Examiners' commentaries 2014

FN2029 Financial intermediation

Important note

This commentary reflects the examination and assessment arrangements for this course in the academic year 2013–14. The format and structure of the examination may change in future years, and any such changes will be publicised on the virtual learning environment (VLE).

Information about the subject guide and the Essential reading references

Unless otherwise stated, all cross-references will be to the latest version of the subject guide (2011).

General remarks

Learning outcomes

At the end of this course, and having completed the Essential reading and activities, you should be able to:

- discuss and evaluate key theories relating to the role of banks as financial intermediaries
- discuss and evaluate the risks which banks face and explain how these risks are managed, with particular focus on techniques of asset and liability management, and credit risk measurement and management
- discuss the importance of capital in bank management and the role of securitisation, and explain the importance of capital adequacy within banking regulation
- describe and analyse the various means of analysing bank performance
- explain the principles and techniques involved in the use of derivative instruments for hedging credit, interest rate and exchange rate risk.

Format of the examination

The examination is three hours long. You must answer four questions from a choice of eight.

Questions on this paper will often contain multiple elements. In such cases, the primary element often requires an explanation or description of theoretical concepts, with the secondary element requiring application of such information to a specific issue of theoretical importance or practical relevance. Complete answers to this style of question should seek to ensure that the answers to the two elements are well integrated.

Planning your time in the examination

It is essential that you prepare sufficiently thoroughly to be able to make a serious attempt at four questions on the paper. Try to allow an approximately equal amount of time for each answer and make sure that you attempt all parts or aspects of a question. It is a very common failing

for candidates to be unable to provide four adequate answers in the time permitted, due either to inappropriate study and revision strategies or to ineffective time management during the examination itself. If you gain a low mark for the fourth answer, this does severe harm to your overall mark.

Select your material carefully

When reading an examination question, it is important that you first identify key words. To begin, identify the words in the question that indicate the depth required in each part of the answer; for example, 'analyse', 'assess' and 'explain' will require greater depth than 'define', 'describe' or 'outline'. Then identify the scope of the question (namely, what content must be included in the answer). It is equally important to identify what should be excluded from the answer (that is, marks will not be gained for presenting information that is irrelevant to the question posed).

You should be prepared to demonstrate an understanding of theory and be able to cite appropriate models, arguments and examples. Some questions allow an element of independent thought and reasoning. However, where personal opinions or experiences are offered, their relevance should be fully explained and justified and they should not comprise the major part of the answer provided.

Some of the examination questions will require breadth of knowledge across the syllabus. It will be common for questions to require a synthesis of topics from different chapters of the subject guide. Therefore, it is important to appreciate that different topics within the subject guide are not self-contained – and you are guided in this respect by the cross-referencing between different chapters of the subject guide. For examination purposes, you need to have an understanding of the subject as a whole, and remember that the examination seeks to cover the entire breadth of the syllabus.

Read widely

The best examination answers are those that reflect knowledge and understanding obtained from following the suggested readings given in the subject guide. When following the suggested readings, you need to keep in mind the following question: 'How can I reflect the insights from this reading within an examination answer?' Take notes on your reading and link these notes to the material in the subject guide. Alternatively, treat the subject guide material as a starting point, and seek to supplement this with relevant extracts or examples obtained from the suggested readings. The structure of each chapter in the subject guide can guide you in such activity. Wider reading gives you a stronger and deeper appreciation of theory and empirical evidence, and will enable you to take a more critical and analytical approach to examination questions. This is the very best thing you can do when preparing for the examination.

This course covers some dynamic subject material. If you keep abreast of current issues in financial markets (for example, by reading from quality sources such as the *Bank of England Quarterly Bulletin*, the *Financial Times* and *The Economist*), you will be able to include topical perspectives in your answers (for example, in answer to questions like Questions 2, 3 and 6 from Zone A 2014 and Questions 2, 6, 7 and 8 from Zone B 2014). The Examiners will reward answers that blend awareness of current events (for example, the European sovereign debt crisis, the credit crunch or sub-prime mortgage crisis, or the downgrading of sovereign credit ratings

of the USA or France) with the theory and empirical evidence from the subject guide and suggested readings.

Structure your argument

Your answers should be constructed in a logical and coherent manner, and must always address the question posed. Conceptual terms and definitions should always be clearly explained. Examiners expect to read a clear introduction to each answer, which sets out the objective of the answer and the key points under analysis, and a concluding paragraph which acts as a summary of the main points of the argument. The main body of the answer should develop and substantiate the issues under analysis. Make sure that you write clearly and legibly. You should also clearly label diagrams and tables, and cite relevant sources if quoting empirical data or evidence.

Key steps to improvement

The most important issue is to read widely beyond the subject guide, as this additional material will allow you to provide a more thoughtful and comprehensive answer in line with the Examiners' expectations. The examination is not a test of how well you have read the subject guide. Achieving good marks requires explicit arguments in the context of the question, and the quality of each answer depends on a critical, analytical approach to theories and empirical evidence.

Updating of Essential reading

There is a new edition of the recommended textbook by Joel Bessis. The full details are: J. Bessis *Risk Management in Banking.* (Chichester: Wiley, 2010) third edition [ISBN 9780470019139]. This new edition contains additional chapters and very substantial revisions to the material appearing in the second edition. It is very important that you use the revised citations to this textbook, available on the VLE.

Question spotting

Many candidates are disappointed to find that their examination performance is poorer than they expected. This can be due to a number of different reasons and the Examiners' commentaries suggest ways of addressing common problems and improving your performance. We want to draw your attention to one particular failing – 'question spotting', that is, confining your examination preparation to a few question topics which have come up in past papers for the course. This can have very serious consequences.

We recognise that candidates may not cover all topics in the syllabus in the same depth, but you need to be aware that Examiners are free to set questions on any aspect of the syllabus. This means that you need to study enough of the syllabus to enable you to answer the required number of examination questions.

The syllabus can be found in the Course information sheet in the section of the VLE dedicated to this course. You should read the syllabus very carefully and ensure that you cover sufficient material in preparation for the examination.

Examiners will vary the topics and questions from year to year and may well set questions that have not appeared in past papers – every topic on the syllabus is a legitimate examination target. So, although past papers can be helpful in revision, you cannot assume that topics or specific questions that have come up in past examinations will occur again.

If you rely on a question spotting strategy, it is likely you will find yourself in difficulties when you sit the examination paper. We strongly advise you not to adopt this strategy.

