

STAFF PAPER

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Project	Macro Hedge Accounting		
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CONTACT(S)	Christian Garz	cgarz@ifrs.org	+44 (0)20 7246 6410
	Martin Friedhoff	mfriedhoff@ifrs.org	+44 (0)20 7246 6410

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Introduction

1. The purpose of this paper is to provide a more detailed discussion of alternatives for the valuation of the risk position as briefly introduced with agenda paper 7A of the November IASB meeting. It relates to step 3 (*net interest margin as risk management objective*) as explained there.
2. This paper compares a valuation based on fair value changes attributable to the hedged interest rate risk (step 2) with the risk management objective of stabilising an interest margin (step 3). It is therefore based on the discussion and insights of agenda paper 4A of this series and should be read in conjunction with that.
3. The focus is on the discussion of the appropriate benchmark interest rate to be used for the determination of the hedged interest rate risk. The differences in respect of financial statement information provided with both approaches are highlighted.
4. There are no questions to the Board in this paper.

Fair value versus net margin as hedged risk

5. The considerations in agenda paper 4A of this series assumed that the valuation of the risk position is based on its fair value distinguishing between full fair value and fair value changes that are attributable to the hedged risk. However, the fact

that the risk management focus is on stabilising the calculated interest margin rather than fair values leads to further differences between risk management and accounting:

- (a) The fair value change attributable to interest rate risk might not represent the actual risk management objective, leading to differences. This topic is discussed for the example of sub-Libor transactions.
- (b) The risk management objective affects the determination of the appropriate benchmark interest rate, which could lead to deviations as well.

The sub-Libor issue

6. The following example is used to illustrate the considerations around the sub-Libor topic. It is based on the assumption that a funding transaction (retail deposit) is entered into with a term of 6 years and a contractual rate of 1%. The actual market rate used for the transfer pricing is 3% which leaves the bank with a positive margin of 2% to cover administrative expenses. This leads to the following cash flow pattern (income and expenses)¹:

¹ In this simplified example the cash flows represent the income and expense amounts as no accruals are required (all payments occur at the end of the period).

End of Period	1	2	3	4	5	6
Market Rate (benchmark)	2.5%	2.0%	1.5%	1.0%	0.5%	0.0%
Funding Unit						
Interest Expense	(1.0)	(1.0)	(1.0)	(1.0)	(1.0)	(1.0)
<i>Interest Income (internal)</i>	3.0	3.0	3.0	3.0	3.0	3.0
Net Interest Margin	2.0	2.0	2.0	2.0	2.0	2.0
Administrative Expenses	(2.0)	(2.0)	(2.0)	(2.0)	(2.0)	(2.0)
Profit or Loss	0.0	0.0	0.0	0.0	0.0	0.0
Asset Liability Management (ALM)						
<i>Interest Expense (internal)</i>	(3.0)	(3.0)	(3.0)	(3.0)	(3.0)	(3.0)
Interest Income ²	3.0	2.5	2.0	1.5	1.0	0.5
Swap (receive fix, pay floating) ³	0.0	0.5	1.0	1.5	2.0	2.5
Margin	0.0	0.0	0.0	0.0	0.0	0.0
Consolidated View						
Interest Income	3.0	2.5	2.0	1.5	1.0	0.5
Interest Expense	(1.0)	(1.0)	(1.0)	(1.0)	(1.0)	(1.0)
Net Interest Margin (unhedged)	2.0	1.5	1.0	0.5	0.0	(0.5)
Hedging Effect (on net interest)	0.0	0.5	1.0	1.5	2.0	2.5
Net Interest Margin (hedged)	2.0	2.0	2.0	2.0	2.0	2.0
Administrative Expenses	(2.0)	(2.0)	(2.0)	(2.0)	(2.0)	(2.0)
Profit or Loss	0.0	0.0	0.0	0.0	0.0	0.0

² The interest income is determined by the market rate at the end of the respective preceding period.

³ The net payment is determined by the market rate at the end of the respective preceding period.

7. As already discussed in agenda paper 9B of the 19-22 September IASB meeting the result of a *cash flow view* is that the hedging relationship, although using a benchmark rate higher than the fixed rate, leads to a stabilised net interest margin (in this example a fixed interest margin).⁴
8. The same four alternatives discussed in agenda paper 4A (paragraph 18) apply to the measurement of the hedged liability (the risk position):
9. **Alternative 1:** For the calculation of the full fair value changes it is assumed that the spread deducted from the benchmark interest rate declines from period to period by 0.2 percentage points. Together with the changes in the benchmark interest rate this results in a decline in the overall market rate for the deposits of 0.3 percentage points per period. It is assumed that the market rate (combination of benchmark rate and deposit margin) for these products cannot become negative. This leads to the following overview⁵:

⁴ For a more detailed discussion of the risk management view and objective in connection with the sub-Libor issue please refer to agenda paper 9B of the September 2011 IASB meeting.

