Examiners' commentaries 2015

FN2029 Financial intermediation – Zone A

Important note

> This commentary reflects the examination and assessment arrangements for this course in the academic year 2014–15. 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).
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> ### 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 refer 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

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

A calculator may be used when answering questions on this paper and it must comply in all respects with the specification given with your Admission Notice. The make and type of machine must be clearly stated on the front cover of the answer book.

Comments on specific questions

Question 1

Explain how the theories of transactions costs and delegated monitoring lead to the dominance of financial intermediation over direct financing.

Reading for this question

Please refer to Chapter 1 of the subject guide (pp.9–16). Within these pages, there are 'Activity' boxes which direct you to study appropriate sections from Matthews and Thompson (2008), Saunders and Cornett (2008), Bhattacharya and Thakor (1993) and Diamond (1996). You may also benefit from reading relevant chapters in Freixas and Rochet (1998). Chapter 1 of the subject guide covers four reasons for the dominance of intermediation over direct financing (see bottom of p.11). Two of these reasons are covered in this question.

Approaching this question

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

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 studied 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 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 pp.13–16 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, 1996) 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 and include a critical evaluation of the material.

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' in Chapter 1 of the subject guide.

Question 2

Use the Diamond and Dybvig (1983) model to explain the liquidity insurance theory for the preference for financial intermediation over direct financing. Discuss the implications of the equilibrium outcomes of the model.

Reading for this question

Please refer to Chapters 1 and 2 of the subject guide (p.13 and pp.18–22). In addition to Diamond and Dybvig (1983), 'Activity' boxes within these pages highlight suggested readings from Matthews and Thompson (2008), Saunders and Cornett (2008) and Bhattacharya and Thakor (1993). You would also benefit greatly from reading Chapter 2 (pp.20–23) of Freixas and Rochet (1998).

Approaching the question

The answer requires careful reading of Chapters 1 and 2 of the subject guide (supplemented by Diamond and Dybvig, 1983; Freixas and Rochet, 1998, Ch. 2; Matthews and Thompson, 2008, Ch. 12; and Saunders and Cornett, 2008) in order to demonstrate a clear understanding of the term 'liquidity insurance'. Note: 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. In terms of the game theory model, there are two equilibria – 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 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 the nature of the deposit contract. The implication of the possibility of a bank run is that it provides a rationale for 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. Diamond and Dybvig (1983) argue that deposit insurance could be introduced to prevent bank runs, and there are many historical examples to support this theory. Better answers will highlight the faults in the provision of deposit insurance (moral hazard in particular) and will present other possible solutions.

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 and critical evaluation of deposit insurance. Generally, there is much scope in this question for you to demonstrate rigorous analysis drawn from readings suggested above.

Question 3

Analyse the roles of the gearing ratio and the risk-assets ratio in banking regulation.

Reading for this question

The relevant material can be found in Chapter 2 of the subject guide (pp.18–25 and 30–32). 'Activity' boxes within these pages highlight suggested readings from Bessis (2010), Matthews and Thompson (2008) and Saunders and Cornett (2008).

Approaching the question

This question requires a discussion of banking regulation but with particular focus on two key tools of regulation; namely, the gearing ratio and the risk-assets ratio. Your answer must recognise that both are measures of capital adequacy. A good answer would begin by presenting the rationale for banking regulation (and some counter arguments) and its focus on bank capital (see pp.18–23 and 30–32 of the subject guide). The 2007–9 financial crisis and other events since provide numerous examples that can be used to motivate the topic and to support the need for banking regulation. The best answers would provide a flavour of the debate surrounding banking regulation during and after this crisis, and would reflect the sense of outrage expressed by the public and politicians in many countries.

