Examiners' commentaries 2013

FN2029 Financial intermediation

Important note

This commentary reflects the examination and assessment arrangements for this course in the academic year 2012–13. 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). You should always attempt to use the most recent edition of any Essential reading textbook, even if the commentary and/or online reading list and/or subject guide refers to an earlier edition. If different editions of Essential reading are listed, please check the VLE for reading supplements – if none are available, please use the contents list and index of the new edition to find the relevant section.

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 concept(s), 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 all four questions on the paper. Try to allow an equal amount of time for each answer and make sure that you attempt all parts or aspects of a question. It is a 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. Gaining only a low mark for the fourth answer, severely harms 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.

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 question: 'how can I reflect the insights gained 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 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 of the 2012 Zone A paper and Questions 2, 3 and 6 of the 2013 Zone B paper). 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 the US or French sovereign credit ratings) 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.

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 2013

FN2029 Financial intermediation – Zone A

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Comments on specific questions

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

Question 1

Critically evaluate the transactions costs and delegated monitoring theories for the existence of financial intermediaries.

Reading for this question

Please refer to Chapter 1 of the subject guide which covers four reasons for the dominance of intermediation over direct financing. Two of these reasons are covered in this question (and the others are covered in Question 2 of this examination paper and in Questions 1 and 2 of the 2013 Zone B examination paper).

Chapter 1 activities direct you to study appropriate sections from 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]; 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; and Diamond, D.W. 'Financial intermediation as delegated monitoring: a simple example', *Federal Reserve Bank of Richmond Economic Quarterly* 82(3) 1996, pp.51–66.

Approaching the question

This question requires a critical analysis of the preference for intermediation over direct financing, and specifically expects the focus to be on transaction costs and delegated monitoring. 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. There are four further reasons for the dominance of intermediation over direct financing:

a. transaction costs (e.g. Benston and Smith,1976)

b. liquidity insurance (e.g. Diamond and Dybvig, 1983)

c. information-sharing coalitions (Leland and Pyle, 1977)

d. delegated monitoring (Diamond, 1984, 1996).

This question relates to reasons (a) and (d).

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 textbook readings. Specifically, the Activity box 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 box 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 second aspect of the question relates to one of the key learning outcomes of Chapter 1 of the subject guide, namely the theory of financial intermediation as delegated monitoring. 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 should initially address information costs and monitoring costs, which then serves as a foundation to proceed to a discussion of the Diamond (1984) model. Delegated monitoring is one of the key reasons for the dominance of intermediation over direct financing. 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). A good answer should then proceed to analyse

the costs and benefits of monitoring. Generally, there is much scope in this question for you to demonstrate rigorous analysis drawn from the textbook and journal readings as suggested above, and this will be well rewarded by the Examiners.

Question 2

With reference to the Diamond and Dybvig (1983) model, explain the theory of liquidity insurance for the existence of banks and discuss its relevance for explaining bank runs.

Reading for this question

Please refer to Chapters 1 and 2 of the subject guide (specifically pp.13 and 18–23). Within these pages, there are Activity boxes which direct you to study appropriate sections from Bhattacharya and Thakor (1993), Matthews and Thompson (2008) and Saunders and Cornett (2011). It is also essential to be familiar with the Diamond and Dybvig (1983) model.

Approaching the question

This question requires the linking of two elements from Chapters 1 and 2 of the subject guide. The bulk of the answer should discuss insights from theory, which obviously will be primarily based on the Diamond and Dybvig (1983) model. Some contextual material should also be included in the answer. For example, it would be appropriate to discuss Northern Rock as a case study (which is covered in the Essential reading). Good answers would illustrate that aspects of the theory were evident in the behaviour of depositors in this case.

The answer requires careful reading of Chapters 1 and 2 of the subject guide (supplemented by Diamond and Dybvig, 1983) in order to demonstrate a clear understanding of the term 'liquidity insurance' – this should not be confused with deposit insurance, which is a completely different concept. Liquidity insurance relates to the fact that consumers are unsure of their future liquidity requirements in the face of unanticipated events. 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. The 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. Good answers to this question would compare two cases: the case where there are no banks; and the case where there is a bank providing liquidity insurance. This comparison should then be used to explain clearly the arguments for the presence of banks. Using the Diamond and Dybvig (1983) model, in terms of their game theory model, there are two equilibria when banks exist – the first is the existence of a bank providing liquidity insurance and optimal risk sharing among economic agents, while the second is the situation of a bank run.