Examiners' commentaries 2014

FN2029 Financial intermediation – Zone A

Important note

This commentary reflects the examination and assessment arrangements for this course in the academic year 2013–14. The format and structure of the examination may change in future years, and any such changes will be publicised on the virtual learning environment (VLE).

Information about the subject guide and the Essential reading references

Unless otherwise stated, all cross-references will be to the latest version of the subject guide (2011).

Comments on specific questions

Candidates should answer **FOUR** of the following **EIGHT** questions. All questions carry equal marks.

Question 1

Explain how the theories of information sharing coalitions and delegated monitoring resolve the problems of information asymmetry in direct financing and lead to the dominance of financial intermediation over direct financing.

Reading for this question

Please refer to Chapter 1 of the 2011 subject guide (pp.10, 11 and 13–16). Within these pages, there are Activity sections which direct you to study appropriate sections from:

Bhattacharya, S. and A.V. Thakor 'Contemporary banking theory', *Journal of Financial Intermediation* 3(1) 1993, pp. 2–50; Sections 1, 2, 4, 5 and 7.

Diamond, D.W. 'Financial intermediation as delegated monitoring: a simple example', *Federal Reserve Bank of Richmond Economic Quarterly* 82(3) 1996, pp.51–66.

Matthews, K. and J. Thompson *The Economics of Banking*. (Chichester: Wiley, 2008) second edition [ISBN 9780470519646].

Saunders, A. and M.M. Cornett *Financial Institutions Management: A Risk Management Approach.* (New York: McGraw Hill, 2011) seventh edition [ISBN 9780071289559].

You may also benefit from reading relevant chapters in:

Freixas, X. and J-C. Rochet *Microeconomics of Banking.* (Cambridge, MA, London: MIT Press, 1998) [ISBN 9780262062701].

Chapter 1 of the subject guide covers four reasons for the dominance of intermediation over direct financing (at the bottom of p.11). Two of these reasons are covered in this question (and the other two are covered in Question 1 of the 2014 Zone B examination paper).

Approaching the question

This question requires an explanation of the preference for intermediation over direct financing, and specifically expects the focus to be on information asymmetry, information sharing coalitions and delegated monitoring.

You should use the material from pages 10 and 11 of the subject guide to set the context for your answer. Despite different requirements of lenders and borrowers, one could still envisage that the shorter chain of transactions involved in direct financing would be less costly than intermediated financing. In a situation of perfect knowledge, no transaction costs and no indivisibilities, financial intermediaries would be unnecessary, but these conditions are not present in the real world.

In this context, information asymmetry relates to the notion that the borrower is very likely to have more information than the lender about the risks of the project for which they receive funds. This situation leads to problems of moral hazard and adverse selection (discussed on pages 13–14 of the subject guide). Your answer should specifically mention banks' commitment to long-term relationships with customers, and the notion of a financial intermediary interpreted as an information-sharing coalition.

The theory of financial intermediation as delegated monitoring is one of the key learning objectives of Chapter 1 of the subject guide. In a good answer to this question, at least half of the material should focus upon this aspect (starting from the elements covered on pages 14–16 of the subject guide). Defined broadly, 'monitoring' of a borrower by a bank refers to information collection before and after a loan is granted, including screening of loan applications, examining the borrower's ongoing creditworthiness and ensuring that the borrower adheres to the terms of the contract. This section could initially address information costs and monitoring costs, which would then serve as a foundation to proceed to a discussion of the Diamond (1984) model.

An important constraint on direct investment by households in the financial claims of corporations is the cost of information collection. Failure to monitor in a timely and complete manner exposes a supplier of funds to agency costs. Financial institutions provide a solution to these problems by pooling funds from suppliers (e.g. household savers) and investing in the financial claims of corporations. The financial institution has an incentive to collect information and monitor, which also alleviates potential 'free rider' problems with direct financing. The average cost of collecting information is also reduced. It is thus argued that suppliers of funds appoint banks as delegated monitors (to act on their behalf). Better answers are expected to proceed to analyse the costs and benefits of monitoring, to critically evaluate the Diamond (1984) model and suggest how some of the problems can be resolved.

Generally, there is much scope in this question for you to demonstrate analysis drawn from the textbook and journal readings suggested as 'Essential reading' and 'Further reading' for Chapter 1 of the subject guide.

Question 2

'The liquidity transformation function of banks makes them vulnerable to runs.' Use the Diamond and Dybvig (1983) model to explain your views on this statement.

Reading for this question

Please refer to Chapters 1 and 2 of the 2011 subject guide (pp.13 and pp.18–22). Activity sections within these pages highlight suggested

readings from Matthews and Thompson (2008), Saunders and Cornett (2011) and Bhattacharya and Thakor (1993). Candidates would benefit greatly from reading Chapter 2 (pp. 20–23) of Freixas and Rochet (1998).

In addition, refer to:

Diamond, D.W. and P. Dybvig 'Bank runs, deposit insurance and liquidity', *Journal of Political Economy* 91(3) 1983, pp.401–19.

Approaching the question

The quotation in the question is found on page 21 in Chapter 2 of the subject guide. The focus of the question is on bank runs and the Diamond and Dybvig (1983) model of liquidity insurance, which is one of the main theories of financial intermediation covered in the syllabus. The section titled 'Liquidity insurance' on page 13 of the subject guide offers one possible means to provide a clear introduction to the answer. The main substance of the expected answer is covered on pp.18–22 of the subject guide. You should be aware that demonstrating a clear understanding of the term 'liquidity insurance' is important and any confusion of this with 'deposit insurance' (which is a completely different concept) must be avoided.

In the absence of perfect information, consumers will maintain their own pool of liquidity. Provided that shocks are not perfectly correlated across individuals, portfolio theory suggests that the total liquid reserves needed by a bank will be less than the aggregation of the reserves required by individual consumers acting independently. Diamond and Dybvig (1983) use this argument to account for the existence of banks. Their view is that banks enable consumers to alter their consumption patterns according to the influence of shocks, and the value of this service permits a fee to be earned by the bank. It is important that you provide a detailed description of the Diamond and Dybvig (1983) model and liquidity insurance argument for the existence of banks. This should include a discussion of possible versions of the model: the autarky case; no bank but trading in financial assets between individuals; and the case with banks. This will provide a sound basis for discussing the liquidity transformation function that banks perform and the Pareto optimal condition that is achieved with banks providing liquidity insurance.

