

# *Subject SP9*

## 2018/19 CMP upgrade

### ***CMP Upgrade***

This CMP Upgrade lists all significant changes to the Core Reading and the ActEd material since last year so that you can manually amend your **2018 ST9 study material** to make it suitable for study for the **2019 SP9 exams**.

Whilst there have been minimal changes to the Syllabus and Course, the format and appearance of the **SP9 Course Notes** is very different to that of the **ST9 Course Notes**.

You can buy a full replacement set of up-to-date **Subject SP9 Course Notes** at a significantly reduced price if you have previously bought the full price **Subject ST9 Course Notes**. Please see our **2019 Student Brochure** for more details.

# 1 Changes to the Syllabus Objectives and Core Reading

## 1.1 Syllabus Objectives

Changes to the Syllabus Objectives for the 2019 exams are highlighted in bold font in the table below, including:

- a new syllabus topic (Syllabus Objective 8) on Solving Problems, which is now covered in Module 32 on Case Studies
- weightings assigned to each main syllabus topic, which are indicative of the approximate balance of the assessment of this subject between the main syllabus topics, averaged over a number of examination sessions
- modifications to the instruction or command words (*eg* describe, discuss, explain, assess). More information on these command words can be found here: <https://www.actuaries.org.uk/studying/prepare-your-exams/command-verbs-used-associate-and-fellowship-exams>

Syllabus Objectives that are unchanged, are shown in greyed out font in the table below.

	<b>2018 Syllabus Objective</b>		<b>2019 Syllabus Objective</b>
1	<i>ERM Concept and Framework</i>	1	<b>ERM Concept and Framework (15%)</b>
1.1	Understand the principal terms in Enterprise Risk Management (ERM).	1.1	<b>Explain</b> the principal terms in Enterprise Risk Management (ERM).
1.2	Describe the concept of ERM, including:	1.2	Describe the concept of ERM.
1.2.1	Define what is meant by ERM.	1.2.1	Define what is meant by ERM.
1.2.2	Describe the role of the following concepts in ERM: <ul style="list-style-type: none"> <li>• the holistic approach</li> <li>• downside and upside risks</li> <li>• measurement of risk</li> <li>• unquantifiable risks</li> <li>• responses to risk, and risk management.</li> </ul>	1.2.2	Describe the role of the following concepts in ERM: <ul style="list-style-type: none"> <li>• the holistic approach</li> <li>• downside and upside risks</li> <li>• measurement of risk</li> <li>• unquantifiable risks</li> <li>• responses to risk, and risk management.</li> </ul>
1.2.3	Describe the benefits of ERM.	1.2.3	Describe the benefits of ERM.
1.3	Discuss the framework for risk management and control within a company, including:	1.3	Discuss the framework for risk management and control within a company.
1.3.1	Describe an appropriate framework for an organisation's ERM.	1.3.1	<b>Recommend</b> an appropriate framework for an organisation's ERM.
1.3.2	Discuss how to adopt best practice in ERM in compliance and corporate governance.	1.3.2	<b>Propose</b> best practice ERM approaches in compliance and corporate governance.

