

CMP Upgrade 2019/20

Subject SA7

CMP Upgrade

This CMP Upgrade lists the changes to the Syllabus objectives, Core Reading and the ActEd material since last year that might realistically affect your chance of success in the exam. It is produced so that you can manually amend your 2019 CMP to make it suitable for study for the 2020 exams. It includes replacement pages and additional pages where appropriate. Alternatively, you can buy a full set of up-to-date Course Notes / CMP at a significantly reduced price if you have previously bought the full-price Course Notes / CMP in this subject. Please see our *2020 Student Brochure* for more details.

This CMP Upgrade contains:

- all significant changes to the Syllabus objectives and Core Reading.
- additional changes to the ActEd Course Notes and Assignments that will make them suitable for study for the 2020 exams.

1 Changes to the Syllabus objectives

This section contains all the *non-trivial* changes to the Syllabus objectives.

The syllabus objectives have not changed materially from 2019 to 2020, however, the numbering has been altered. Instead of ranging from 1.1 to 1.9, the objectives now span from 1.1 to 4.1.

A new syllabus objective was added to reflect the material in Chapter 10. It reads as follows (using the revised numbering system):

- 3.1.6 Demonstrate an understanding of the psychological aspects which influence investor behaviour. *Chapter 10*

In addition, a tweak was made to the wording of one syllabus objective, which now reads:

- 3.1.1 Discuss active management approaches, both within and across asset classes, and over different time horizons. *Chapters 9, 10, 11*

2 Changes to the Core Reading

This section contains all the *non-trivial* changes to the Core Reading.

Chapter 3

Sections 1 to 7

A large number of small changes have been made in this chapter, up to the section on self-administered defined contribution pension schemes. Replacement pages have been attached to the end of this document.

Chapter 4

Section 10

Many of the graphs and charts contained in this section have been updated. Replacement pages for this section are included at the end of this document.

Chapter 7

Section 3.4

The five areas considered by UK corporate governance codes has changed and now reads:

The five main principles and sections of the Code are:

- **Board Leadership and Company Purpose**
- **Division of Responsibilities**
- **Composition, Succession and Evaluation**
- **Audit, Risk and Internal Control**
- **Remuneration.**

Chapter 9

Section 5

The charts and graphs in this section, and the ActEd text discussing these graphs, has been updated. Replacement pages are included at the end of this document.

3 Changes to the ActEd material

This section contains all the *non-trivial* changes to the ActEd text.

There only significant changes to the ActEd text are with reference to the material on historical performance and current economic situation. These are fully covered in the replacement pages to the various chapters that can be found at the end of this document, particularly with respect to chapters 4 and 9.

4 Changes to the X Assignments

Assignment X2

A new question has been written to replace X2.1 (iii). The question and its solution read as follows:

The manager has been offered an opportunity to invest the money into a bond-based structured product which is being launched. It guarantees that in each year over the coming 10 years the fund will give investors the total return on 20-year government bonds, subject to a maximum of 4% *pa* and a minimum of 0.5% *pa*.

- (iii) Discuss the relative merits of using this product to gain bond exposure rather than investing directly in a bond portfolio. [8]

Solution

- (iii) ***Structured product rather than direct bond investment***

The return is linked to government bonds only, whereas the actual bond portfolio would be expected to earn a higher return due to the corporate bond exposure. [½]

The maximum cap on the return would impact the fund in years when bonds rose sharply, such as periods of falling inflation or intense Quantitative Easing (QE) activity. [½]

However, the minimum return would guarantee against losses during period of falling bond markets such a major financial crisis or a currency collapse. [½]

As such the volatility of returns would be lower than a direct bond market investment. [½]

The 20-year term of the bond exposure would match closely with the existing maturity of the bond portfolio, and therefore be suitable. [½]

There would be hidden fees in the product, which would be very difficult for the fund manager to determine, given the complex nature of the embedded options. [1]

Valuations would be required for pricing purposes, but these would only be available from the company running the structured product. [½]

This could lead to issues with transparency and subjectivity during valuation exercises. [½]

It would be important to determine whether the structured product was segregated and has its own asset pool, or whether it was on the balance sheet of the company managing the product. This would determine the level of counterparty risk that the fund manager would be exposed to. [1½]

Even if there is a segregated fund, there will be bonds, and over the counter options contained in it, exposing the fund manager to counterparty risk indirectly. [1]

If the structured product needs to be sold prior to the end of the 10-year period, it is uncertain what marketability or secondary market would exist. [1]

The tax treatment and accounting treatment of the product should be relatively straight-forward for the fund, similar to the treatment of a bond portfolio. [½]

It would be necessary for the fund manager's legal team to examine the structured product in detail before investment, and this would take time and cost money / resources. [1]
[Maximum 8]

5 Other tuition services

In addition to the CMP you might find the following services helpful with your study.

5.1 Study material

We also offer the following study material in Subject SA7:

- Flashcards
- Mock Exam and AMP (Additional Mock Pack).

For further details on ActEd's study materials, please refer to the *2020 Student Brochure*, which is available from the ActEd website at www.ActEd.co.uk.

5.2 Tutorials

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- a set of Regular Tutorials (lasting three full days)
- a Block Tutorial (lasting three full days)
- an Online Classroom.

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5.3 Marking

You can have your attempts at any of our assignments or mock exams marked by ActEd. When marking your scripts, we aim to provide specific advice to improve your chances of success in the exam and to return your scripts as quickly as possible.

For further details on ActEd's marking services, please refer to the *2020 Student Brochure*, which is available from the ActEd website at www.ActEd.co.uk.

5.4 Feedback on the study material

ActEd is always pleased to get feedback from students about any aspect of our study programmes. Please let us know if you have any specific comments (*eg* about certain sections of the notes or particular questions) or general suggestions about how we can improve the study material. We will incorporate as many of your suggestions as we can when we update the course material each year.

If you have any comments on this course please send them by email to SA7@BPP.com.

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3

Institutional investors

Syllabus objectives

- 1.2 Describe the key domestic and global influences over the economic and capital markets environment in the United Kingdom and other jurisdictions from:
- Central Banks.
 - regulatory capital requirements (including the Basel Accords and Solvency II).

(This is only part of this objective.)

- 1.3 Describe how the principles of a legislative, taxation and regulatory conduct framework apply to investment management in the United Kingdom and other jurisdictions.

Syllabus objectives continued

2.1 Discuss the principles and objectives of investment management, along with the main factors influencing investment strategy, and analyse the investment needs of an investor.

2.1.1 Analyse the particular liability characteristics, investment requirements and the influence of the regulatory environment (including capital requirements) on the investment policies of the following institutions:

- a life insurance company transacting with-profits, non-profit or unit-linked business
- a non-life insurance company
- a defined benefit pension fund
- a defined contribution pension fund
- an endowment, charity or other fund
- a bank, hedge fund or other proprietary investor
- other unconstrained investors, including a sovereign wealth fund.

(This is only part of this objective.)

3.3 Describe the impact of technology on investment management, including:

- trading in derivative, equity and bond markets
- product development.

0 Introduction

This chapter gives an overview of the main institutional investors in financial markets.

It is a relatively long chapter, which gives information on each of the main institutional investors, including for each of them a description of the investment restrictions and constraints that they face. Although it is long, much of the information will be familiar to students from their study in earlier courses.

In some cases, understanding the liabilities of an institution makes it easier to discuss solutions in certain exam situations. Likewise knowing about the solvency and capital requirements can add additional detail to solutions. The chapter also contains some lists that could be examined on a bookwork basis.

1 Brief review of material from earlier subjects

This chapter draws on material covered in several earlier subjects, notably Subject SP5.

In particular, this chapter covers some information on the liabilities of life insurance companies, general insurance companies, banks and defined benefit pension schemes, which will be familiar to those that have studied earlier subjects. There is also some information on the shadow banking market, and on the issues facing endowment funds, sovereign wealth funds and charities that may be less familiar. Other institutions such as hedge funds are discussed, and again there is information in earlier courses that can be considered as additional to what is contained in this course.

2 Life insurance companies

Life insurance companies can sell a range of different types of business (for example with profits, without profits, unit linked etc). The nature and term of the liabilities of one company can vary significantly to another depending on the types of business the company has written.

A life company's liabilities will generally be medium to long term.

The majority of without profits liabilities and the accrued guaranteed part of with profits liabilities tend to be fixed in monetary terms. Some without profits liabilities may be guaranteed in terms of an index of prices or similar. The future bonus part of with profits benefits are often inflation related. For unit-linked business the benefits are generally determined directly by the value of the investments underlying the contracts.

Legislation requires life companies to maintain an excess of assets over liabilities. The need to meet this capital adequacy requirement means that many companies have to choose assets which match their liabilities quite closely.

The extent to which the company can depart from matching their liabilities will depend on the extent of the company's free assets and the company's appetite for risk. Companies which have a large surplus of assets over liabilities will tend to have more investment freedom.

Many life insurance companies invest in derivatives. This is usually done for the purposes of hedging market risks, but can also be used to provide or increase exposure to equities as an alternative to direct investment.

Sections 3 and 4 consider the issues that will impact the investment strategy in more detail for a life insurance company that:

- mainly transacts with-profits business
- mainly transacts unit-linked business respectively.

3 Life insurance companies transacting mainly with-profits business

3.1 Nature of liabilities

Nature of a with-profits contract

A with-profits contract may be conventional with-profits or accumulating with-profits.

Under with-profits business there is a basic (normally low) guaranteed amount of benefit. Even if the company fails to achieve the implicit guaranteed rate of interest on its investment portfolio, the benefit will still be payable. The company would need to meet any shortfall from its internal resources.

In practice, the company will normally make investment gains of more than the guaranteed rate. With-profits policyholders are entitled to share in investment surpluses, and normally also other types of profit / loss arising in the with-profits fund. Such surpluses are distributed to policyholders in the form of bonuses. Bonuses can be added regularly throughout the life of the policy as reversionary bonuses, in which case they are guaranteed once they have been awarded, and at the end as terminal bonus.

On early surrender, life offices have freedom concerning the surrender value offered to policyholders. This has made these policies unpopular in the past.

Differences in bonus philosophy are one of the key factors that make one company's liabilities different from another. The higher the initial sum assured and regular bonuses, the more a with-profits policy generates an increasing, guaranteed liability.



Question

What factors will determine the size of the terminal bonus on a policy when it matures?

Solution

Almost everything!

- the office's bonus philosophy (*ie* regular versus terminal bonus)
 - investment experience
 - experience in every other aspect (*eg* expenses, tax, *etc*)
 - methods used to group policies for bonus distribution
 - smoothing policy
 - free asset levels
 - levels of competitor's bonuses
 - extent to which profits from without-profit business are distributed in current bonus levels.
-

Accumulating with-profits contracts, under which bonuses are added as an addition to premiums paid and previously declared bonuses, now form the vast majority of new with-profits business, with many life assurance companies ceasing to write conventional with-profits contracts. However, with-profits business has also more generally fallen out of favour, due to falling bonus rates and its lack of transparency.