⁵ For simplification the fair value measurement of the sub-Libor transactions does not include the option price valuation of the embedded interest rate floor.

End of Period	0	1	2	3	4	5	6
Benchmark Rate	(3.0%)	(2.5%)	(2.0%)	(1.5%)	(1.0%)	(0.5%)	(0.0%)
Deposit Margin	2.0%	1.8%	1.6%	1.4%	1.2%	1.0%	0.8%
Market Rate	(1.0%)	(0.7%)	(0.4%)	(0.1%)	(0.0%)	(0.0%)	(0.0%)
Fair Value	(100.0)	(101.5)	(102.4)	(102.7)	(102.0)	(101.0)	(100.0)
Fair Value Change		(1.5)	(0.9)	(0.3)	0.7	1.0	1.0
Swap Fair Value Change ⁶		2.3	1.5	0.6	(0.4)	(1.5)	(2.5)
Valuation Mismatch		0.8	0.6	0.3	0.3	(0.5)	(1.5)

10. The valuation mismatch results from the effect of changes to the discount rate due to the changing margin element used for the measurement of the liability. As the margin element is not hedged it is not offset by the measurement of the interest rate swap. Starting with the end of period 4 the discount rate used for the fair value calculation is zero, which reflects the fact that a current reference transaction at identical terms would not bear a negative interest. Regarding the usefulness of this information the same considerations apply as discussed for full fair value measurement in agenda paper 4A.
11. **Alternative 2** would be to use the internal transfer price transactions (valuation model) to measure the hedged risk. For this example the cash flow pattern and

⁶ The fair value changes of the swap reflect the development of the benchmark interest rate only.

discount rate of the transfer price transaction and the fixed leg of the swap are identical and therefore no valuation mismatch would result.⁷

12. **Alternative 3** is based on the contractual cash flows discounted with the current benchmark rate adjusted by the original (fixed) margin. This however creates a problem at the end of the third period when the discount rate calculated like that would be a negative 0.5%,⁸ which produces (at least on the face of it) counter-intuitive results.⁹ As an alternative, the discount rate could be set at 0% to reflect the implicit optionality (ie the contractual interest rate of a potential reference transaction at otherwise identical terms would be floored at this level). This is introducing the fair value consideration of alternative 1. In this example the periods 4 to 6 would show the same result as for the fair value measurement in alternative 1.
13. **Alternative 4** is to discount the contractual cash flows with the benchmark interest rate leading to a 'day 1-difference' that could be amortised over the following periods on an effective interest rate basis (as discussed as discussed in agenda paper 4A). This ensures that the full contractual cash flows are used as a basis for the calculation whereby the amortisation of the 'day 1-difference' serves as an adjustment for the pull-to-par effect. This would lead to the following valuation:

⁷ This reflects the fact that the risk management decision to enter into the interest rate swap is based on the model value. Therefore in an otherwise 'perfect' risk management approach the net valuation would be balanced.

⁸ Calculated as the benchmark rate of 1.5% minus the original margin fixed at 2.0%.

⁹ A negative discount rate implies that in the current interest rate environment the same transaction would have to be carried out at a negative interest rate (or extra charge of fees) to achieve the same result which is usually not a realistic scenario. Dependent on the definition of the hedged risk this approach still leads to useful results when taken as a measure for the hedged risk. For the example above, the valuation of the risk position after the third period on the basis of a discount rate of negative 0.5% leads to a present value of 104.5 and a hedge adjustment of 4.5 that corresponds to the swap valuation of 4.3 in this example.