The main body of your answer must focus on detailed analysis of **the two ratios** mentioned in the question. You must use terminology in a precise manner and avoid confusion between liquidity and solvency. It is reasonable to devote more attention to the risk-assets ratio than to the gearing ratio. Some algebraic analysis should be used to support your intuitive arguments on the gearing ratio (see pp.23–24 of the subject guide and the suggested readings from Matthews and Thompson, 2008). The gearing ratio is based on the level of deposits held by a bank relative to its capital. It is an indicator of how much of the deposit base is covered if a given proportion of the bank's borrowers default.

Your discussion of the risk-assets ratio 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, your answer should remain focused on the risk-assets ratio; the question is not focused 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, your answer must also recognise how regulators have sought to incorporate measures of interest rate risk, market risk, operational risk and liquidity 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 Matthews and Thompson (2008) and Saunders and Cornett (2008).

The answer should conclude with a summary of the key points:

- Why is banking regulation important?
- Why is bank capital a focus for regulatory interest?
- Why are the gearing ratio and the risk-assets ratio important factors for regulators?

Question 4

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

Reading for this question

Please refer to Chapter 4 of the subject guide (pp.53–58). Within these pages, there are various citations to Bessis (2010) and Saunders and Cornett (2008).

Approaching the question

This question has two elements: analysis of the constituents of credit risk; and explanation of how these risks could be managed. The question is entirely focused on credit risk, but requires you to show an understanding of how the risks can be managed.

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 you 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 and pp.53–56 from the subject guide:

$L = D \cdot X \cdot (1 - R)$. 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 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. 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. You 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. You 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 of these constituents of credit risk (see pp.57–58 of the subject guide). You 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. However, it is important that your 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, you 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 and relevant readings in Saunders and Cornett, 2008 and Bessis, 2010). Finally, good answers may explain briefly how securitisation and credit derivatives can help to transfer credit risk, using material from Chapter 6 of the subject guide. While these are certainly relevant and will be rewarded, they should not comprise a significant proportion of your answer.

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 (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 (2008).

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. These relate to the broader concepts of risk measurement and management.

To address the first part of the question, answers should focus on 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 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. 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. You should draw only on those issues that relate directly to liquidity or interest rate risk.

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

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 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 (2008), and Bessis (2010).

Approaching this 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 information such as that in Table 6.1 in the subject guide. You are expected to discuss 'other forms of securitisation' discussed on p.77 of the subject guide as well as 'pass-through' securitisation. 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' boxes 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. You should explain clearly how mechanics of securitisation differ between the different forms of securitisation.

A very good answer to this question would provide a thorough and comprehensive analysis of the costs and benefits of securitisation. Many of these are included in Chapter 6 of the subject guide; and further relevant arguments can be found in the recommended reading. Securitisation provides benefits to banks in terms of both 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.

There are important suggested readings on p. 76 of the subject guide and in the 'Activity' box on p.77. Engagement with these readings and activities would greatly enhance your answer.

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 (2008) cited in these chapters of the subject guide.

Approaching this 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; operational 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, accounting-based measures of performance could be omitted or alternatively should only be discussed very briefly for the 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. RAROC, RORAC and EVA) should be explained in detail. The 'Activity' box on p.90 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 appropriate examples, explain how banks use forward and swap contracts to manage credit risk, exchange rate risk and interest rate risk.

Reading for this question

This question relates to Chapter 6 (credit derivatives) and Chapter 8 (exchange rate and interest rate risk) of the subject guide, which should be supplemented by the recommended readings from Saunders and Cornett (2008).

Approaching this question

The question relates to key learning outcomes stated in Chapters 6 and 8 of the subject guide. A good starting point for an answer would be to establish the key features of the forwards and swaps which are used to hedge the three categories of risk mentioned in the question. A concise comparison of them 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 forwards, credit default swaps and

total return swaps. The relevant suggested readings from Saunders and Cornett (2008) cited in Chapter 6 of the subject guide provide examples and payoff diagrams which would provide an excellent focus for this element.

For 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. Information relating to a money market hedge is not required, although some candidates may point out that if the parity condition holds, the two hedging techniques produce the same outcome. In a very good answer, the forward hedge should be demonstrated by numerical examples.