From an investment perspective, the two forms of with-profits business are similar.

Derivative strategies may be used for hedging guaranteed minimum benefits and/or guaranteed annuity options.

Treating customers fairly and meeting policyholders' reasonable expectations

Regulators in many countries want life companies to treat their customers fairly but what that means in practice can vary significantly from one country to the next.

As an example, a UK life insurance company is required by regulation to treat customers fairly and satisfy 'policyholders' reasonable expectations'. Policyholders' reasonable expectations will often be heavily impacted by what customers have been told in the policy literature and pre-sales material. Arguably, it is these expectations that define the liability under a with-profits policy, although some liabilities will be explicit – for example, where a minimum benefit guarantee applies. Reasonable expectations are likely to include:

- **that the investment policy follows that stated in the company's Principles and Practices of Financial Management (a document that UK life companies are required to publish).**
- **that, over the long term, the investment return should be higher than under a without profits policy.**
- **that bonus rates are consistent with material published by the company, taking into account past bonus records.**

To maintain its market share, the company will be concerned to achieve an investment return that is at least as good as its competitors.



Question

Why is keeping up with competitors important for a life office?

Solution

Because levels of new business are very dependent on company investment performance. Financial advisors do not point customers in the direction of life offices with continuing poor investment performance.

League tables of results are very important when it comes to winning new business.

Other liabilities

A company transacting with-profits business may also have the following liabilities within its with-profits fund:

- **conventional without profits liabilities, particularly term assurance and annuity business.** These liabilities are normally guaranteed in nominal terms. Although in some jurisdictions (such as the UK) a number of life companies have been transferring their annuity business out of their with profit funds.
- **future expenses.** Expenses are mainly staff costs, and thus should be considered real expenses. Expenses may be denominated in various currencies, according to where the company transacts business and where it maintains its operational offices.

3.2 Term of liabilities

The term of the liabilities will depend upon the type of business and maturity of the individual company. Generally, the liabilities under regular premium contracts will be long-term, but single premium business may be shorter.



Question

How might you expect the term of life insurance liabilities to compare to those of a typical defined benefit pension scheme which has active members?

Solution

It will depend on the types of business sold by the life office, and the level of maturity of the pension fund. However, *very generally*, the liabilities of the life office would be expected to be shorter.

3.3 Liquidity requirements

Some liquidity will be required to meet day-to-day surrenders or other unexpected immediate benefit payments. This is particularly important where a company sells policies that give guaranteed surrender terms. Future regular premium income can be used for this purpose, although it would be dangerous to rely on future new premium income alone (because the company may experience reduced sales volumes in future) and so liquidity is also a requirement from the investments.

In general, the liquidity requirements for life companies are very much less important than they are for general insurers. However, where a life insurer makes significant use of derivatives, sufficient collateral will need to be maintained to cover these positions. Often the need to cover foreseeable collateral requirements can be more constraining than the profile of the liabilities.

If you compare the liquidity requirements of a life office with those of a bank, you can see that:

- the life office liabilities are longer-term, and have limited scope for policyholders to surrender immediately for a known sum of money, whereas bank liabilities are often redeemable at short notice by their customers.
- life office asset portfolios consist of bonds, equities and overseas assets, which can be quite marketable, whereas bank asset portfolios consist of mortgages, car loans, credit card loans, *etc*, which can be very hard to convert into cash at short notice.

This makes the liquidity requirements for life office considerably less demanding.

Closed books of business which are being run down over a period of time can have more serious liquidity issues. At some point there will be more policies maturing in a year and expenses than there are premiums and investment income. In these circumstances, assets require to be sold on a regular basis to meet outgo, which can result in more demanding liquidity issues.

3.4 Investment freedom

The extent to which assets exceed liabilities will be a main determinant of the investment freedom, as will taking into consideration the inherent level of guarantees. At all times, the life insurance company must be in a position to show that it has sufficient assets to meet the total of its liabilities and its capital requirements. Warren Buffett, a famous investor, has used surplus insurance company assets as an important source of funds for his investment programme, and has successfully grown the surplus through astute investing over many years.

3.5 Solvency II

General

The Solvency II Directive (2009/138/EC) is a Directive in European Union law that codifies and harmonises EU insurance regulation. It has a material impact on insurance companies operating within the European Union and to an extent those elsewhere, for example where they are part of a European insurance group. Primarily the directive concerns the amount of capital that EU insurance companies must hold to reduce the risk of insolvency.

Solvency II has been in effect since 1 January 2016. Its aim was to increase the level of harmonisation of solvency regulation across Europe, to introduce capital requirements that are more sensitive to the levels of risk being undertaken, and to provide appropriate incentives for good risk management.

The Solvency II framework consists of three ‘pillars’. Pillar 1 sets out valuation methods for assets and liabilities, and two levels of capital requirements that firms will be required to meet: a Solvency Capital Requirement (SCR) and a Minimum Capital Requirement (MCR).

Pillar 2 includes the supervisory review process, under which each insurance company will be required to carry out an Own Risk and Solvency Assessment (ORSA) and supervisors may decide that a firm should hold additional capital against risks not covered in Pillar 1.

Pillar 3 is the disclosure and supervisory reporting regime.

Background and scope

The key objectives of Solvency II were to:

- increase the level of harmonisation of solvency regulation across Europe
- protect policyholders
- introduce Europe-wide capital requirements that were more sensitive to the levels of risk being undertaken
- provide appropriate incentives for good risk management.

It was hoped that greater harmonisation of solvency regulation would then lead to greater competition in insurance markets from insurers from different countries within the EU.

The Solvency II framework was created in accordance with the Lamfalussy four-level process:

Level 1: developing an EU legislative instrument that sets out the key *framework principles*, including implementation powers

Level 2: developing more detailed *implementing measures* (delegated acts and technical standards)

Level 3: developing *supervisory guidance* and common standards, and conducting peer reviews and consistency comparisons

Level 4: *enforcement* across the Member States.

The Solvency II Directive applies to all EU insurance and reinsurance companies with gross premium income exceeding €5 million or gross technical provisions in excess of €25 million. It became operative from 1 January 2016.

Transitional arrangements may be available for some aspects (eg technical provisions, risk-free interest rates) for a defined period (up to 16 years). The intention is to avoid unnecessary disruption of markets and availability of insurance products.

Structure

The Solvency II framework comprises three ‘pillars’.

Pillar 1 sets out the minimum capital requirements that firms are required to meet. It specifies valuation methodologies for assets and liabilities (‘technical provisions’), based on market consistent principles.

Under Pillar 1 there are two distinct capital requirements:

- the Solvency Capital Requirement (SCR)
- the Minimum Capital Requirement (MCR).

The SCR can be calculated using a prescribed standard formula approach, or by using a company-specific internal model, which has to be approved by the regulator. The SCR and MCR both represent capital requirements that must be held in addition to the technical provisions. Supervisors may decide that a firm should hold additional capital (as a capital add-on) against risks that are either not covered or are inadequately modelled for the SCR.

Pillar 2 includes:

- the supervisory review process
- systems of governance
- and risk management.

Also under Pillar 2, each insurance company is required to carry out an Own Risk and Solvency Assessment (ORSA). The ORSA requires each insurer to identify the risks to which it is exposed, including those not covered under Pillar 1, to identify the risk management processes and controls in place, and to quantify its ongoing ability to continue to meet the MCR and SCR.

Pillar 3 is the disclosure and supervisory reporting regime, under which defined reports to regulators and the public are required to be made.



Question

Why do you think Pillar 3 requires an insurance company to make *public disclosures* to the market?

Solution

The market discipline of public disclosures is intended to add an additional degree of confidence in the regime. A company's public disclosures will enable other stakeholders, *eg* capital markets and rating agencies, to form an informed view on a company's capital and risk management. The discipline this imposes on a company, *eg* in wishing to maintain its share price or achieve a certain credit rating, should support the supervisory process and reporting.

For the purposes of Subject SA7, we are mainly concerned with Pillar 1.

This combination of:

- minimum capital standards
- qualitative risk management requirements
- a well-defined and rigorous review process of companies' solvency by supervisors
- prescribed disclosures to supervisors, policyholders and investors

has been designed to deliver a more coherent and robust prudential regulatory system.

Impact on business culture and strategy

Engagement with Solvency II is important throughout the business, including right up to senior management and Board level. This is the case for all insurance companies and not just those opting to use an internal model — although as noted above, being able to demonstrate full integration of Solvency II into the business is a key part of the internal model approval process.

Given this, it is not surprising that Solvency II affects almost all of an insurance company's activities:

- **Solvency II is not just a reporting framework, but a *risk management framework* with implications for *capital allocation, risk mitigation activities* and *performance management*.**
- **The regime may also have an impact on the optimal *product mix* for the company, and on *product design*.**
- **It is also likely to impact the optimal *asset mix* for the company, since some asset classes have become relatively more attractive as a result of their lower capital requirements.**
- **The availability, or otherwise, of risk diversification benefits may also affect *corporate structures* and generate *merger and acquisition activity*.**
- ***Management information* has changed to align Solvency II with the business and strategic decision-making process.**
- **The impact on the market of the *external disclosures* also needs to be considered.**

Assets

Assets are required to be valued at market value, based on readily available market prices in orderly transactions that are sourced independently (*ie* quoted market prices in active markets).

If such prices are not available then mark-to-model techniques can be used – provided these are consistent with the overall market consistent (or 'fair value' or 'economic value') approach, *ie* the amount at which the assets could be exchanged between knowledgeable willing parties in an arm's length transaction.



Question

List some assets that might have to be marked-to-model.

Solution

A list might include:

- unquoted or AIM equity shares, or less liquid corporate bonds
 - swaps and over-the-counter derivatives
 - annuities purchased from other life companies
 - certain types of commercial property
 - hedge fund holdings that are only priced quarterly by the manager.
-

Technical provisions

Also based on a market consistent approach, technical provisions should represent the amount that the insurance company would have to pay in order to transfer its obligations immediately to another insurance company.

The technical provision consists of a best estimate liability and a risk margin.

The best estimate liability is the present value of expected future cashflows, discounted using a 'risk-free' yield curve (*ie* term dependent rates). All assumptions should be best estimate, with no prudential margins.

Risk-free yield curves are published for each of the key currencies within the EU insurance market. This ensures consistency between insurance companies across the EU, and also allows for the different interest rate environments across the different economies. The rates are based on swap rates where there is a sufficiently deep and liquid swap market, or government bond rates otherwise. These rates are then adjusted to reflect the risk of default of the counterparty (*ie* credit risk adjustment).

