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Introduction

1.   This paper describes alternatives under a valuation approach for the accounting of core demand deposits developed on the basis of common interest rate risk management approaches.

2.   There are no questions to the Board in this paper.

Current accounting convention versus behaviour-based valuation

3.   The following graph illustrates the differences between the current accounting convention and a behaviour-based valuation that reflects the common risk management approach for a portfolio that contains demand deposits.
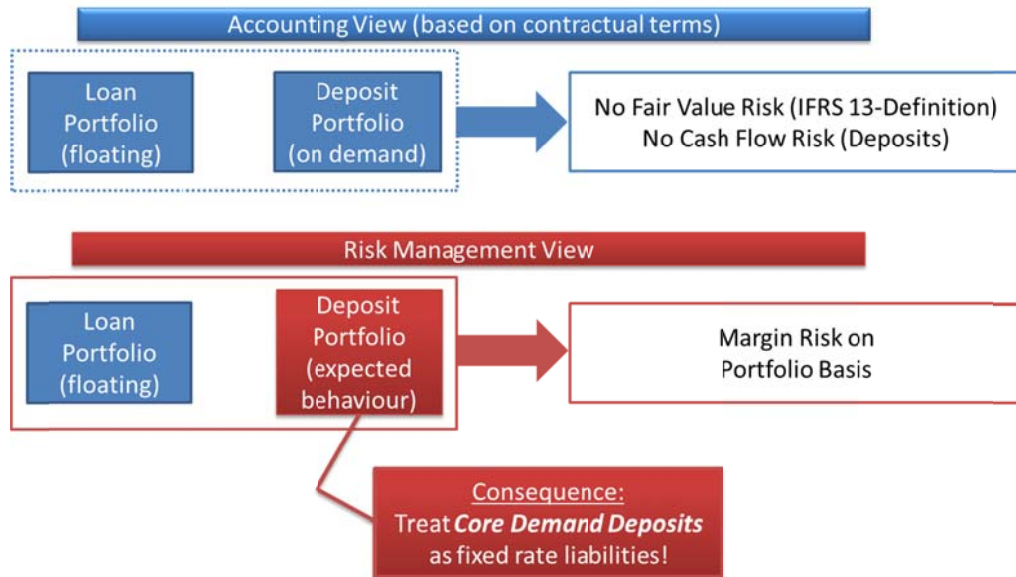
4. The current accounting convention only considers the individual instruments and their contractual terms. Hence for this scenario it is not possible today for hedge accounting to reflect a risk management strategy that views demand deposits as fixed rate positions. It would require the demand deposits to be designated as hedged items:

(a) Designation as part of a fair value hedge is not possible because the contractual maturity (on demand) does not give rise to fair value risk—the fair value (based on the current accounting convention) always matches the balance of the deposit account. Furthermore the fair value hedge designation would require the designation of the deposit portfolio, which includes forecast replacements (ie forecast transactions), which in turn conflicts with the notion of a fair value hedge. A fair value hedge relates to items that are already recognised in the financial statements or that comply with the definition of a firm commitment.

(b) For the designation in a cash flow hedge, volatility in cash flows is required—this is missing for (core) demand deposits.

5.   So the only possibility is to set up a hedging relationship for accounting purposes with the floating rate loans as hedged items.[1]

6.   In addition to their current ineligibility as hedged items, demand deposits are usually subject to the "sub-Libor" issue[2]. This is because the interest rates paid to retail customers (if any) are lower than the benchmark interest rate that is used for pricing purposes and for the management of interest rate risk.

7.   In contrast, risk managers view the demand deposit balance as a risk position within a wider portfolio that contributes to the portfolio's overall product margin. As the general risk management approach is to identify and quantify interest rate risk from repricings on the basis of fixed rate instruments[3] an assessment is required of the extent to which the demand deposit position is expected to be stable in respect of the balance and related interest expense (if any). The identified stable part of the overall deposit balance is referred to as a *core demand deposit*.

8.   If in the example above the demand deposits remain unchanged over the life of the loans, the net interest margin of the portfolio is driven by the floating interest rate of the loans. This *net interest margin* volatility is avoided when the demand deposits are treated as fixed rate instruments and the resulting interest rate risk is managed with hedging instruments. Risk managers treat demand deposits as fixed rate liabilities on the basis of their *expected behaviour* and manage the interest rate risk accordingly. This approach is described in more detail in the following section.

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[1] Entities that have liabilities bearing fixed interest can also use those as hedged items (this is not included in the example in this paper).

[2] This refers to the restriction that a benchmark interest rate used for hedge accounting purposes must be less than the total contractual interest cash flows of the hedged item (see IAS 39.AG99C).

[3] The risk management approach to look at fixed rate instruments rather than floating rate ones when determining the risk position—and the rationale for that—was explained in earlier agenda papers. Please refer to agenda paper 9A of the September 2011 IASB meeting for a comprehensive description of the risk management approach.

## Description of risk management considerations

Introduction to the example

9. The following analysis is based on a portfolio that consists of a loan portfolio of 100 notional amount bearing floating interest rates (benchmark rate) plus a fixed margin of 1%. The loans are funded with non-interest bearing demand deposits of the same notional amount. It is assumed that for the entire term of the loans the deposit balance of 100 remains stable and there is no change in the contractual deposit interest rate. This results in the following:

Development of Interest Rates							
Period	0	1	2	3	4	5	6
Benchmark Rate	3.0%	2.0%	3.0%	4.0%	3.0%	2.0%	3.0%
Loans (floating)	4.0%	3.0%	4.0%	5.0%	4.0%	3.0%	4.0%
Deposits (fixed)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Static approach

10. This section is an introduction into the topic for illustrative purposes. The approach described is less common in practice because of its static nature.