In this syllabus, swaps would be the obvious instrument for the discussion of managing interest rate risk (although you may refer to FRAs if you have gained knowledge of this from beyond the subject guide). 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. A very good answer should explain clearly how an interest rate swap is beneficial to both counterparties in reducing borrowing costs and managing interest rate risk. 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 2015

FN2029 Financial intermediation – Zone B

Important note

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Information about the subject guide and the Essential reading references

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Comments on specific questions

Question 1

Discuss the primary functions of financial intermediaries and critically evaluate the theories of information sharing coalitions and delegated monitoring that resolve the problems of information asymmetry in direct financing.

Reading for this question

Please refer to Chapter 1 of the 2011 subject guide (pp.9–16). Within these pages, there are 'Activity' boxes that direct you to study appropriate sections from Matthews and Thompson (2008), Saunders and Cornett (2008), Bhattacharya and Thakor (1993) and Diamond (1996). You may also benefit from reading relevant chapters in Freixas and Rochet (1998). Chapter 1 of the subject guide covers four reasons for the dominance of intermediation over direct financing (see the bottom of p.11). Two of these reasons are covered in this question.

Approaching the question

This question comprises two elements; with the latter requiring a more detailed and technical discussion. The first part of your answer (see

pp.10–11 of the subject guide including the 'Activity Box') should focus on the main activities of financial institutions in their provision of brokerage and asset transformation functions. In brokerage, financial institutions match surplus and deficit units, and thus reduce transaction costs and information costs. In asset transformation, they issue claims that are far more attractive to savers than the claims issued directly by corporations. The asset transformation function includes an asset diversification function and an asset evaluation function. The most important contribution of intermediaries is a steady flow of funds from surplus to deficit units.

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

You should use the material from p.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 pp.13–14 of the subject guide). Your answer should specifically mention banks' commitment to long-term relationships with customers, and the notion of banks as information sharing coalitions (see Matthews and Thompson, 2008 and Leland and Pyle, 1997, which are referred to in the subject guide).

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 pp.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, 1996) 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 and offer critical evaluation of the theory, which can be found in the recommended readings.

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' in Chapter 1 of the subject guide.

Question 2

Use the Diamond and Dybvig (1983) model to explain the liquidity insurance theory for the preference for financial intermediation over direct financing. Discuss the implications of the equilibrium outcomes of the model.

Reading for this question

Please refer to Chapters 1 and 2 of the subject guide (p.13 and pp.18–22). In addition to Diamond and Dybvig (1983), 'Activity' boxes within these pages highlight suggested readings from Matthews and Thompson (2008), Saunders and Cornett (2008) and Bhattacharya and Thakor (1993). You would also benefit greatly from reading Chapter 2 (pp.20–23) of Freixas and Rochet (1998).

Approaching the question

The answer requires careful reading of Chapters 1 and 2 of the subject guide (supplemented by Diamond and Dybvig, 1983; Freixas and Rochet, 1998, Ch. 2; Matthews and Thompson, 2008, Ch. 12; and Saunders and Cornett, 2008) in order to demonstrate a clear understanding of the term 'liquidity insurance'. Note: 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. In terms of the game theory model, there are two equilibria – 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 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 the nature of the deposit contract. The implication of the possibility of a bank run is that it provides a rationale for 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. Diamond and Dybvig (1983) argue that deposit insurance could be introduced to prevent bank runs, and there are many historical examples to support this theory. Better answers will highlight the faults in the provision of deposit insurance (moral hazard in particular) and will present other possible solutions.

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 and critical evaluation of deposit insurance. Generally, there is much scope in this question for you to demonstrate rigorous analysis drawn from readings suggested above.

Question 3

Discuss the main sources of risks in commercial banking and explain the principles of capital adequacy regulation. Explain how market and operational risks are addressed in the Basel capital adequacy accords.

Reading for this question

Please refer to Chapter 2 (pp.19–25) and Chapter 3 of the subject guide. Within these pages, there are 'Activity' boxes which direct you to study appropriate sections from Matthews and Thompson (2008), Saunders and Cornett (2008) and Bessis (2010).