The credit risk adjustment is applied as an upward shift to the observed market yields.

The risk margin is intended to increase the technical provision to the amount that would have to be paid to another insurance company in order for them to take on the best estimate liability. It therefore represents the theoretical compensation for the risk of future experience being worse than the best estimate assumptions, and for the cost of holding regulatory capital against this.

The risk margin is based on the cost of holding capital (a subset of the Solvency Capital Requirement – see below) to support those risks that cannot be hedged.

Capital requirements

In addition to the technical provisions, insurance companies must hold sufficient capital to meet each of the following capital requirements.

The Solvency Capital Requirement (SCR) is a Value at Risk measure of the variation over one year of the amount of 'basic own funds' (which is broadly assets minus technical provisions).

There is a prescribed list of risk groups that the SCR has to cover, including:

- **underwriting risk** (health, life and non-life)
- **market risk**
- **operational risk**
- **counterparty / default risk.**



Question

If a life company focused on selling annuity products and invested mainly in domestic government bonds, which of these risks would be more important to model accurately?

Solution

Annuity products expose the company to the risk that people live longer than expected, or longevity risk. This would be a sub-category under 'life underwriting risks', along with expense risks.

Government bonds would contain some market risk, but this would be limited if the maturity of the assets and liabilities was matched. There would be some credit risk, but if the domestic government was well-rated, this would also be limited.

Operational risk is always present and needs to be modelled as accurately as possible.

The SCR can be calculated using standard prescribed stress tests or factors, which is known as the standard formula.

The SCR can alternatively be calculated using an internal model, which must be approved by the insurance company's supervisory authority and which must meet a number of standards. This effectively requires the company to demonstrate that the internal model is widely used within the company and plays an important role in its decision-making and governance processes.

The Minimum Capital Requirement (MCR) is defined as a simple factor-based linear formula that is targeted at a Value at Risk measure over one year with 85% confidence.

There is also an absolute minimum capital requirement, the amount of which differs for life insurance, non-life insurance and reinsurance companies.

Impact for Subject SA7

What is important from the perspective of Subject SA7 is how this affects the assets that are held to meet the liabilities. Broadly, the lower the surplus, the lower the investment freedom and so there is less scope to invest in risky assets. If a company is running close to its SCR capital, it will have less scope to invest in equities, property or other return-seeking assets. If a company breaches its SCR and has capital between the SCR and MCR then there will be very little scope for any risk in the investment portfolio at all, and indeed the regulators may take over the running of the company or dictate how the company is to be run.

In addition, the Solvency II rules on admissible assets may impact on the choice of investment portfolio.

4 Unit-linked life insurance company

4.1 Nature of liabilities

Under a unit-linked contract most of the benefits are linked directly to the investment performance of the assets backing the business. The key consideration is any stated objective of the particular unit-linked fund.

In other words, if the policy proceeds are linked to the performance of an equity segregated fund, then the life office has offered almost no guarantee to the policyholders. The investment strategy will not be designed around some liabilities that have to be met, but will be designed around the benchmark that was set in the marketing literature, or any goals, targets or objectives that are set in the literature.

Non-unit liabilities related to the unit-linked business may include:

- ***Guaranteed benefits (eg death benefits) that are independent of the value of the units. From an investment perspective, the excess of the sum assured over the value of units can be considered as a term assurance policy, albeit with a variable sum at risk.***
- ***Future expenses, which to a large extent are paid for by making deductions from policyholders' unit holdings. However, the company will need to cover any expenses that it cannot expect to recover in this way.***

Under Solvency II, the unit and non-unit components must be unbundled for the purposes of determining the technical provisions. The non-unit component can be negative.

As for with-profits business, derivative strategies may be appropriate in respect of some contingent options and guarantees.

The company may also write traditional without profits policies (for example annuity business).

4.2 Liquidity requirements

An internal unit trust will need to maintain some liquidity in order to meet the proceeds due when units are being redeemed. For funds investing in quoted equities or bonds the amount of cash held will be small. More cash will be held where the underlying asset is less liquid.

Property funds are an example of where more cash may be held in the fund for this purpose.

However, to avoid holding too much cash the office might reserve the right to insist on several months' notice before encashment of property units. Six months' notice might not be unusual for a large encashment of units, so as to give the office a little time to restructure its portfolio. In fact, selling a large property will often take longer than this, so there may still be some difficulties for the office in meeting the payments for very large withdrawals from property funds. So holding a substantial amount of cash may be sensible (*ie* negative gearing).

Specific issues can arise in the case of very illiquid funds such as large property investments. If there are significant withdrawals from the unit fund and it is necessary to dispose of such assets, this might take some time. Companies therefore often include policy conditions that limit policyholder withdrawals or enable them to defer encashment of units in these funds, rather than doing so immediately.

4.3 Investment freedom

Any authorised unit trusts run by the company are subject to the supervisory authority's normal rules for authorisation that may restrict the investments that can be held. There may also be rules setting out 'permitted links' for internal funds, which specify the types of asset that can be held. If such restrictions exist, the fund cannot then legally hold any other types of asset.

4.4 Solvency II

The Solvency II Directive applies to unit-linked insurance companies in a similar way as to life insurance companies, adjusted as necessary for the type of business being written (such as the level of any fixed benefits).

4.5 Other comments

Unit-linked life companies are becoming more common in the market place, replacing the historic dominance of with-profits life insurers. Unit-linked life companies often have significantly less risk sharing than other life insurers. Investment risk is usually mostly borne by the policyholder.

In other words, with a traditional unit-linked policy, bad investment choices or bad performance of the individual unit-linked funds against their benchmarks, is a risk for the policyholder rather than the life office. As such the capital adequacy requirements for such policies are much less demanding than those for traditional with-profits policies.

Any ability to vary mortality charges over time can also push some of this risk back on the general cohort of policyholders.

5 General insurance companies

The general insurance industry can be very competitive as at any given time there is often a small number of players trying to build market share. They will offer reduced premiums (sometimes deliberately loss-making) and hence, as the rest of the market is forced to follow suit to avoid losing business, underwriting profit for the industry is frequently negative. In a low interest rate environment (such as the current one), the supplement from investment income is much lower than the long-term average, further hurting profitability.

The term of the liabilities for a general insurer will depend on the nature of the business written. Whilst most lines of business generate very short-term liabilities, some lines (eg employer's liability, pollution cover) can generate large claims which take many years to settle. Occasionally, such liabilities may take decades to settle fully. The terms used in general insurance are 'short-tail' and 'long-tail'.



Question

Give an example of a type of general insurance claim that might reasonably be expected to be

- (i) short-tail
- (ii) long-tail.

Solution

- (i) Most claims involving damage, eg burglary claims on household insurance policies, motor claims on accidents in which no-one is injured but damage has been caused.
 - (ii) Most claims involving serious injury, eg motor claims on accidents involving injury, employer's liability claims.
-

5.1 Nature of liabilities

The liabilities of a general insurer are largely in respect of insurance claims yet to be paid. The amounts will be a mixture of:

- amounts linked to various forms of inflationary increase.
- amounts that are largely fixed in nominal terms.

The mix of the liabilities will depend on the classes of insurance written (eg motor insurance, fire insurance, cyber insurance, product liability insurance, etc.). However, because the term of the liabilities of most classes of insurance is quite short there is relatively little inflation risk and investment policy need not be concerned too heavily with the real/fixed split of the liabilities. The exception is 'liability' insurance (also called 'casualty insurance' in North America), such as employer's liability/workers' compensation insurance, which can be very long term. These classes tend to have real liabilities, which are often not closely correlated with general price inflation.

The inflation of personal injury costs is not closely correlated to price inflation, and therefore cannot easily be hedged using index-linked bonds.

Noteworthy in this latter context is an increase in certain types of claims being paid out as annuities rather than as lump sums. In the UK, claims settled in this way are known as periodical payment orders (PPOs), used in awarding damages for bodily injury cases. Here a court may award, not a traditional lump sum, but an escalating annuity-style payout for the remainder of the claimant's life. Matching assets can be only approximated, and this may be further complicated by the fact that the rate of escalation may be linked to an index of medical inflation rather than (often lower) retail price inflation.

Many companies write business globally, so there may be liabilities denominated in other currencies. Under matching and localisation rules, general insurers are sometimes required to:

- **match foreign currency liabilities by currency**
- **hold assets in the country or territory where the liability is written.**

Thus, there could be a significant portion of international bonds and international equities within the portfolio of many general insurers.

5.2 Term of liabilities

The timeline of claims will depend on when the claims originate, when they are notified, and when they are settled/paid. A very small proportion of claims may need to be reopened and reassessed.

The liabilities of general insurance companies are mostly short term. Some claims from liability classes may take many years to settle, as some claims can take many years to emerge, eg health hazards such as asbestos.

Policies are almost always taken out for one year, with some exceptions being shorter-term policies such as single trip travel insurance that could be for just a few days, and on the other hand longer-term policies of several years such as extended warranty insurance. Claims under most classes of insurance are settled within a period of months.

5.3 Liquidity requirements

The claim outgo for general insurers is much more uncertain than for the other institutions, and consequently liquidity is more important. The investments must include sufficient liquid and marketable assets.



Question

Give examples of assets that are liquid and marketable.

Solution

A general insurer's portfolio is likely to include a significant proportion of cash. In addition, there may well be substantial money market investments (such as Treasury bills, bills of exchange, commercial paper and reverse repos) and some short-dated gilts.

Some outgoes could be met by future premiums, but it is always imprudent to rely heavily on these. This is particularly true in general insurance because most policies are written as annual policies. At renewal, policyholders can easily switch to another insurance company.

5.4 Investment freedom

Like life companies, general insurers must demonstrate a minimum level of free reserves (*ie* excess of assets over liabilities) to the regulator each year.

Liabilities

For the purpose of demonstrating to the regulator that the excess of assets over liabilities meets a minimum requirement, the liabilities are valued taking into account the time value of money (*ie* they are discounted).

The specifics of valuing liabilities of UK and EU insurers is set out in the Solvency II Directive.

Assets

The rules for valuing assets are the same as for a life insurance company.

Solvency margin

Solvency margin is the minimum level of the excess of assets over liabilities, and may also be known as the Solvency Capital Requirement (SCR).

In the UK and in EU states, the minimum level of free assets is set out in the Solvency II Directive. General insurers have the option to calculate this minimum using a standard formula, or to apply to their regulator for approval to calculate this minimum using their own internal model.

Given the uncertainty of the timing and amount of claims outgo and the use of the market value of assets to assess solvency, the calculation of the minimum of the excess of assets over liabilities takes into account volatility of both claims outgo and the market value of their assets.

Shareholders' profit

Most general insurance companies are owned by shareholders who will be concerned with maximising their profits. Usually investment gains are the most important contributor to profit – indeed, as described earlier, many general insurance companies make underwriting losses year after year (*ie* claims and expenses exceed premium income).

