Step 1: To change the allocation from AUD 60,000,000 (= AUD 200,000,000 × 30%) to -----AUD 120,000,000 (= AUD 200,000,000 × 60%), the number of small-cap equity index futures contracts that Degenek needs to execute is:

$$N_{sf} = \frac{S_T - S_P}{f_s} \times \frac{\beta_P}{\beta_f}$$

where:

- N_{sf} = number of small-cap equity index (stock) futures contracts
- S_T = target portfolio size (AUD 120,000,000)
- S_P = existing portfolio size (AUD 60,000,000)
- f_s = small-cap equity index (stock) futures price (AUD 104,000)
- β_P = beta of the existing small-cap portfolio (0.90)
- β_s = beta of the small-cap equity index futures contract (1.30)

$$N_{sf} = \frac{S_T - S_P}{f_s} \times \frac{\beta_P}{\beta_f}$$
$$= \frac{\text{AUD } 120,000,000 - \text{AUD } 60,000,000}{\text{AUD } 104,000} \times \frac{0.90}{1.30} = \underline{\underline{399.41}}$$

Step 2: To increase the beta from 0.90 to 1.25 (on the new small-cap equity allocation of AUD 120,000,000), the number of small-cap equity futures contracts that Degenek needs to execute is:

$$N_{sf} = \frac{\beta_T - \beta_P}{\beta_f} \times \frac{S_P}{f_s}$$
$$= \frac{1.25 - 0.90}{1.30} \times \frac{\text{AUD } 120,000,000}{\text{AUD } 104,000} = \underline{\underline{310.65}}$$

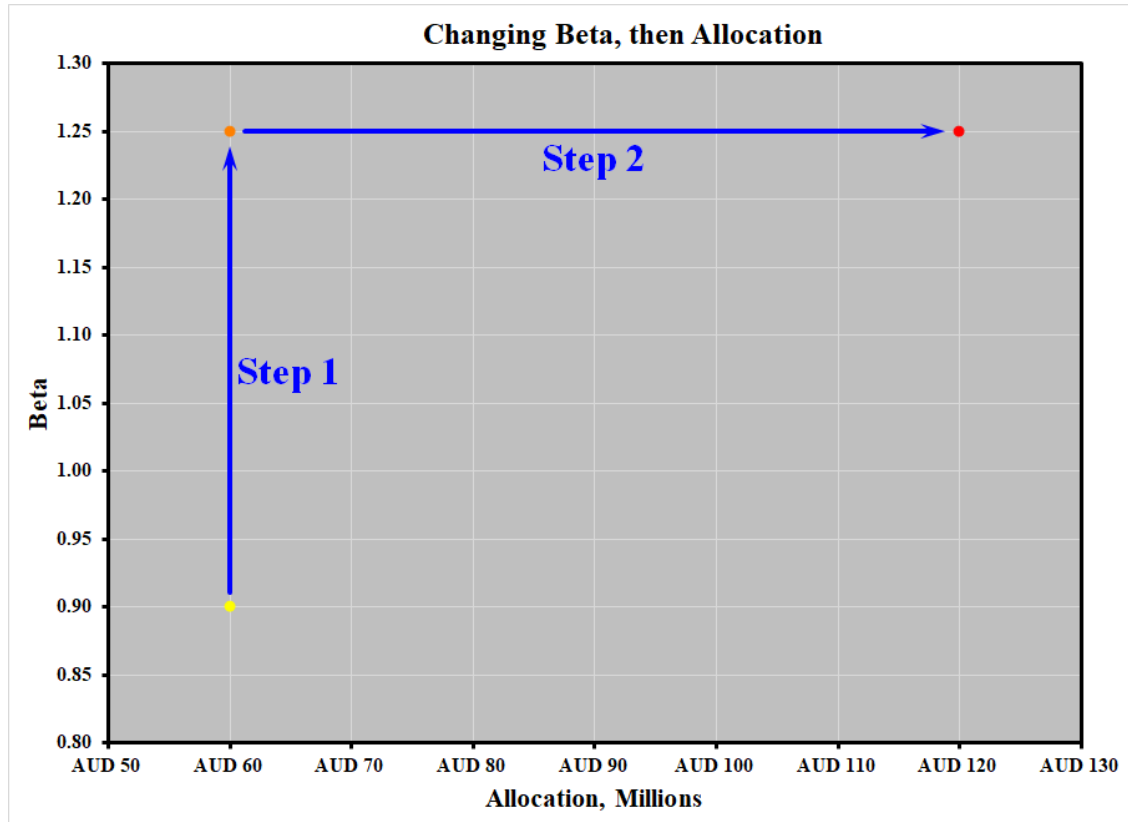
The total number of small-cap equity index futures contracts that Degenek needs to execute is:

$$399.41 + 310.65 = \underline{\underline{710.06}}$$

Therefore, Degenek should buy (i.e., take the long position in) 710 small-cap equity index futures contracts.

Beta, then Reallocation

Graphically, changing the beta, then changing the allocation, looks like this:



Step 1: To increase the beta from 0.90 to 1.25 (on the existing small-cap allocation of AUD 60,000,000 (= 30% × AUD 200,000,000)), the number of small-cap equity futures contracts that Degenek needs to execute is:

$$N_{sf} = \frac{\beta_T - \beta_P}{\beta_f} \times \frac{S_P}{f_s}$$

$$= \frac{1.25 - 0.90}{1.30} \times \frac{\text{AUD } 60,000,000}{\text{AUD } 104,000} = \underline{\underline{155.33}}$$

Step 2: To change the allocation from AUD 60,000,000 (= AUD 200,000,000 × 30%) to AUD 120,000,000 (= AUD 200,000,000 × 60%) on a portfolio that now has a beta of 1.25, the number of small-cap equity index futures contracts that Degenek needs to execute is:

$$N_{sf} = \frac{S_T - S_P}{f_s} \times \frac{\beta_P}{\beta_f}$$
$$= \frac{\text{AUD } 120,000,000 - \text{AUD } 60,000,000}{\text{AUD } 104,000} \times \frac{1.25}{1.30} = \underline{\underline{554.73}}$$