11. The assumed risk management approach is to consider core demand deposits of 60 as stable for three years and to treat them as a fixed rate liability. The "buffer" compared with the current balance of 100 and the simple assumption of only a three year maturity reflects (simplistically) the uncertainty regarding expected behaviour. The bank enters into an interest rate swap (receive fix, pay float, notional amount of 60, term of three years). After three years the assumptions regarding the behaviour of the demand deposits are unchanged. Therefore a new liability with a notional amount of 60 and a three year term is "established". The described approach can be illustrated as follows:
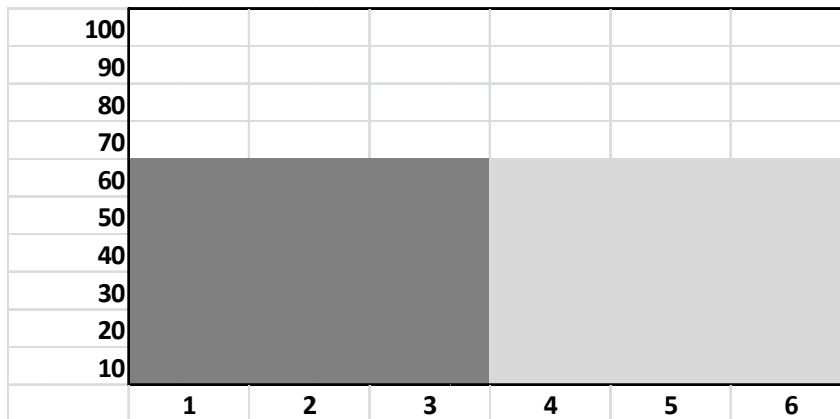
12. The risk management activities lead to the following net interest income for the portfolio (unhedged and hedged):
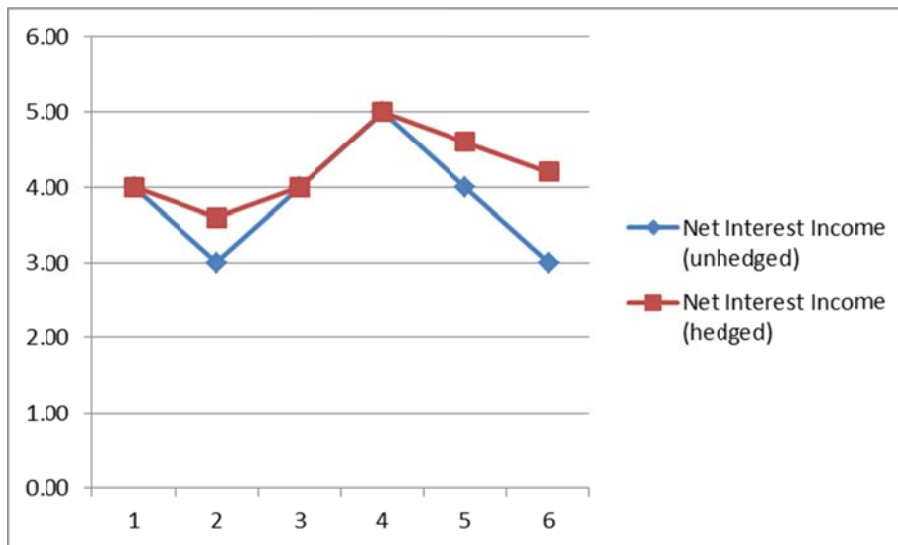
13. The graph shows that because the floating rate loans the unhedged net interest income of the portfolio fluctuates in line with the movement in benchmark interest rates. Treating some of the demand deposits as fixed rate liabilities and addressing the resulting interest rate risk takes away some of the volatility in net interest income. Basically, the bank locks in the interest rate level whenever a new liability is set up for risk management purposes (based on expected behaviour). This example represents a rather static approach and is therefore very uncommon in practice.

Roll-over method

14. An approach used by some institutions is to adjust the maturity of the fixed rate liability representing the core demand deposits on an ongoing basis. In essence this is like a permanent extension of the liability so that its remaining term stays at three years (for as long as the three year assumption is considered valid).

15. This is for example, the approach used by financial institutions that identify the risk position by basically comparing notional amounts by time bucket. With this approach the described core demand deposit position would always be allocated to the 3-year bucket without consideration of the passage of time.

16. Assuming that the maturity of the core demand deposits is extended by one year at the end of each period with concurrent resetting of their terms, the following structure occurs:
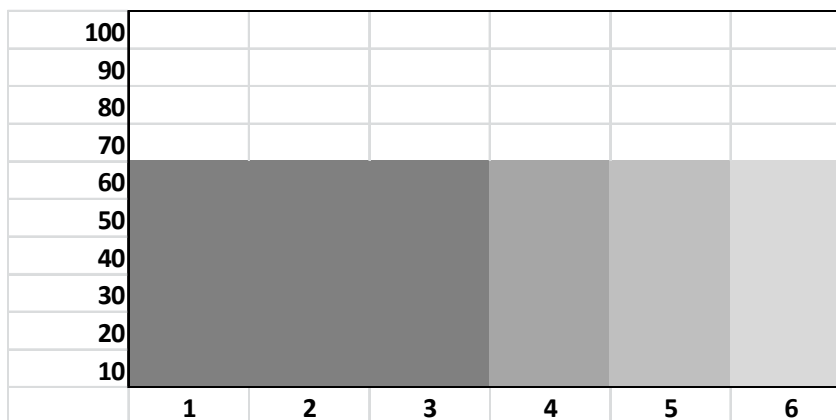
17. The described approach results in the following development of net interest income assuming that risk management addresses the identified interest rate risk (a fixed rate position of 60) in its entirety:
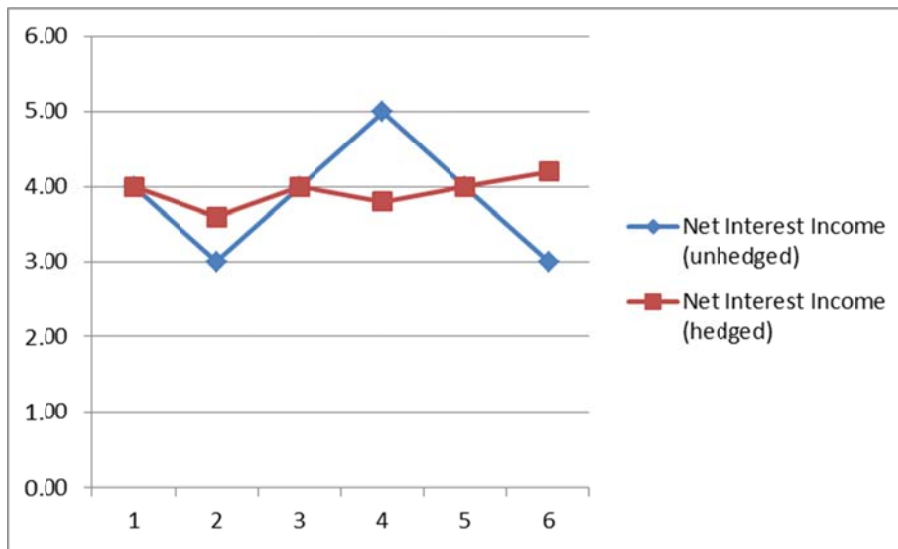
18.   It can be observed that the more dynamic roll-over approach leads to more stable net interest income over time.

Replication portfolio

19.   A replication portfolio is an even more sophisticated approach that splits the core demand deposits into various tranches with different maturities. That approach is also commonly used in practice. For example a core demand deposit position with a notional amount of 120 that is considered stable for 5 years could be split into 60 monthly tranches (5 years times 12 months). Each tranche has the same notional amount of 2 (120/60). As consequence at the end of each month a tranche is treated as maturing and is "re-set" for risk management purposes based on then current interest rates.

20.   The advantage of this ongoing adjustment mechanism is that adjustments to the assumptions can be reflected on a constant basis without resetting the entire model valuation. Hence an entity can decide on a monthly basis whether notional amounts of new tranches should be increased or decreased or whether the maturity should be adjusted to reflect changes in the entity's deposit basis.

21.   Another consequence is that the underlying interest rate of the replication portfolio always represents the *average* of the last 60 months. This averaging effect means changes in market rates are considered on a decelerated basis. This simulates the pricing behaviour of some demand deposits for which interest rates

are adjusted when market rates change on a sustained basis (eg savings accounts in some jurisdictions).