The second part of the answer should include a clear definition of a 'bank run'. 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. This results in a vulnerability to bank runs. Better answers would link the theory of bank runs to the nature and shortcomings of the deposit contract and regulation. A key reason

for regulation is that uninsured depositors are likely to cause a bank run when faced with information of an adverse shock to bank balance sheets. This is the point at which the notion of deposit insurance could be introduced. This argument has support both in history and in theory. Good answers may also offer more critical analysis of the regulatory and deposit insurance solutions to help prevent bank runs and then proceed to suggest other possible solutions such as suspension or limitation of withdrawals, securitisation, subordinated debt and joint deposit insurance. This may be presented within the recent context of events (e.g. Northern Rock, Cyprus).

The material in the subject guide provides an intuitive argument and some of the more formal theory; a good answer should include both aspects. A very good answer would provide a full analysis of the implications of the theory, and would include discussion of the relevance of the design of deposit contracts.

Generally, there is much scope in this question for you to demonstrate rigorous analysis drawn from readings suggested above.

Question 3

Discuss the arguments for banking regulation and explain the role of the risk-assets ratio in capital adequacy regulation.

Reading for this question

Please refer to Chapter 2 of the subject guide. Within this chapter, there are Activity boxes 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 first, third and fourth learning outcomes of Chapter 2 of the subject guide (pp.17–18). The question contains two elements that must be addressed in detail: the arguments in favour of banking regulation and a discussion of capital adequacy regulation.

As a starting point, a good answer should include some contextual material. There is ample scope to draw on the events of 2007–09 in banking and financial markets in order to highlight why banking regulation is an important and relevant issue. 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 (answers can also refer to Matthews and Thompson, 2008). The most logical progression from this would be to analyse the arguments in favour of banking regulation. The case for regulation rests on the argument that unregulated private actions create outcomes whereby social marginal costs are greater than private marginal costs (see p.20 of the subject guide). 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. A good answer should 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. A strong answer would provide a link between the theory of bank runs and regulation at this point. The subject guide provides both an intuitive argument and some of the more formal theory. Good answers should include both aspects. To achieve high marks,

candidates should include explanation on the relevance of the Diamond and Dybvig (1983) model for banking regulation, although much of the detail included in an answer to Question 2 is not required here.

In the second part of the answer, candidates should proceed to describe the motivation for capital adequacy regulation and, in particular, a discussion of the risk-assets ratio, which should naturally link with the Basle I and Basle II accords. The best answers would offer some comments on the current moves towards a new regulatory regime under Basle III. However, answers should remain focused on the risk-assets ratio; the question is not directed towards a critique or comparison of the Basle accords. A key element of the discussion should focus on the means by which bank assets can be risk-weighted. There is potential for a deep analysis of the approach of using internal and external credit ratings within the Basle II accord. However, the answer must also recognise how regulators have sought to incorporate measures of interest rate risk, market risk and operational risk. It is not necessary to discuss Pillars 2 and 3 of the Basle II accord in detail. To support the above approach, it is essential for your answer to reflect your reading from Matthew and Thompson (2008) and Saunders and Cornett (2011).

The answer could conclude with a summary of key points: (i) why banking regulation is important; (ii) why bank capital is a focus for regulatory interest; (iii) why the risk-assets ratio is important for regulators.

Question 4

Compare and contrast the nature and formulation of credit rating systems and credit scoring models as measures of credit risk.

Reading for this question

This question is based on Chapter 4 of the subject guide, especially pp.47–53 and 58–60. The answer should also draw on the relevant suggested readings from Bessis, J. *Risk Management in Banking.* (Chichester: Wiley, 2010) third edition [ISBN 9780470019139] and Saunders and Cornett (2011).

Approaching the question

The two themes in the question must be adequately addressed, but also similarities and differences ('compare and contrast') must be identified.

In discussing credit rating systems, answers should explain the main features of internal and external ratings. Attention should be placed on scope (e.g. entities covered), types of rating, information used in constructing the rating and users of ratings. 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.

