

THE FOUR DETERMINANTS OF ASSET DEMAND

1) **wealth**

2) **expected returns for asset i**

$$RET_i^e = \sum p_i \times RET_i$$

= probability of getting a realization (p_i) times the realization of the return (RET_i)

If the probability of earning 15% on an investment is 50% and the probability of earning 5% on the same investment is 50%, then:

$$\begin{aligned} RET_i^e &= .5(.15) + .5(.05) \\ &= .1 \text{ or } 10\% \end{aligned}$$

3) **risk**

Measured as the standard deviation of returns on asset i, σ_i

$$\sigma_i = \left[\sum p_i \times (RET_i - RET_i^e)^2 \right]^{1/2}$$

the standard deviation of the above investment opportunity is:

$$\sigma_i = \left[.5 \times (.15 - .10)^2 + .5 \times (.05 - .10)^2 \right]^{1/2} = .5$$

4) **liquidity**

DIVERSIFICATION

IDEA: hold assets whose returns move in opposite directions in response to changes in the economy.

state of the world	probability of realization	rate of return		
		asset A	asset B	asset C
deep recession	.1	.11	.06	.26
mild recession	.2	.12	.10	.22
normal	.4	.14	.14	.18
minor boom	.2	.16	.18	.14
major boom	.1	.17	.22	.10
RET^e		.14	.14	.18
σ		.018	.044	.044

a measure that allows us to determine whether assets move in similar directions is termed the *covariance*:

$$\sigma_{A,B}^2 = \sum p_i \times (RET_A - RET_A^e) \times (RET_B - RET_B^e)$$

$\sigma_{A,B}^2$.0008	$\rho_{A,B}$.99
$\sigma_{A,C}^2$	-0.0008	$\rho_{A,C}$	-.99
$\sigma_{B,C}^2$	-0.0019	$\rho_{B,C}$	-1.00

The covariance between A and B is positive, while the other two are negative -- this tells us that the return on B tends to be high when the return on C is low, and the return on B is high when the return on A is high.

Covariance gives us a measure of whether the returns on two assets move in the same direction -- however, it can not tell us the *strength* of the relationship between assets.

The correlation coefficient is a standardized measure of covariance -- it lies between -1 and 1. If two assets are perfectly positively correlated their correlation coefficient is 1. Likewise, if two assets are perfectly negatively correlated their correlation coefficient is -1. If the returns on two assets are unrelated their correlation coefficient is 0.

The formula for the correlation coefficient is the covariance formula divided by the product of the standard deviations of the two asset return distributions in question.

$$\rho_{A,B} = \frac{\sigma_{A,B}^2}{\sigma_A \sigma_B}$$

If we calculate the correlation coefficient for the three asset pairings we find that assets B and C are perfectly negatively correlated. This indicates that every movement away from the expected value for B is perfectly matched by a movement in the opposite direction for asset C.

With the help of the three concepts:

expected return,
standard deviation,
correlation coefficient,

we can compare the risk and return on different combinations of assets in order to best create a diversified portfolio.

Theoretically, if we could find sufficient assets with uncorrelated returns, we could eliminate portfolio risk completely.

Unfortunately, this situation is not typical in real securities markets, where returns are positively correlated to a considerable degree because they tend to respond to the same set of influences (e.g. business cycles and interest rates). The addition of international assets will increase the potential for diversification. However, while portfolio risk can be reduced substantially by (international) diversification, it cannot be eliminated entirely.

Is there evidence that investors diversify internationally?

In a fully diversified world economy, approximately 70 percent of the US capital stock would be owned by foreigners and US residents would own foreign stock equal to approximately 70 percent of the value of the US capital stock.

PUZZLE: Although the volume of international asset transactions is enormous, the average US portfolio remains heavily weighted toward US assets.

For current data on US Net International Investment see:
http://www.bea.gov/bea/newsrel/intinv_highlights.pdf