22. The following (simplified) example illustrates the basic principle:
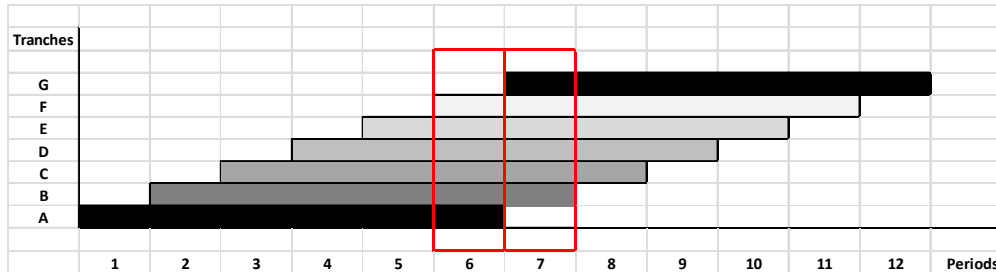
23. A portfolio of core demand deposits is split into tranches that are equal in respect of their notional amount and term (here 6 periods each). However, they have different starting points and therefore different assigned fixed interest rates. Whenever a tranche matures it is replaced by a new one, ie at the end of period 6 tranche A is replaced by tranche G. Hence the average interest rate of the replication portfolio in period 6 is based on the rates of tranches A to F while for period 7 the relevant tranches are B to G.

24. For the valuation example used in this paper the core demand deposits of 60 are split into 6 tranches of 10 each with different maturities. At the end of each period the maturing tranche is assumed to be reinvested for another term of 6 periods at the then current market rate (benchmark rate). This leads to the following portfolio structure over time:
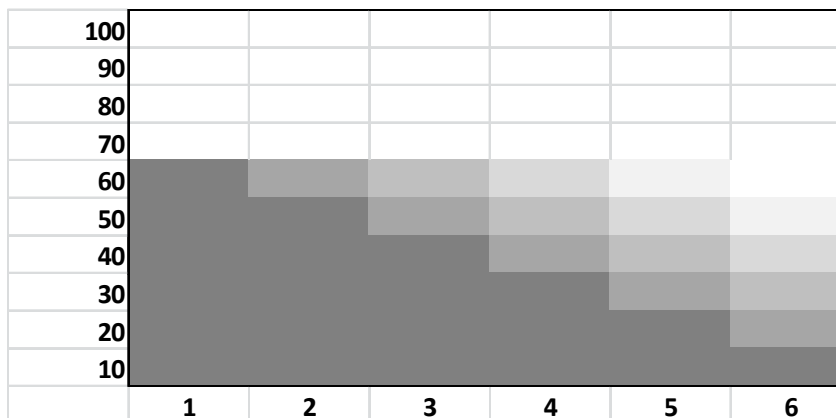
25. Hedging the resulting interest rate risk leads to the following development of net interest income, which again represents a stabilisation in comparison to the unhedged scenario:
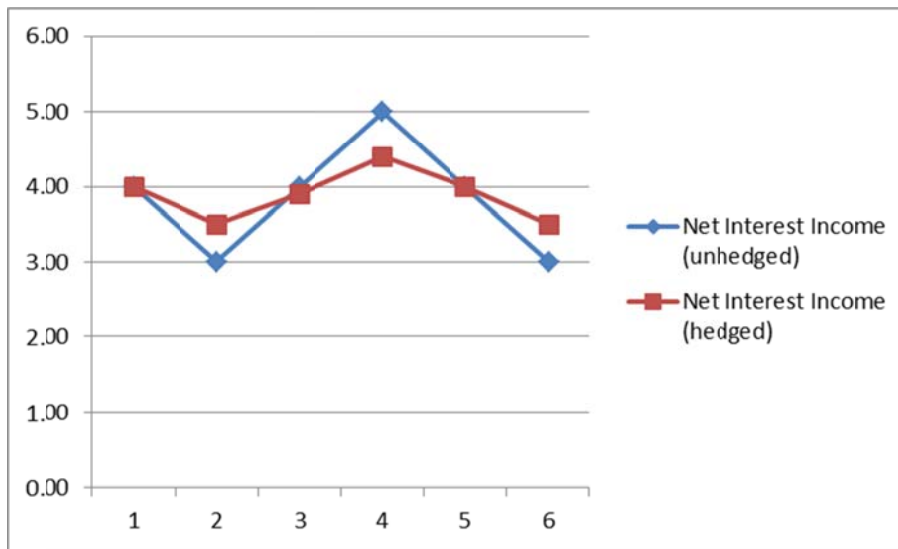
Determination of core demand deposits

26. Determining the subset of demand deposits that are considered the core depends on various factors that also affect the parameters used to value the resulting risk position. In addition to those factors, risk management decisions and targets also affect the valuation. This can be summarised as follows:
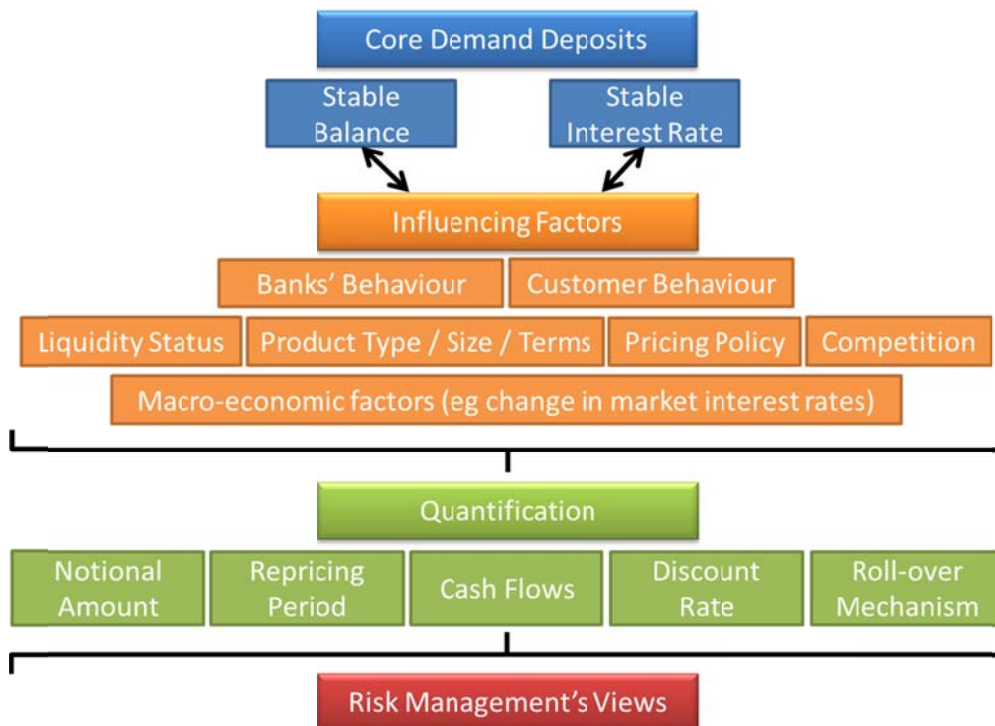
Definition of core demand deposits

27. Core demand deposits represent a stable part of the overall deposit balance. As the risk management target is to manage interest rate risk, stability is limited not only to the existence of a minimum balance but also to the contractual interest rate of the deposits. Therefore the identification of core demand deposits is linked to two questions:

    (a) What is the minimum balance of demand deposits that is expected to be stable for a forecast future period (liquidity risk)?