In the second part of your answer, you should include a clear definition of a 'bank run' and should explain the context of the bank balance sheet, liquidity transformation and the Diamond and Dybvig (1983) model. Financing long-term assets through short-term deposits is a source of potential fragility for banks because they are exposed to the possibility that a large number of depositors will decide to withdraw funds for reasons other than liquidity needs. This results in a vulnerability to bank runs. Better answers would link the theory of bank runs to regulation. A key reason for regulation is that uninsured depositors are likely to cause a bank run when faced with information about an adverse shock to bank balance sheets. This is the point at which the notion of deposit insurance could be introduced, along with suggestions of other ways to help prevent bank runs. This argument has support both in history and in theory. The material in the subject guide provides an intuitive argument and a little of the more formal theory; a good answer should include both aspects and an excellent answer will provide technical details from the suggested readings.

Better answers would highlight the real-world relevance of the issue addressed in this question. Good answers would illustrate that aspects of the theory were evident in the behaviour of depositors in the case of Northern Rock. Candidates with an awareness of current affairs could

also refer to concerns about the potential for bank runs in other European countries in the recent past.

There is much scope in this question for you to demonstrate analysis drawn from the textbooks and journals suggested as 'Essential reading' and 'Further reading' in Chapter 2 of the subject guide.

Question 3

Critically evaluate internal and external credit rating systems and explain their roles in the capital adequacy regulation of banks.

Reading for this question

Please refer to Chapters 2 and 4 of the subject guide. Within these chapters, there are Activity sections which direct you to study appropriate sections from:

Bessis, J. *Risk Management in Banking*. (Chichester: Wiley, 2010) third edition [ISBN 9780470019139].

and Saunders and Cornett (2011).

Approaching the question

This question requires the linking of two elements from Chapters 2 and 4 of the 2011 subject guide. The first part focuses on critically evaluating credit rating systems, and the second part on the use of credit ratings in capital adequacy bank regulation. A good answer requires convincing answers to both elements.

Risk quality covers both the probability of default and the recoveries in the event of default, and is commonly captured through credit ratings. Internal ratings refer to credit ratings assigned by banks to their borrowers, using proprietary scales that vary across banks. External ratings are assigned by credit rating agencies using publicly disclosed scales that vary across agencies. The answer should highlight the similarities and differences between internal and external ratings. A good answer would provide full discussion of the main categories of ratings systems, the criteria and information employed in assigning ratings, and the scope of rated entities (e.g. from Bessis, 2010). In considering the merits of external ratings, a very good answer would highlight the failures of ratings in the context of structured finance (as identified during the credit crunch). An excellent answer would refer to recent high-profile news events relating to ratings (e.g. the frequent market reactions to rating changes for European sovereign debt issuers during 2010 and 2011). An answer could also refer to recent calls for increased regulation of rating agencies, especially within the European Union.

For the second part of the question, the answer should briefly explain the set-up of capital adequacy regulation. Banks would generally prefer to maintain a relatively low amount of capital in order to boost their return on equity. However, even for the best managed bank, which has effective risk management procedures, there always remains the possibility of risks materialising that produce losses. Therefore, it is essential for banks to have adequate capital backing. The need to generate more capital acts as a vital constraint on a bank's asset and liability management. Because capital is so important to the banking firm, capital adequacy has become a primary concern of bank supervision. Within Basle I, the concept of a credit risk-adjusted asset was used. In Basle II, the risk-weighting became much more sensitive with the introduction of weighting based on credit ratings (either internal or external). Answers should also explain the alternative 'standardised' and 'internal ratings based' (IRB) approaches

permitted within the Basle II accord. The answer should outline the nature of the weighting system, at least for the standardised approach. For the IRB approach, the answer should explain the Foundations approach and the Advanced approach (refer to pp.28 and 29 of the 2011 subject guide).

An exceptional answer would comment on ongoing consultations with regard to the future framework under Basle III.

Question 4

Explain the risk management process in banks, and critically evaluate the downside risk measurement techniques.

Reading for this question

The relevant reading material can be found in Chapter 3 of the subject guide. The key reading for the first part of the question is from Bessis (2010). The key reading for the second part of the question is from Matthews and Thompson (2008) and Saunders and Cornett (2011). The Activity section on p.45 is crucial for answering this question. It is not possible to devise a fully convincing answer to this question based on the subject guide alone. Your answer must demonstrate evidence of having done the suggested readings in order to achieve a high mark.

Approaching the question

This question requires an explanation of the risk management process in banks, and a critical evaluation of the Value-at-Risk and Earnings-at-Risk approaches to risk measurement.

Your answer should begin by providing an overview and explanation of the risk management process in banks. Risk management is both a set of tools and techniques, and a process that banks use to optimise risk-return trade-offs. The aim of the process is to measure risks in order to monitor and control them. Your answer should discuss the four key stages in the typical risk management process. Comments should be included about top-down and bottom-up perspectives. It is not necessary to compare different sources of risk in detail (as found on p.36–42 of the subject guide). This would detract from the main thrust of the argument and would diminish the focus on the question. Instead, your answer could draw on examples of how risks are measured (see p.44 of the subject guide).

Your answer should proceed to discuss the Value-at-Risk approach in some depth. Recall that the question requires a critical evaluation rather than a description of the technique. You should explicitly link the discussion to market risk (see pp.39–41 of the subject guide). A graphical explanation of the concept of Value-at-Risk is essential (i.e. focusing on the left tail of the returns distribution). Your answer should discuss the two user-defined parameters and emphasise how perceptions of risk are affected by these parameters (some simple examples would be beneficial). Your critique of the method should include attention to accuracy, in the context that the quantile of interest is composed of the most extreme events. The next element of the answer should address the three major approaches, followed by institutions in developing internal models of market risk:

i. risk metrics (or the variance/covariance approach)

ii. historic or back simulation

iii. Monte Carlo simulation.

The final element of your answer should discuss Earnings-at-Risk. A good answer should explain the role of economic capital and discuss the similarities and differences between Value-at-Risk and Earnings-at-Risk

measures.

Reading beyond the subject guide is essential in order for you to present a detailed discussion of these points. Your answer must conclude with a summary of the key elements of your discussion, as they relate to the question posed.

Question 5

Discuss the motivations and techniques of Asset and Liability Management.