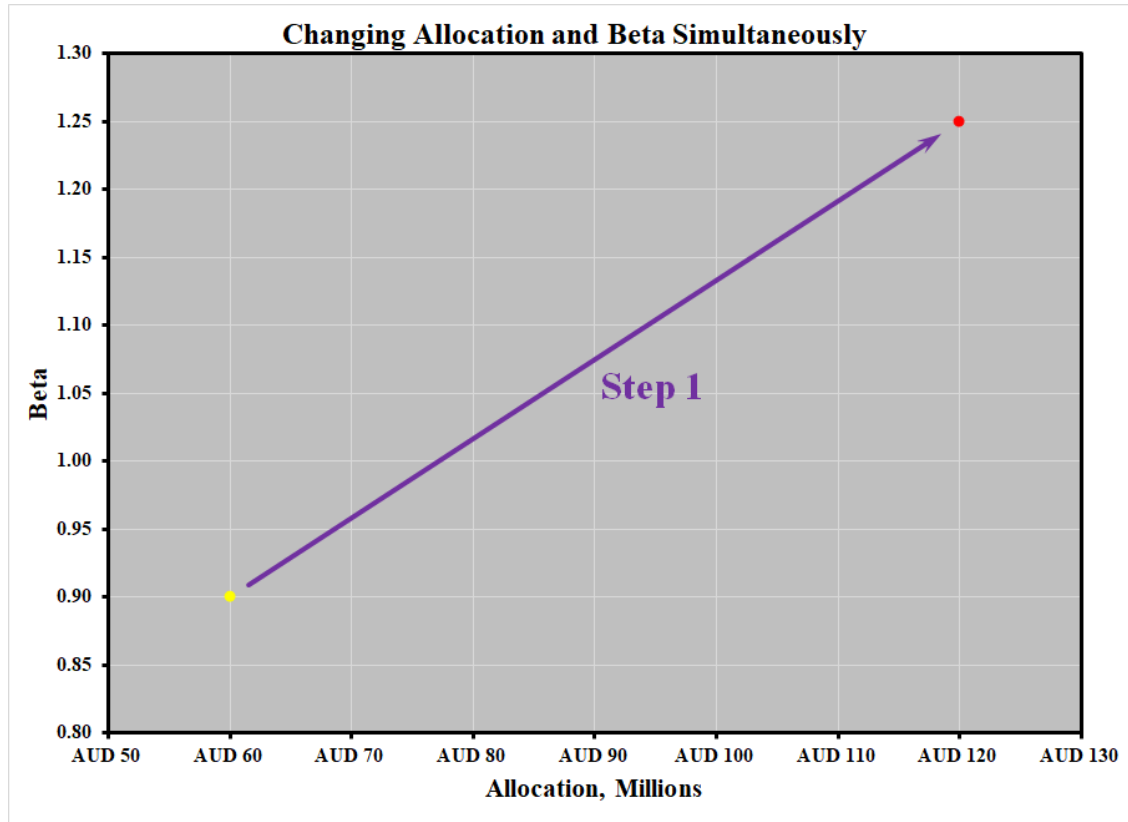
The total number of small-cap equity index futures contracts that Degenek needs to execute is:

$$155.33 + 554.73 = \underline{\underline{710.06}}$$

Therefore, Degenek should buy (i.e., take the long position in) 710 small-cap equity index futures contracts.

Reallocation and Beta Simultaneously

Graphically, changing the allocation and beta simultaneously looks like this:



Step 1: The existing AUD-beta (money beta) of the small-cap portfolio is:

$$\text{AUD } 60,000,000 \times 0.90 = \text{AUD } 54,000,000$$

The target AUD-beta of the portfolio is:

$$\text{AUD } 120,000,000 \times 1.25 = \text{AUD } 150,000,000$$

The AUD-beta of a small-cap equity index futures contract is:

$$\text{AUD } 104,000 \times 1.30 = \text{AUD } 135,200$$

The number of small-cap equity index futures contracts to execute to change the small-cap equity portfolio's value and beta is:

$$N_{sf} = \frac{\text{money-}\beta_T - \text{money-}\beta_P}{\text{money-}\beta_f}$$
$$= \frac{\text{AUD } 150,000,000 - \text{AUD } 54,000,000}{\text{AUD } 135,200} = \underline{\underline{710.06}}$$

Therefore, Degenek should buy (i.e., take the long position in) 710 small-cap equity index futures contracts.

Allocation of marks:

6 marks for the correct answer (710 contracts, *buy or long position*)

If the answer is incorrect:

1 mark for the correct formula for increasing the allocation to small-cap equity

1 mark for the correct calculation of the number of contracts to increase the allocation to small-cap equity

1 mark for the correct formula for changing the beta of the resulting small-cap equity allocation

1 mark for the correct calculation of the number of contracts to change the beta of the resulting small-cap equity allocation

1 mark for correctly adding the numbers of contracts

1 mark for correctly interpreting the positive sign as buying / taking the long position

Reading:

Swaps, Forwards, and Futures Strategies

LOS: Demonstrate how interest rate swaps, forwards, and futures can be used to modify a portfolio's risk and return.

- 1.2 **Identify** *one* alternative derivative strategy that Degenek could use to achieve his goals *instead of his proposed futures strategy*.

Synthetic futures using options

– or –

Total return equity swap

Identify the derivative security(ies) that Degenek would use, and **describe** his position (e.g., long, short, buy, sell, etc.) in *each* derivative security.

