Financial Markets and Institutions

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> REVISE EFFECTIVELY
> TAKE EXAMS WITH CONFIDENCE

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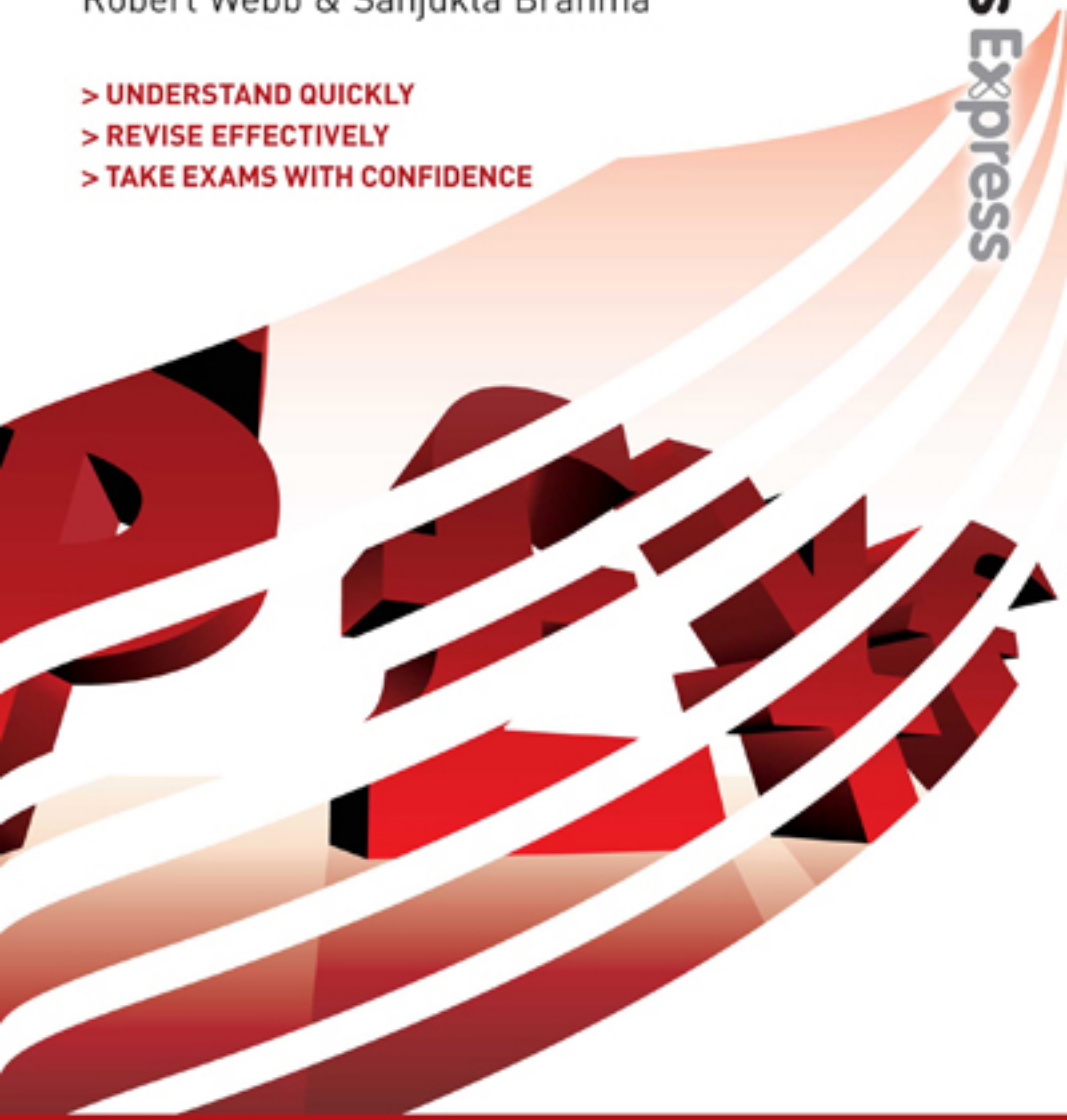

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specific risk on a portfolio = $\sum_{j=1}^{n} w_s \sigma_{es}$