In proceeding to the second part of the question, it would be important to introduce the motivation for the use of credit risk models, drawing a distinction between rating and modelling (scoring). An essential point would be to identify a contrast between large corporate/sovereign/financial institution (rating) and consumer/small corporate (modelling/scoring). There is possibly some blurring of the distinction around

medium-sized companies. However, the contrast should also consider differences in methodologies and the final product. Both ratings and credit risk models are designed to capture the probability of default; ratings produce an ordinal rating whereas models/scoring produce a measure or probability of default.

Good answers should provide a convincing coverage of credit scoring, highlighting typical methods and should compare different approaches. The most popular techniques are linear probability models; logit models and linear discriminant analysis (see pp.59–60 of the subject guide).

Better answers will conclude by drawing attention to the most salient points in relation to similarities and differences among the two credit-related themes of the question.

Question 5

Explain the nature of liquidity risk and interest rate risk, and analyse the relevance of gap analysis for managing these risks.

Reading for this question

Please refer to Chapters 3 and 5 of the subject guide (specifically pp.37–39 and 63–69). 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).

Approaching the question

A good starting point for your answer is to address the rationale for asset and liability management (ALM) in banks (see pp.64–65 of the subject guide). Answers should highlight the relevance of net interest margin and net interest income as target variables, with both the level and variability of these variables being important.

To address the first part of the question, answers should provide a detailed discussion of the issues of liquidity risk and interest rate risk in bank balance sheets (covered in Chapter 3 of the subject guide, pp.37–39). Good answers should proceed to explain that the two risks are inter-related, for example when considering liquidity risk arising through maturity mismatching and the associated re-investment or re-financing interest rate risk.

The second part of the answer should consist of a detailed consideration of liquidity gap analysis and interest rate gap analysis. In discussing liquidity gap analysis, sources of liquidity and maturity mismatching should be addressed in the answer. Under interest rate gap analysis, it is important for candidates to discuss the identification of rate-sensitive assets and liabilities. Illustrative examples should be provided in both cases. There are many examples available in the suggested readings from the textbooks. It is recommended that candidates demonstrate some reading beyond the subject guide when discussing the application and critical evaluation of gap analysis, in particular referring to the method and importance of measuring gaps at many different maturities. It is also important that the explanations of gap analysis explain clearly how the techniques manage both liquidity and interest rate risk.

The section in Chapter 5 of the subject guide titled 'Issues associated with ALM' (pp.65–66) is of limited relevance to the question posed here, and this material should not constitute a large portion of an answer.

Generally, there is much scope in this question for the answer to demonstrate rigorous analysis drawn from the suggested readings.

Question 6

Explain banks' motivation for engaging in the securitization of balance sheet assets, and analyse the costs and benefits of this process.

Reading for this question

The relevant material is covered in Chapter 6 of the subject guide. The Activity boxes in this chapter direct you to relevant sections from Bessis (2010), Matthews and Thompson (2008) and Saunders and Cornett (2011).

Approaching the question

This question requires candidates to explain banks' motivation for engaging in securitisation, and to analyse the costs and benefits of the process. A good starting point would be to identify the context of securitisation within risk transfer instruments (e.g. Table 6.1 of the subject guide). A distinction can be made that securitisation is mainly used by banks for funding purposes whereas credit derivative transactions have hedging or trading motivations.

A primary factor in banks' motivation to use securitisation is to increase the flexibility of operations while adhering to the regulatory capital requirements. Pass-through securitisation enables banks to transform illiquid assets (e.g. residential mortgage loans) into negotiable assets that are attractive to investors. This technique was used widely in the period prior to the 2007–09 financial crisis. A good answer would highlight the role of securitised assets (e.g. collateralised debt obligations (CDOs)) within the sub-prime crisis of 2007 onwards. Despite the adverse consequences and publicity surrounding this, much of the problem rests in banks' selection of poor quality borrowers in the loan origination process. In principle, pass-through securitisation remains an efficient means of redistributing the credit risks of a bank to other banks or nonbank investors. It is a means to enhance risk diversification. In terms of increasing a bank's flexibility, the pass-through securitisation removes assets from the balance sheet, thus reducing the denominator in the risk-assets ratio and increasing the ratio. However, some supervisory authorities have restricted the interpretation to cases where risks have genuinely passed to a third party.