Solvency II

The requirements for general insurance are comparable to those under life insurance.

6 Health and care insurance

Health and care liabilities have similar characteristics to general insurance liabilities, and therefore similar investment needs. An insurer's investment needs will be determined by its mix of liabilities. Products with short-tail liabilities will include private medical insurance, health cash plans and personal accident cover where there is relatively little delay to reporting and settlement.

Long-term liabilities arise where level premiums are used to pay for increasing risks, for example income protection insurance, critical illness cover and long-term care insurances. Some of these are like liability insurance and can be very long-tail (for example, chronic illness claims requiring life-long medication and treatment).

7 Self-administered defined benefit pension schemes

This section draws on the situation in the UK as an example scenario for the liabilities and investment requirements of pension schemes.

7.1 Nature of liabilities

The typical defined benefit pension scheme provides its members with pensions which are based on salaries just prior to retirement (*ie* 'final salary' schemes). The liabilities in respect of existing employees are real in nature because they increase with salary inflation.

Once the pension is in payment the type of pension increases will determine whether the liabilities are fixed or real.

For level pensions *or* pensions which have fixed increases (*eg* fixed at 3% per year), the pensioner liabilities are of fixed monetary amount (ignoring the mortality risk).

Where the trustees aim to provide some discretionary protection against inflation, the liabilities are, to an extent, real.

For inflation-linked pensions the liabilities are real.

Pension liabilities in the UK are often increased each year in payment at Limited Price Indexation (LPI), *ie* the *lesser* of 5% (or 3%) and RPI. LPI results in the pensioner liabilities being a hybrid of fixed monetary and real.

If the pricing of index-linked gilts suggests that the market expects inflation to be less than 5%, then the liability could be considered as real. If the market expects inflation to be greater than 5%, the liability could be considered as fixed.

Public sector schemes generally give increases to pensions in payment in line with consumer price inflation.

The situation for private companies is more complex. For example, in the UK, pensions accruing after April 1997 must, as a minimum, be increased each year in line with the increase in prices, or by a cap if this is lower. This is known as limited price indexation (LPI). Few private sector schemes guarantee increases fully in line with price inflation. Where a scheme agrees to contractually increase pensions in line with a predefined inflation index, this must be paid and provided for.

As an employee approaches retirement age, the liability in respect of the employee becomes increasingly like a pensioner liability in nature. Thus, the age distribution of scheme members is a factor to consider. For 'immature' schemes (made up mainly of young employees) the bulk of the liability will be linked to salaries until the membership matures.

For a final-salary scheme as a whole, the nature of the liabilities depends on:

- (i) the benefits provided
- (ii) the basis for pension increases
- (iii) the mix of young employees, old employees and pensioners.

In recent years, many final salary schemes have closed to new members, thus affecting their future liability profile. Many schemes have also closed to future service with sponsoring employers offering defined contribution arrangements instead. Buyouts and incentive exercises, which encourage members to fix their future benefits or to switch into defined contribution schemes, affect the liability profile and are becoming increasingly common.

7.2 Term of liabilities

The liabilities are generally long term. For example, for a 40-year old member, the first payment may be in 25 years and the last might be over 50 years away. A scheme with a young membership has very long-term liabilities.



Question

Why is it the case that the liabilities for an older member may be a large multiple of the liability for a younger member?

Solution

There are two main reasons:

- first, the older member has a great deal more past service liability, which directly impacts the pension promised
- second, the salary of the older member is likely to be a multiple of the salary of the younger member, which significantly increases the past service liability.

Pension fund liabilities are typically of longer duration than standard bond indices. So a fall in bond yields can give rise to a reduction in a scheme's funding level as their liabilities increase by more than the increase in the value of their bonds and equities. In recent years, low interest rates and quantitative easing (QE) which reduced bond yields have had a big negative impact on pension fund solvency. Pension funds have suffered the opposite impact to the wealth effect experienced by asset owners: an underfunded pension scheme might be considered to have negative wealth so QE has resulted in an increase in the funding shortfall.



Question

If index-linked bond yields are negative, does this mean that the expected return on an index-linked bond is negative?

Solution

No. The yield on an index-linked bond is its 'real yield', *ie* the yield above the level of inflation over the future period. So if I buy an index-linked bond with a yield of say, -1% , and inflation turns out to be 6% *pa* over the coming 20 years, then my overall total return will be 5% *pa*.



Question

List the parties who have gained and who have lost out as a result of the policy of QE.

Solution

Those that can be argued to have gained might include:

- older people with savings in bonds, equities or property
- the government, who have found it much easier to issue bonds in the market with low yields
- the central bank who benefit from the imposed market stability that results from a sanguine bond market
- the government who may benefit from higher growth levels that result from increased corporate borrowing and activity
- borrowers, including those with mortgages, bank loans and credit card debt.

Those that can be argued to have lost out include:

- young people who require to buy the inflated assets (such as equities and property)
 - pension scheme sponsors due to the impact on solvency
 - life companies due to the impact on solvency
 - manufacturers that require to import raw materials due to the weakening effect on the national currency
 - older people with fixed pensions due to the threat of inflation.
-

7.3 Liquidity requirements

Schemes that are dominated by active members (employees who have not yet retired) will normally have more contribution and investment income than benefit outgo. This provides a natural source of liquidity. However, pension schemes may have unexpected outgo in the form of bulk transfer payments, so it is prudent to maintain some liquidity within the investments.

Many UK schemes are 'mature' so benefit outgo exceeds contribution income. Unless capital proceeds are used, mature schemes require sufficient investment income to make up the cash shortfall.

Where there is an excess of assets over liabilities the sponsoring employer may, under certain circumstances, take a contribution holiday. This lack of contributions may generate a need for liquidity on the part of the pension scheme, depending on whether, and by how much, active members are paying contributions into the scheme. Where a scheme is closed to future service, it will not be receiving regular contributions, though the sponsoring employer may still be contributing to the scheme as part of a plan to recover any deficit in the scheme.

In today's market, there are precious few schemes in this position.

Pension schemes are increasingly using derivatives for risk management purposes. This leads to a need to maintain sufficient collateral to cover foreseeable margin requirements, creating additional liquidity requirements to those arising from the profile of a scheme's liabilities.

7.4 Investment freedom

The extent to which investment risks can be taken to achieve greater overall returns will be largely determined by the attitudes of the sponsoring employer and by the trustees of the scheme. Under trust law the trustees typically have a duty to seek the best return possible in relation to (acceptable) risk. The covenant of the sponsoring employer is a key consideration. All other things being equal, the trustees' appetite for risk might be higher if the covenant is strong.

The sponsor covenant is important firstly because it provides confidence that a (modestly) poor investment performance could be repaired through a period of additional contributions, and secondly because it affects the regulatory Pension Protection Fund (PPF) levy in the UK. A weaker sponsor, as measured by short-term credit rating agencies, means that the levy can increase.



Question

What are the benefits and drawbacks of introducing additional stronger regulation to protect members' benefits?

Solution

The benefits include:

- minimum requirements on scheme funding levels
- enforced timeframes to repair deficits
- a consistent method of measuring scheme security.

The drawbacks include:

- additional costs for schemes, which can lead to scheme closures and scheme buyouts. These costs include any retrospective improvements made by the regulator and the costs of any minimum benefits levels going forward.
 - additional regulatory overheads for government to finance
 - moral hazard, whereby schemes alter their scheme policies on the basis that there may be a safety net for members if the scheme fails.
-

The duties of the trustees may be laid out in legislation and may include the fact that they must produce and be conversant with a written statement of investment principles (SIP) which might include (amongst other things) the:

- scheme's funding and investment objectives
- scheme's appetite for risk and its approach to managing different risks
- current investment strategy, risks relating to the strategy and expected return
- policy for meeting any statutory obligations or objectives
- policy for selecting investments
- kinds of investments to be held
- balance between different kinds of investments
- minimum and maximum allocations to different asset classes
- rebalancing policy
- liquidity and collateral management policy
- the realisation of assets
- use of derivatives
- exposure to foreign currency
- self-investment restrictions
- policies on corporate governance and socially responsible investment
- details of the scheme's managers, their benchmarks and fees
- roles and responsibilities of the trustees, investment committee, advisers and managers.

The trustees must typically review their SIP periodically or after any significant change in investment policy. Reviews might include (among other things) the:

- Liability structure of the scheme and any changes since the last review.
- Scheme's funding position.
- Investment managers' past performance.

One constraint for all UK (and many other) schemes is that 'self-investment' should not exceed a small portion of the market value of the assets (perhaps 5% of assets). Self-investment means investment linked to the sponsoring employer (eg in the company's own shares, ownership of the company's buildings, loans to the company). This makes sense if one considers that any adverse economic impact on the sponsoring employer (*in extremis* that sponsor becoming insolvent) would impact the sponsor's ability to make further contributions and at the same time dramatically reduce the value of any shares or bonds issued by the sponsor which the scheme owns.

There are quite a few acronyms in this business. Here are a few that you should be aware of (not all of which are contained in this chapter):

- SPF: Statement of Funding Principles, which contains the goals of the trustees in terms of the scheme's funding level and any repair measures that need to be undertaken. (It also stands for Statement of Financial Position, which is a balance sheet.)
- SFO: Statutory Funding Objectives, is a level of assets that is sufficient to meet the liabilities as measured by the technical provisions as determined by the actuary.
- SRI: Socially Responsible Investment policy, requires schemes to explain how they consider social and environmental issues when investing members' funds.
- SIPP: Self-Invested Pension Plan, is a personal pension product that allows a high degree of freedom for the individual to manage their own pot of money.
- PPF: Pension Protection Fund, which is a state-sponsored but privately funded asset pool into which solvent schemes pay a levy, and which aims to provide a high proportion of any member benefits that are lost due to a scheme collapse.
- LPI: Limited Price Inflation is an inflation index that is capped at some level (often 3% or 5% *pa*).
- SCR: Solvency Capital Requirement, which is a lower level of solvency that most insurers will aim to beat, and which will be more than twice as much as the MCR (Minimum Capital Requirement) which is the absolute minimum that an insurer can have in terms of solvency capital.

8 Self-administered defined contribution pension fund

This section draws on the situation in the UK as an example scenario for the liabilities and investment requirements of pension schemes.

8.1 Nature of liabilities

In a defined contribution scheme (sometimes called a money purchase scheme) contributions are paid into the fund at a pre-determined (*ie* 'defined') level and are accumulated, together with investment returns, in a separate account for each member.

When the member wishes to take benefits, the accumulated fund can often be withdrawn in the form of one or more cash lump sums and/or used to purchase an annuity. The liability of the fund is thus equal to the assets held in respect of each particular member and there is no investment risk to the fund.