The short position in large-cap equity index futures can be created synthetically with a combination of a short position in large-cap equity index call options and a long position in large-cap equity index put options. To duplicate the futures position exactly, the strike price on the options would have to equal the large-cap equity index futures price.

The long position in small-cap equity index futures can be created synthetically with a combination of a long position in small-cap equity index call options and a short position in small-cap equity index put options. To duplicate the futures position exactly, the strike price on the options would have to equal the small-cap equity index futures price.

– or (respectively) –

The short position in large-cap equity index futures and the long position in small-cap equity index futures can be approximated with a total return equity swap. In this case, Degenek would enter into the swap to pay the large-cap equity return and receive the small-cap equity return on a notional value equal to the value that Degenek wants to reallocate from large-cap to small-cap.

A wrinkle in using the swap is that the notional value typically does not change over time, even though the values of the underlying equity portfolios will change over time. However, as swaps are custom derivatives, the details are open to negotiation; Degenek could negotiate to have the returns calculated on notional values that change over time.

Allocation of marks:

2 marks for identifying the strategy of creating a synthetic futures position using options

1 mark for identifying the short position in large-cap equity call options

1 mark for identifying the long position in large-cap equity put options

1 mark for identifying the long position in small-cap equity call options

1 mark for identifying the short position in small-cap equity put options

— or —

2 marks for identifying the strategy of using an equity swap

2 marks for specifying paying the large-cap equity total return

(Less: **1 mark** for not specifying *total* return)

2 marks for specifying receiving the small-cap equity total return

(Less: **1 mark** for not specifying *total* return)

Reading:

Swaps, Forwards, and Futures Strategies

LOS: Demonstrate how equity swaps, forwards, and futures can be used to modify a portfolio's risk and return.

Question 2 relates to Equity Investments – Portfolio Management Pathway**SGIA Case Scenario**

- 2.1 Each of the correlations that Garcia asks Chirwa to calculate is *most accurately* described as a:
- a. Transfer coefficient (TC)
 - b. Pearson information coefficient (IC)**
 - c. Spearman information coefficient (IC)

The correlation between factor exposures and stock returns is known as the information coefficient (IC). When a correlation is calculated on calculated values of the exposures and the calculated values of the returns (rather than ranking the calculated exposures, ranking the calculated returns, and computing the correlation of the rankings), it is known as a Pearson correlation. Thus, Chirwa's calculation is a Pearson IC.

Answer a. is incorrect: the transfer coefficient measures the manager's ability to translate his or her insight into investment decisions; here, it would be the correlation between the factor exposures and the corresponding active weights the manager would implement for those exposures.

Answer c. is incorrect: the Spearman IC is the correlation between the ranks of the exposures and the ranks of the return values, rather than between their respective calculated values.

Reading:

Active Equity Investing: Strategies

LOS: Describe how quantitative active investment strategies are created.

2.2 The futures position undertaken by Edathodika is *best* described as a:

- a. Currency overlay
- b. Completion overlay**
- c. Rebalancing overlay

A completion overlay is used when an index portfolio has drifted from its proper (or mandated) exposures. A common example is a portfolio that has a large cash balance (e.g., from a large cash contribution, or from accumulated dividends that have not been reinvested), causing the portfolio's beta to be significantly lower than desired. This is exactly the situation that Edathodika is addressing with the futures position.

Answer a. is incorrect: a currency overlay transforms the return in one currency into a return in a different currency (e.g., by using currency forwards, currency futures, or currency swaps). A common use of a currency overlay is to hedge the returns on holdings denominated in foreign currencies back to the home currency of the investor.

Answer c. is incorrect: although a rebalancing overlay is also used when a portfolio's exposures have drifted from their desired levels, it is used specifically in situations where some securities would need to be sold and others purchased, which is not the case here (no securities need to be sold). A common use for a rebalancing overlay is in a mixed equity/fixed income portfolio to return the equity percentage and the fixed income percentage to their desired levels, which would normally involve selling stocks and buying bonds or vice versa.