The question does not require a detailed discussion of the mechanics of securitisation; the costs and benefits must be emphasised. The benefits of pass-through securitisation include savings in required capital through the sales of assets, reduced funding costs (when the process is implemented at a lower cost than attracting deposits or issuing bonds) and management of the bank's return on equity and interest rate gaps. Bessis (2010) provides relevant worked examples that could be included in the answer. To achieve funding cost reductions, the gains should more than offset the cost of setting up the structure of the transaction (e.g. rating agency fees and credit enhancement costs). A good answer would draw on further detail from Bessis (2010) and Saunders and Cornett (2011) at this point. Identification of appropriate packages of assets has an important influence. The more costly and difficult it is to find asset packages of sufficient size and homogeneity, the more expensive it is to securitise these asset packages. Despite the diversity of maturities, interest terms and covenants, banks also issue securitisation packages of loans and bonds, termed collateralised loan obligations (CLOs) and CDOs. The lower quality loans and bonds included in such packages have led to large losses for many investors during the recent financial crisis.

Answers should include a concluding summary of the main points.

Question 7

Discuss the main sources of risk in commercial banking, and critically evaluate the approaches used to conduct risk-adjusted performance measurement.

Reading for this question

This question requires a synthesis of material from Chapters 3 and 7 of the subject guide. There are important suggested activities and readings from Bessis (2010) and Saunders and Cornett (2011) cited in these chapters of the subject guide.

Approaching the question

The theme of the question is risks in banking and how risk-taking might influence performance. If a bank performs well over a particular time period, it is important to identify 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 (e.g. Northern Rock, see Matthews and Thompson, 2008).

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. 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.

The second half of the answer should proceed to consider performance measures. To remain focused on the question, regulatory and accounting-based measures of performance could be omitted or alternatively should only be discussed very briefly for purposes of context. The 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), risk on return-adjusted capital (RORAC), and economic value added (EVA)) should be explained in detail. The 'Activity' box on p.88 of the subject guide is highly relevant to this part of your answer. The best answers would address any limitations with these measures or any issues with implementation or interpretation in practice.

A concluding paragraph should be included to draw together the key themes addressed in your answer in a summarised form.

Question 8

Using examples, explain how banks use derivatives to manage credit risk, exchange rate risk and interest rate risk.

Reading for this question

This question relates to the readings from Saunders and Cornett (2011) which are referred to in Chapter 6 (credit derivatives) and Chapter 8 (exchange rate and interest rate risk) of the subject guide.

Approaching the question

The question relates to key learning outcomes stated in Chapters 6 and 8. A good starting point for an answer would be to establish the key features of the main derivative instruments which are used to hedge the three categories of risk mentioned in the question. A concise comparison of forwards, futures, options and swaps would serve as a strong foundation for more specific analysis later in the answer.

In the case of managing credit risk, a good answer should focus on the characteristics of hedging using credit derivatives. Specifically, credit default swaps, credit forwards and credit spread options are the most appropriate instruments to be analysed here. The relevant suggested readings from Saunders and Cornett (2011) cited in Chapter 6 of the subject guide provide examples and payoff diagrams which would provide an excellent focus for this element. You should also consider Figure 6.3 from the subject guide.

In the case of managing exchange rate risk, a good approach in the context of this syllabus is to focus the analysis on the covered interest parity condition. After explaining this condition and its relevance to forward contract pricing, the answer should demonstrate the mechanics of a forward hedge and of a money market hedge. If the parity condition holds, the two hedging techniques produce the same outcome. In a very good answer, this would be demonstrated by numerical examples.

In this syllabus, swaps would be the obvious instrument for the discussion of managing interest rate risk. The interest rate swap is based on comparative advantage in borrowing at fixed and floating interest rates. Beware that it is common for answers to this type of question to provide an illustration of the mechanics of the interest rate swap without explaining the source of interest rate risk faced by the parties involved. For this particular question, the analysis could usefully be extended to currency swaps. In this case, a common problem for past candidates has been a failure to emphasise that the hedging technique is based on comparative advantage in borrowing in different currencies.

Examiners' commentaries 2013

FN2029 Financial intermediation – Zone B

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Comments on specific questions

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

Question 1

Discuss how the existence of financial intermediaries is able to help resolve the problems of imperfect information and asymmetric information.