Reading for this question

Please refer to Chapter 5 of the 2011 subject guide. Within this chapter, there are Activity section which direct you to study appropriate sections from Saunders and Cornett (2011), Bessis (2010) and Matthews and Thompson (2008). Good answers would also include some discussion of securitisation as a form of asset management, drawing from Chapter 6 of the subject guide (pp.71–78) and the suggested readings cited there.

Approaching the question

This question relates to the learning objectives of Chapter 5 of the subject guide (p.61) and the first learning objective of Chapter 6 (p.69).

A good answer would begin with a clear statement of the aims inherent in asset and liability management (ALM). You should focus on the issues of liquidity risk and interest-rate risk in bank balance sheets, and you should highlight the relevance of net-interest margin and net-interest income as target variables. ALM involves the continual monitoring of the existing position of a bank, evaluating how this differs from the desired position, and undertaking transactions (including hedging) to move the bank towards the desired position. The objective is to enhance profitability, while controlling and limiting different risks, as well as complying with the constraints of banking supervision. Therefore, a bank must assess the risks and benefits of all assets and liabilities in the light of the contribution they make to the earnings and to the risks of its total portfolio. Banks have to continually adjust assets and liabilities, both by varying the terms they offer for business with clients and by regular trading in financial markets.

Your answer should then proceed to focus on techniques. Gap analysis (both liquidity and interest rate) and interest margin variance analysis (IMVA) are the main aspects covered in the syllabus. Your discussion should be complemented by clearly explained numerical examples, especially for gap analysis. In this aspect, good answers would take the opportunity to demonstrate insights achieved from your reading beyond the subject guide. In discussing liquidity gap analysis, sources of liquidity and maturity mismatching should be addressed. Under interest rate gap analysis, it is important to discuss the identification of rate-sensitive assets and liabilities.

If you draw the potential link to securitisation, you may also include material relating to events during the credit crunch. This type of material could significantly enhance your answer, if used with precision and appropriate detail. You may perceive that this question has very clear and straightforward requirements, but you need to ensure that the answer covers the issues in depth. In order to obtain a high mark, it would be essential for your answer to demonstrate insights achieved from reading beyond the subject guide (i.e. following the suggested readings from the textbooks), particularly in highlighting the limitations of liquidity and

interest rate gap analysis.

Question 6

Critically analyse the advantages and disadvantages of banks' use of securitisation and credit derivatives for credit risk transfer.

Reading for this question

Please refer to Chapter 6 of the subject guide (pp.71–83). Within these pages, there are Activity boxes which direct you to study appropriate sections from Bessis (2010), Matthews and Thompson (2008) and Saunders and Cornett (2011). Also read:

Neal, R.S. 'Credit derivatives: new financial instruments for controlling credit risk', *Federal Reserve Bank of Kansas City Economic Review* 81(2) *(*1996), pp.15–28,

Approaching the question

The question relates to Chapter 6 of the subject guide and its learning outcomes.

A good answer would begin by setting the context for securitisation and credit derivatives under the umbrella of risk transfer (see Table 6.1 and p.72 of the subject guide). A distinction can be made between securitisation which is mostly used for funding purposes whereas credit derivative transactions have hedging (or trading) motivations. These financial innovations have changed the landscape of risk by enabling market participants to trade risk (credit risk in particular) across the financial and non-financial sectors. A substantial portion of your answer should be focused on the motivation, merits and drawbacks of banks' use of these instruments.

Your answer should proceed to consider banks' objectives when engaging in securitisation (p.73 of the subject guide) and using credit derivatives (pp.79–80 of the subject guide). For example, securitisation is recognised as an efficient means of redistributing credit risks to other banks or non-bank investors. It is a vehicle for transforming illiquid financial assets into tradeable capital market instruments, and thus can be expected to provide enhanced risk diversification and financial stability. Securitisation enables banks to increase the flexibility of their operations while adhering to regulatory capital requirements. The possibility of adjusting a bank's risk profile, the potential savings in required capital and the reduced funding costs should be explained. A good answer would use examples based on different forms of securitisation to support the argument.

Your answer should not be restricted to pass-through securitisation. Attention should also be placed on the factors that influence the risks and benefits of securitisation. Capital management, risk management and reduced funding costs are crucial benefits. On the other hand, there are significant costs in setting up a pass-through structure. Identification of appropriate packages of assets has an important impact on the cost–benefit calculation. In extending the discussion to collateralised loan obligations (CLOs) and collateralised debt obligations (CDOs), your answer should comment on the increased difficulties and costs associated with securitising lower quality assets (e.g. credit insurance, over-collateralisation). Good answers would draw on insights from the suggested readings in the subject guide. The best answers would comment on the current issues and future prospects for securitisation and credit derivatives, given the negative publicity surrounding structured finance during the 2007–09 financial crisis. Volumes of issuance/trading in these markets have been slashed. Regulators are pressing for centralised clearing

and exchange-based trading of credit derivatives.

Credit risk transfer instruments (especially credit derivatives) offer important diversification benefits for banks with large credit exposures, and can also act as a stabilisation mechanism for the financial system, while enhancing efficiency in pricing and intermediation. However, others would argue that these innovations have also created risks for financial stability. A key concern is that the pace of innovation may have exceeded the development of infrastructure and risk management systems. Any shock to the financial system may be magnified by the resulting interrelationships, as witnessed in the recent credit crunch. The best answers would provide a coherent argument of these consequences, and should demonstrate clear awareness of the relevance of these issues in the context of the recent financial crisis.

Question 7

Critically evaluate the relative merits of accounting measures and risk-adjusted measures of bank performance.

Reading for this question

Please refer to Chapter 7 of the subject guide. Within this chapter, there are Activity sections which direct you to study appropriate sections from Bessis (2010) and Matthews and Thompson (2008).

Approaching the question

This question relates to all learning outcomes of Chapter 7 of the 2011 subject guide. You should initially note from the question that the Examiners' expectations require an assessment of relative merits, and not simply a description of the methods.

Your answer should begin by identifying the motivation for analysing bank performance. The initial focus should be on the risk-return trade-off, and this issue should then permeate the answer in the sense of comparing accounting measures with risk-adjusted measures of performance.

In addressing the accounting measures of performance, you should focus discussion around the Du Pont model, which decomposes the accounting return on equity. You should identify how different measures of profitability can provide alternative perspectives. A good answer will analyse the potential for misleading inferences from accounting measures (e.g. if a bank has inadequate equity capital). Your answer should proceed to consider market value measures of performance and should compare these with the accounting measures.