    (b) For how long is this balance expected to have unchanged contractual interest rates (interest rate risk in the meaning of repricing risk)?

28. While the first question mainly influences the notional amount of the core demand deposits, the second one determines their term. However, there are also interdependencies between both that have to be considered.

Influencing factors

29. The demand deposits' balance depends on the behaviour of both the bank and the customer. The bank controls the pricing of the demand deposits or whether a particular product is (still) offered at all. The customer keeps money "invested" as a demand deposit or withdraws it for a different investment opportunity. All of that is dependent on various factors described below.

30. The **liquidity status** of the bank is a foundation for a core demand deposit balance. Doubtful liquidity leads to customers withdrawing money for safer alternatives. This is also the reason why it is often said that the establishment of core demand deposits is linked to the "going concern assumption". In addition to the liquidity status of the bank, customer behaviour is also influenced by the regulatory environment especially the existence of deposit protection for retail accounts, which helps to stabilise the balance.

31. Furthermore there is a link between the **product type** and customer behaviour. Current accounts are usually run by customers to manage ongoing payments. Therefore there is typically a high turnover within the accounts at low and stable interest rates (when interest-bearing at all). This reflects the fact that current

accounts are less an investment decision for customers but rather an "organisational" decision (ie to facilitate the process of managing cash flows). In contrast, savings accounts bear interest rates, have higher average balances and there is less turn-over. This reflects that those accounts result from investment decisions. Therefore, savings account customers react more sensitively to changes in the interest rate environment, which influences the pricing as well.

32. A similar relationship exists between the individual account balance (**product size**) and customer behaviour. On the one hand, the higher the balance the more sensitively customers react to changes in the interest rate environment as moving to another investment could make a significant difference. On the other hand, higher balances are less often transferred than low balances because of their investment nature (ie they are not used as day-to-day liquidity).

33. The **product terms** mainly influence the stability of interest rates. For example, deposits that bear floating interest rates linked to a market index would usually not be considered as core demand deposits because of their floating interest nature. For other accounts like some savings accounts interest rates are adjusted for changes in the market environment. However, those adjustments do not occur immediately with the market changes but are rather decelerated—ie only sustained changes in the level of market interest rates lead to an adjustment of the savings interest rates. Furthermore some accounts (although on demand) have termination clauses addressing the withdrawal of balances above a particular amount within a pre-defined period. Those withdrawals might be prohibited or trigger a penalty (loss of interest income for the customer) which has a stabilising effect on the overall balance.

34. The **pricing policy** of the bank also has a significant influence on the stability of interest rates and balances. This is linked to the question of the circumstances (factors and scenarios) when a bank would adjust the pricing for its products or even cease to offer a product. The assessment of those future scenarios influences the expected repricing for demand deposits.

35. Pricing considerations sometimes lead to a conflict between the two elements of core demand deposits—stable balance and stable interest rate. This can be illustrated with the so-called "hot money" issue. It describes situations where

banks offer extraordinarily high interest rates (also called "teaser rates") for demand deposits limited to new customers for a pre-defined period of time (eg one year). This is usually done to increase the deposit balance for liquidity reasons. However, customers attracted to those offers are usually sensitive to interest rates. Therefore when the period for the special rate ends many of those will move on to another offer. Hence, those balances cannot be considered stable for more than the period the special rate is offered.

36. All factors described so far considered the relationship between a bank and its customer. In addition the general market **competition** has to be considered. In markets where banks generally adjust the terms of their products frequently in response to changes in the interest rate environment and customers are inclined to switch between products and banks, the generation of core demand deposits is limited because of the implicit repricing risk.

37. On a general level all of the factors described are influenced by the general **macro-economic environment**. This includes the general interest rate level (high interest rates trigger increased rates, low interest rates might lead to the disappearance of products). It also influences the development and availability of alternative investments for customers (like shares or real estate) influencing their "stickiness" to deposits. Finally, the general propensity to save a portion of income affects demand deposit balances, especially of savings accounts. This differs jurisdiction by jurisdiction and also depends on the general economic situation (like levels of unemployment rates).

Quantification

38. The analysis of the influencing factors in the previous section identified the key features of core demand deposits in order to determine the parameters. As for many other financial instruments, those are:

    (a)   a notional amount;

    (b)   a maturity (repricing assumption); and

    (c)   a benchmark interest rate:

         (i)   to determine ongoing cash flows; and

      (ii)   to determine the discount rate for the present value calculation.

39. For simplification some risk management approaches just determine the notional amount and the expected repricing period of core demand deposits. This corresponds with approaches that in general identify the net risk position on the basis of notional amounts and time buckets.

40. In addition, a roll-over mechanism has to be determined to consider that tranches periodically mature when assumptions regarding the repricing periods are unchanged (as illustrated earlier in this paper). The setting of this mechanism (frequency, replication portfolio, benchmark rates) affects the quantification of the value of core demand deposits as well.

Risk management's views

41. Finally the process of determining demand deposits that are considered the core and their quantification is also driven by general risk management targets and approaches. For example, there are differences in the level of accuracy (as described above) or the particular interest rate risk that is managed.

42. Furthermore risk management's expectations might affect the parameters set for core demand deposits. For example, in a low interest rate environment a financial institution might have the assumption that mid-term interest rates increase again. Therefore choosing a rather low nominal amount for the core demand deposit balance would be beneficial.

Valuation for accounting purposes

43. Paragraph 18 of agenda paper 4A of the December 2011 IASB meeting described four alternatives for the measurement of the risk position or portfolio being measured. Beside full fair value measurement there are three alternatives that calculate a value that refers to interest rate risk only.

44. The appendix to this paper illustrates the valuation alternatives that are limited to interest rate risk (alternatives 2 to 4). Although the three alternatives lead to different results because of the implicit interest rate risk definition, that does not

necessarily mean the alternatives have to be narrowed down for accounting purposes. The valuation differences are relatively small in comparison to the entire valuation, which is mainly driven by the benchmark interest rate.

45.   However, from a practical perspective, alternative 2 can be considered the most relevant. It mirrors the way interest rate risk associated with core demand deposits is usually quantified. Also, the scope of interest rate risk implicit in this approach corresponds to the actual business activities—protecting the product margin against benchmark interest rate related movements and using the margin when it is earned to cover other expenses or for distribution.