Putting this all together gives the total portfolio risk:

TOTAL PORTFOLIO RISK = $\beta_p \sigma_m + \sum_{j=1}^{n} w_s \sigma_{es}$

this denotes the specific portfolio risk with w = weight or amount of the security multiplied by the standard deviation of the security – that is - the security only adds risk in the proportion that it is held

this denotes the market or systematic risk portion of the portfolio

It is also the case that the β value for a portfolio is the average of the individual security β's weighted by the amount of each individual security in the portfolio such that:

$\beta_p = \sum_{j=1}^{n} w_s \beta_s$

this denotes that the beta for the portfolio is the sum of all the individual beta's for the entire portfolio – with each beta being weighted by how much of that security is represented in the portfolio

Test yourself

Q1. Which two elements combine to make up the individual return on a security?

Q2. What does βR_m and a signify when considering the individual return on a security?

Q3. If the β value was 2 and if the return for the market was 5% then calculate the systematic part of the individual return.

Q4. In the market model alpha (a) is broken up into two components α and e. What do these signify?

Q5. What does the equation below signify? State the meaning of each of its component parts.

$$\beta_p \sigma_m = \sum_{j=1}^{n} w_s \sigma_{es}$$

At this point you may be thinking, so what? But the above relationships in the market model mean that:

- if all securities in the market were in the portfolio then β would equal one;
- the unsystematic risk of a portfolio with diversification will tend towards zero (as explained in this chapter);
- individual security systematic risk is equal to the security's β multiplied by market risk σ_m (as indicated by the standard deviation);
- the portfolio systematic risk is the weighted average of all the individual security risks.

Key definitions

Portfolio theory

The analysis of how investors can use diversification to construct a portfolio to minimise risk and maximise returns.

Normal distribution

Signifies that the different returns for a given security will be clustered around the expected return and will be symmetrically distributed above and below the expected return.

Market model

A model that states that the return for an individual security and by extension a portfolio will equal systematic return plus unsystematic or specific return of the (weighted) securities within the portfolio.

Systematic risk of security

The influence that outside or economic 'system' events have on the returns of a financial security.

Unsystematic or specific risk of a security

Risk events that only influence that particular financial security.

β (beta)

A measure of how sensitive an individual security's return is to changes in the market or 'system', describing how the return varies with movements in the market.

α (alpha)

Represents a constant and is the expected value of the unsystematic return of the security. That is, if there was no movement in the market, this is the return from this individual security.

Examples & evidence

DIVERSIFICATION is always cited as a good thing when investing. Spread your bets, and you will not be exposed to a sudden collapse in a single company, sector or economy. But for equity investors the task is getting harder and harder. International markets seem to be increasingly correlated.

In part, this may be down to the diversification process itself. Investors buy an exchange-traded fund based on the MSCI world index, or US mutual funds venture into more exciting emerging markets. Either way, a loss of confidence among such investors may cause a worldwide sell-off (as research shows: **http://www.economist.com/node/21528640**).

But it may also be that companies have diversified themselves. The table, from Orrin Sharp-Pierson at BNP Paribas, shows the proportion of corporate revenue that comes from various countries. So, for example, Canadian companies get 11.5% of their revenues from Europe; UK companies get 20% of their revenues from emerging markets.

Corporate revenue exposure by area

%	Emerging markets	Developing Asia	Japan	Europe	North America	Implied revenue
GDP*, 2012 forecast	11.1	7.0	0.9	2.5	2.5	—
Canada	9.2	0.6	nil	11.5	78.7	3.32
Europe excl. Britain	25.1	0.4	0.5	52.7	21.4	4.68
Japan	13.1	0.5	68.6	7.7	10.4	2.57
Britain	20.0	1.1	nil	46.2	32.7	4.28
United States	15.6	0.7	1.9	19.2	62.5	3.86
Developing Asia	36.8	35.4	1.7	13.3	12.8	7.24

Source: BNP Paribas

*% change on previous year

So let us assume that revenues grow in line with GDP. Combine the mix of revenues, and GDP growth forecasts for 2012, and you can figure out how the revenues of national corporate sectors might grow. The result can be surprising. You might assume that the US economy will do better than

the UK economy this year. But because of the UK's exposure to emerging markets, UK revenues will actually grow faster.