Approaching the question

This question requires analysis of the inherent risks in commercial banking activities and the associated need for capital adequacy regulation. The question relates to the third and fourth learning objectives of Chapter 2 (found on pp.17–18 of the subject guide) and the first learning objective of Chapter 3 (seen on p.35 of the subject guide). You are therefore required to link elements from Chapters 2 and 3 of the guide in tackling the question.

In the first part of your answer, you should address the sources of risk. Drawing from Chapter 3 of the subject guide, you should cover credit risk, interest-rate risk, market risk and operational risk as the 'main' relevant sources. Several other categories of risk could be mentioned, but these four are the types of risk that relate directly to provisions in the Basle capital adequacy regulations. Drawing on pp.19-20 and pp.23–27 of the subject guide, the question requires you to emphasise the rationale and principles of capital adequacy regulation. Central banks and other regulatory agencies have typically utilised two measures of capital adequacy; namely, the gearing ratio and the risk assets ratio. Discussion of the gearing ratio is an essential component of a good answer (see p.23 of the subject guide).

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.

The second part of the answer requires more specific detail about the provisions made for market and operational risks. Under Basel II, market risk exposure was incorporated using an 'add-on', where a bank's exposure to market risk is calculated using either a regulatory model or their own internal model (approved by regulatory audits). Basel II proposed that capital required to cover operational risk could be calculated using three methods: Basic Indicator; Standardised; and Advanced Measurement Approaches. This material is summarised on pp.26–27 of the subject guide, which should be supplemented by readings from Bessis (2010); Saunders and Cornett, (2008); and Matthews and Thompson (2008). An outstanding answer would enhance the discussion by drawing on the recent debate and developments on bank capital in Basel III that include provision for liquidity risk.

Question 4

Discuss the motivations and techniques of Asset and Liability Management.

Reading for this question

Please refer to Chapter 5 of the subject guide. Within this chapter, there are 'Activity' boxes which direct you to study appropriate sections from Saunders and Cornett (2008), Bessis (2010) and Matthews and Thompson (2008). Good answers may also include some discussion of securitisation as a form of asset management, drawing from Chapter 6 of the subject guide (pp.72–78) and the suggested readings cited there.

Approaching the question

This question relates to the learning objectives of Chapter 5 of the subject guide (p.63) and the first learning objective of Chapter 6 (p.71).

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 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 (namely, following the suggested readings from the textbooks).

Question 5

Explain the structures of credit derivative products and discuss the motivations for using such products.

Reading for this question

Please refer to Chapter 6 of the subject guide (especially pp.72, 78–83). Within this chapter, there are 'Activity' boxes which direct you to study appropriate sections from Bessis (2010), Saunders and Cornett (2008) and Neal (1996). These boxes also direct you to several relevant websites.

Approaching the question

This question relates to the final two learning objectives of Chapter 6 (see p. 71 of the subject guide). Please note that the question specifically relates to credit derivatives, not to financial derivatives in general. Your answer should begin by explaining the context of risk transfer (e.g. using the information on p. 72 and Table 6.1 in the subject guide).

The question specifically requires you to explain the structures of products and there are four examples of 'pure' credit derivatives discussed in the subject guide: credit default swap (including indices), total return swap, credit spread call option and credit forward. Discussion of CLOs and CDOs would be acceptable since these would often be included in a wider definition of credit derivatives (see Table 6.1 of the subject guide). A good answer would clearly distinguish between securitisation (used for funding purposes) and credit derivative transactions (typically having hedging or trading motivations).

To achieve the higher range of marks, there would be a need to supplement the material derived from the subject guide with evidence of reading from the textbooks. One example of how to achieve this would be to present payoff diagrams in your answer (e.g. of the type illustrated in Figure 6.3 of the subject guide). The first 'Activity' box on p.83 of the subject guide also directs you to another approach you could use to prepare thoroughly for a question of this type.