Changes to the valuation approach

46.   So far, this paper has described the valuation of core demand deposits based on pre-determined mechanisms and settings. However, the factors influencing the valuation as well as risk management's targets might change over time requiring an adjustment to the valuation parameters and approaches. The potential changes, their triggers and impacts can be summarised as follows:
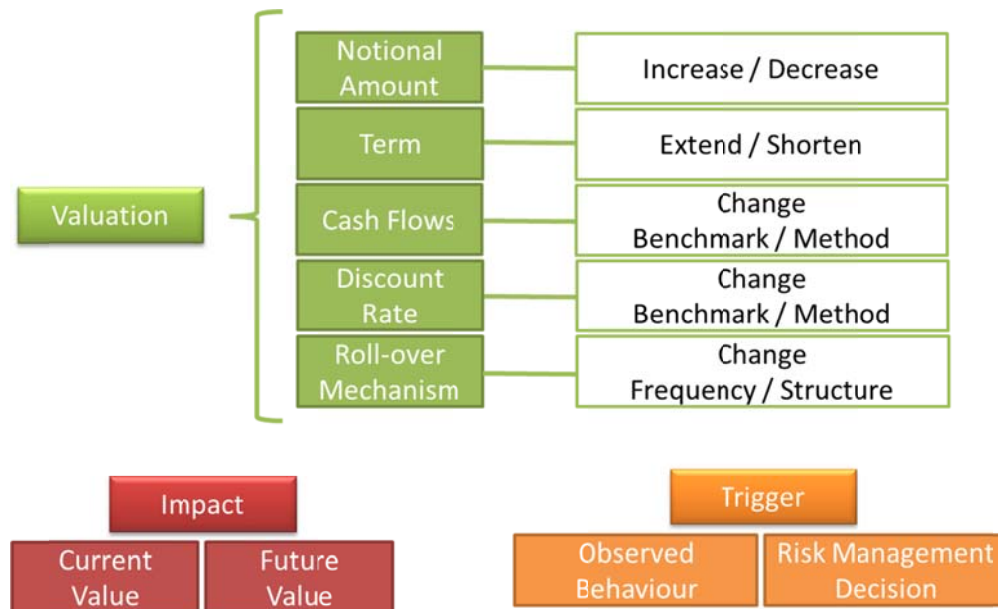
Impact of changes

47. Changes to the valuation parameters can either affect only the future value or might also affect the current valuation.

48. Any changes that are only applied to new tranches (in the course of the roll-over mechanism) affect the future value of the core demand deposits but not its current valuation. These changes would be the decision to extend the term (and therefore introduce additional tranches) or to increase the notional amount (for new tranches).

49. For the example used in this paper a new tranche could have a notional amount of say 15 or 8 rather than the previous 10 that matured when a higher or lower core demand deposit balance is expected. Similarly, two new tranches might be used as a replacement, one covering 6 periods (as the "matured" one) and one covering 7 periods to reflect an adjusted assumption regarding repricing behaviour. Finally, new tranches could be priced on the basis of a new benchmark interest rate that is assumed to better reflect the managed interest rate risk.

50. Although there are no immediate consequences on the valuation, it is important to know about significant changes in the approach for comparability with the treatment of core demand deposits in previous periods.

51. However, changes can also affect the existing value. For example, decreasing the notional amount or shortening the term immediately affects the valuation model. The impact is then similar to a prepayment. Also the re-consideration of the benchmark interest rate used to set the cash flows or the discount rate can affect the entire current valuation (ie a change of the valuation approach).

52. Carrying over such valuations of core demand deposits into accounting means that changes affecting the current valuation have an immediate effect on profit or loss when following the general principles of the net portfolio valuation model. (This is the case for any valuation model where changes in values are recognised in profit or loss). Alternatively, one might consider prohibiting immediate valuation impacts resulting from some changes, depending on the trigger for the change. For example, the one-time effect on the valuation could be required to be amortised to

avoid an immediate effect on profit or loss. Alternatively, judgemental areas could be banned from being applied to the valuations used for accounting purposes.[4]

Trigger for changes

53. One can distinguish between changes that arise from observed behaviour (external factor) and mere risk management decisions (internal factor).

54. Changes that are triggered by observed behaviour would include, for example, the reduction of the core demand deposit position in response to a strong decline in the actual deposit balance. Also the change of valuation parameters can be driven by general market developments. For example, the financial crisis lead to some financial institutions reconsidering the most appropriate benchmark rates (eg considering rates derived from overnight interest rate indexes).

55. But changes can also be triggered by mere risk management decisions. For example, in a low interest rate environment a financial institution might decide to lower the level of core demand deposits as a mid-term increase of interest rates is expected. This would lead to an immediate release of the associated valuation adjustment resulting in a gain or loss (more likely a gain given the low interest rates). For accounting purposes one way of addressing the gain could be to require it to be recognised but also to require disclosure explaining the impact and its rationale. Alternatively, an immediate impact on profit or loss could be prohibited (similar to some day 1-gains) by introducing a separate amortisation for those. This would reflect the fact that usually changes in mere risk management objectives or strategies do not immediately affect profit or loss (see for example the discontinuation of a hedging relationship or the reclassification of financial instruments in accordance with IFRS 9 *Financial Instruments*).

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[4] Please see agenda paper 6A of this series for a more detailed description of alternatives regarding the treatment of changes to the valuation of the risk position.

Presentation and disclosures

Presentation

56.   Following the general principles of IFRS 9 hedging instruments are accounted for at fair value through profit or loss and presented as financial assets or financial liabilities in the statement of financial position.

57.   Hedged core demand deposits (that are currently accounted for at their notional amount as a liability), could be treated consistently with the hedging instruments by revaluing them for the hedged risk. For the presentation of the valuation of the core demand deposits in the statement of financial position two general alternatives can be considered:

(a)   Adjustment of the carrying value of the underlying deposit balance (similar to a fair value hedge adjustment);

(b)   Presentation in other comprehensive income or in a separate balance sheet position outside equity.

58.   The presentation as an adjustment to the balance sheet position corresponds with a separate valuation approach for the entire macro hedging position. Therefore the statement of financial position would provide information about the items on the balance sheet that are part of the cumulative risk position. It also corresponds with similar accounting approaches (like hedge accounting or general fair value measurement) where the valuation impacts are presented as an adjustment to the related items.

59.   A potential disadvantage could be that the allocation of the valuation adjustment to individual items within the risk position might not be considered consistent with the risk management view. In general, risk management considers the risk position as a whole and the source of the risk is less relevant. However, the entire process within an entity should allow the risk position to be linked to its underlying sources. This might even be contemplated as a pre-condition for the acceptance for accounting purposes. For financial institutions applying fair value hedge accounting in accordance with IAS 39 or applying the fair value option for hedged items this would not represent a new requirement.

60. Presentation within a separate balance sheet item for the entire risk position might be considered to reflect the fact that risk management addresses one comprehensive risk position rather than individual sources. However, to achieve adequate transparency a disclosure of the sources contributing to this balance sheet item would arguably still be desirable (including its quantification).

61. Regarding the location of the item itself (accumulated) other comprehensive income has the advantage that an existing accounting concept could be used. Creating a separate balance sheet item (like deferred income) would introduce a new accounting concept with doubtful benefit in respect of financial statement information.

Disclosures

Qualitative disclosures

62. The qualitative disclosures that accompany a valuation approach for core demand deposits should include an explanation of the products (and their terms), the input parameters for the determination of the core demand deposits and their valuation and the rationale for the selections made. There should also be an explanation of any changes from prior periods and the reasons for those changes.