Typically the annuity will be purchased from a life office and so the fund can ignore pension in payment liabilities. Unless a scheme is large, it would be difficult for it to cope with the mortality risk of providing annuities.

In recent years, this type of provision has become increasingly popular with companies due to the reduced investment risk and less onerous regulation.

8.2 Term of liabilities

Terms will be similar to defined benefit schemes, *ie* generally long but dependent on the maturity of the scheme.

8.3 Liquidity requirements

Each member of a defined contribution scheme has an individual 'pot' of assets. For many defined contribution schemes, the member has a choice of funds in which to invest their pot. Schemes may also offer a default option into which the pot will be invested if the member has not made a specific choice. The member may choose to move this pot to a new scheme on changing employment, which may require the realisation of the relevant assets or an in-specie transfer.

8.4 Investment freedom

As with unit-linked life policies, under a defined contribution pension scheme it is the investments that determine the amount of the liabilities. In other words, the amount of pension to be paid is whatever the value of the member's fund at retirement happens to be.

The investment requirements might be expected to be similar to the investments in respect of active members of a defined benefit scheme, since the members are likely to have similar requirements for income in retirement. However, depending on their investment options taken and the form of the retirement benefits (see below), individual members can be vulnerable to a fall in the market value of their fund immediately before retirement. In a defined benefit scheme this risk is borne by the scheme (and by extension by the sponsoring employer).

In a defined contribution scheme, if members wish to purchase an annuity on retirement, investments may be switched into matching assets, such as gilts, which match the purchase price of the annuity required. This is a process often known as 'life-styling' and many schemes offer this facility, where switches occur automatically, sometimes as the default option. A similar approach is to invest in a 'target date' fund whose fund manager de-risks the portfolio over time depending on the remaining period until the target date.

In some schemes members are offered the choice of investment types. The only constraints on investment freedom will come from:

- (i) any rules imposed by the employer (possibly including a pre-selected list of investment funds to choose from)
- (ii) the need to invest the assets in a prudent way.

Members who do not wish to purchase an annuity on retirement have a number of alternative options and the taxation of benefits will be a key consideration. Two key options are normally:

- **income drawdown** – the fund remains invested and members can withdraw cash, subject to taxation, to meet their needs.
- **cash sum** – members can withdraw their fund as cash, taxed at their marginal rate possibly with an initial tax-free amount.

It can be argued that the management of liquidity risk is much more difficult in circumstances where the member can choose between a cash lump sum and a drawdown. The scheme must have sufficient cash or marketable assets to cope with the possibility that many retiring members choose to take their pot as cash, whilst still investing in accordance with the literature for the various investment-linked funds on offer to members.

As a result of these changes, members' investment needs may change, targeting an asset mix at retirement more suited to their choices.

In other words it is to be expected that members switch gradually towards less volatile assets as they approach retirement age.

A *glide path* is such an investment strategy that switches to less volatile assets as a target date draws closer. It can be expressed as a formula, and is often used to model the liabilities of typical DC scheme members. A distinct glide path formula can be designed for members of each age.



Question

A fund is marketed to the public which is designed for people who are (say) 20 years from retirement. This fund will pursue an investment strategy in line with a certain glide path, which is deemed suitable for that cohort of people. What might the difficulties be in designing an investment strategy suitable for the fund, even though all the investors can be assumed to be a fixed number of years from retirement?

Solution

There are several problems, including:

- Not all investors will have the same risk appetite. Some may wish to pursue a much higher risk strategy in the early years when they have a long time until retirement, while others may be more conservative and have an aversion to losses at any time.
- As the fund nears the target date, some members will be aiming to buy an annuity, in which cash a bond-based portfolio is suitable. But others may feel that they still have a while to go, and will want a portfolio that is expected to earn a reasonable return that they can draw down over time.

So the 'glide path' might not be that simple to design.

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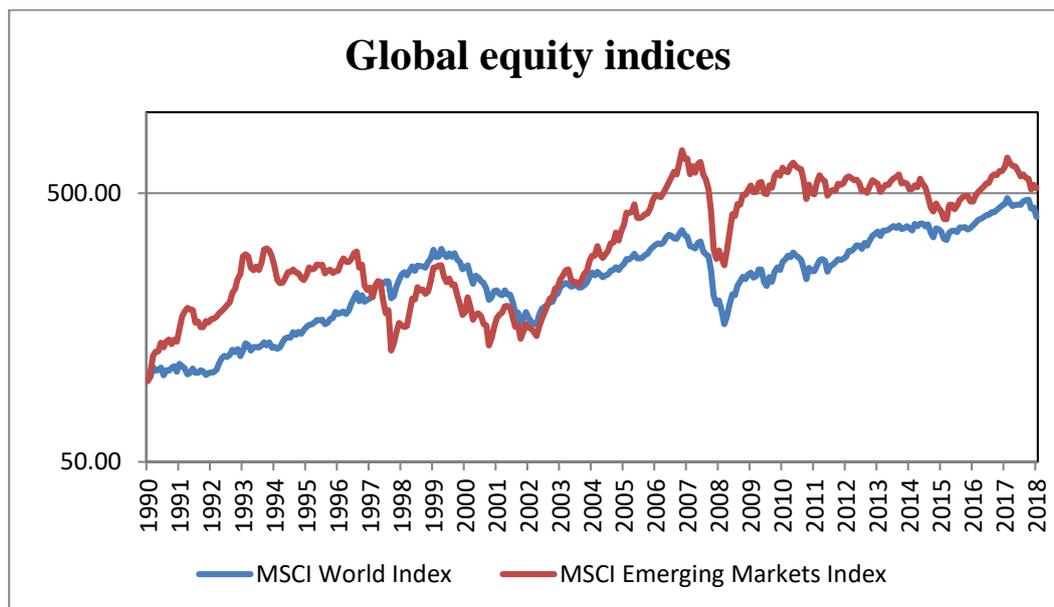
10 Historical performance of asset markets

The following section is quite long and looks at the historical performance of various asset classes. It is more important to know the general shape of the historical performances, and the reasons for the trends and any sharp movements, rather than know the exact returns over historical periods.

The following charts illustrate the historical behaviour of various main market indices and indicators.

10.1 Equity markets

Global equity markets



Source: MSCI: IFoA calculations

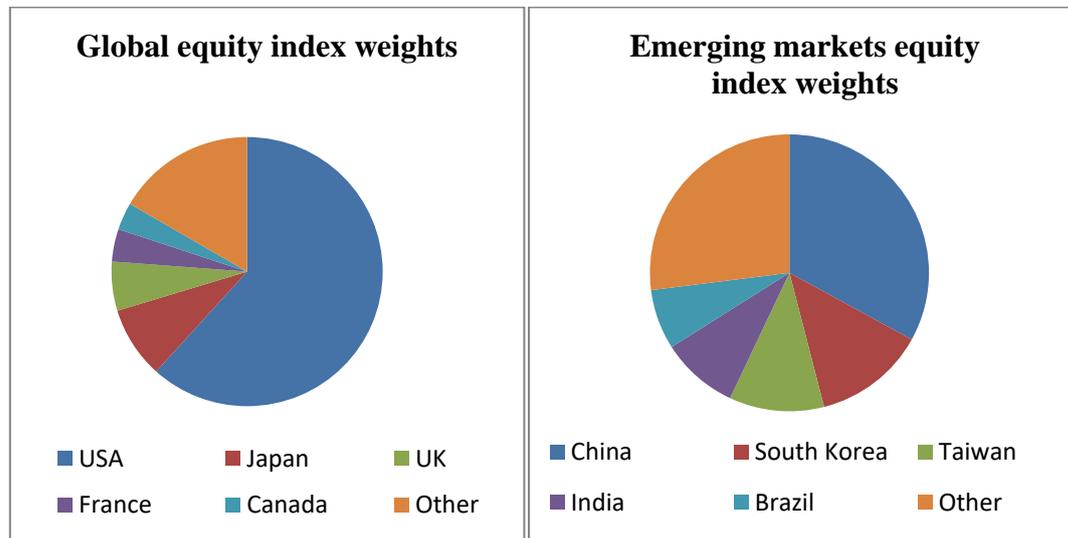
The World index is the one that is less volatile in the picture.

Performance of the MSCI World Index, a widely used index for global developed market equities, and the MSCI Emerging Markets Index, both rebased and shown from Dec 1990 – Dec 2018.

The MSCI World index actually measures both developed and emerging markets together, however the large relative size of the developed markets means that in practice the performance tracks developed markets.

The World Index is dominated by developed markets, notably the USA. Note how performance is positive overall, but with significant negative periods corresponding (in the case of World Index):

- to the 'dot.com' bubble bursting in 2000-2001
- to the 2008-2009 financial crisis
- (in the case of the Emerging Markets Index) additionally to the Russian and emerging markets debt crisis of 1997-1998.



Source: MSCI; As at 31 December 2018

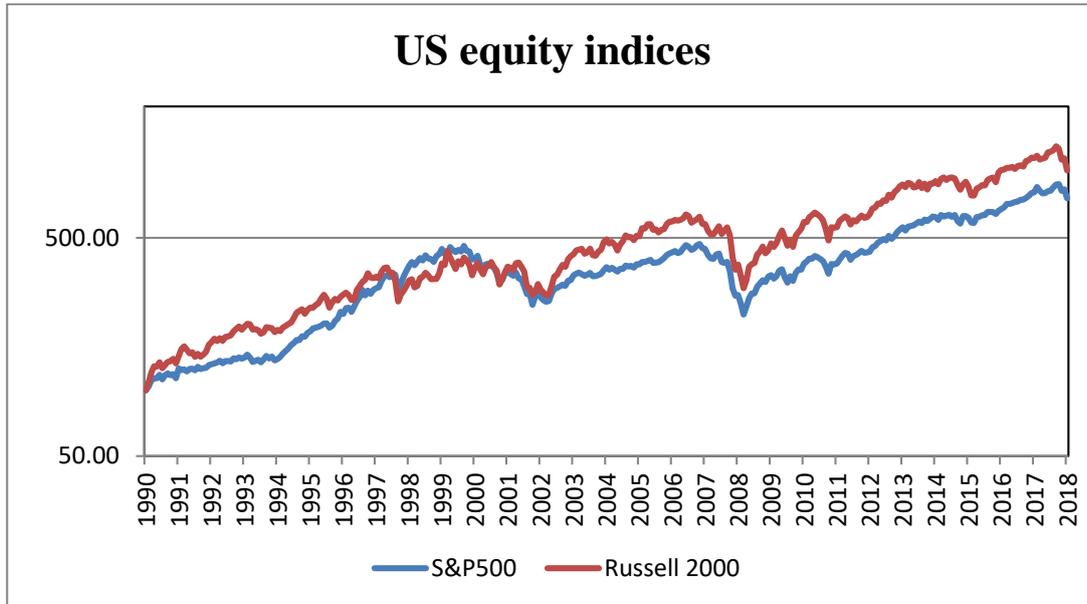
If the colour categories cannot be easily seen in black and white, the segments begin at 12 o'clock and work clockwise (eg in the first graph USA is the largest, then clockwise Japan, UK, France, ...)

