

Corporate finance, CAPM, β of portfolio, practice exam problems

(The attached PDF file has better formatting.)

*Question 1.1: Beta of Portfolio

An investor forms a portfolio from 9,000 shares of Stock Y and 8,000 shares of Stock Z.

- Stock Y has a price of \$80 and a CAPM beta of 0.950.
- Stock Z has a price of \$90 and a CAPM beta of 0.850.
- The correlation of returns between the two stocks is 40%.

What is the CAPM beta of the portfolio?

- A. $\frac{1}{3} \times (0.950 + 0.850 + 2 \times 40\% \times 0.950 + 0.850) = 0.815$
- B. $\frac{1}{2} \times (0.950^2 + 0.850^2 + 2 \times 40\% \times 0.950 + 0.850)^{\frac{1}{2}} = 0.899$
- C. $\frac{1}{2} \times (0.950^2 + 0.850^2 - 2 \times 40\% \times 0.950 + 0.850)^{\frac{1}{2}} = 0.655$
- D. $(0.950 + 0.850 - 2 \times 40\% \times 0.950 + 0.850) = 0.945$
- E. $(0.950 + 0.850) / 2 = 0.900$

Answer 1.1: E

The CAPM beta is based on diversifiable risk, which is perfectly correlated among the stocks. The beta of the portfolio is the market value weighted average of the betas of the individual stocks, regardless of their correlations.

The market values are \$720,000 for Stock Y and \$720,000 for Stock Z, so the beta of the portfolio is the straight average of the betas of the stocks: $\frac{1}{2} \times (0.950 + 0.850) = 0.900$

*Question 1.2: Betas

An investor has an equally weighted portfolio of three stocks, with betas of 0.850, 1.175, and 1.275. The risk-free rate is 6.3% and the market risk premium is 7%. What is the expected return on the portfolio?

- A. 11%
- B. 12%
- C. 13%
- D. 14%
- E. 15%

Answer 1.2: D

The beta of a portfolio is the weighted average of the betas of each stock in the portfolio. These stocks are equally weighted, so the beta of the portfolio is $\frac{1}{3} \times (0.850 + 1.175 + 1.275) = 1.100$. The expected return on the portfolio is $6.3\% + 1.1 \times 7\% = 14.00\%$

*Question 1.3: Betas

In 2005, an investor has an equally weighted portfolio of two stocks, with betas of 0.750 and 1.250. The risk-free rate is 7% and the market risk premium is 8%. The return on each stock was exactly equal to the expected return in 2005. Neither stock paid dividends in 2005.

In 2006, the risk-free rate, market risk premium, and betas of the stocks remain the same. The portfolio is now the accumulated values of these stocks.

What is the expected return on the portfolio (to the nearest percentage point)?

- A. 14.965%
- B. 14.985%
- C. 15.000%
- D. 15.015%
- E. 15.035%

Answer 1.3: E

The returns on each stock in 2005 were 13% and 17%.

- $\beta = 0.750$, return = $7\% + 0.750 \times 8\% = 13.00\%$
- $\beta = 1.250$, return = $7\% + 1.250 \times 8\% = 17.00\%$

The beta of the portfolio in 2006 is $(1.13 \times 0.75 + 1.17 \times 1.25) / (1.13 + 1.17) = 1.00435$

The expected return in 2006 is $7\% + 1.00435 \times 8\% = 15.0348\%$