1.3.3	Describe governance issues including market conduct, audit, and legal risk.	1.3.3	<b>Discuss</b> governance issues including market conduct, audit, and legal risk.
1.3.4	Discuss the cultural aspects of risk assessment and management, including the problems of bias.	1.3.4	<b>Evaluate an organisation's risk management culture, including risk awareness, accountabilities, collaboration, incentive compensation, communication and the problem of bias.</b>
1.4	Understand risk frameworks in regulatory environments, including:	1.4	<b>Demonstrate</b> an understanding of risk frameworks in regulatory environments.
1.4.1	Discuss the role of regulators in ERM and effective management of the supervisor relationship.	1.4.1	<b>Explain</b> the role of regulators in ERM and effective management of the supervisor relationship.
1.4.2	Describe the Basel Accord and Solvency II frameworks, including their underlying principles and approaches to risk measurement.	1.4.2	Describe the Basel Accord and Solvency II frameworks, including their underlying principles and approaches to risk measurement.
1.4.3	Demonstrate an understanding of Sarbanes-Oxley and other regulatory risk frameworks and their underlying principles.	1.4.3	<b>Outline</b> the requirements of Sarbanes-Oxley and other regulatory risk frameworks and their underlying principles.
1.5	Describe the role of credit agencies in the evaluation of risk management functions, including the risk management grading criteria used, and discuss the relevance of these criteria.	1.5	<b>Demonstrate an understanding of the perspectives of credit rating agencies.</b>
		1.5.1	Describe the role of credit rating agencies in the evaluation of risk management functions, including the risk management grading criteria used.
		1.5.2	<b>Assess</b> the relevance of these criteria.
2	<i>ERM Process</i>	2	<i>ERM process (10%)</i>
2.1	Demonstrate an understanding of the relevance of ERM to all stakeholders, including:	2.1	Demonstrate an understanding of the relevance of ERM to all stakeholders.
2.1.1	Discuss the relevance of risk measurement and management to all stakeholders.	2.1.1	<b>Compare</b> the relevance of risk measurement and management to various stakeholders.
2.1.2	Show an understanding of the role of contagion and how it affects different stakeholders.	2.1.2	<b>Explain</b> contagion and how it affects different stakeholders.
2.1.3	Discuss the risks arising from any misalignment of interests between different groups of stakeholders.	2.1.3	<b>Explain</b> the risks arising from any misalignment of interests between different groups of stakeholders.
2.2	Describe how to determine a company's risk appetite, risk capacity and risk objectives.	2.2	<b>Demonstrate</b> how to determine and <b>articulate</b> risk appetite, risk capacity, <b>risk tolerances, desired risk profile</b> and risk objectives.

2.3	Describe and assess the elements and structure of a successful risk management function, including the ERM roles and responsibilities of the people within an organisation, and how the different groups should interact, and recommend a structure for an organisation's risk management function.	2.3	<b>Evaluate</b> the elements and structure of a successful risk management function.
		2.3.1	Describe the ERM roles and responsibilities of the people within an organisation and how the different groups should interact.
		2.3.2	Recommend a structure for an organisation's risk management function.
2.4	Describe how financial and other risks and opportunities influence the selection of strategy.	2.4	<b>Assess the implications of financial and other risks and opportunities for strategic planning and the selection of strategy.</b>
2.5	Discuss the application of the risk management control cycle, including the relevance of external influences and emerging risks.	2.5	<b>Demonstrate</b> the application of the risk management control cycle, including the relevance of external influences and emerging risks.
2.6	Discuss how to identify risks and their causes and implications.	2.6	<b>Describe methods</b> for the identification of risks and their causes and implications.
2.7	Demonstrate the application of ERM to real and hypothetical contexts:	2.7	Discuss important past examples of both good risk management practices and of risk failures, <b>for financial and non-financial entities</b> , including how better risk management might have prevented these failures.
2.7.1	Discuss important past examples of both good risk management practices and of risk failures, and discuss how better risk management might have prevented these failures.		
2.7.2	Analyse hypothetical examples ex ante and discuss how the situations described could benefit from risk management.		
		2.8	<b>Propose an ERM process that creates value for an organisation.</b>