Quantitative disclosures

63. The major part of the quantitative disclosures should be to explain the development of the valuation over the period. This can be broken down by events influencing the valuation (see the appendix of agenda paper 6A for a potential format).

64. In addition, the disclosure of the total balance of deposits, the amount of core demand deposits derived from that and the respective valuation adjustment provides insights about the extent to which the approach is used and helps in understanding whether changes in the valuation adjustment are driven by valuation effects that solely reflect pricing (including discounting) or also result from a different underlying volume.

Conclusion

65. The analysis in this paper shows that risk management approaches regarding the interest rate risk management of core demand deposits can be used in a macro hedging model that is based on a valuation approach.

66. Doing so means that different approaches for the modelling of interest rate risk are applied and that they are based on risk management decisions regarding the input parameters and their changes. Therefore the accounting model has to be able to accommodate common risk management approaches. This would provide transparency regarding the actual business activities as well as enhance practicability by using risk management data.

67. In addition, the level of management judgement involved requires meaningful disclosures that provide a sufficient level of transparency regarding input parameters, their changes and the reasons for those decisions. This is not limited to narrative descriptions but also encompasses quantitative disclosures to facilitate the assessment of the information for users of the financial statements.

Appendix:

Illustration of the three valuation alternatives referring to interest rate risk

A1.   This appendix illustrates the valuation alternatives that are limited to interest rate risk (alternatives 2 to 4 listed below) rather than a full fair value measurement. The calculation of all examples is based on the replication portfolio mechanism that was explained earlier in this paper. It is assumed that the swap transactions entered into to hedge the resulting interest rate risk mirror the cash flows of the replication portfolio "perfectly"[5]. At the end of each period a new tranche of the replication portfolio is introduced, which means a new offsetting interest rate swap is entered into.

A2.   The general valuation alternatives as introduced with agenda paper 4A of the December 2011 IASB meeting are:

   (a)   **Alternative 1** is a full fair value measurement. Following the definition in IFRS 13 and calculating the fair value on the basis of individual deposit or customer accounts leads to a fair value identical to or close to the notional amount. This does not reflect the risk management view where demand deposits are considered on a portfolio basis taking into account similar criteria to the risk management approach, ie stickiness of the balance, interest expense, interest income that a bank could earn from investing the transfer price (benchmark rate), expenses for servicing the demand deposits as well as the consideration of a profit margin and a spread for the uncertainty of the timing of the cash flows.

   (b)   **Alternative 2** mirrors the common risk management approach so treats core demand deposits like fixed rate liabilities. Therefore the measurement is based on the present value of a modelled liability

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[5] The example is designed in a way that the cash flow pattern of the hedging instruments always matches the cash flow pattern of the replication portfolio. Hence, each new tranche of the replication portfolio is covered by a swap with matching conditions. In practice, the selection of hedging instruments is actually dependent on the overall risk management approach and might be based on duration calculation or the sensitivity of interest income or present values. Dependent on the approach taken valuation differences might occur when the net valuation approach is applied.

whose interest cash flows and the discount rate are based on a benchmark interest rate.[6]

(c)   **Alternative 3** is a present value calculation based on the contractual cash flows of the core demand deposits discounted at the current benchmark rate. The difference between the cash flows and the discount rate represents the product margin of the deposits. It is considered as an adjustment (deduction) to the discount rate. This calculation implicitly considers the interest rate risk on the product margin under the assumption that the earned margin is accumulated (ie reinvested at the original rate) over time.

(d)   **Alternative 4** is like alternative three but without the described adjustment of the discount rate. As a consequence, at the beginning the present value calculation leads to a value different from the notional amount of the deposits (day 1 gain). This difference represents the present value of the future product margin earned on the basis of the modelling assumptions. In order to avoid a day 1 gain this difference is amortised over time as an adjustment to the ongoing valuation. This approach leads to the narrowest definition of interest rate risk as it does not take into account any interest rate risk associated with the product margin cash flows.

Alternative 2

A3.   On the basis of the described risk management approach underlying this example the valuation of the core demand deposits and the interest rate swaps matched exactly (no net valuation impact). The remaining volatility in interest income simply reflects that only a portion of the demand deposits were subject to risk management. This leads to the following overall development of the income statement:

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[6] This approach covers the interest rate risk associated with the product margin under the assumption that the product margin does not assume reinvestment at the original rate.

Development of Income Statement	1	2	3	4	5	6
Interest Revenue	4.000	3.000	4.000	5.000	4.000	3.000
Interest Expense	0.000	0.000	0.000	0.000	0.000	0.000
Swap (Net Interest Income)	0.000	0.500	-0.100	-0.600	0.000	0.500
Net Interest Income	4.000	3.500	3.900	4.400	4.000	3.500
Valuation Adjustment Loans	0.000	0.000	0.000	0.000	0.000	0.000
Valuation Adjustment Deposits	-1.433	1.891	1.275	-1.909	-1.444	1.892
Fair Value clean Swaps	1.433	-1.891	-1.275	1.909	1.444	-1.892
Net Valuation	0.000	0.000	0.000	0.000	0.000	0.000
Other Expenses	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Profit or Loss	**3.000**	**2.500**	**2.900**	**3.400**	**3.000**	**2.500**
NET CASH FLOWS	3.000	2.500	2.900	3.400	3.000	2.500

Alternative 3

A4.   This alternative leads to an ongoing net valuation impact, ie the change in valuation of the core demand deposits is always higher than that of the interest rate swaps. This is a result from the described implicit assumption of this valuation approach that interest cash flows are reinvested and accumulated over time. In other words, it assumes a permanent "under-hedge" scenario[7].

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[7] "Under-hedge" scenario in this context means that although the cash flow pattern used for the core demand deposits and the hedging instruments match the change in the valuation of the hedged items is always higher than that of the hedging instruments. This indicates that the entire risk is not hedged (the risk is under-hedged). This corresponds with the wider definition of risk implicit in this valuation alternative.

Development of Income Statement	1	2	3	4	5	6
Interest Revenue	4.000	3.000	4.000	5.000	4.000	3.000
Interest Expense	0.000	0.000	0.000	0.000	0.000	0.000
Swap (Net Interest Income)	0.000	0.500	-0.100	-0.600	0.000	0.500
Net Interest Income	4.000	3.500	3.900	4.400	4.000	3.500
Valuation Adjustment Loans	0.000	0.000	0.000	0.000	0.000	0.000
Valuation Adjustment Deposits	-1.536	2.021	1.352	-2.058	-1.543	2.042
Fair Value clean Swaps	1.433	-1.891	-1.275	1.909	1.444	-1.892
Net Valuation	-0.103	0.130	0.076	-0.150	-0.099	0.151
Other Expenses	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Profit or Loss	**2.897**	**2.630**	**2.976**	**3.250**	**2.901**	**2.651**
NET CASH FLOWS	3.000	2.500	2.900	3.400	3.000	2.500

Alternative 4

A5.   For the calculation of this example the valuation of the deposits includes the ongoing valuation of the replication portfolio and the amortisation of the day 1 gains that results from the mismatch between the cash flows and the discount rate.[8]

A6.   It can be observed that changes to the valuation of the deposits are always lower than those for the interest rate swaps. This is because this approach ignores the

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[8] The amortisation is calculated on the basis of the effective interest method whereby the effective interest rate is set for each tranche individually (ie benchmark rate at the date when the tranche was established). This is the most complex of the alternatives from a calculation perspective (and hence operationally).

interest rate risk from the cash flows that are associated with the product margin. It therefore indicates an "over-hedge" situation[9].