Reading for this question

Please refer to Chapter 1 of the 2011 subject guide, in particular pp.9–11 and 13–16. There are Activity boxes which direct you to study appropriate sections from 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]; 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; and Diamond, D.W. 'Financial intermediation as delegated monitoring: a simple example', *Federal Reserve Bank of Richmond Economic Quarterly* 82(3) 1996, pp.51–66.

Good answers must cite Diamond, D.W. 'Financial intermediation and delegated monitoring', *Review of Economic Studies* 51(3) 1984, pp.728−62, Diamond, D.W. 'Financial intermediation as delegated monitoring: a simple example', *Federal Reserve Bank of Richmond Economic Quarterly* 82(3) 1996, pp.51–66 and Leland, H.E. and D.H. Pyle 'Informational asymmetries, financial structure and financial intermediation', *Journal of Finance* 32(2) 1977, pp.371−87.

Approaching the question

This question relates to the Chapter 1 learning outcomes. A good answer would begin with a concise discussion of the characteristics of financial intermediaries and the functions that they perform. The answer should proceed to explain in detail how imperfect information and asymmetric information can impinge on the efficient flow of funds from surplus units to deficit units. In this regard, good answers must include full and accurate definitions of the concepts of imperfect information, asymmetric information, adverse selection and moral hazard in the context of financial intermediation.

Despite the 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.

There are four further reasons for the dominance of intermediation over direct financing:

a. transaction costs (e.g. Benston and Smith, 1976)

b. liquidity insurance (e.g. Diamond and Dybvig, 1983)

c. information-sharing coalitions (Leland and Pyle, 1977)

d. delegated monitoring (Diamond, 1984, 1996).

This question relates to reasons (c) and (d).

The bulk of the answer should be structured around the following three elements whereby banks help to overcome problems of moral hazard and adverse selection:

i. providing commitment to long-term relationships with customers

ii. economies of scale, and the view of banks as information-sharing coalitions

iii. delegated monitoring of borrowers.

Under point (i), the answer should emphasise the merits and benefits arising from a close relationship between the intermediary and its customers.

Under point (ii), the answer should discuss Leland and Pyle's (1977) ideas that information is a private good within a bank, thus providing an incentive for the gathering of information.

More depth is expected for point (iii) since this attracts greater coverage in the subject guide and the suggested readings. 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. 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 intermediaries provide a solution to these problems by pooling funds from suppliers (e.g. household savers) and investing in the financial claims of corporations. The intermediary has an incentive to collect information and monitor, which 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).

Coverage of technical aspects (especially on the delegated monitoring of borrowers) would be expected from a good answer. For example, the costs and benefits of monitoring are analysed on p.16 of the subject guide. It is important that these issues are discussed and explained rather than simply reproducing the formula.

Question 2

Using the Diamond and Dybvig (1983) model, explain the liquidity insurance theory for the existence of banks and their susceptibility to runs.

Reading for this question

Please refer to Chapters 1 and 2 of the subject guide (specifically pp.13 and 18–23). Within these pages, there are Activity boxes which direct you to study appropriate sections from Bhattacharya and Thakor (1993), Matthews and Thompson (2008) and Saunders and Cornett (2011). It is also essential to be familiar with the Diamond and Dybvig (1983) model.

Approaching the question

This question requires the linking of two elements from Chapters 1 and 2 of the subject guide. The bulk of the answer should discuss insights from theory, which obviously will be primarily based on the Diamond and Dybvig (1983) model. Some contextual material should also be included in the answer. For example, it would be appropriate to discuss Northern Rock as a case study (which is covered in the Essential reading). Good answers would illustrate that aspects of the theory were evident in the behaviour of depositors in this case.

The answer requires careful reading of Chapters 1 and 2 of the subject guide (supplemented by Diamond and Dybvig, 1983) in order to demonstrate a clear understanding of the term 'liquidity insurance' – this should not be confused with deposit insurance, which is a completely different concept. Liquidity insurance relates to the fact that consumers are unsure of their future liquidity requirements in the face of unanticipated events. 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. The 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. Good answers to this question would compare two cases: the case where there are no banks; and the case where there is a bank providing liquidity insurance. This comparison should then be used to explain clearly the arguments for the presence of banks. Using the Diamond and Dybvig (1983) model, in terms of their game theory model, there are two equilibria when banks exist – the first is the existence of a bank providing liquidity insurance and optimal risk sharing among economic agents, while the second is the situation of a bank run.