3	<i>Risk Categories and Classification</i>	3	<i>Risk categories and identification (10%)</i>
3.1	Explain what is meant by risk and uncertainty, and discuss different definitions and concepts of risk.	3.1	Explain what is meant by risk and uncertainty, including different definitions and concepts of risk.
3.2	Show an awareness and understanding of risk categories:	3.2	<b>Demonstrate</b> an understanding of risk categories.
3.2.1	Show an understanding of the following risk categories and be able to provide examples of each type of risk: market risk, economic risk, interest rate risk, foreign exchange risk, basis risk, credit risk, counterparty risk, liquidity risk, insurance risk, operational risk, environmental risk, legal risk, regulatory risk, political risk, agency risk, reputational risk, project risk, strategic risk, demographic risk, moral hazard.	3.2.1	<b>Identify</b> the risks faced by an entity, including market risk, economic risk, interest rate risk, foreign exchange risk, basis risk, credit risk, counterparty risk, liquidity risk, insurance risk, operational risk, environmental risk, legal risk, regulatory risk, political risk, agency risk, reputational risk, project risk, strategic risk, demographic risk, moral hazard.
		3.2.2	<b>Analyse the financial and non-financial risks faced by an organisation within a given context.</b>
3.2.2	Show an awareness of how individual risks might be categorised in different ways.	3.2.3	<b>Discuss risk taxonomy</b> , including an awareness of how individual risks might be categorised in different ways.
3.3	Describe the relationship between systematic risk, non-systematic or specific risk, and concentration of risk.	3.3	Describe the relationship between systematic risk, non-systematic or specific risk, and concentration of risk.
4	<i>Risk Modelling and Aggregation of Risks</i>	4	<i>Risk modelling and aggregation of risks (15%)</i>
4.1	Discuss the extent to which each of the risks in 3.2.1 can be amenable to quantitative analysis.	4.1	<b>Assess</b> the extent to which each of the risks in 3.2.1 can be amenable to quantitative analysis.
4.2	Describe risk aggregation and correlation:	4.2	<b>Demonstrate</b> an understanding of the use of correlation measures.
4.2.1	Describe enterprise-wide risk aggregation techniques incorporating the use of correlation.	4.2.1	Demonstrate enterprise-wide risk aggregation techniques incorporating the use of correlation.
4.2.2	Describe different measures of correlation and discuss the relative merits of each for modelling purposes.	4.2.2	<b>Comment</b> on the relative merits and <b>implications</b> of different correlation measures.

4.3	Describe the use of scenario analysis and stress testing in the risk measurement process, including the advantages and disadvantages of each.	4.3	<b>Discuss</b> the use of scenario analysis and stress testing in the risk measurement process, including the advantages and disadvantages of each.
4.4	Demonstrate understanding of the use of copulas as part of the process of modelling multivariate risks, including recommendation of an appropriate copula.	4.4	Demonstrate understanding of the use of copulas as part of the process of modelling multivariate risks.
		4.4.1	<b>Evaluate different types of copula for a given purpose.</b>
		4.4.2	Recommend an appropriate copula for a given situation.
4.5	Explain the importance of the tails of distributions, tail correlations and low frequency / high severity events.	4.5	Explain the importance of the tails of distributions, tail correlations and low frequency / high severity events.
4.6	Demonstrate how extreme value theory can be used to help model risks that have a low probability.	4.6	Demonstrate how extreme value theory can be used to help model risks that have a low probability.
4.7	Explain the importance of the tails of distributions, tail correlations and low frequency / high severity events.	4.7	<b>Demonstrate</b> an understanding of model and parameter risk.
4.8	Discuss the use of models in the overall ERM decision-making process, including:	4.8	Discuss the use of models in the overall ERM decision-making process.
4.8.1	Describe the development and use of models for decision-making purposes in ERM.	4.8.1	Describe the development and use of models for decision-making purposes in ERM.
4.8.2	Discuss how the decision-making process takes account of the organisation's risk appetite and corporate governance, and builds on the results of stochastic modelling, scenario analysis, stress testing and analysis of model and parameter risk.	4.8.2	<b>Explain</b> how the decision-making process takes account of the organisation's risk appetite and corporate governance, and builds on the results of stochastic modelling, scenario analysis, stress testing and analysis of model and parameter risk.
		4.8.3	<b>Evaluate different types of model for a given purpose.</b>