Development of Income Statement						
	1	**2**	**3**	**4**	**5**	**6**
Interest Revenue	4.000	3.000	4.000	5.000	4.000	3.000
Interest Expense	0.000	0.000	0.000	0.000	0.000	0.000
Swap (Net Interest Income)	0.000	0.500	-0.100	-0.600	0.000	0.500
Net Interest Income	4.000	3.500	3.900	4.400	4.000	3.500
Valuation Adjustment Loans	0.000	0.000	0.000	0.000	0.000	0.000
Valuation Adjustment Deposits	-1.338	1.769	1.201	-1.767	-1.354	1.754
Fair Value clean Swaps	1.433	-1.891	-1.275	1.909	1.444	-1.892
Net Valuation	0.095	-0.122	-0.074	0.141	0.091	-0.138
Other Expenses	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Profit or Loss	**3.095**	**2.378**	**2.826**	**3.541**	**3.091**	**2.362**
NET CASH FLOWS	3.000	2.500	2.900	3.400	3.000	2.500

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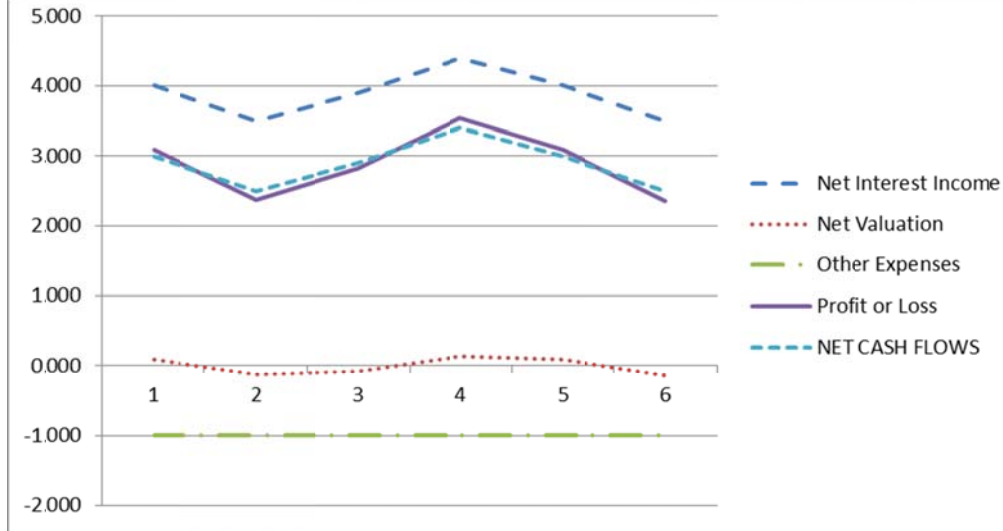
[9] "Over-hedge" scenario in this context is the opposite effect as described in footnote 5 of this paper for the under-hedge scenario.

Detailed calculation underlying the valuation alternatives

Alternative 2

Period 0

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	1.80	1.50	1.20	0.90	0.60	0.30	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Spread (fix)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Discount Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Present Value	11.456	10.840	10.250	9.685	9.144	8.626	60.000
Hedge Adjustment	1.456	0.840	0.250	-0.315	-0.856	-1.374	0.000

Period 1

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	1.70	1.40	1.10	0.80	0.50	0.20	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	
Spread (fix)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Discount Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	
Present Value	11.471	10.957	10.460	9.978	9.510	9.057	61.433
Hedge Adjustment	1.471	0.957	0.460	-0.022	-0.490	-0.943	1.433
Profit or Loss	0.014	0.117	0.210	0.293	0.367	0.431	1.433

Period 2

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	1.70	1.40	1.10	0.80	0.50	0.30	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Spread (fix)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Discount Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Present Value	11.359	10.746	10.158	9.596	9.057	8.626	59.542
Hedge Adjustment	1.359	0.746	0.158	-0.404	-0.943	-1.374	-0.458
Profit or Loss	1.345	0.628	-0.052	-0.697	-1.309	-1.805	-1.891

Alternative 3

Period 0

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	0	0	0	0	0	0	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Spread (fix)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Discount Rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Present Value	10.000	10.000	10.000	10.000	10.000	10.000	60.000
Hedge Adjustment	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Period 1

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	0	0	0	0	0	0	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	
Spread (fix)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Discount Rate	-1.00%	-1.00%	-1.00%	-1.00%	-1.00%	-1.00%	
Present Value	10.101	10.203	10.306	10.410	10.515	10.000	61.536
Hedge Adjustment	0.101	0.203	0.306	0.410	0.515	0.000	1.536
Profit or Loss	0.101	0.203	0.306	0.410	0.515	0.000	1.536

Period 2

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	0	0	0	0	0	0	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Spread (fix)	3.00%	3.00%	3.00%	3.00%	2.00%	3.00%	
Discount Rate	0.00%	0.00%	0.00%	0.00%	1.00%	0.00%	
Present Value	10.000	10.000	10.000	10.000	9.515	10.000	59.515
Hedge Adjustment	0.000	0.000	0.000	0.000	-0.485	0.000	-0.485
Profit or Loss	-0.101	-0.203	-0.306	-0.410	-1.001	0.000	-2.021

Alternative 4

Period 0

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	0	0	0	0	0	0	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Effective Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Amortised Cost	9.709	9.426	9.151	8.885	8.626	8.375	54.172
Present Value	9.709	9.426	9.151	8.885	8.626	8.375	54.172
Valuation Adjustment	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Period 1

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	0	0	0	0	0	0	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	
Effective Rate	3.00%	3.00%	3.00%	3.00%	3.00%	2.00%	
Amortised Cost	9.709	9.426	9.151	8.885	8.626	8.880	54.677
Present Value	9.804	9.612	9.423	9.238	9.057	8.880	56.014
Valuation Adjustment	0.095	0.186	0.272	0.354	0.431	0.000	1.338
Profit or Loss	0.095	0.186	0.272	0.354	0.431	0.000	1.338

Period 2

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	0	0	0	0	0	0	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Effective Rate	3.00%	3.00%	3.00%	3.00%	2.00%	3.00%	
Amortised Cost	9.709	9.426	9.151	8.885	8.626	8.375	54.172
Present Value	9.709	9.426	9.151	8.885	9.057	8.375	54.172
Valuation Adjustment	0.000	0.000	0.000	0.000	-0.431	0.000	-0.431
Profit or Loss	-0.095	-0.186	-0.272	-0.354	-0.862	0.000	-1.769