The USA is the world's largest equity market, representing over half of global market capitalisation. In emerging markets, China has grown rapidly over recent decades to become the largest single constituent.

The financials and information technology sectors are the largest individual sectors in both, making up just under 20% each in the World Index and slightly more in the Emerging Markets Index.

The historical dividend yield for both indices was about 2.2% as at 30 June 2017. It has been in the range 1.5% – 2.5% for most of the past decade.

US equity markets

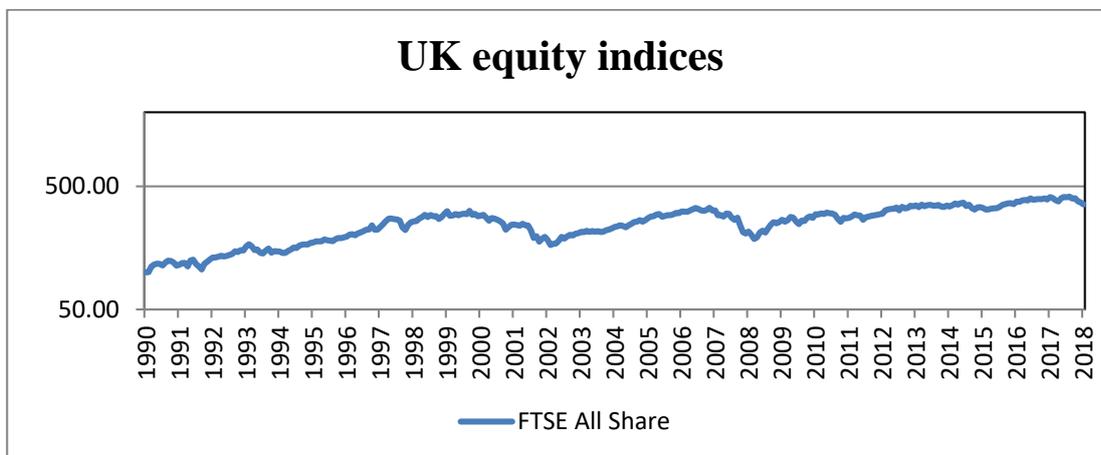


Source: St Louis Federal Reserve; IFoA calculations

Performance of the S&P500 Index, a widely used large cap market index for the US equity market, and the Russell2000 Index for small cap shares, both rebased and shown from Dec 1990 – Dec 2018. The data shows price changes only so is indicative of relative performance rather than a measure of accurate returns.

Small cap shares have outperformed very slightly over the period but with periods of under- and outperformance at various times.

UK equity markets



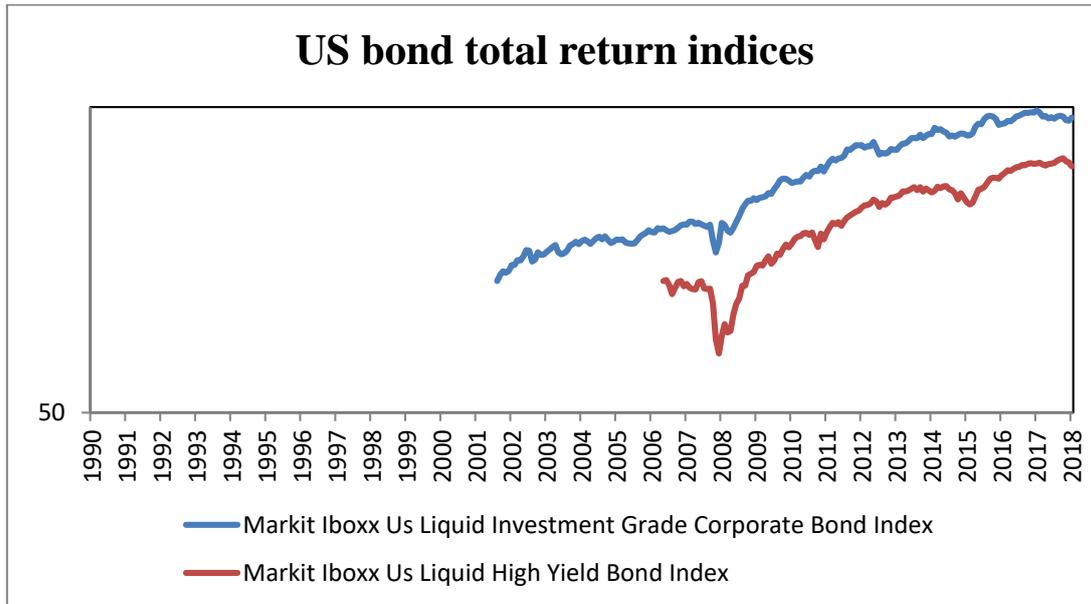
Source: London Stock Exchange; IFoA calculations

Performance of the FTSE All Share Index, the main market index for the UK equity market. rebased and shown from Dec 1990 – Dec 2018.

Again this represents price performance only showing a pattern similar to the US S&P500 index.

10.2 Fixed income markets

US bond markets



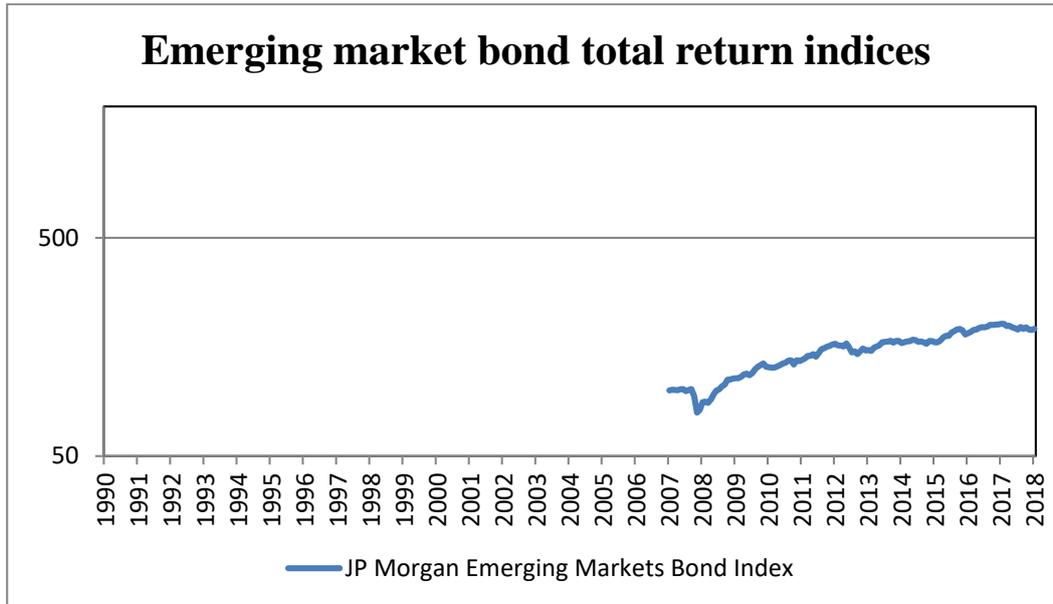
Source: *iShares.com; IFOA calculations*

The Investment grade index is the top line in the graph.

Performance of the Markit iBoxx US Liquid Investment Grade Corporate Bond Index and Markit iBoxx US Liquid High Yield Bond Index, both representative of the US bond market, rebased and shown from Dec 1990 – Dec 2018.

As might be expected bond indices have displayed a smoother, less volatile (and overall less rewarding) profile than comparable equities. Having said that, high yield bonds suffered particularly during the 2008-2009 financial crisis; this may be as expected since the crisis was foremost a *fixed income* or *credit* crisis rather than one affecting equities more generally.

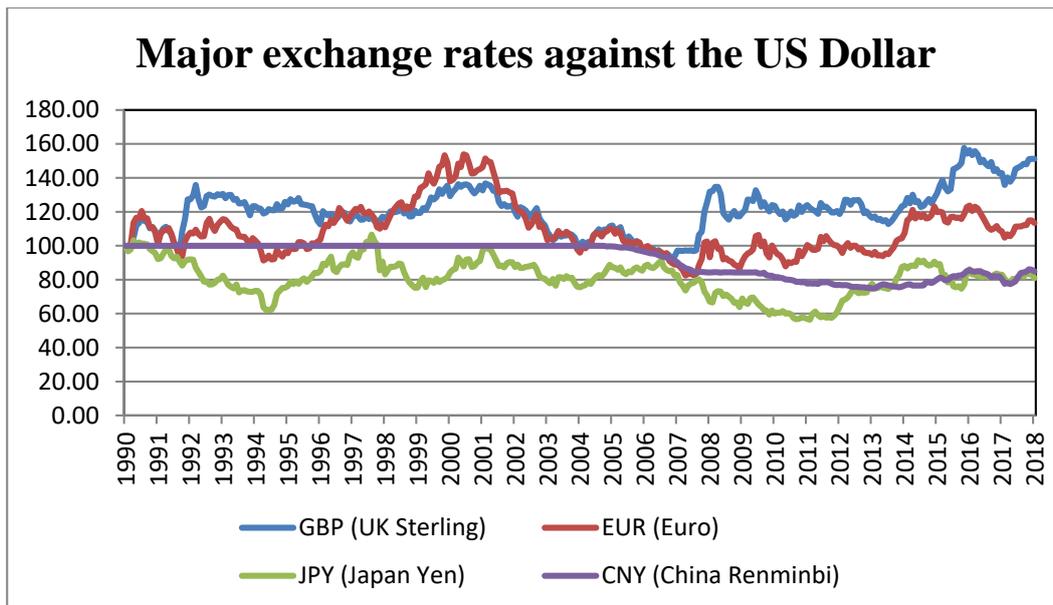
Emerging market bond markets



Source: iShares.com; IFoA calculations

Performance of the JP Morgan Emerging Markets Bond Index, a representative index of emerging market bond performance, rebased and shown from Dec 1990 – Dec 2018.