5	<i>Risk Measurement and Assessment</i>	5	<i>Risk measurement and assessment (15%)</i>
5.1	Demonstrate an understanding of common risk measures.	5.1	Demonstrate an understanding of common risk measures.
5.1.1	Describe the properties and limitations of common risk measures, including: <ul style="list-style-type: none"> <li>Value at Risk (VaR)</li> <li>Tail Value at Risk (TVaR)</li> <li>Probability of ruin</li> <li>Expected shortfall.</li> </ul>	5.1.1	Describe the properties and limitations of the following: <ul style="list-style-type: none"> <li>Value at Risk (VaR)</li> <li>Tail Value at Risk (TVaR)</li> <li>Probability of ruin</li> <li>Expected shortfall.</li> </ul>
5.1.2	Determine risk exposures and tolerances using these measures.	5.1.2	Determine risk exposures and tolerances using these measures.
5.2	Describe how to choose a suitable time horizon and risk discount rate.	5.2	Describe how to choose a suitable time horizon and risk discount rate.
5.3	Analyse univariate and multivariate financial and insurance data (including asset prices, credit spreads and defaults, interest rates and insurance losses) using appropriate statistical methods.	5.3	Analyse univariate and multivariate financial and insurance data (including asset prices, credit spreads and defaults, interest rates and insurance losses) using appropriate statistical methods.
5.4	Recommend a specific choice of model based on the results of both quantitative and qualitative analysis of financial or insurance data.	5.4	Recommend a specific choice of model based on the results of both quantitative and qualitative analysis of financial or insurance data.
5.5	Discuss the assessment of different types of market risk.	5.5	<b>Assess</b> different types of market risk.
5.6	Evaluate credit risk:	5.6	<b>Assess</b> credit risk.
5.6.1	Describe what is meant by a credit spread, and describe the components of a credit spread.	5.6.1	Describe what is meant by a credit spread and its components.
5.6.2	Discuss different approaches to modelling credit risk.	5.6.2	Discuss different approaches to modelling credit risk.
5.7	Discuss the assessment of operational, liquidity and insurance risks.	5.7	<b>Assess</b> operational, liquidity and insurance risks.
6	<i>Risk Management Tools and Techniques</i>	6	<i>Risk management tools and techniques (20%)</i>
6.1	Describe risk optimisation and responses to risk, including:	6.1	<b>Demonstrate</b> risk optimisation and responses to risk.
6.1.1	Discuss how to optimise an objective, possibly subject to constraints.	6.1.1	<b>Explain</b> how to optimise an objective, possibly subject to constraints.
6.1.2	Discuss risk optimisation and responses to risk using illustrative examples.	6.1.2	<b>Demonstrate</b> risk optimisation and responses to risk using illustrative examples.

		6.1.3	<b>Analyse the risk and return trade-offs that result from changes in the organisation's risk profile.</b>
6.2	Recommend approaches, which balance benefits against inherent costs, that can be used to manage an organisation's overall risk profile, including:	6.2	Recommend approaches, which balance benefits against inherent costs, that can be used to manage an organisation's overall risk profile.
6.2.1	Describe how to reduce risk by transferring it.	6.2.1	Describe how to reduce risk by transferring it.
6.2.2	Describe how to reduce risk without transferring it.	6.2.2	Describe how to reduce risk without transferring it.
6.2.3	Demonstrate an understanding of the importance of residual risks and new risks arising following risk mitigation actions.	6.2.3	<b>Analyse</b> the residual risks and new risks arising following risk mitigation actions.
6.2.4	Demonstrate an understanding of how an organisation's ability to manage risk is affected by regulatory, capacity and cost constraints.	6.2.4	<b>Explain</b> how an organisation's ability to manage risk is affected by regulatory, capacity and cost constraints.
6.3	Discuss the management of market risk, including:	6.3	<b>Demonstrate</b> strategies for the management of market risk.
6.3.1	Develop and recommend strategies for the reduction of market risk using financial derivatives.	6.3.1	Recommend strategies for the reduction of market risk using financial derivatives.
6.3.2	Demonstrate an awareness of the practical issues related to dynamic hedging using market instruments.	6.3.2	Demonstrate an awareness of the practical issues related to <b>market risk hedging</b> , including dynamic hedging.
6.4	Discuss the tools and techniques for identifying and managing credit and counterparty risk.	6.4	<b>Demonstrate</b> the use of tools and techniques for identifying and managing credit and counterparty risk.
6.5	Discuss the management of operational, liquidity, insurance and other key risks.	6.5	<b>Demonstrate</b> possible strategies for the management of operational, liquidity, insurance and other key risks.