Discussion of risk-adjusted performance measures and Economic Value Added should then represent a significant portion of your answer. Good answers will demonstrate reading on this issue from beyond the subject guide, for example, from Bessis (2010).

You may think that this question has very clear and straightforward requirements, but you need to ensure that the answer covers the issues in depth. In order to obtain a high mark, it will be essential for your answer to demonstrate insights achieved from reading beyond the subject guide (i.e. following the suggested readings from the textbooks).

Question 8

Discuss the main features and payoff structures of call and put options, and discuss the determinants of call and put option prices. Explain how these payoff

structures and determinants are useful in option-based credit modelling.

Reading for this question

Please refer to Chapters 4 and 8 of the subject guide. In these chapters, there are Activity sections which direct you to study appropriate sections from Saunders and Cornett (2011).

Approaching the question

This question requires candidates to draw on material from different parts of the subject guide: Chapter 8 for the characteristics of options and Chapter 4 for credit risk modelling. The question links technical material on options with an application more closely focused on the theme of credit risk in this course. The second part of the question is more challenging and requires a deeper and more technical discussion.

Many candidates who have attempted this question in the past have been unable to answer both parts of the question. In many cases, they were only able to tackle the first part of the question. In other cases, candidates wrote about credit derivatives, an area which is not relevant to this question. Candidates should ensure that they have a clear understanding of the distinction between credit derivatives and option-based credit risk modelling.

Your answer should begin by explaining the definitions and structures of options and should then proceed to identify the characteristics of call options and put options in turn. Attention should be placed on the payoff structures (pp.93–94 of the subject guide) and how they differ between calls and puts (for both holders and writers). The determinants of option prices (p.101 of the subject guide) should be addressed, with a clear discussion of how each factor influences the call and put option prices. A full discussion of put options would indicate to the Examiners that candidates have engaged in reading beyond the subject guide. A detailed discussion of option pricing models is not expected for this particular question. Discussion of payoff structures for call and put options and determinants of call and put option prices are essential for the first part of the question, since these form the basis of the application of the theory to credit risk modelling in the second part.

The second element in this question requires candidates to demonstrate an understanding of how option pricing theory can be applied to credit risk (see pp.60–62 of the subject guide). There are two main insights:

i. holding equity is analogous to buying a call option on the value of the firm's assets

ii. the payoff structure for debt holders resembles that of writing a put option on the value of the firm's (borrower's) assets.

Continuing to repay debt is not rational if liabilities exceed assets, thus the borrower may relinquish assets instead. Lenders should adjust the risk premium as a borrower's leverage and asset risk change. Market value of assets (the underlying asset), relative to the face value of debt (exercise rice) and asset risk (volatility), are a key focus in estimating default probabilities under this approach. Value of, and volatility of, assets are not directly observable. The KMV method relies mostly on equity market information. The key output is the probability (over a one year horizon) that the market value of assets will fall below promised repayments on short-term liabilities.

The best answers would demonstrate evidence of reading beyond the subject guide (e.g. from Saunders and Cornett, 2011, Chapter 11).

Examiners' commentaries 2014

FN2029 Financial intermediation – Zone B

Important note

This commentary reflects the examination and assessment arrangements for this course in the academic year 2013–14. The format and structure of the examination may change in future years, and any such changes will be publicised on the virtual learning environment (VLE).

Information about the subject guide and the Essential reading references

Unless otherwise stated, all cross-references will be to the latest version of the subject guide (2011).

Comments on specific questions

Candidates should answer **FOUR** of the following **EIGHT** questions. All questions carry equal marks.

Question 1

Explain how transaction costs and liquidity insurance theories propose the dominance of financial intermediation over direct financing.

Reading for this question

Please refer to Chapter 1 of the 2011 subject guide (pp.10–13). Within these pages, there are Activity sections which direct you to study appropriate sections from:

Bhattacharya, S. and A.V. Thakor 'Contemporary banking theory', *Journal of Financial Intermediation* 3(1) 1993, pp. 2–50; Sections 1, 2, 4, 5 and 7.

Diamond, D.W. and P. Dybvig 'Bank runs, deposit insurance and liquidity', *Journal of Political Economy* 91(3) 1983, pp.401–19.

Matthews, K. and J. Thompson *The Economics of Banking*. (Chichester: Wiley, 2008) second edition [ISBN 9780470519646].

Saunders, A. and M.M. Cornett *Financial Institutions Management: A Risk Management Approach.* (New York: McGraw Hill, 2011) seventh edition [ISBN 9780071289559].

Candidates would benefit greatly from reading:

Freixas, X. and J-C. Rochet *Microeconomics of Banking.* (Cambridge, MA, London: MIT Press, 1998) [ISBN 9780262062701] Chapter 2 (pp. 20–23).

Chapter 1 of the subject guide covers four reasons for the dominance of intermediation over direct financing (at the bottom of p.11 of the subject guide). Two of these reasons are covered in this question (and the other two are covered in Question 1 of the 2014 Zone A examination paper).

Approaching the question

This question requires an explanation of the preference for intermediation over direct financing, and specifically expects the focus to be on transaction costs and liquidity insurance.

You should use the material from pp.10–11 of the subject guide to set the context for your answer. Despite different requirements of lenders and borrowers, one could still envisage that the shorter chain of transactions involved in direct financing would be less costly than intermediated financing. In a situation of perfect knowledge, no transaction costs and no indivisibilities, financial intermediaries would be unnecessary, but these conditions are not present in the real world.

With regard to transaction costs, the relevant elements consist of search, verification, monitoring and enforcement costs. The algebraic analysis of transaction costs (see p.12 of the subject guide) is an essential component in a strong answer. Additionally, you have an opportunity here to demonstrate to the Examiners that you have engaged in the Essential reading. Specifically, the Activity section on p.12 of the subject guide directs you to a graphical illustration from Matthews and Thompson (2008). Using this in your answer would be a considerable benefit. The discussion should proceed to explain the operational aspects, which would mean that the presence of banks leads to reduced transaction costs (for example, branch networks, internet banking, mobile banking, standardised contracts). A fuller discussion of economies of scale and scope would also be relevant (possibly including elements from Chapter 2 of the subject guide on size and maturity transformation). Better answers would include a consideration of how banks' advantages in these respects are arguably eroding over time (for example, using some elements on dis-intermediation from Chapters 4 and 6 of the subject guide). Most importantly, there are directed activities in the Activity section on p.13 of the subject guide. You should pursue such reading and study in a manner that enables you to bring in additional discussion in an answer to a question like this.