The second part of the answer should include a clear definition of a 'bank run'. 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. This results in a vulnerability to bank

runs. Better answers would link the theory of bank runs to the nature and shortcomings of the deposit contract and regulation. A key reason for regulation is that uninsured depositors are likely to cause a bank run when faced with information of an adverse shock to bank balance sheets. This is the point at which the notion of deposit insurance could be introduced. This argument has support both in history and in theory. Good answers may also offer more critical analysis of the regulatory and deposit insurance solutions to help prevent bank runs and then proceed to suggest other possible solutions such as suspension or limitation of withdrawals, securitisation, subordinated debt and joint deposit insurance. This may be presented within the recent context of events (e.g. Northern Rock, Cyprus).

The material in the subject guide provides an intuitive argument and some of the more formal theory; a good answer should include both aspects. A very good answer would provide a full analysis of the implications of the theory, and would include discussion of the relevance of the design of deposit contracts.

Generally, there is much scope in this question for you to demonstrate rigorous analysis drawn from readings suggested above.

Question 3

Compare and contrast internal and external credit rating systems, and critically evaluate their roles in capital adequacy regulation.

Reading for this question

Please refer to Chapters 2 and 4 of the subject guide. Within these chapters, there are Activity boxes 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 subject guide. The first part focuses on credit rating systems and the second on the use of credit ratings in bank regulation. A good answer requires convincing answers to both elements, but with more focus and emphasis on the critical evaluation of the role of credit ratings in capital adequacy regulation.

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 relative 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 setup 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). The answer 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.28–29 of the subject guide).

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

Question 4

Explain the constituents of credit risk and discuss how these risks could be managed or hedged.

Reading for this question

Please refer to Chapters 4 and 6 of the subject guide (specifically pp.53–58 and 80–83). Within these pages, there are various citations to Bessis (2010) and Saunders and Cornett (2011).

Approaching the question

This question has two elements: analysis of the constituents of credit risk and explanation of how these risks could be managed or hedged. The question is entirely focused on credit risk, but requires candidates to show understanding of how the risks can be managed or hedged, which requires an application of derivative instruments.

There are several themes which could be explored in introducing the importance of credit risk to banks. Even with no mismatching of assets and liabilities, banks would still face credit risk. Credit risk is probably the most important type of risk in terms of potential losses for a bank. Default by a small number of key customers could be catastrophic for some banks. In addition, there is scope for candidates to draw on examples from the sub-prime crisis, or the recent example of the concerns emanating from the reduction in the credit standing of Greece and other European sovereigns.

The first part of the question focuses on Equation 4.1 from the subject guide:

$$L = D \times X \times (1 - R)$$

The expected loss given default (L) is the product of the loss given default and the default probability (D). The loss given default is comprised of an uncertain exposure (X) and an uncertain recovery rate (R).

The answer should thus initially present a detailed explanation of the three elements: default risk, exposure risk and recovery risk. The default risk is measured by the probability of default. It is important to note that default can be defined in several ways. Answers should highlight the

factors that will influence the probability of default, and the possibility of mapping default probabilities from historical data linked to rating systems. Candidates may also explain some of the relevant credit scoring models that derive probabilities of default. Exposure is the amount at risk in the event of default (excluding recoveries). Since default occurs at an unknown future date, the risk is generated by the uncertainty regarding future amounts at risk. Candidates should be careful with this element: exposure risk is often not well defined by candidates in this type of question. Recoveries in the event of default are unpredictable and depend on the type of default and the guarantees received from the borrower. Recoveries involve legal procedures, expenses and a significant lapse of time. A key issue is that the 'expected loss given default' goes beyond the probability of default, which might be viewed as a more traditional measure. Candidates may also describe migration risk even though it does not form part of the equation explicitly.