7	<i>Capital Management</i>	7	<i>Capital management (15%)</i>
7.1	Demonstrate an understanding of capital calculations, including:	7.1	Demonstrate an understanding of capital calculations.
7.1.1	Describe the concept of economic measures of value and capital, and their uses in corporate decision-making processes.	7.1.1	Describe the concept of economic measures of value and capital, and their uses in corporate decision-making processes.
7.1.2	Demonstrate the ability to develop a capital model for a representative financial firm.	7.1.2	<b>Evaluate different risk measures and capital assessment approaches.</b>
		7.1.3	Demonstrate the ability to develop a capital model for a representative financial firm.
7.2	Demonstrate an understanding of how to allocate capital across an organisation.	7.2	<b>Propose</b> techniques for allocating capital across an organisation.
		8.0	<b><i>Solving problems</i></b>
		8.1	<b>Analyse hypothetical examples and scenarios in relation to the application of ERM, in both financial and non-financial contexts.</b>
		8.1.1	<b>Propose solutions and actions that are appropriate to the given context, with justification where required.</b>
		8.1.2	<b>Suggest possible reasons why certain actions have been chosen.</b>
		8.1.3	<b>Assess the implications of actions within a given scenario.</b>
		8.1.4	<b>Discuss the advantages and disadvantages of suggested actions, taking into account different perspectives.</b>

## 1.3 Core Reading

Links to 'online' papers, which form part of the required reading for Subject SP9, have been provided:

**Note on Enterprise Risk Management for Capital and Solvency Purposes in the Insurance Industry – International Actuarial Association:**

[http://www.actuaries.org/CTTEES\\_FINRISKS/Documents/Note\\_on\\_ERM.pdf](http://www.actuaries.org/CTTEES_FINRISKS/Documents/Note_on_ERM.pdf)

**Insurance Criteria: Evaluating the Enterprise Risk Management Practices of Insurance Companies – Standard & Poor's:**

<https://www.actuaries.org.uk/documents/insurance-criteria-evaluating-enterprise-risk-management-practices-insurance-companies>

### Module 03

#### Page 21

The first sentence in relation to concentration of risk has been modified to:

**Concentration of risk can be described as 'putting all your eggs in one basket'; that is, relying upon the success of one course of action which, if it fails, leave no alternative.**

### Module 04

#### Page 10

An additional paragraph in relation to the Walker review has been added:

**The detail of the report does not form part of this Core Reading but can be accessed via the following link:**

<https://www.governance.co.uk/resources/item/256-the-walker-report-review-of-corporate-governance-in-uk-banks-and-other-financial-industry-entities-final-recommendations>

### Module 32

An additional section has been added to cover the small amount of new Core Reading on 'Solving Problems'. A copy of this additional section is provided at the end of this CMP Upgrade.

## 2 Changes to the ActEd Course Notes

As mentioned in the introductory box to this upgrade, the format and appearance of the Subject SP9 Course Notes is very different to that of the Subject ST9 Course Notes. For example, the Self-Assessment Questions have been replaced by in-text examples, questions and solutions. Each Module now contains a set of Practice Questions and Solutions (drawn from the Q&A Bank).

The following specific changes have been made in the Course Notes:

### Module 18

#### Page 20

The definition of the product copula has been replaced by:

$$\begin{aligned} \text{ind } C(F_{X_1}(x_1), \dots, F_{X_N}(x_N)) &= \text{ind } C(u_1, \dots, u_N) \\ &= \prod_{i=1}^N u_i \\ &= \prod_{i=1}^N F_{X_i}(x_i) \end{aligned}$$

### Module 32

An additional section has been added to cover the small amount of new Core Reading on 'Solving Problems'. A copy of this additional section is provided at the end of this CMP Upgrade.