The other aspect of this question relates to liquidity insurance. For this aspect, it is very important to draw from Diamond and Dybvig (1983). The essence of the argument is that banks enable consumers to alter their consumption patterns according to the influence of shocks, and the value of this service permits a fee to be earned by the bank. Further details on this appear on p.13 of the subject guide. It is important that you provide a detailed description of the Diamond and Dybvig (1983) model and liquidity insurance argument for the existence of banks. Strong answers would include a discussion of possible versions of the model: the autarky case; no bank but trading in financial assets between individuals; and the case with banks. This will provide a sound basis for explaining that the existence of a financial intermediary is Pareto optimal and explains why financial intermediation may dominate direct financing.

Generally, there is much scope in this question for you to demonstrate analysis drawn from the textbook and journal readings suggested as 'Essential reading' and 'Further reading' for Chapter 1 of the subject guide.

Question 2

Discuss the importance of the deposit contract for causing banks to be susceptible to runs, and critically evaluate potential solutions to the problematic features of deposit contracts.

Reading for this question

Please refer to Chapter 2 of the 2011 subject guide, in particular pp.18–23. Within these pages, there are Activity section which direct you to study appropriate sections from Matthews and Thompson (2008), Saunders and Cornett (2011) and Bhattacharya and Thakor (1993). Good

answers should cite Diamond and Dybvig's (1983) model and discuss its implications.

Approaching the question

This question relates to the learning objectives and material in Chapter 2 of the 2011 subject guide. The question contains three elements that an excellent answer must address in detail: the theory of bank runs, the problematic features of deposit contracts in causing fragility of banks and the potential for bank runs, and the possible solutions to these problematic features of demand deposits. Note that full details of the Diamond and Dybvig (1983) model are not required, although you should refer to the main features of the model and how they relate to this question.

As a starting point, a good answer should include some contextual material. There is ample scope to draw on the events of 2007–2009, and more recent events, in banking and financial markets in order to highlight the real possibilities of bank runs. For example, the subject guide discusses the Northern Rock bank run as a motivational case – a good answer would illustrate that aspects of the theory of bank runs were apparent in the behaviour of depositors in this case (you can also refer to Matthews and Thompson, 2008). The most logical progression from this would be to include a clear definition of a 'bank run' at this point. Financing long-term assets through short-term deposits is a source of potential fragility of banks because they are exposed to the possibility that a large number of depositors will decide to withdraw funds for reasons other than liquidity needs. Uninsured depositors are likely to cause a bank run when faced with information about an adverse shock to bank balance sheets. This is one possible equilibrium outcome of the Diamond and Dybvig (1983) liquidity insurance theory for the existence of banks, and reference to this model is recommended at this point.

The next element of your answer should discuss deposit contracts. Although they form the cornerstone of Diamond and Dybvig's (1983) liquidity insurance theory, they also contain problematic features including: debt claims, the sequential service constraint and likelihood of default on the last claim. Some authors argue that this type of contract is run-prone and would not exist in this form under a 'free banking' system. A full explanation of these problematic features and the run-prone nature of the contract is required in a good answer.

The discussion then naturally leads on to the possible solutions to these problems. The first potential solution is the securitisation of assets (see also Chapter 6). A securitised loan can be viewed as a loan sold to investors with recourse to the bank (a collateralised deposit). This could allow banks to issue deposit-type claims of different seniority. This solution can be argued to provide the benefits of liquidity and risk sharing, but removes the drawback of the sequential service constraint. The second possible solution relates to policy initiatives that may help reduce the possibility of a bank run: suspension of convertibility and deposit insurance.

Third, proponents of 'free banking' argue that 100 per cent deposit insurance creates the side effect of moral hazard. Possible solutions to this problem are: co-insurance; requiring banks to pay higher deposit insurance premiums; capital adequacy regulation and the use of subordinated debt in banking regulation. A very good answer would cover many of these solutions and show evidence of reading of the recommended texts.

Question 3

Discuss the main sources of risk in commercial banking, and critically analyse the Value-at-Risk approach to risk measurement.

Reading for this question

The relevant reading material can be found in Chapter 3 of the subject guide. The Activity section on p.45 is crucial for this question. It is not possible to devise a fully convincing answer to this question based on the subject guide alone. Your answer must demonstrate evidence of following the suggested readings in order to achieve a high mark. The key additional readings are from Matthews and Thompson (2008) and Saunders and Cornett (2011) as well as:

Bessis, J. *Risk Management in Banking*. (Chichester: Wiley, 2010) third edition [ISBN 9780470019139].

Approaching the question

This question requires an explanation of the main risks that banks face, and a critical evaluation of the Value-at-Risk approach to risk measurement.

Drawing mainly from material in Chapter 3 of the subject guide, the answer should focus on the 'main' sources of risk in commercial banking. An argument should be made for the selection of risks that are considered to be most important. The subject guide stresses several reasons why credit risk might be viewed as the most important (e.g. even a perfectly matched balance sheet will remain subject to credit risk). Other crucial risks addressed in the subject guide include liquidity risk, interest rate risk and market risk. Good answers would identify where credit and liquidity risk arose in the build-up to the 2007–09 financial crisis. In general, the theme of the first part of this question has resonance with the 2007–09 credit crunch and financial crisis, and the best answers would include some reference to risk-taking by Western banks in the years prior to 2007 (e.g. sub-prime lending) as well as comments on some banks' reliance on liquidity from wholesale sources (e.g. Northern Rock – see Matthews and Thompson, 2008). An additional argument could be made based on the types of risks addressed by regulators. For example, Chapter 2 of the subject guide explains the role of credit risk, interest rate risk, market risk and operational risk in the Basle II accord.

Your answer should proceed to discuss the Value-at-Risk approach in depth. Recall that the question requires a critical evaluation rather than a description of the technique. You should explicitly link the discussion to market risk (see pp.39–41 of the subject guide). A graphical explanation of the concept of Value-at-Risk is essential (i.e. focusing on the left tail of the returns distribution). Your answer should discuss the two user-defined parameters, and emphasise how perceptions of risk are affected by these parameters (some simple examples would be beneficial). Your critique of the method should include attention to accuracy, in the context that the quantile of interest is composed of the most extreme events. The final element of the answer should address the three major approaches followed by institutions in developing internal models of market risk:

i. risk metrics (or the variance/covariance approach)

ii. historic or back simulation

iii. Monte Carlo simulation.