Motivations for using credit derivatives are focused on trading, hedging and customising credit risk, which are discussed directly in the subject guide (pp.78–80). A discussion of market participants and market growth would reinforce this section of your answer. An excellent answer would highlight negative aspects of the use of risk transfer instruments which have come to light during the credit crunch. This would be well rewarded if presented with accuracy and conviction. Note that there is a short section in the subject guide which addresses the impact of the credit derivatives market on financial stability (see p.83), which would be relevant to 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 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 (2008), and Bessis (2010).

Approaching this 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 information such as that in Table 6.1 in the subject guide. You are expected to discuss 'other forms of securitisation' discussed on p.77 of the subject guide as well as 'pass-through' securitisation. 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' boxes 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. You should explain clearly how mechanics of securitisation differ between the different forms of securitisation.

A very good answer to this question would provide a thorough and comprehensive analysis of the costs and benefits of securitisation. Many of these are included in Chapter 6 of the subject guide, and further relevant arguments can be found in the recommended reading. Securitisation provides benefits to banks in terms of both 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.

There are important suggested readings on p. 76 of the subject guide and in the 'Activity' box on p.77. Engagement with these readings and activities would greatly enhance your answer.

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. From the question, firstly you should note 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.

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). From past experience, candidates often perceive that this type of question has very clear and straightforward requirements. However, you need to ensure that your 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 (namely, 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' boxes that direct you to study appropriate sections from Saunders and Cornett (2008).

Approaching this 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 thoroughly. 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. You should ensure that you 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 call and put 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 (see 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 you 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 option-based 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:

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

2. 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 and asset risk are a key focus in estimating default probabilities under this approach. Value of, and volatility of, assets are not directly observable. The KMV method offers an alternative method that relies mostly on equity market information instead. 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, 2008, Chapter 11).

Examiners' commentaries 2016

FN2029 Financial intermediation – Zone A

Important note

> This commentary reflects the examination and assessment arrangements for this course in the academic year 2015–16. 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 refer 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.

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.9–16). Within these pages, there are Activity boxes which direct you to study appropriate sections from

> Matthews, K. and J. Thompson *The economics of banking*. (Chichester: Wiley, 2008) 2nd edition [ISBN 9780470519646].
>
> Saunders, A. and M.M. Cornett *Financial institutions management: a risk management approach*. (New York: McGraw Hill, 2008) 6th edition [ISBN 9780071267045 (international edition)].
>
> 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.

Students would benefit greatly from reading Chapter 2 (pp.20–23) of

> Freixas, X. and J-C. Rochet *Microeconomics of banking*. (Cambridge, MA; London: MIT Press, 1997) [ISBN 9780262061933].
>
> Chapter 1 of the subject guide covers four reasons for the dominance of intermediation over direct financing (see bottom of p.11). Two of these reasons are covered in this question (i.e. transaction costs and delegated monitoring).

Approaching this 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 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 other aspect of this question relates to liquidity insurance. For this aspect, it is very important to draw from Diamond, D.W. and P. Dybvig 'Bank runs, deposit insurance and liquidity', *Journal of Political Economy* 91(3) 1983, pp.401−19. 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. 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 explaining 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 and Further reading for Chapter 1.

Question 2

In an important theoretical model, Diamond and Dybvig (1983) show that a bank run can force a bank to default that would not otherwise have defaulted. Use their model to 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 (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 (2008). It is also essential to be familiar with the Diamond and Dybvig (1983) model.

Approaching the question

This question requires linking 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 p.19 of 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. In terms of their game theory model, there are two equilibria. 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 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.

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 main sources of risk in commercial banking, and critically discuss the Value-at-Risk (VaR) approach to risk measurement.

Reading for this question

The relevant reading material can be found in Chapter 3 of the subject guide. The key additional reading is from Bessis (2010), Matthews and Thompson (2008) and Saunders and Cornett (2011). The Activity box on p.45 is also 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.