### **3 Changes to the Q&A Bank and X Assignments**

There have been no material changes to the X Assignments. However, the Q&A Bank no longer exists. Most Q&A Bank questions have been moved to the Subject SP9 Course Notes as Practice Questions and Solutions at the end of each Module.

### 3 Hypothetical examples / Problem solving

**There is no explicit Core Reading for syllabus objective 8.1. All the material that has been covered in the rest of the Core Reading for Subject SP9 also covers this objective.**

**The examiners expect students to be able to apply the knowledge and understanding they have developed through the study of this Core Reading to propose ERM solutions and strategies and to produce coherent advice and recommendations for the application of ERM techniques in the management of a range of different hypothetical business scenarios.**

**In this context, students are also expected to be able to interpret hypothetical balance sheets and financial statements.**

*Note the advice above! In the examination you may be expected to apply any of the knowledge and understanding you have gained throughout the course to some hypothetical situation. This may include analysing some financial statements.*



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#### Question

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*Here is a hypothetical example for you to consider. Further hypothetical examples are given in the end of module practice questions and Assignment X6.*

A small fund management company oversees the pension fund assets of a manufacturing company. It invests funds in a range of equities, bonds and property. In addition, it manages the payments to pensioners and the receipt of company contributions into the fund.

The fund-management company has a restricted budget and the Investment Director is considering three different structures to re-organise his department in order to save money.

Discuss the merits and risks of each of the following three structures.

*A sample solution appears immediately after the description of the third structure.*

**Structure 1**

Six fund managers spread across equities and bonds reporting to the Investment Director, with the property management being outsourced to a specialist professional property management company. The property management company would be paid only if the value of the property portfolio outperforms a certain property index each year, and would receive nothing in the event of underperformance.

Nine people involved in back-office, settling the trades and managing the cash movements. All cash movements have to be authorised by two specified people and two people are employed to reconcile the accounts on a daily basis.

*Write down your thoughts on Structure 1:*

**Structure 2**

Nine fund managers, comprising:

- four equity managers
- one expert in derivatives
- two bond managers
- two property managers, one of whom is a professional property lawyer and one of whom has experience in property management and rent negotiation.

Back-office functions would be outsourced to a custodian company that also undertakes settlement and administration functions. Two people would be employed in the company to provide the interface between the third-party custodian and the fund management organisation itself.

*Write down your thoughts on Structure 2:*

**Structure 3**

Two 'star performing' equity managers would be employed to manage the equity portfolio. These individuals would have excellent reputations in the financial market, would require significant salaries and bonuses and would expect senior management status in order to attract them. Two bond managers would be employed. The property investment would be outsourced to a company for a flat fee with a bonus if the property portfolio outperforms a given index over a five-year rolling period.

A new back-office software package would be installed at significant cost, enabling the back-office to be run by three junior input clerks on low salaries.

*Write down your thoughts on Structure 3:*



## Sample solution

### *Structure 1*

Having all fund managers reporting to the Investment Director will avoid problems with seniority jeopardising the smooth running of the department. However, in line with the 'pay for performance' guidelines, the organisation may achieve mediocre performance if it does not have some experienced managers in the team. Considering the 'yardstick' guidelines, there appears to be little in the way of incentives for the fund managers to perform.

Outsourcing the property management on the suggested basis may reduce costs, but does give a very lop-sided reward payoff for the property management company. There may be some implications, namely:

- the property management company may take high risks in the hope of earning big fees, and with the knowledge that no fees are obtained for either large underperformance or a small underperformance
- the fees are annual, which is a relatively short time in the property world. The valuation of property is subjective, but the valuation will materially affect the level of bonuses and fees payable to the management company. Therefore the temptation will be there for the company to push up property valuations when fees are payable to increase the fees, and to reduce the valuation in years when no fees are payable.