End of Period	0	1	2	3	4	5	6
Benchmark Rate	3.0%	2.5%	2.0%	1.5%	1.0%	0.5%	0.0%
Present Value	(89.2)	(93.0)	(96.2)	(98.5)	(100.0)	(100.5)	(100.0)
Present Value Change		(3.9)	(3.2)	(2.4)	(1.5)	(0.5)	0.5
Amortisation Day 1-difference		1.7	1.7	1.8	1.8	1.9	1.9
Adjusted Present Value Change		(2.2)	(1.5)	(0.6)	0.3	1.4	2.4
Swap Fair Value Change		2.3	1.5	0.6	(0.4)	(1.5)	(2.5)
Valuation Mismatch		0.1	0.0	0.0	(0.1)	(0.1)	(0.1)

14. The overview shows that this alternative leads to a relatively balanced result. The amortisation of the ‘day 1- difference’ on the basis of the effective interest rate adjusts the present value change for the pull-to-par effect. As such the risk management approach can be applied for accounting purposes on the basis of the actual external cash flows of the instrument. However, the amortisation of the ‘day 1-difference’ introduces an additional level of complexity as this approach is typically not used outside accounting.
15. The advantage of this alternative is that it uses the actual cash flows of the hedged item rather than fictitious higher benchmark cash flows as with alternative 2 above. As the discount rate does not include the margin element the problem of a

negative discount rate cannot occur.¹⁰ This alternative becomes especially important when the original margin exceeds the declined market rate (as discussed with alternative 3 above).

Conclusion

16. The full fair value measurement (**alternative 1**) results in valuation mismatches in comparison to the interest rate swap that do not reflect risk management activities or a business model with an objective to primarily *hold* financial instruments. They rather represent the changes in parameters of un-hedged risk elements under a fictitious disposal assumption.
17. Alternatives 2 to 4 represent different possibilities to isolate interest rate risk. It can be observed that they all lead to similar outcomes regarding the measurement of the risk position in the absence of discounting and unwinding effects. This demonstrates that the selection of the benchmark interest rate for discounting the cash flows is the key driver for the valuation under these alternatives.
18. However, a closer look also shows that alternatives 2 to 4 differ in respect of the underlying definition of interest rate risk. Those differences lead to the mentioned discounting and unwinding effects resulting from different reinvestment/refunding assumptions. The following simple example illustrates those effects:
19. A liability with a notional amount of 100 at a three year term bearing an interest rate of 1% and a cash flow inflow of 100 is originated. At a current market interest rate of 3% for investments only 94.3 of the cash position is needed to service the debt (ie pay interest and repay the liability after three years). The amount of 94.3 represents the present value of the liability discounted at 3%.The remaining cash position of 5.7 (100 minus 94.3) represents the present value of the margin earned with the liability, ie three annual cash flows of 2 discounted at 3%. The amount of 2 is calculated as the per annum margin (3% minus 1%) in relation to the notional amount of the liability of 100.

¹⁰ However, the negative discount rate is avoided by using cash flows and a discount rate that are inconsistent (full cash flows versus a benchmark interest rate, ie an interest rate that is only a part of the contractual interest rate).

20. On that basis **alternative 4** represents the narrowest risk definition. It covers the interest rate risk resulting from the reinvestment of the portion of the cash position required to cover all associated cash flows of the liability. This is reflected in the starting present value of 94.3 for the risk position. The fact that the difference to the notional amount is amortised at 3% over time essentially excludes any interest rate risk associated with the additional margin earned.
21. By fixing the margin-element used for the calculation of the discount rate for the measurement of the risk position, **alternative 3** implicitly assumes the accumulation of the margin earned to maturity of the liability. Therefore it covers the reinvestment risk of the additional margin earned in addition to the scope of the interest rate risk position under alternative 4. This is even true in situations where the discount rate turns negative. As such, this alternative best represents the risk position when the business model is to accumulate the earned margin and the investment risk of this portion should be covered as well. However, it has to be taken into account that the margin elements are usually supposed to cover actual expenses (defaults, administrative expenses). Otherwise they represent funds available for the distribution as dividend or for other purposes like the investment in completely different assets or the repayment of other debt. Therefore the accumulation assumption will often not be realistic. Actually for those situations this alternative *overstates* the risk position.
22. The discussion above leads to **alternative 2**. The underlying objective of this measurement is to ensure a return of 3% on the cash received to pay the annual interest at 1% and have the margin of 2% available to cover extra expenses, for distributions or other purposes. The underlying cash flow profile for the additional margin therefore is a constant payment of an amount of 2 at the end of each period in this example. This is usually in line with the actual business objectives. Therefore this alternative usually best represents the risk management approach (eg when using a transfer pricing system).
23. For more details regarding the underlying assumptions, calculation and scenarios refer to the appendix in the back of this document.