10.3 Currency markets



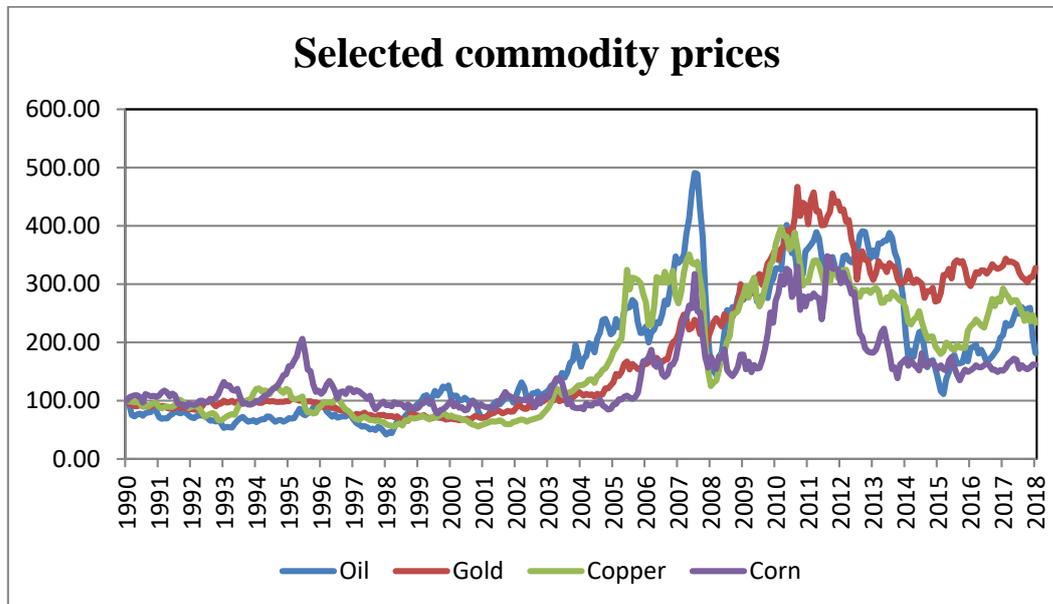
Performance of the GBP/USD, EUR/USD, JPY/USD and CNY/USD exchange rates, rebased and shown from Dec 1990 – Dec 2018. An increase in the chart level indicates a *weakening* of the respective currency against the US Dollar.

A rise in the currency chart indicates a weakening currency relative to the dollar.

Some exchange rates are driven by market forces whereas others tend to be managed by the relevant Central Bank (that is, the movement in the exchange rate is a combination of market forces and intervention by the Central Bank to achieve a particular level or particular path). The Chinese Renminbi for example, tends to experience less volatile behaviour than, say, UK Sterling because the People's Bank of China is more active in managing the path of its exchange rate.

Over time, exchange rates have fluctuated, however there is also an argument that exchange rates are somewhat mean-reverting – in that they return to a long-term level after short-term deviations. Certainly looking at the historical performance as above shows there have been large intra-period moves, but without an obvious trend in favour of any one major currency. Currencies which are undervalued tend to result in cheaper exports for the country in question, which increases the inflow of foreign currency from foreign consumers, which in turn causes the local currency to re-appreciate. As a consequence, many investors prefer to hedge out their currency exposure, or to engage in short-term tactical currency trading. Few investors consider unhedged currency positions as long-term strategic allocations.

10.4 Commodity markets



Source: *macrotrends.net*; IFoA calculations

Performance of oil, gold, copper and corn spot prices, in nominal terms, rebased and shown from Dec 1990 – Dec 2018.

Commodity prices typically exhibit greater price volatility than equities. In particular, commodities can be prone to 'bubble' and 'depression' behaviour, where belief of a shortage (or conversely belief of excess production) has a significant impact on short term prices. Also, there is an argument that the price of a commodity does not necessarily have any growth underpin – unlike, say, a company which grows its earnings year by year. Continuously increasing commodity prices imply either an ever-worsening shortage caused by some combination of ever-increasing demand (with constant supply) or constant demand with a depleting resource. New sources of production or substitutes for demand are often found, causing the market to adjust back to a 'normal' level. An example of this would be the discovery / invention of the shale oil process over recent decades which enabled large previously-untapped oil reserves to be accessed. This was initially driven by a high oil price, promoting the discovery and development of new drilling techniques which in turn led to an increase in supply.

Students should be aware of the major events that have occurred in the last 10 years, and perhaps have an idea of the major events that have occurred in the decade prior to that. Events that have caused major market movements should be researched, and if there are any equivalences between those events and what the industry and the markets are experiencing at the present time, then students should be ready to talk about these similarities. More ActEd material on this is contained in Chapter 9.

They often say that history never repeats itself, but it often rhymes. This means that the same situations rarely occur exactly as they did before, but certain similarities in the outcomes can be foreseen and predicted. In today's market we have a prolonged period of ultra-low interest rates, which has led to an increase in personal borrowing levels. This has happened before in the early 2000s. We have Quantitative Easing in most major developed countries which is a different strategy from anything that has been experimented with in the past. However, there are countries and periods in history where central banks have printed money, which gives some information to inform choices in the present circumstances. We are seeing a movement towards protectionism in trade, and a retreat from globalisation, which has occurred at times in the past. And we are experiencing a technological revolution that is transforming the way industry operates, on a similar scale to the changes seen in other industrial revolutions. It is good to think through the possibly scenarios and know the various possible outcomes for each, and be prepared to discuss them.

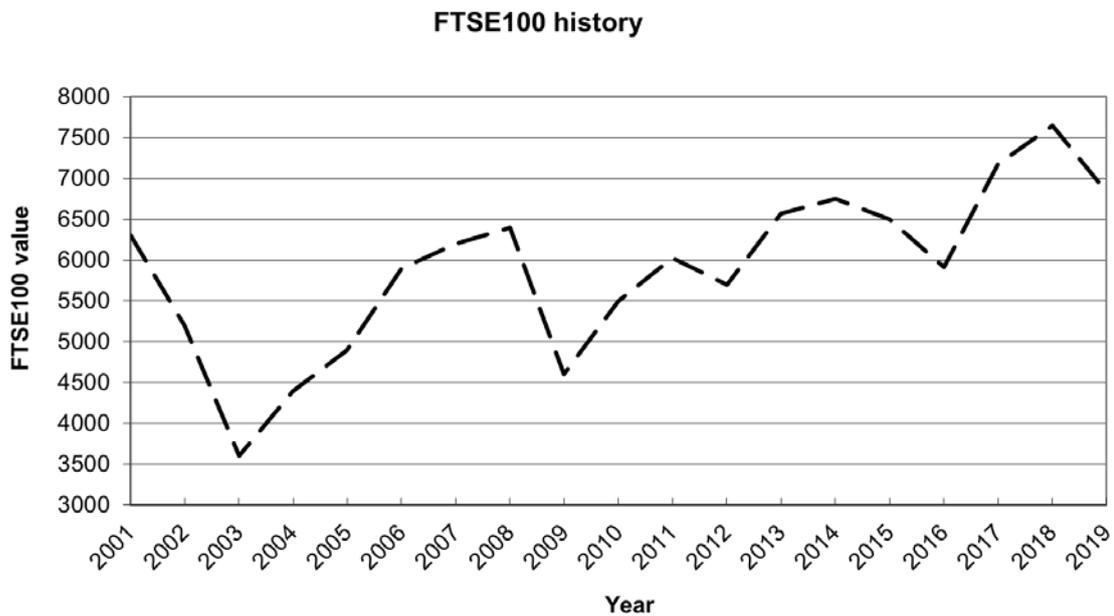
5 Historical analysis of investment returns

Students should have an overview of recent historical returns and are encouraged to review publications such as *The Financial Times*, *Investors Chronicle* and *The Economist: Intelligence Unit 'Country Reports'* for the UK, US, China, Japan, Germany and France (which are available on the IFoA's website (<https://www.actuaries.org.uk/learn-and-develop/research-and-knowledge/library-services>)).

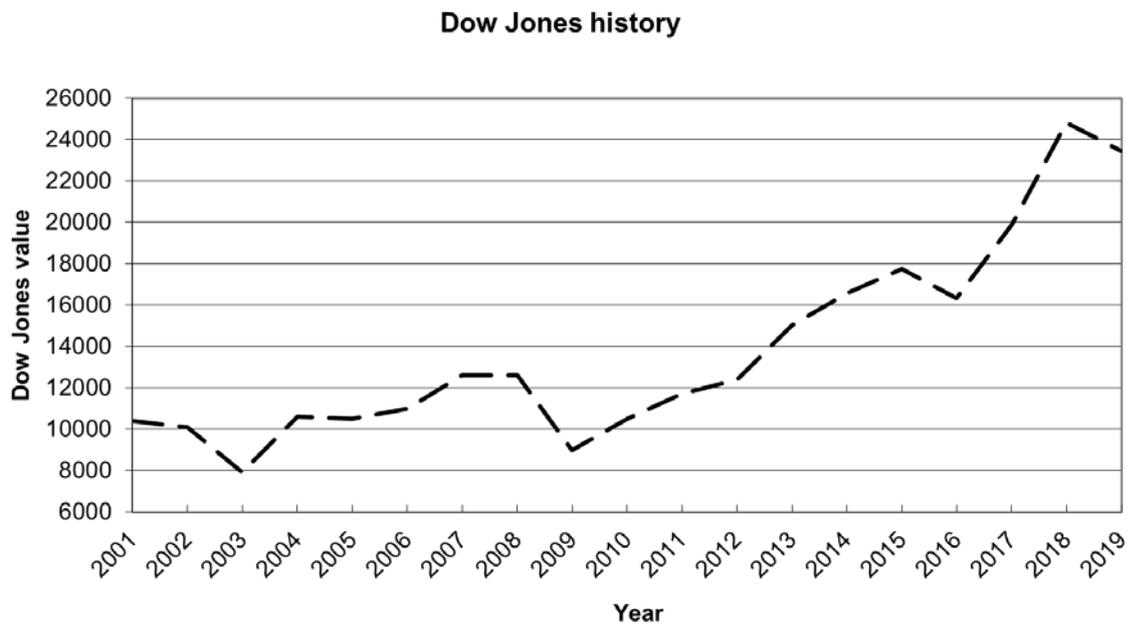
It is useful to have a reasonable recollection of the development of the major markets in recent times, even if the specific events are not known in detail. The following gives an account of the major markets over the last 20 years, which may be of interest.

5.1 UK and US markets

The following chart shows, in very rough terms, how the UK equity market has performed since 2001. There is only one plotted point per year, so a lot of the detail is missing, but for the purposes of SA7 it is the big picture that matters.



As you can see, there are similarities (but also differences!) between the FTSE100 and returns on the US market:



Period to 2000 (prior to graph)

During this period the UK market performed very well, in line with the performance of the US market at the time. The main driving forces behind the market were the IT bubble and falling inflation. The IT bubble pushed shares strongly upwards on expectations of monstrous profits in a brave new world. Inflation (for example in the UK) fell from around 5% *pa* in 1995 to 2.5% *pa* in 1999. At the same time, long interest rates were falling, partly due to lower and stable inflation, and partly due to the introduction of a European common currency, which had the effect of driving all bond yields down to the lowest common denominator. At the start of this period many economies in Europe (including the UK) had budget surpluses – *ie* the government spent less than it received in taxation.