The second part of the question should address the management and hedging of these constituents of credit risk. Candidates should explain the contractual mechanisms that can control credit risk. Basic answers will describe how banks employ traditional selection, limitation and diversification techniques to manage default probabilities. But, it is important that answers recognise that credit risk management needs to focus beyond these simple processes and beyond the management of only this single constituent of credit risk. For example, candidates should explain that exposure also needs to be properly managed and that there is potential for recovery rates to be improved through the use of enhancements such as collateral, guarantees and covenants (refer to pp.36–37 and 57–58 of the subject guide). Finally, good answers should explain how credit derivative products hedge against default (credit default swap) and increases in exposure, usually measured by credit rating downgrades (total return swap) or increases in the credit spread above a benchmark (option, forward). Since this second part of the question requires the explanation of the application of credit risk management techniques, it is likely to comprise a slightly larger weighting in the answer compared to the descriptions of the determinants of credit risk.

Question 5

Explain the general risk measurement and risk management functions of banks. Discuss how these functions are applied by banks when they use Asset and Liability Management and gap analysis to manage liquidity risk and interest rate risk.

Reading for this question

This question covers some reading from Chapter 3 (pp.43–44) and relevant reading based on Chapter 5 of the subject guide (pp.63–69). It is essential for candidates to have followed the 'Activity boxes' within Chapter 5, which direct them to specific sections from Bessis (2010), Matthews and Thompson (2008) and Saunders and Cornett (2011). And it is also essential that candidates provide a convincing link between the two elements of the answer.

Approaching the question

The first part of the answer should discuss the risk management and risk measurement processes in bank (pp.43–44). Quantitative risk measures can fall into three categories: sensitivity of target variables; volatility of target variables; and downside risk. Risk management can be described in four stages: identification of areas where risks can arise; measurement

of the degree of risk; balancing risk-return trade-offs; and establishing appropriate monitoring and control procedures.

The second part of the question requires a discussion of the principles of balance sheet management, along with an explanation of the application of gap analysis. It is essential that candidates explain how the specific application of asset and liability management (ALM) and gap analysis follows the general approaches to risk measurement and management identified in the first part of the question. The answer should begin by focusing on some core principles of ALM. The answer should state explicitly at an early stage that the focus is on liquidity risk and interest rate risk (identification of risks). A good answer would highlight some case(s) of failure in liquidity risk management during the 2007–09 financial crisis (extreme cases of downside risk). ALM should be presented as a subset of the bank's overall risk management process.

The net interest margin (NIM) must be identified as the target of ALM policies. The ALM objective is the minimisation of the NIM for a target level, or the maximisation of NIM for a given level of risk (sensitivity and volatility of target variable). The bank will set its targets based on a particular attitude towards risk, and this will strongly influence the extent of mismatching on the balance sheet and the complexity of hedging arrangements (balancing risk-return trade-off). Better answers would highlight the building blocks of ALM (see the Activity on p.65 of the subject guide).

The answer should then proceed to discuss the application of gap analysis. Both liquidity and interest rate gaps must be discussed. When formulating illustrative examples, candidates must explicitly identify the source and implications of the risk in each example (identify source of risk, measure degree of risk, sensitivity of target variable). Within the discussion of liquidity gap analysis, answers should refer to potential sources of liquidity and maturity mismatching. Following the Activity on p.67 of the subject guide would help the preparation for this aspect. Good answers are also likely to refer to the importance of calculating liquidity gaps for different maturity buckets, static gaps and dynamic gaps. In relation to interest rate gap analysis, it is important to comment on rate-sensitivity, fixed-rate versus variable-rate assets and liabilities and the time period. Pursuing the Activity on p.69 of the subject guide would enable candidates to produce a much deeper and more convincing answer. Good answers will also highlight some of the weaknesses of gap analysis for managing interest rate gaps.

Answer should conclude with a summary of the key points raised above, while noting the focus of the question posed.

Question 6

Critically evaluate banks' use of securitisation as a means of credit risk transfer.

Reading for this question

This question relates to the readings from Matthews and Thompson (2008) and Saunders and Cornett (2011) which are referred to in Chapter 6 of the subject guide. The question relates specifically to the learning outcomes of Chapter 6.

Approaching the question

This question focuses on risk transfer using the techniques of securitisation. A distinction can be made that securitisation is mostly used for funding purposes whereas credit derivative transactions have hedging

(or trading) motivations. The financial innovation of securitisation has changed the landscape of risk by enabling participants to transfer risk (credit risk in particular) across financial and non-financial sectors.