Alternative 2

Period 3

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	1.80	1.50	1.20	0.90	0.70	0.40	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	
Spread (fix)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Discount Rate	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	
Present Value	11.346	10.632	9.957	9.317	8.795	8.219	58.267
Hedge Adjustment	1.346	0.632	-0.043	-0.683	-1.205	-1.781	-1.733
Profit or Loss	-0.013	-0.113	-0.201	-0.278	-0.263	-0.407	-1.275

Period 4

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	1.80	1.50	1.20	1.00	0.70	0.30	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Spread (fix)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Discount Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Present Value	11.456	10.840	10.250	9.773	9.230	8.626	60.175
Hedge Adjustment	1.456	0.840	0.250	-0.227	-0.770	-1.374	0.175
Profit or Loss	0.110	0.207	0.293	0.456	0.435	0.407	1.909

Period 5

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	1.70	1.40	1.20	0.90	0.50	0.20	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	
Spread (fix)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Discount Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	
Present Value	11.471	10.957	10.554	10.070	9.510	9.057	61.619
Hedge Adjustment	1.471	0.957	0.554	0.070	-0.490	-0.943	1.619
Profit or Loss	0.014	0.117	0.304	0.297	0.280	0.431	1.444

Period 6

							Total
Notional Amount	10	10	10	10	10	10	
Interest Cash Flows	1.70	1.50	1.20	0.80	0.50	0.30	
Term (Periods)	1	2	3	4	5	6	
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Spread (fix)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Discount Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Present Value	11.359	10.840	10.250	9.596	9.057	8.626	59.728
Hedge Adjustment	1.359	0.840	0.250	-0.404	-0.943	-1.374	-0.272
Profit or Loss	-0.111	-0.117	-0.304	-0.474	-0.453	-0.431	-1.892

Alternative 3

Period 3

								Total
Notional Amount	10	10	10	10	10	10	10	
Interest Cash Flows	0.00	0.00	0.00	0.00	0.00	0.00		
Term (Periods)	1	2	3	4	5	6		
Benchmark Rate	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%		
Spread (fix)	3.00%	3.00%	3.00%	2.00%	3.00%	4.00%		
Discount Rate	1.00%	1.00%	2.00%	2.00%	1.00%	0.00%		
Present Value	9.901	9.803	9.706	9.238	9.515	10.000	10.000	58.163
Hedge Adjustment	-0.099	-0.197	-0.294	-0.762	-0.485	0.000	0.000	-1.837
Profit or Loss	-0.099	-0.197	-0.294	-0.762	0.000	0.000	0.000	-1.352

Period 4

								Total
Notional Amount	10	10	10	10	10	10		
Interest Cash Flows	0	0	0	0	0	0		
Term (Periods)	1	2	3	4	5	6		
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%		
Spread (fix)	3.00%	3.00%	2.00%	3.00%	4.00%	3.00%		
Discount Rate	0.00%	0.00%	1.00%	0.00%	-1.00%	0.00%		
Present Value	10.000	10.000	9.706	10.000	10.515	10.000		60.221
Hedge Adjustment	0.000	0.000	-0.294	0.000	0.515	0.000		0.221
Profit or Loss	0.099	0.197	0.000	0.762	1.001	0.000		2.058

Period 5

								Total
Notional Amount	10	10	10	10	10	10		
Interest Cash Flows	0	0	0	0	0	0		
Term (Periods)	1	2	3	4	5	6		
Benchmark Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%		
Spread (fix)	3.00%	2.00%	3.00%	4.00%	3.00%	2.00%		
Discount Rate	-1.00%	0.00%	-1.00%	-2.00%	-1.00%	0.00%		
Present Value	10.101	10.000	10.306	10.842	10.515	10.000		61.764
Hedge Adjustment	0.101	0.000	0.306	0.842	0.515	0.000		1.764
Profit or Loss	0.101	0.000	0.600	0.842	0.000	0.000		1.543

Period 6

								Total
Notional Amount	10	10	10	10	10	10		
Interest Cash Flows	0	0	0	0	0	0		
Term (Periods)	1	2	3	4	5	6		
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%		
Spread (fix)	2.00%	3.00%	4.00%	3.00%	2.00%	3.00%		
Discount Rate	1.00%	0.00%	-1.00%	0.00%	1.00%	0.00%		
Present Value	9.901	10.000	10.306	10.000	9.515	10.000		59.722
Hedge Adjustment	-0.099	0.000	0.306	0.000	-0.485	0.000		-0.278
Profit or Loss	-0.200	0.000	0.306	0.000	-0.842	-1.001		-2.042

Alternative 4

Period 3

								Total
Notional Amount	10	10	10	10	10	10	10	
Interest Cash Flows	0	0	0	0	0	0		
Term (Periods)	1	2	3	4	5	6		
Benchmark Rate	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%		
Effective Rate	3.00%	3.00%	3.00%	2.00%	3.00%	4.00%		
Amortised Cost	9.709	9.426	9.151	9.238	8.548	8.626	7.903	54.054
Present Value	9.615	9.246	8.890	9.151	8.219	7.903		52.421
Valuation Adjustment	-0.093	-0.180	-0.261	-0.261	-0.690	-0.407	0.000	-1.632
Profit or Loss	-0.093	-0.180	-0.180	-0.690	-0.690	0.024	0.000	-1.201

Period 4

								Total
Notional Amount	10	10	10	10	10	10		
Interest Cash Flows	0	0	0	0	0	0		
Term (Periods)	1	2	3	4	5	6		
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%		
Effective Rate	3.00%	3.00%	3.00%	2.00%	4.00%	3.00%		
Amortised Cost	9.709	9.426	9.423	9.151	8.885	8.219	8.375	54.037
Present Value	9.709	9.426	9.151	8.885	8.626	8.375		54.172
Valuation Adjustment	0.000	0.000	-0.272	0.000	0.407	0.000		0.135
Profit or Loss	0.093	0.180	-0.010	0.690	0.814	0.000		1.767

Period 5

								Total
Notional Amount	10	10	10	10	10	10		
Interest Cash Flows	0	0	0	0	0	0		
Term (Periods)	1	2	3	4	5	6		
Benchmark Rate	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%		
Effective Rate	3.00%	2.00%	3.00%	4.00%	3.00%	2.00%		
Amortised Cost	9.709	9.612	9.151	9.423	9.238	9.057	8.880	54.526
Present Value	9.804	9.612	9.423	9.151	9.057	8.880		56.014
Valuation Adjustment	0.095	0.000	0.272	0.000	0.431	0.000		1.489
Profit or Loss	0.095	0.000	0.544	0.690	0.690	0.024		1.354

Period 6

								Total
Notional Amount	10	10	10	10	10	10		
Interest Cash Flows	0	0	0	0	0	0		
Term (Periods)	1	2	3	4	5	6		
Benchmark Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%		
Effective Rate	2.00%	3.00%	4.00%	3.00%	2.00%	3.00%		
Amortised Cost	9.804	9.426	8.890	9.151	8.885	8.626	8.375	54.437
Present Value	9.709	9.426	9.151	8.885	8.626	8.375		54.172
Valuation Adjustment	-0.095	0.000	0.261	0.000	-0.431	0.000		-0.265
Profit or Loss	-0.190	0.000	-0.010	-0.690	-0.862	0.000		-1.754