The effect of this on pension schemes was mixed. Most schemes (particularly in the UK and the US) had asset portfolios that were very close to a peer group average, and which contained a high proportion of equities. The effect of falling interest rates was offset by strong equity growth, and surpluses were common. Indeed this was a time when contribution holidays to *remove* surplus were still commonplace.

2000 to 2002

This was an eventful period when equity markets fell and interest rates remained low. The main causes were the bursting of the IT bubble and the loss of confidence that followed. In addition, the events of 9/11 and the introduction of international tensions in Afghanistan played a major role, along with some accounting scandals in the US that led to the demise of some large companies. Central banks pushed interest rates as low as possible to fend off recession. European growth rates at this time were very poor, but the UK and US escaped with only modestly lower growth. During this time the UK public spending increased considerably, and the budget moved into significant deficit. Because of the higher level of growth in the UK than in Europe, the UK deficit remained lower than that of Germany and France.

The impact of these market movements was quite profound. Pension scheme deficits appeared, and were put in the spotlight due to new accounting standards. This caused many to try to sell equities and buy bonds, which further aggravated the situation. Life insurance companies found that solvency was under pressure, and were forced to sell equities to maintain solvency. The combination of accounting standards, the Myners report (which suggested that a move away from peer group matching would be good) and chaotic stock markets led to a number of important changes, and started the trend towards more liability driven investment approaches.

2003 to 2006

During this period the market advanced steadily, almost reaching its earlier highs. Despite further terrorist uncertainty and the war in Iraq, economic growth was robust and equity markets grew in confidence. Falling equity risk premiums around the world led to increasing equity prices. Short-term interest rates remained low which boosted economic growth but also fuelled the increase in house prices, particularly in the UK, US and some European countries (such as Spain). Strong growth in some emerging economies such as China and India began to cause shortages in commodities, which in turn began the rise in commodity prices. The budget deficit in the UK grew to more than 3% of GDP. The true extent of the deficit was however being hidden by a bank lending bubble which was building up in preparation for a crash. Fortunately, due to the demand for bonds from the pension industry, the issuance of bonds was easily absorbed by institutions and yields remained low. Retrospectively, it is possible to see that this period was fuelled by easy credit, low interest rates, and low corporate bond yield premiums. This was the bubble that was about to burst.

During this period, the pensions industry saw a continued move towards de-risking company balance sheets, which often involved either closing schemes or following an LDI approach. Some companies used improved profitability to repair the deficits in their company schemes. Deficits were also improving due to strong equity performances and some companies were keen to lock in the existing deficit before any unexpected problems arose.

2007 to 2010

The sub-prime crisis began to affect sentiment in the US and subsequently in the UK. House price falls in the US (and elsewhere) affected consumer confidence and left the more aggressive banks with a lot of potentially poor quality mortgages, which were not covered by the value of the houses. Due to securitisation and structured lending, these problems affected everyone, and an air of mistrust began to envelop the banking sector. This culminated in the nationalisation of Northern Rock in the UK and problems with Bear Stearns and Lehman brothers in the US, and led banks to reduce substantially the amount of credit that they were willing (or able) to extend to consumers. During this period of uncertainty, equity prices fell substantially and volatility increased significantly in the equity market. Commodity-based companies were initially the exception to this, as the surge of commodity prices continued and oil prices rose above \$140 per barrel but then fell again to around \$100 per barrel. Commodity prices then fell back to previous levels. Bond yields remained low. Central banks reduced short-term interest rates to almost zero, and the UK and US began aggressive quantitative easing.

2011 onwards

As the economy faltered, bank tax revenues fell and unemployment rose (again a function of the bank bubble bursting). The budget deficits of major countries rose enormously, leaving the UK in a worse position than many other European countries. However, due to the demand from pension funds, the continued belief that inflation was under control, and the Bank of England's policy of quantitative easing, yields on bonds continued to decline.

The Eurozone crisis began to take centre stage. Greece, Cyprus, Ireland and Portugal all required European and IMF bail outs from funds provided by Germany, France and to a lesser extent, the UK. The US has seen its government bond credit rating reduced but this had little effect on bond prices.

During this latter period, equity volatility continued to fuel the drive towards de-risking, closing schemes and LDI. Due to the fact that the problems were most acute in the UK and the US, where borrowing levels were much higher than elsewhere, and where house prices had risen far further than elsewhere, the pound remained at a lower level than historically, and the US dollar also struggled (but to a lesser extent). This underlined the advantage for institutions of having a diversified asset portfolio.

From 2013, quantitative easing was scaled back in the US, and subsequently reversed – in the UK no more QE was carried out for quite a few years until the BREXIT vote, when it was restarted. The outstanding gilt holdings by the UK central bank has reached high levels (over £430bn in 2019). The UK central bank governor indicated that he did not foresee the gilt holdings ever being unwound.

Greek deficit worries and austerity came back to the fore. The UK deficit, which was meant to be eliminated in the 5-year term of government, has only been to a forecast £40bn for 2019. The reason for this is that, although the population of the UK has surged, which leads to an increase in GDP, this has not been matched by an increase in tax revenues. Government costs have only been modestly reduced compared to other countries in the Eurozone. Growth in China showed signs of weakening, which led to considerable uncertainty on the world markets, and at a local level, but has held up relatively well.

The BREXIT vote in 2016 reduced clarity even further, as did the unexpected general election in the UK in 2017. However, government borrowing continues to be absorbed, interest rates remain low (short-term and long-term), and inflation has only increased modestly. Sentiment is likely to be driven by the political changes that are occurring in the US, China and around Europe, including potential trade friction.

5.2 Europe

The European banks were affected by the credit crunch problems and some large German, Swiss and French banks were forced to write off large sums of money and resort to government aid. Although this had an effect on the economies, it was not as great an effect as it was in the UK and US where the banking systems represent a larger proportion of the economy. The major European economies are affected by uncertainty in the US and Chinese markets, because these are large export markets for them. The Eurozone dealt with the government deficit problems of many of its nations, but was then faced with a human migration problem with knock-on political ramifications. The ECB embarked on quantitative easing to ease the problems in the banking sector.



Question

A UK pension scheme wishes to hedge exposure to the Euro. What instruments might it use, how would it set up the overlay and how would it maintain the overlay on an ongoing basis?

Solution

What instruments would it use?

Typically currency forwards, but currency futures are also used. Swaps are a possibility, but since they are harder and more expensive to set up, and do not achieve anything that forwards cannot achieve, they are less common.

How would it set up the overlay?

If the European equity portfolio has a market value of 200m Euros, then it would sell 200m Euros into sterling using a forward contract, for settlement in (say) a year's time. By doing this, if the Euro falls against sterling, the value of the portfolio of equities falls in sterling terms, but the value of the forward currency contract rises correspondingly.

How would it maintain the overlay on an ongoing basis?

When the forward currency contract nears its term, the fund would not wish to have to raise 200m Euros to settle the contract. It would therefore cancel the contract by buying 200m Euros at the ruling rate, for settlement on the same date as the forward contract expires. On the day of the forward currency expiry, the bank would both receive 200m Euros from the newest deal, and pay 200m Euros in respect of the original deal. Therefore the only *net* movements are in sterling, releasing the profit or loss from the two trades. The fund would then Euro hedge the exposure again by taking out a new forward currency contract to sell 200m Euros in another year's time.

As the value of the European equities changed on a day to day basis, the amount of Euros sold would have to be reviewed and rebalanced if necessary. Dividends would also have to be taken into account.

Credit risk with the investment banks offering the forward contracts would have to be continuously monitored.

Portfolio management reports would have to be carefully reviewed to ensure that the appropriate net exposure is being reported to management and the fund manager himself.

Because many European countries operate their pension schemes in a very different way (more like an insurance contract), they are not affected by equity volatility in the same way as those in the US and the UK. LDI has not had the same popularity in Europe as it has in the UK. On the other hand, European companies did not benefit from the equity market returns over the 80s and 90s, as UK companies did.

5.3 Japan

In many ways, the difficulties experienced by Japan since the early 1990s are similar to what the UK and US experienced during the banking crisis. (History never repeats itself, but it sometimes rhymes!) Asset prices were very high, and banks extended loans secured on those assets until eventually the bubble burst. The banking sector was very weak for more than a decade in Japan, and the government increased spending to help push the economy out of recession. The Central Bank of Japan also resorted to quantitative easing during this time to inject cash into the economy.

The following long-term chart of the Nikkei index shows how the Japanese market has performed:



Japanese interest rates and inflation have been very low for a long time. Deflation was a problem at times over the last two decades.

UK pension schemes that have invested in Japan have had a difficult time over the last 25 years, although in currency terms the Yen has been strong. The Japanese economy benefits from its position in the world and its relationship with some developing economies in the East. Japanese bond yields have been very low (almost zero) for almost two decades because of the low or negative inflation, and QE.

The economy was badly impacted by the tsunami in early 2011. The cost of rebuilding was estimated to be around \$50bn, which is being financed by more government debt. However, many are saying that the government has already issued enough debt and in these times of sovereign debt crises, taxes should be raised to pay for the rebuilding. This would further weaken the economy. However, in line with other markets, in particular the US equity market, the Japanese market has been strong in recent years, and QE has played its part in this.

6 Current market yields

In some circumstances you may be required to demonstrate your knowledge of current market yields. The following table contains the most important items, updated as at May 2019, but you should keep an eye open for any *major* changes in these. The table contains some empty cells for you to use to add the up-to-date yields as you get close to the exam. In SA7 it is rarely essential to know the yields and PEs to the second decimal place, but a broad idea to within a half percent is recommended.

	May-19				Review nearer exam!			
	UK	US	Japan	Europe	UK	US	Japan	Europe
Short-interest rate	0.75%	2.0%	0.0%	-0.5%				
Equity market PE	17							
Equity market dividend yield	4.2%	2.0%	2.5%	2.5%				
10 year bond yield	1.0%	2.0%	-0.1%	-0.3% (*)				
10 year Index-linked real yield	-2.2%							
Ultra-long gilt yield	1.3%							
Ultra-long index-linked real yield	-2.0%							
Inflation (CPI)	2.4%							
Property rental yield	4% to 6%							
Corporate spread over gilt "AA"	0.7%							
Corporate spread over gilts "A"	1.3%							
VIX index		16% (**)						
Crude oil		\$63						
(*) German yields have been used here, but yields vary a great deal across Europe.								
(**) It has been as high as 36% and as low as 11% in 2019 so far								

Most of these can be obtained from the back few pages of the weekend FT, and commercial property rental yields can be found on the internet. The sections that are shaded are less important from an exam perspective. Anything that becomes topical, or changes a great deal in the 18 months prior to the exam, is more important, even if it is not on the table above.