Having plenty of staff in the back-office area and managing this in-house is a relatively expensive solution. This incurs a larger fixed salary cost and requires more management time. However, according to the principle of 'keep your eye on the cash', it is important that the people responsible for moving the cash out of the firm are kept closely monitored, and that no single person has responsibility to make cash movements. This is where the majority of fraud takes place.

It is also recommended that people are employed to make regular checks and balances on the accounting system and reconcile the cash balances on a daily basis. This will cut out a major source of fraud and operational risk.

## **Structure 2**

The staffing of the front-office generates various risks. First, there is a derivative expert employed, who will be in charge of the derivative exposures. Many companies have experienced losses and fraud as a result of dealing in derivatives. These are complex instruments and no one individual should have responsibility for derivative dealing as they can build up substantial risk exposures with relatively little capital outlay.

Derivatives have also proven to be difficult to monitor, and many companies have experienced losses from positions that they knew about but were unaware of the size of the potential exposure. Margin and liquidity problems have also caused many losses in firms. In line with the 'set limits and boundaries' principle, there should be detailed limits placed on exposures and on liquidity requirements in respect of derivative deals.

Employing two people to look after the property portfolio, even though the company is 'small' and may not have many properties, is dangerous. One employee has sole responsibility for the legal aspects of the property transfers and the legality of any rent agreements entered into by the company. This is dangerous because there is no-one to check the robustness of any contracts signed. Having at least two people in each area of responsibility adds a layer of checks and balances that may prevent a legal problem giving rise to a significant loss.

Likewise having one person responsible for rent negotiation leaves the door open for fraud and kick-backs. Lower rents could be negotiated in return for cash transfers to the individual, and there need to be some checks and balances here too.

There is no indication that the property or the fund management team in general are rewarded in a manner that may encourage either good performance or risk control. This could lead to poor fund performance or excessively high (or low) risk levels. In line with the principle of 'set limits and boundaries', there should be maximum risk limits set with respect to a variety of indices for equities, bonds and property. Any breach of these limits should be a source for concern.

Outsourcing the back-office function is very dangerous without a watertight contract and layer of checks over the custodian's handling of the cash. The duty of risk management is passed to an external company, including the cash movements. In line with the 'pay for performance' principle, it would be critical to select a larger, well-established custodian with a respected reputation in the field.

### **Structure 3**

The employment of star managers could generate some good performance if they are capable, but may have some negative effects:

- The senior position of these individuals could upset the harmony of the department. In line with the 'yin and yang' principle, it is best to treat people in a manner that encourages the behaviour that senior management desire.
- Teamwork is important in investment management, and the imposition of a seniority structure with star individuals could make the firm a hierarchical organisation, with those at the bottom being de-motivated (and liable to cheat).
- The bonuses given to these individuals to encourage high performance will send the message that performance is everything. This will in turn take attention away from the risks that are taken on board.

Outsourcing the property management has the same problems as those mentioned in Structure 1, but the fee structure may solve some of the difficulties. The 5-year rolling performance measures are more in keeping with the long-term nature of the property market and remove many of the risks of inflating values and assuming excessive risks in the portfolio. However, the risk that the portfolio is managed on a passive basis is then high. In line with the principle of 'yardsticks', the management should aim to reward positive performance if that is what they aim to achieve.

The back-office solution suffers from a variety of problems:

- computer systems are potentially a risk if there is a problem that goes unnoticed for years. Such problems can build up to significant losses. Without the human element to detect such problems, this is a risk.
- there is no incentive for the individuals operating the system to behave in the best interests of the firm in the long term. This could generate an undesirable attitude towards input errors and reconciliation mistakes.
- the back-office is where the cash movements are controlled, and this would become largely computer operated. In line with the 'watch the cash' principle, this may be dangerous. There should be careful checks and balances put in place. The junior input clerks on low salaries do not appear to be the right people for this job.

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