Reading beyond the subject guide is essential in order for you to present a detailed discussion of these points. Your answer must conclude with

a summary of the key elements of your discussion, as they relate to the question posed.

Question 4

Explain the methods available to banks for credit risk modelling and management.

Reading for this question

Please refer to Chapter 4 of the 2011 subject guide. The chapter contains Activity sections and various citations which direct you to study appropriate sections from Bessis (2010) and Saunders and Cornett (2011). A more complete answer would also integrate some elements from Chapters 2, 3 and 6 of the subject guide.

Approaching the question

This question relates to all the learning objectives of Chapter 4 of the 2011 subject guide. A good answer would begin by identifying the nature and importance of credit risk for a bank. Some evidence from the 2007–09 credit crisis could provide useful motivation and context. A good answer should also briefly discuss the separate constituents of credit risk summarised by the expected loss equation (pp.53–56). The expected loss given default (L) is the product of the loss given default and the default probability (D) (see Equation 4.1 in the subject guide). The loss given default comprises an uncertain exposure (X) and an uncertain recovery rate (R). Your answer should present an explanation of the three elements: default risk, exposure risk and recovery risk.

A significant portion of the answer should be devoted to credit risk models. This section should commence by discussing the objectives and intended output of the modelling process (i.e. probability of default) and the relevance of the level of information available (e.g. contrasting retail customers with large corporate borrowers). Discussion of qualitative models should emphasise the subjectivity of the approach and should contrast market-specific factors with borrower-specific factors. A much more objective approach is found with credit scoring and option-based models. Your discussion of credit scoring should identify its characteristics, and should address linear probability models, logit models and linear discriminant analysis. Turning to option-based models, you are required to demonstrate an understanding of how option pricing theory can be applied to credit risk (see p.59 of the subject guide). There are two main insights: (i) holding equity is analogous to buying a call option on the value of the firm's assets; (ii) the payoff for debt holders resembles that of writing a put option on the value of the firm's (borrower's) assets. Continuing to repay debt is not rational if liabilities exceed assets, thus the borrower may relinquish assets instead. Lenders should adjust the risk premium as a borrower's leverage and asset risk change. Market value of assets and asset risk are a key focus in estimating default probabilities under this approach. The value and volatility of assets are not directly observable. To address this, the KMV method relies mostly on equity market information, and its key output is the probability (over a one-year horizon) that the market value of assets will fall below promised repayments on short-term liabilities.

Risk quality covers both the probability of default and the recoveries in the event of default. The final part of your answer should discuss the methods available to banks for managing these elements of credit risk. Candidates are expected to refer to contractual mechanisms, credit allocation

decisions, credit enhancement and loan sales (pp.57–58) and relate these techniques to the specific constituent of credit risk that is being managed. Good answers would also explain that securitisation and credit derivatives (from Chapter 6) may also be used to manage credit risk.

There is considerable merit in demonstrating evidence of reading beyond the subject guide.

Question 5

Explain how banks may manage interest rate risk by using gap analysis and interest rate swaps.

Reading for this question

Please refer to Chapters 3, 5 and 8 of the subject guide. In these chapters, there are directions to engage in reading from Bessis (2010), Matthews and Thompson (2008) and Saunders and Cornett (2011).

Approaching the question

This question relates to two quite different approaches employed by banks to manage interest rate risk. Your answer needs to draw on elements from three different chapters in the subject guide. However, the section from Chapter 3 solely relates to defining interest rate risk and would be particularly useful for the introduction part of your answer.

In addressing the first part, your answer should highlight the relevance of net interest margin and net interest income as target variables in asset and liability management (ALM), with both their level and variability being important elements. The answer should present detailed consideration of interest rate gap analysis. It is important to discuss the identification of rate-sensitive assets and liabilities. Illustrative examples should be provided, and there are many examples available in the suggested readings from the textbooks.

In addressing the second part, Chapter 8 directs you to appropriate sections from Saunders and Cornett (2011). The answer should clearly define the nature of a swap contract (i.e. two parties agreeing to exchange pre-specified future cash flow streams over a pre-specified future period). The interest rate swap is based on comparative advantage in borrowing at fixed and floating interest rates. Example(s) should be provided, and an essential element is to ensure that there are clear statements of how and where the interest rate risk arises for the counterparties used in the example(s).

The final element required in a very good answer is to contrast the two different approaches and to explain how they might be used for different reasons or with different aims (i.e. interest rate gap analysis helps banks to adjust the composition of the balance sheet, interest rate swaps allow hedging of risk due to this composition of the balance sheet). Reading beyond the subject guide is essential in enabling you to offer an element like this in concluding your answer, and it considerably enhances the quality of the answer.

Question 6

Explain the mechanics, costs and benefits of different forms of securitisation.

Reading for this question

The appropriate reading is from Chapter 6 of the 2011 subject guide. Key sections appear on pp.72–78. Within these pages, you are guided to pursue readings from Matthews and Thompson (2008), Saunders and Cornett (2011) and Bessis (2010).

Approaching the question

A good starting point for your answer would be to identify that securitisation is a financial innovation with far-reaching consequences, not least in its role within the credit crunch and financial crisis (2007 onwards). To place securitisation within a broader context, it is recommended that you introduce it with information such as that in Table 6.1 in the subject guide.

Your answer should proceed with two main themes linked to the question, namely, 'mechanics' and 'costs and benefits'. The main options available to banks to increase the flexibility of operations while adhering to the regulatory capital requirements are to liquidate assets or to reduce risks. During the period prior to the US sub-prime crisis, liquidation of assets through securitisation became an increasingly widespread means used by banks to transform illiquid assets like loans into securities that are attractive to investors. Securitisation is recognised as an efficient means of redistributing the credit risks held by a bank to other banks or non-bank investors. In principle, it offers a vehicle to transform illiquid financial assets into tradable capital market instruments, which therefore offers potential for enhanced diversification of risks.

Within Chapter 6 of the subject guide, you should identify that Figure 6.1 and the surrounding discussion is highly relevant to the 'mechanics' element required by the question. Pursuing the directions given in the Activity sections on pp.73–74 of the subject guide would be highly beneficial to your ability to produce a complete answer to this element of the question. A strong answer would extend the discussion beyond 'pass through' securitisation to include other forms of securitisation such as collateralised loan obligations (CLOs), collateralised debt obligations (CDOs) and mortgage-backed bonds (MBBs).