However, what is striking about the last column is how similar the numbers are; with the exception of non-Japan Asia, they are all in a range of 2.6–4.7%. Diversification does not get you very far.

There is a silver lining to this cloud, for investors at least. The ability of companies to diversify their sources of production means they can control their costs. That may explain why profit margins are so high. Of course, this does not seem quite such a wonderful thing if you are a worker in the West.

Source: Globalisation and diversification, *The Economist*, February 23, 2012, by Buttonwood.

Question

Relate how this analysis may be linked to diversification and the market model. Putting real-world examples into your exam answer will help boost your grade. Think how what the author is saying relates to systematic and specific risk and portfolio theory.

Chapter summary – pulling it all together

By the end of this chapter you should be able to:

	Confident ✓	Not confident?
Calculate the holding period return on a security		Revise page 91
Define and explain probability and understand probability and frequency functions		Revise pages 90–92
Calculate the expected return on a security		Revise pages 92–95
Understand and explain the notation used in expected return, portfolio theory and market model formulae		Revise page 94
Understand and calculate the variance and standard deviation for a security and portfolio – knowing the difference between variance and standard deviation		Revise pages 95–98

	Confident ✓	Not confident?
Show how a diversified portfolio reduces variance		Revise pages 98–102
Define and explain the difference between risk-loving, risk-neutral and risk-averse investors		Revise page 102
Explain covariance and correlation within a portfolio		Revise pages 102–104
Show how the market model extends portfolio theory and how it explains systematic and unsystematic returns and risks		Revise pages 104–112
Provide and explain a diagram representing the market model		Revise page 109

Now try the sample question at the start of this chapter, using the answer guidelines below.

Answer guidelines

✱ Assessment question

Analyse how holding a portfolio of assets helps reduce risk. Explain using the market model why, when holding a diversified portfolio, an investor is only exposed to systematic risk.

Can you answer this essay-type question? Guidelines on answering the question are presented below.

Approaching the question

Begin by introducing a single security and explain – using a frequency distribution – how holding a single security has 'risky' outcomes. Ensure that you fully explain your key terms – this is regularly ignored by students. Define variance and standard deviation and explain that these are terms used to calculate the dispersion around the expected return (stating that the expected return is the weighted average return given all possible outcomes). Once you have fully explained the risk on a single security, present a frequency distribution of two securities and combine them together in a 50/50 holding and show how this reduces variance (and standard deviation). To gain a higher grade introduce the concept of the 'risk-averse' investor.

The second part of the question is testing your knowledge of the market model. Begin by explaining that it was first introduced by William Sharpe in 1963. Define systematic and unsystematic risk and draw a diagram showing the difference between them. Explain that a security's return is made up of systematic and unsystematic returns – and begin to use the common formula notation and explain the notation fully. Begin to develop the model by explaining that the unsystematic return is broken down into alpha, the expected part of the unsystematic return, and an error term which is the 'pure' unsystematic return. At this point draw the market model diagram and place all the notation used in the formula on the diagram to show understanding. Once you have completed this, move on to analyse beta, explaining that the value of beta for a portfolio is the weighted values of beta for the individual securities and that the specific risk on a portfolio is given by the weighted standard deviations of the individual securities within the portfolio; again use the common notation. Complete your answer by referring to the question and summarising how after diversification an investor will only be exposed to systematic risk.

Important points to include:

- Fully explain key terms such as risk, variance and standard deviation.
- Use the formula notation – write the formulae into your answer and explain them fully.
- Draw the appropriate diagrams and take your time to label them fully and correctly.
- Refer to the question repeatedly and remain 'on message'.
- Define unsystematic and systematic risk.
- Define what is meant by the market model.
- Write down the market model formula and label correctly using the common notation.
- Draw the market model diagram and label correctly.

Make your answer stand out

This question is testing your knowledge and understanding of risk and why holding a variety of assets with different variances will reduce risk (for a given return). It is important that you explain your key terms and that all formulae are utilised and labelled correctly. Use of appropriately labelled diagrams will make your answer stand out. Once again, knowing