A good answer could discuss the characteristics of securitisation processes (e.g. by explaining the mechanics of pass-through and other types of securitisation). However, a significant element of the answer should be focused on the motivation, merits and drawbacks of banks' use of these techniques. A primary factor in banks' motivation to use securitisation is to increase the flexibility of operations while adhering to the regulatory capital requirements. Pass-through securitisation enables banks to transform illiquid assets (e.g. residential mortgage loans) into negotiable assets that are attractive to investors. This technique was used widely in the period prior to the 2007–09 financial crisis. A good answer would highlight the role of securitised assets (e.g. collateralised debt obligations (CDOs)) within the sub-prime crisis of 2007 onwards. Despite the adverse consequences and publicity surrounding this, much of the problem rests in banks' selection of poor quality borrowers in the loan origination process. In principle, pass-through securitisation remains an efficient means of redistributing the credit risks of a bank to other banks or nonbank investors. It is a means to enhance risk diversification. In terms of increasing a bank's flexibility, the pass-through securitisation removes assets from the balance sheet, thus reducing the denominator in the risk-assets ratio and increasing the ratio. However, some supervisory authorities have restricted the interpretation to cases where risks have genuinely passed to a third party.

The benefits of pass-through securitisation include savings in required capital through the sales of assets, reduced funding costs (when the process is implemented at a lower cost than attracting deposits or issuing bonds) and management of the bank's return on equity and liquidity and interest rate gaps. Bessis (2010) provides relevant worked examples that could be included in the answer. To achieve funding cost reductions, the gains should more than offset the cost of setting up the structure of the transaction (e.g. rating agency fees and credit enhancement costs). A good answer would draw on further detail from Bessis (2010) and Saunders and Cornett (2011) at this point. Identification of appropriate packages of assets has an important influence. The more costly and difficult it is to find asset packages of sufficient size and homogeneity, the more expensive it is to securitise these asset packages. Despite the diversity of maturities, interest terms and covenants, banks also issue securitisation packages of loans and bonds, termed collateralised loan obligations (CLOs) and CDOs. The lower quality loans and bonds included in such packages have led to large losses for many investors during the recent financial crisis.

Answers should include a concluding summary of the main points.

Question 7

Explain the rationale for bank performance measurement and critically analyse the various methods of bank performance measurement.

Reading for this question

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

Approaching the question

This question relates to all learning objectives of Chapter 7 of the subject guide. The question addresses both the rationale for performance

measurement and discussion of performance measures. Candidates should initially note from the question that the Examiners' expectations require a critical analysis, not simply a description of the methods.

A good answer should begin by identifying the rationale for analysing bank performance (pp.85–86). 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, answers should focus discussion around the 'du Pont' model, which decomposes the accounting return on equity. Candidates should identify how different measures of profitability can provide alternative perspectives. A good answer would analyse the potential for misleading inferences from accounting measures (e.g. if a bank has inadequate equity capital). Answers should proceed to consider market value measures of performance and should compare these with the accounting measures. For good answers, it is essential that candidates include critical analysis of these measures of performance.

Discussion of risk-adjusted performance measures should then represent a significant portion of the answer. Good answers would demonstrate reading on this issue from beyond the subject guide, e.g. from Bessis (2010). Candidates often perceive that this type of question has very clear and straightforward requirements, but candidates need to ensure that the answer covers the issues in depth. In order to obtain a high mark, it would be essential for answers to demonstrate insights achieved from reading beyond the subject guide (i.e. following the suggested readings from the textbooks), and to include critical appraisal of these risk-adjusted performance measures.

Question 8

Discuss the characteristics of call and put options, and explain how these characteristics 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 boxes 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 towards 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, the 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.

Answers 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 (and for both holders and writers). The determinants of option prices (pp.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 (firm) may relinquish assets instead. Lenders (banks) should adjust the risk premium as a borrower's leverage and asset risk change. Excellent answers would link the effect of these variables to the effect on the value of call and put options. The market value of assets and asset risk are a key focus in estimating default probabilities under this approach. Practically, the value and volatility of assets are not directly observable. The KMV method relies mostly on equity market information to help in this regard. 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.