Securitisation provides benefits to banks in terms of risk management, capital position and funding costs. Securitised assets reduce the capital required to comply with regulations. A bank's decision to engage in a securitisation transaction will depend on the balance between the cost of raising funds in this manner relative to attracting deposits or issuing bonds. The identification of appropriate packages of assets on the bank's balance sheet also has an important influence on the viability of a securitisation transaction. With a given set of benefits from securitisation, the more costly and difficult it is to find asset packages of sufficient size and homogeneity, the more expensive it will be to securitise these asset packages. The potential boundary to securitisation may be defined by the relative degree of heterogeneity and credit quality of an asset type or group. This depth of coverage of costs and benefits should also be extended to the other forms of securitisation described above for an excellent answer.

There are important suggested readings on p.76 of the subject guide. Similarly, if your answer can demonstrate evidence that you have engaged in the Activity section on p.77, the Examiners would certainly reward this.

Question 7

Analyse the importance of adjusting for risk in bank regulation and bank performance measurement.

Reading for this question

The relevant reading draws from several elements of the 2011 subject guide, including pp.23–28, 35–43 and 88–90. Within these pages, the Activity sections guide you to pursue reading from Matthews and

Thompson (2008), Saunders and Cornett (2011) and Bessis (2010). The question requires a synthesis of material appearing in Chapters 2, 3 and 7 of the subject guide. Chapter 3 covers risk-taking by banks, Chapter 2 covers the bank regulation aspects and Chapter 7 covers bank performance measurement.

Approaching the question

This question follows two main themes: (i) how does the risk-taking inherent in banking relate to the need for bank regulation; and (ii) how does risk-taking influence bank performance and its measurement?

The introduction to Chapter 3 of the subject guide (pp.35–36) provides a good basis for an introduction to this answer. Your answer should proceed by very briefly discussing the main types of risk arising in banking (pp.36–43 of the subject guide). This should certainly not comprise the major focus of the answer. An argument could be made for an emphasis on particular risks that are considered most important to the question. For example, this section of your answer could focus on explaining the types of risk that receive greater attention in regulation (e.g. the role of credit risk, interest rate risk, market risk and operational risk in the Basle II accord). Alternatively, you could stress several reasons why credit risk might be viewed as the most important category of risk.

Drawing from Chapter 2 of the subject guide (pp.23–28), your answer should develop clear linkages between bank risks and bank regulation. Given the syllabus of this course, it is reasonable that you will focus mainly on capital adequacy regulation. An important manner in which excessive risk-taking can be regulated is by linking banks' shareholder capital to the risk held by the bank in its assets. Emphasis should be placed on the risk-assets ratio (and the related Basle Accords) and the gearing ratio (deposits relative to capital). Better answers would highlight developments within Basle III regulations (e.g. an increased focus on liquidity risk). This would obviously reflect additional reading on a topical subject and would certainly be rewarded by the Examiners.

If a bank performs well over a particular time period, it is important to identify and consider the level of risks taken in order to achieve such performance. In general, this theme has resonance with the 2007–09 credit-crunch and financial crisis, and the best answers would include some reference to risk-taking by Western banks in the years prior to 2007 (e.g. sub-prime lending) as well as comments on some banks' reliance on liquidity from wholesale sources. To remain focused on the question, accounting-based measures of performance can be omitted from the answer, or alternatively they should only be discussed very briefly for purposes of context. Your answer should focus on the rationale for making a risk-adjustment when assessing bank performance. The construction of risk-adjusted measures (e.g. risk-adjusted return on capital (RAROC), return on risk-adjusted capital (RORAC), and Economic Value Added (EVA)) should be explained in detail. The readings in the Activity section on p.90 of the subject guide are highly relevant to this part of the answer. The best answers would address any limitations with these measures or any issues with implementation or interpretation in practice.

Better answers could also choose to link regulation and performance (e.g. p.24 of the subject guide). Given the multiple strands required in this answer, it is important that your conclusion should draw together the key themes.

Question 8

Using credit derivatives as examples, explain the different structures of forwards, options and swaps.

Reading for this question

This question requires a synthesis of material appearing in Chapters 6 and 8 of the 2011 subject guide. Key sections appear on pp.78–83 and pp.92–96. Within these pages, you are guided to pursue readings from Saunders and Cornett (2011) and Bessis (2010).

Approaching the question

A good starting point for your answer would be to present a general introduction to credit derivatives as a specific class of financial instruments which enables the isolation and then management of the credit risk from underlying assets. A brief explanation of the motives for using credit derivatives would also be desirable within the opening paragraphs. Relevant material and suggested reading for these aspects can be drawn from pp.78–80 of the subject guide, including the Activity sections.

The remainder of your answer can be successfully structured in three elements, focusing on forwards, options and swaps. It is essential to meet the requirements of the question by using credit derivatives as the examples in each case. There is very little reward offered by the Examiners if you use examples that do not comply with the specific statement in the question (and this is true more generally). In many respects, the best approach to addressing the main requirements of the question can be found from pursuing the first Activity section on p.83 of the subject guide. This advocates that you 'find supporting examples of credit derivatives and take notes on them by reading Saunders and Cornett (2011)' (followed by specific guidance on page numbers).

The basic characteristics of a forward contract are discussed on pp.92–93 and pp.96–97 of the subject guide. The main focus of your sub-section on credit forward contracts should draw from pp.81–83 of the subject guide. The basic characteristics of options contracts are discussed on pp.93–94 and p.101 of the subject guide. The main focus of your sub-section on credit related option contracts should draw from pp.81–82 of the subject guide and the Activity section on p.83. The basic characteristics of swap contracts are discussed on pp.95–96 and p.102 of the subject guide. The main focus of your sub-section on credit-related swaps should draw from pp.80–81 of the subject guide and the Activity section on p.83.

In all three sub-sections, the technical accuracy of the examples that you use is very important. For example, candidates often confuse the features of call and put options. Also, it is common for candidates to present payoff diagrams with incorrect or non-existent labelling. Another common error is to discuss the credit risk inherent in the forward or swap contract itself, which can reveal a failure to understand the requirements of a question such as this one. Overall, the Examiners will expect a synthesis of material from Chapters 6 and 8 of the subject guide within your answer to this question.