Approaching the question

This question requires an explanation of the main risks that banks face, and a critical evaluation of the VaR 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 VaR 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 2011 subject guide). A graphical explanation of the concept of VaR 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:

- risk metrics (or the variance/covariance approach)

- historic or back simulation

- 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

Discuss the methods used by banks to model and manage credit risk.

Reading for this question

Please refer to Chapter 4 of the 2011 subject guide. The chapter contains Activity boxes 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 is comprised of 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 and (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 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 students 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 (2008). 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 banks (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 box 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. 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.

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

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), 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 and Saunders and Cornett (2011).

Approaching this 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 that securitisation 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 financial and non-financial sectors. A substantial portion of your answer should be focused towards the motivation, merits and drawbacks of banks' use of these instruments.

Your answer should proceed to consider banks' objectives when engaging in securitisation (see p.73 of the subject guide) and using credit derivatives (see pp.79–80 of the subject guide). For example, securitisation is recognised as an efficient means of redistributing credit risks to other banks or nonbank 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 to adjust 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 which 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 upon 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 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 financial crisis.

Question 7

Do you think that it is important to adjust for risk in bank regulation and bank performance measurement? Explain and justify your answer.

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 boxes 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 this 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 this answer. You should very briefly discuss the main types of risk arising in banking (see 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 box 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 examples, explain the following three hedging techniques: delta hedging, forward hedging, and money market hedging.

Reading for this question

This question relates to Chapter 8 of the 2011 subject guide (pp.93–94 and 96–105). Additional reading would be from Saunders and Cornett (2008).

Approaching this question

The introduction to a good answer would define the motivation for the use of forward and option contracts. It would be appropriate to proceed to explain, using examples, the characteristics of these derivative contracts and to briefly illustrate their payoff structures. Comparisons should be made between long and short positions, and between call and put options. The additional flexibility which is inherent in options versus forward contracts needs to be clearly explained. Much relevant material for this can be found on pp.93–94 of the subject guide.

The core of the essential material for the answer is to be found on pp.102–05 of the subject guide, where delta hedging, forward hedging and money market hedging are discussed.

For delta hedging, a better quality answer will explain its link with option pricing (pp.98– 101) and particularly the sensitivity of the option contract's value to changes in the value of the underlying asset.

In proceeding to the forward and money market hedging examples, your answer must clearly state that the focus is on considering exchange rate risk. To be fully convincing, the examples for these two related hedging techniques must demonstrate the possibility of equivalent outcomes. This occurs in the situation of covered interest parity (see pp.97–98 and 105 of

the subject guide). This parity condition ensures that the money market hedge and forward hedge yield the same outcome, and therefore the money market hedge can be viewed as a synthetic forward contract.

The question clearly states the need to use examples, so including examples is essential for you to achieve a good mark. Also, the quality and accuracy of the examples will be a key influence on the mark to be awarded.

As for all the other questions, the examiners will reward candidates who demonstrate analysis drawn from the textbook and journal readings suggested as Essential and Further reading (from Chapter 8 in this case).

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Examiners' commentaries 2016

FN2029 Financial intermediation – Zone B

Important note

This commentary reflects the examination and assessment arrangements for this course in the academic year 2015–16. 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 refer 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.

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. Within this chapter, there are Activity boxes which direct you to study appropriate sections from Matthews and Thompson (2008), Saunders and Cornett (2008), Bhattacharya and Thakor (1993) 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 (1996) 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 both learning objectives of Chapter 1 of the 2011 subject guide (p.10). 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.

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 (2011 subject guide, p.11):

- transaction costs (Benston, G. and C.W. Smith 'A transaction cost approach to the theory of financial intermediation', *Journal of Finance* 31(2) 1976, pp.215–31)

- liquidity insurance (Diamond and Dybvig, 1983)

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

- 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:

- providing commitment to long-term relationships with customers

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

- 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 in the 2011 subject guide (see p.16).