Determination of benchmark interest rates

24. This section discusses criteria for the selection of the benchmark interest rate. This topic is highly interrelated with the objective of the risk management activities:
- (a) A benchmark interest rate that is supposed to represent the fair value change attributable to interest rate risk should be the one that would be used to determine the actual interest rate of the financial instrument. **The benchmark interest rate a potential buyer¹¹ of the financial instrument would use as a basis for calculating the purchase price.**
 - (b) A benchmark interest rate that is used to determine the margin and therefore represent the margin risk of a product, eg the funding or hedge cost of a financial asset. **The benchmark interest rate of a potential matching funding (for financial assets) or investment (for financial liabilities) transaction.**
25. To the extent that there is a market practice that pricing is driven by margin considerations and that there is more or less a common view in respect of the relevant funding or investment market (and therefore the interest index of that market) both alternatives lead to the same result. In contrast, the results would differ if different funding sources are used, eg because of different strategies or restrictions regarding market access. In those instances the risk from changing correlations between those markets has to be managed as well which includes the acceptance as part of the business risk.
26. Considerations regarding the determination of a benchmark interest rate might take into account the interest rate used for the pricing of the financial instruments, the interest rate used for the funding of a financial asset or reinvestment of a financial liability, or another generally accepted benchmark that is also used as a basis for standard hedging instruments. Restrictions regarding market access apply for example when no sufficient funding market volume is available to

¹¹ Or transferee in case of a financial liability.

finance holdings of financial assets. This might lead to alternative transactions like sales or securitisations, which also changes the relevant benchmark rate to the one implicit in a potential sales price.

27. The following example illustrates the potential effect when the pricing and funding benchmark differ for a financial asset. For that it is assumed that the pricing of a loan and the interest for the related funding are based on different benchmarks with changing correlations. To achieve an adequate pricing of a newly originated loan an entity uses the pricing index as a basis. However, future risk management activities in respect of interest rate risk are related to the funding interest index. This reflects the fact that the margin risk is determined by the pricing of the (fictitious) related funding transaction. The difference between both interest indices represents an additional interest margin at the date the loan is granted (here a positive 0.2%).¹²

¹² For simplification the example is focussing on a benchmark interest rate risk element only. Therefore no further elements like a credit spread etc are considered for the pricing of the loan.

End of Period	0	1	2	3	4
Pricing index	4.2%	4.6%	5.0%	5.4%	5.8%
Funding index	4.0%	4.5%	5.0%	5.5%	6.0%
Business Unit					
Interest Income (Loan)	-	4.2	4.2	4.2	4.2
<i>Interest Expense (internal)</i>	-	(4.0)	(4.0)	(4.0)	(4.0)
Margin	-	0.2	0.2	0.2	0.2
Asset Liability Management (ALM)					
<i>Interest Income (internal)</i>	-	4.0	4.0	4.0	4.0
Interest Expense (Funding)	-	(4.0)	(4.5)	(5.0)	(5.5)
Swap (receive floating, pay fix)	-	0.0	0.5	1.0	1.5
Margin	-	0.0	0.0	0.0	0.0
Consolidated View					
Interest Income (Loan)	-	4.2	4.2	4.2	4.2
Interest Expense (Funding)	-	(4.0)	(4.5)	(5.0)	(5.5)
Net Interest Income (unhedged)	-	0.2	(0.3)	(0.8)	(1.3)
Swap	-	0.0	0.5	1.0	1.5
Net Interest Income (hedged)	-	0.2	0.2	0.2	0.2

28. When the internal transfer pricing transaction is used as a basis for the measurement of the risk position there would be no net valuation effect in this example as the valuation of the interest rate swap perfectly matches the identified risk position. The difference between the pricing of the loan based on the pricing index for that instrument and the funding cost (funding index) leads to an additional profit for the business unit in this example. Any future changes in the pricing benchmark for the loan have no effect on the margin. The margin is rather at risk from changes to the funding interest rate as illustrated with the un-hedged net interest income.
29. A valuation of the loan reflecting changes in the pricing benchmark rate leads to the following valuation results when compared to the valuation of the (fixed leg) of the swap:

End of Period	0	1	2	3	4
Measurement Loan	100.0	98.9	98.5	98.9	100.0
Measurement Swap	0.0	1.4	1.9	1.4	0.0
Change in measurement – Loan	-	(1.1)	(0.4)	0.4	1.1
Change in measurement – Swap	-	1.4	0.5	(0.5)	(1.4)
Net measurement effect	-	0.3	0.1	(0.1)	(0.3)