Reading:

Passive Equity Investing

LOS: Compare different approaches to passive equity investing.

- 2.3 The *most appropriate* management styles for Benjamin to employ for the Kendall and Geneva portfolios, respectively, are:

	Kendall	Geneva
a.	Active	Passive
b.	Active	Active/Passive Mix
c.	Active/Passive Mix	Passive

Kendall's board do not believe that markets are efficient, so they believe that there are opportunities for active management. Their restriction against certain types of investments (military, alcohol, tobacco, gaming) also suggests an active approach. Furthermore, their benchmark is a broad market index of actively traded stocks, so an active strategy can take advantage of market liquidity. Finally, as they are likely to be exempt from taxes (most foundations are), an active strategy is not constrained by concerns about taxable gains. All these characteristics point to an active strategy.

Geneva's management prefer sector-specific portfolios with sector-specific benchmarks, for which a passive strategy is likely more appropriate (as these benchmarks may not be broad enough to allow scope for additional alpha). As they have no specific ESG goals, it's likely that they will not object to any specific investments contained in any of these benchmarks. Finally, life insurance companies are taxable, so an active strategy runs the risk of generating taxable gains, whereas a passive strategy is less likely to do so. All of these characteristics point to a passive strategy.

Reading:

Overview of Equity Portfolio Management

LOS: Describe rationales for equity investment across the-active management spectrum.

2.4 The statements made by Álvarez and Mandouki are, respectively, *most likely*:

	Álvarez	Mandouki
a.	Correct	Incorrect
b.	Correct	Correct
c.	Incorrect	Incorrect

Álvarez' statement is correct:

- Suppose that you have a benchmark with 500 stocks, and a portfolio with 100 stocks. The Active Share is 80% (quite high), but if the portfolio is optimized to minimize tracking error (another name for active risk), then the active risk can be quite low, perhaps less than 2% annualized.
- Suppose that you have a benchmark with 500 stocks and that your portfolio holds 400 of those at the benchmark weights (totaling 80% of the portfolio weight). The Active Share is 20% (quite low). However, if the remaining 20% of the portfolio is invested in a stock whose returns are wildly different from those of the benchmark, it's possible that the tracking error (active risk) could be 10% or more annualized, which is rather high.

Mandouki's statement is incorrect. Active Share is controllable by the manager: the manager decides whether to overweight or underweight each security in the benchmark, and by how much. He is correct about active risk: the manager cannot control the returns on the securities held, which means that the manager cannot control active risk (except within extremely broad ranges).

Reading:

Active Equity Investing: Portfolio Construction

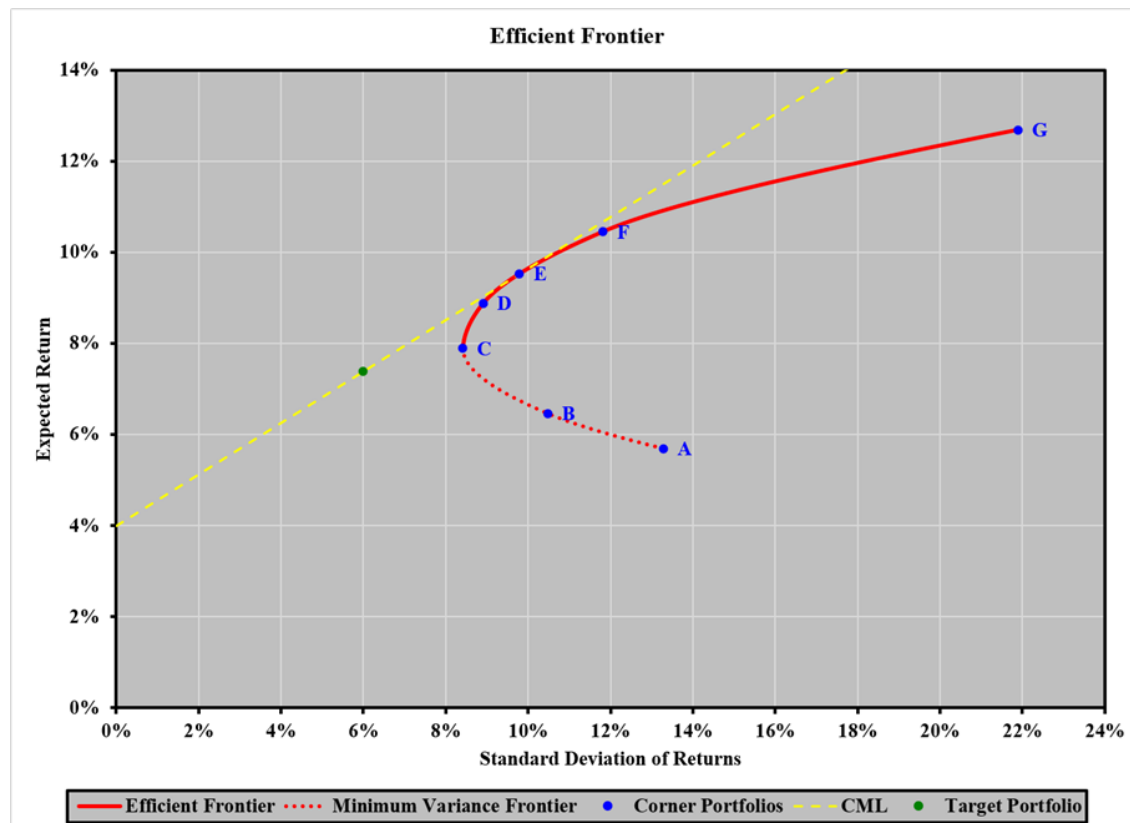
LOS c: Distinguish between Active Share and active risk and discuss how each measure relates to a manager's investment strategy.

Question 3 relates to Capital Market Expectations & Asset Allocation – Core Curriculum

Mount Wuteve Advisors Case Scenario

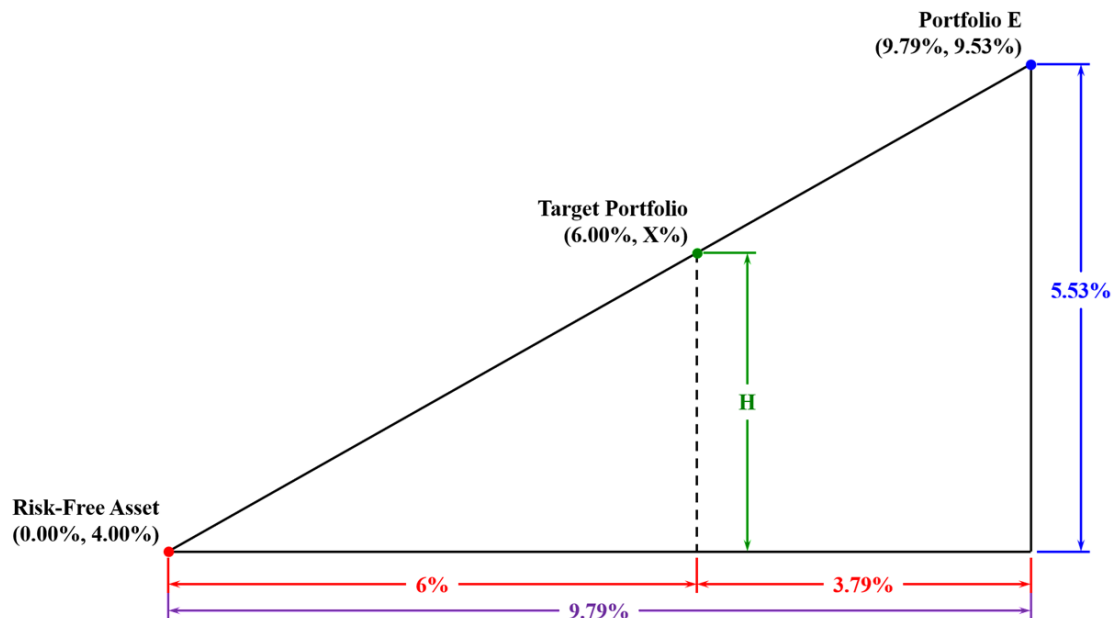
3.1 Based on the data in Exhibit 1, **calculate** the expected return on Edmundsson's portfolio, given his constraints.