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, and in particular pp.18–23. Within these pages, 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). It is expected that good answers cite Diamond and Dybvig's (1983) model and discuss its implications.

Approaching the question

This question relates to the learning objectives and material of 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 2007–09 and, more recently, 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 (p.19) – 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: being 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 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 discuss the Value-at-Risk (VaR) approach to risk measurement.

Reading for this question

The relevant reading material can be found in Chapter 3 of the subject guide. The key additional reading is from Bessis (2010), Matthews and Thompson (2008) and Saunders and Cornett (2011). The Activity box on p.45 is also 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.

Approaching the question

This question requires an explanation of the main risks that banks face, and a critical evaluation of the VaR 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 VaR 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 2011 subject guide). A graphical explanation of the concept of VaR 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:

- risk metrics (or the variance/covariance approach)

- historic or back simulation

- 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

Discuss the methods used by banks to model and manage credit risk.

Reading for this question

Please refer to Chapter 4 of the 2011 subject guide. The chapter contains Activity boxes 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 is comprised of 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 and (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 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 students 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 (2008). 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. 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.

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

Question 6

Explain and discuss the purpose and implementation of (i) gap analysis for liquidity risk and interest rate risk, and (ii) credit risk management.

Reading for this question

Please refer to Chapters 4 and 5 of the 2011 subject guide (pp.53–58 and 66–69). Within these pages, the Activity boxes lead you to pursue readings from Bessis (2010), Saunders and Cornett (2008) and Matthews and Thompson (2008).

Approaching this question

This question requires a synthesis of material from Chapters 4 and 5 of the subject guide, under common themes of risk management and balance sheet management.

A useful approach to the introduction would be to define liquidity risk, interest rate risk and credit risk (see Chapter 3 of the subject guide). Your answer should proceed to address the rationale for Asset and Liability Management (ALM) in banks. In doing this, the answer should highlight the relevance of Net Interest Margin (NIM) and net interest income as target variables, with both their level and variability being important elements (see Chapter 5 of the subject guide, pp.64–65).

In addressing part (i), your answer must present detailed consideration of the rationale for liquidity gap analysis and interest rate gap analysis. In discussing liquidity gap analysis, sources of liquidity and maturity mismatching should be addressed. In discussing 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 to you in the suggested readings from the textbooks. The section in Chapter 5 of the subject guide titled 'Issues associated with ALM' is of limited relevance to the question posed here, and this material should not constitute a major portion of the answer. In addressing part (ii), a good answer would begin with a discussion of expected loss. This should commence by stating Equation 4.1 from p.56 of the subject guide. The components of this equation should be explained in detail, i.e. the default risk, exposure risk and recovery risk. In general, candidates on this course have often found it difficult to produce a precise discussion on the latter two elements. The examiners would be pleased if your answer demonstrated evidence of having followed the suggested reading in the first Activity box on p.56 of the subject guide.

Your answer should proceed to discuss contractual mechanisms used by banks to control the credit risks of lending. These include loan diversification, pricing loans according to the riskiness of borrowers, rationing loans for riskier borrowers, requiring varying levels of collateral, and placing restrictive covenants.

The subject guide also explains credit allocation, credit enhancement and loan sales (pp.57–58), and the examiners would certainly reward your answer if it demonstrated evidence of further reading (e.g. from Bessis, 2010 or Saunders and Cornett, 2008) on these issues.

Question 7

Do you think that it is important to adjust for risk in bank regulation and bank performance measurement? Explain and justify your answer.

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' boxes 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 for this answer. Your answer should proceed by very briefly discussing the main types of risk arising in banking (see 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. RAROC, RORAC and EVA) should be explained in detail. The readings in the Activity box 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 92–96. Within these pages, you are guided to pursue readings from Saunders and Cornett (2011) and Bessis (2010).

Approaching this 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 boxes.

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 which 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 box 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 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 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 box on p.83. The basic characteristics of swap contracts are discussed on pp.95–96 and 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 box 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..

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

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.

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.

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.