30. The net measurement effect represents the additional effect on profit or loss that would be accounted for if the benchmark interest rate relevant for the fair value measurement of the loan (pricing index) was used in this example.
31. The net measurement effect provides useful information when the swap is supposed to hedge the fair value risk (attributable to interest rate risk) of the loan as it represents the ineffectiveness resulting from the imperfect hedging relationship. Conversely, the hedging relationship is perfect in this example when looking at the hedging relationship from the perspective that in order to protect the

calculated margin the swap is supposed to hedge the funding risk associated with the loan. This follows the risk management objective that is based on a ‘buy and hold’ strategy with a *cash flow focus*. The fair value measurement becomes only relevant when the business model of a ‘buy and hold’ strategy for the hedged financial instruments changes.

Discussion of the pricing index as benchmark (fair value orientation)

32. An argument in favour of the fair value benchmark might be that it seems to be the more objective one in comparison to an internally determined transfer price (ie a model valuation). However, often it is not that straightforward to determine the appropriate benchmark rate for the fair value measurement as well. This is especially true when sales transactions are rather rare, which makes it a highly judgemental exercise as well.
33. When there is a clear pricing benchmark for a product it cannot be ignored for pricing purposes. Otherwise the product would be either too expensive or too cheap in comparison to competitors. However, this benchmark is only relevant for the initial pricing to calculate the margin. After that the terms are locked in externally and are then independent of subsequent changes of the pricing index. With an ‘originate and hold’ business model the subsequent development of the (theoretical) sales price is less important for the determination of the associated interest rate risk when addressing the margin risk.¹³ The most relevant risk is the remaining funding risk that threatens the locked-in margin. The funding risk however is dependent on the benchmark relevant for the funding transactions rather than the development of the market rate of the loan in subsequent periods. Therefore, with the objective to hedge the interest margin it is rather important to know the corresponding funding or investment transaction and its benchmark or

¹³ That notwithstanding, fair values still provide useful information on potential alternatives that an entity might have (like a sale resulting from unforeseen events) and are therefore an indicator for the options an entity might have. As such, providing information on fair values in general is useful information. However, useful information does not automatically mean that it is at the same time the best indicator for performance when considering the underlying business model.

to get all transactions onto the same benchmark to achieve a balancing of repricing/maturity differences.

34. Determining the benchmark rate on the basis of the interest rate relevant for the fair value measurement provides information for an exposure that is neither managed nor representing the primary focus of the business model. The financial statement information is then rather reflecting a business model that is based on selling transactions: *What would be the effect of interest rate changes on the fair value (as the potential sales price)?*

Discussion of the funding index as benchmark (margin orientation)

35. Following the margin idea using the funding pricing index as hedged benchmark leads away from the measurement of financial assets and liabilities. It is rather a measurement of the risk on the interest margin associated with fixed rate instruments. This follows the idea that each uncovered fixed rate instrument leads to an implied margin risk as gaps in cash flows have to be bridged as they occur at then current interest rates. This could result from differences in maturities but also includes timing differences in cash flows.
36. The margin concept as explained raises the question why the offsetting floating rate instrument (here the funding liability) that is actually causing the threat to the margin is not used as the hedged item. Strictly speaking, when hedging a margin both transactions (financial asset and liability) should be taken into account. Therefore the margin could be protected by swapping everything to a common floating basis or by fixing cash flows of floating-based instruments to match the fixed rate instruments.
37. An approach with a one-sided focus on the floating rate instruments however would ignore the effect of mismatches on the margin resulting from the fixed rate side. These result from differences between the cash flow pattern of the fixed leg of the swaps (hedging the floating positions) and the corresponding fixed rate

instruments.¹⁴ To address this, the margin risk is commonly identified on the basis of the fixed rate instruments as the more accurate approach. Furthermore the floating positions often represent projected future transactions while the fixed rate position mostly consists of existing ones (with exceptions).

38. Finally, as the risk management approach is focussed on the fixed rate instruments assuming an opposite approach for accounting purposes can create additional mismatches. For example, changes to the hedging instruments are triggered by changes among the fixed rate instruments. This however would be ignored for accounting purposes when the focus is on floating rate instruments, which could potentially misrepresent the actual situation.

¹⁴ In other words: Addressing the margin risk resulting from a fixed rate financial asset and an offsetting floating rate liability by focussing on the floating side only ignores the mismatches between the hedging instrument and the fixed rate asset, which might be the more significant one.