To maximize his return, Edmundsson wants a portfolio on the Capital Market Line (CML): the line that passes through the risk-free asset and is tangent to the efficient frontier. The point of tangency will be the portfolio on the efficient frontier that has the highest Sharpe ratio. A graph of the efficient frontier, the risk-free asset, and the CML is:



Corner portfolio E has the highest Sharpe ratio, so Edmundsson wants a portfolio that is a combination of the risk-free asset and portfolio E. There are three common approaches to determining where along the CML that portfolio lies: linear interpolation, similar triangles, and the Sharpe ratio. I'll cover all three.

All three methods can be visualized better by stripping away the efficient frontier and concentrating only on the risk-free asset and portfolio E:



Linear Interpolation

We need the weight on the risk-free asset and the weight on portfolio E. We get these from the volatilities of the risk-free asset (0.00%), the target portfolio (6.00%), and portfolio E (9.79%). The weight on the risk-free asset is:

$$W_{\text{risk-free}} = \frac{3.79\%}{9.79\%} = \underline{\underline{0.3871}}$$

The weight on portfolio E is:

$$W_{\text{portfolio E}} = \frac{6.00\%}{9.79\%} = \underline{\underline{0.6129}}$$

We then use these weights to interpolate the expected target return, based on the expected risk-free return (4.00%) and the expected return of portfolio E (9.53%):

$$E(R_{\text{target}}) = 0.3871(4.00\%) + 0.6129(9.53\%) = \boxed{7.3893\%}$$

Similar Triangles

In the diagram above, the large triangle and the small triangle have the same shape (technically: they're similar), so the lengths of their sides are proportional:

$$\frac{H}{5.53\%} = \frac{6.00\%}{9.79\%}$$

$$H = \frac{6.00\%}{9.79\%} (5.53\%)$$

$$= \underline{\underline{3.3892\%}}$$

To get the expected return on the target portfolio, we have to add this to the risk-free rate (i.e., as drawn, H is the distance that the expected return is *above* the risk-free rate):

$$E(R_{\text{target}}) = 4.00\% + 3.3892 = \boxed{7.3892\%}$$

(There is a slight discrepancy caused by rounding. Ignore it.)

Sharpe Ratio

The Sharpe ratio tells us the amount of additional return that Edmundsson expects to earn for each unit of additional risk (above that of the risk-free asset) that he accepts. Here:

$$\text{Sharpe ratio} = \frac{\text{Additional return}}{\text{Additional risk}}$$

$$\text{Additional return} = \text{Additional risk} \times \text{Sharpe ratio}$$

$$= 6.00\% \times 0.5649$$

$$= \underline{\underline{3.3894\%}}$$

Again, to get the expected return on the target portfolio, we have to add this to the risk-free rate:

$$E(R_{\text{target}}) = 4.00\% + 3.3894 = \boxed{7.3894\%}$$

(Again, there is a slight discrepancy caused by rounding. Continue to ignore it.)

(Note: rounding the answer to two decimal places – 7.39% – will earn full marks.)

