
Question 4: Portfolio Management**(32 points)**

a)

If the weight of Indian stock is expressed as w , then we can solve $(1 - w) \cdot 10.0 + w \cdot 15.0 = 10.5$ to arrive at $w = 0.1$ or 10%.

b)

Variance is $(0.9)^2 \cdot (0.16)^2 + (0.1)^2 \cdot (0.30)^2 + 2 \cdot (0.9) \cdot (0.1) \cdot (0.16) \cdot (0.30) \cdot 0.3 = 0.02424$ Standard deviation is $\sqrt{0.02424} = 0.1557$ or 15.6%.

c)

The Sharpe ratio will improve by approximately 0.04, as shown below:

Investment only in developed countries: $\frac{10 - 3}{16} = 0.437$ Inclusion of Indian stocks: $\frac{10.5 - 3}{15.6} = 0.481$

d)

Presentation of any convincing stories are acceptable. Below are examples.

Economic fundamentals

Economics and business links are getting stronger between India and developed countries. For example, developed-country companies are making real investments in the India (e.g. automotive industry) and the Indian companies are acquiring developed-country companies (e.g. steel). Employment is growing in the Indian IT-related sectors which provide technology and software to developed-country companies.

Investors' behavior

Institutional investors including hedge funds in developed countries are increasing their positions on India. When developed countries' markets perform well, they tend to reinvest their profit further into India. But once their home markets start performing poorly, they tend to withdraw money from India to cover their losses. This kind of fund flows is likely to make Indian stock market more synchronized to the developed-countries' stock markets.

e)

e1)

Expected return: No change

Standard deviation: Will rise because the correlation coefficient has risen

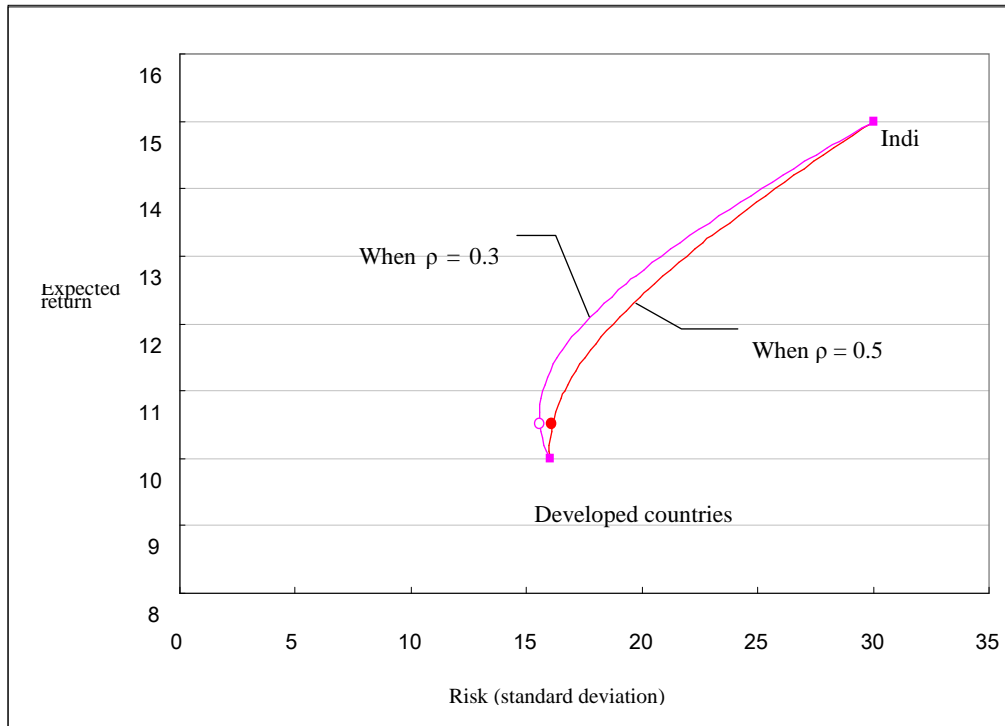
Sharpe ratio: Will decline because the numerator will not change but the denominator will rise

e2)

Below is an illustration of the efficient frontier when the correlation coefficient changes from 0.30 to 0.50.

The curvature of the frontier declines for $\rho = 0.50$ compared to $\rho = 0.30$, so it is closer to being a straight line.

The expected return on the portfolio does not change by including 10% Indian stocks, but the effect of diversified investment declines, which raises the standard deviation.



Note:
The answer sheet only shows the XY axes and the positions of India and developed countries. Frontiers are to be drawn and explained by the candidate.