Note, too that Portfolio E is not, in fact, a corner portfolio. I added it to the list because it's the tangency portfolio for the CML. In the real world, there is no reason to believe that the tangency portfolio will be a corner portfolio (and every reason to believe that it won't be), but you need to assume that for the exam.

Allocation of marks:

4 marks for the correct answer (7.39%)

If the answer is incorrect:

1 mark for selecting Portfolio E

For linear interpolation:

2 marks for the correct values of the weights

1 mark for the correct calculation of the weighted average return

For similar triangles or Sharpe ratio:

2 marks for the correct value of the additional return

1 mark for the correct calculation of the total return

Reading:

Principles of Asset Allocation

LOS: Discuss considerations in constructing and managing portfolios across international credit markets.

- 3.2 Based on the data in Exhibit 2, **identify** the approach (1/N rule, risk parity, optimal risk budgeting) that Di Maria *most likely* employed to create Martinez' existing portfolio.

Di Maria most likely employed a risk parity approach in the construction of Martinez' existing portfolio. This is evidenced by the ACTRs for all of the asset classes being extremely close to each other.

(Note that if Di Maria used a 1/N rule, the weights on each asset class would be 16.7%, and if she used an optimal risk budgeting approach the ratios of excess return to MCTR would be (at least approximately) equal. Neither is remotely the case here.)

Assuming that she employs the same approach to construct Martinez' new portfolio, **determine** which allocation to commodities in Exhibit 3 (Allocation A, Allocation B, Allocation C) is *most appropriate* for Di Maria to select.

The most appropriate allocation to commodities for Martinez' portfolio is Allocation C: 20.5%.

Justify your determination.

For Di Maria to use a risk parity approach to construct Martinez' new portfolio, with seven asset classes (adding commodities to the six existing asset classes), the ACTR for each asset class should be as close as possible to the expected standard deviation of the portfolio returns divided by the number of asset classes. Thus:

$$ACTR_{\text{Asset Class}} = \frac{\sigma \text{ of portfolio returns}}{\# \text{ of asset classes}} = \frac{4.91\%}{7} = \boxed{0.7014\%}$$

Of the three proposed allocations, Allocation C – 20.5% commodities – has an ACTR for commodities closest to 0.7014%: 0.6996%.

Allocation of marks:

1 mark for writing “risk parity”

1 mark for writing “Allocation C”

2 marks for an appropriate justification for Allocation C

Reading:

Principles of Asset Allocation

LOS: Describe and evaluate heuristic and other approaches to asset allocation.

3.3 **Determine** whether Muslera's bias is *more likely* emotional, or else cognitive.

Muslera is exhibiting the classic signs of loss aversion bias, which is an emotional bias.

Evaluate the appropriateness of Čaleta-Car's suggested approach for handling Muslera's bias.

Čaleta-Car's suggested approach for handling Muslera's bias is appropriate.

A common method for handling clients who exhibit loss aversion bias is to identify the client's goals, then, for each goal, create a subportfolio exclusively for that goal. Each subportfolio will be managed separately, with its own risk and return objectives. For high-priority goals, low-risk subportfolios can be created. As the priority of the goals decreases, the risk of the corresponding subportfolios can increase. This will reduce the chance of losses for Muslera's most important goals, and may help reduce her concerns.

Note that emotional biases are particularly difficult to manage, so there is no guarantee that even the sound approach that Čaleta-Car is suggesting will be successful in that respect.

Note, too, that, although it was omitted from the vignette, Muslera did, on one occasion, say to Barnett, "I know that you said that the value of my portfolio could *fluctuate*, but you never told me that it could *go down*."

Sigh.

Allocation of marks:

1 mark for writing "emotional"

1 mark for stating that the suggested approach is appropriate

2 marks for a correct justification of the conclusion

(Note: no marks are earned for justifying an incorrect conclusion.)

Reading:

Asset Allocation with Real-World Constraints

LOS: Identify behavioral biases that arise in asset allocation and recommend methods to overcome them.