Appendix:

A1. This appendix provides additional background and analysis on the alternatives discussed in agenda paper 4A (paragraph 18) for the determination of the hedged interest rate risk (referred to as alternatives 2 to 4).

A2. The analysis is based on the following example and assumptions:

- a. The entity originates a liability with a term of 3 years and a notional amount of 100. The liability bears interest of 1% on an annual basis.
- b. The current market rate for investments is 3%. Therefore the liability results in an interest margin of 2% (sub-Libor scenario).
- c. The cash received by entering into the liability is split into a portion required to service the liability (interest and principal) and an additional portion that essentially represents the present value of the margin earned.
- d. The portion required to meet the obligations from the liability is calculated by discounting the liability's cash flows with the current market rate for investments of 3% leading to an amount of 94.3. The remainder of 5.7 represents the present value of the future margin also discounted at the current market rate of 3%.
- e. **Scenario A** assumes that the entity accumulates the margin earned. This is reflected by considering the obligations of the liability as the only source of cash outflows. With this the cash position representing the additional margin increases over time representing the margin earned and additional reinvestment income.
- f. **Scenario B** assumes that the entity spends the margin earned every year when received. This is considered by the assumption that the entity has interest expenses of 3% rather than the contractual 1%. This scenario reflects the fact that a significant part of the margin is usually supposed to cover other expenses related to the financial instrument like administrative

expenses or defaults (for financial assets) or stands ready for distribution to shareholders (or other uses by the entity).

- g. For both scenarios described above it was assumed that the market interest rate available for the investment of the cash position changes after the first period. For illustration the tables below provide the calculation under the assumption that the market rate drops from 3% to 2.5% after the first year.
- h. To illustrate the underlying risk definitions of the three alternatives it was assumed that additional cash is provided that exactly matches the valuation of the hedged risk following the three alternatives. This simulates a 'perfect' hedging relationship in relation to the respective identified hedged risk. This is like an early settlement of the hedging instrument to simplify the example. For alternative 3 the calculation comprises negative discount rates.
- i. Finally, an analysis is provided that shows the success of the hedging strategies for various interest rate scenarios. It compares the alternatives for measuring the risk position with the situation of an unchanged market interest rate as well as an unhedged scenario.

Scenario A: Accumulation of the earned margin

Interest Scenario	Basic Example (unchanged conditions)			Basic Example (unhedged)			Alternative 2			Alternative 3			Alternative 4		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Cash Position t0	100.000	94.343	5.657	100.000	94.343	5.657	100.000	94.343	5.657	100.000	94.343	5.657	100.000	94.343	5.657
Interest Income	3.000	2.830	0.170	3.000	2.830	0.170	3.000	2.830	0.170	3.000	2.830	0.170	3.000	2.830	0.170
Interest Expense	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-
Swap Settlement	-	-	-	-	-	-	0.964	0.936	0.028	0.993	0.936	0.057	0.936	0.936	-
Cash Position t1	102.000	96.173	5.827	102.000	96.173	5.827	102.964	97.109	5.855	102.993	97.109	5.884	102.936	97.109	5.827
Interest Income	3.060	2.885	0.175	2.550	2.404	0.146	2.574	2.428	0.146	2.575	2.428	0.147	2.573	2.428	0.146
Interest Expense	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-
Cash Position t2	104.060	98.058	6.002	103.550	97.577	5.973	104.538	98.537	6.001	104.567	98.537	6.031	104.509	98.537	5.973
Interest Income	3.122	2.942	0.180	2.589	2.439	0.149	2.613	2.463	0.150	2.614	2.463	0.151	2.613	2.463	0.149
Interest Expense	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-	(1.000)	(1.000)	-
Cash Position t3	106.182	100.000	6.182	105.139	99.017	6.122	106.151	100.000	6.151	106.182	100.000	6.182	106.122	100.000	6.122
Repayment	100.000	100.000	-	100.000	100.000	-	100.000	100.000	-	100.000	100.000	-	100.000	100.000	-
Profit	6.182	-	6.182	5.139	(0.983)	6.122	6.151	-	6.151	6.182	-	6.182	6.122	-	6.122
Original Profit				6.182	-	6.182	6.182	-	6.182	6.182	-	6.182	6.122	-	6.182
Deviation				(1.043)	(0.983)	(0.060)	(0.031)	-	(0.031)	-	-	-	(0.060)	-	(0.060)

A3.Explanations:

- a. Column A represents the accumulated result for each scenario starting with the received cash position of 100 showing the interest cash flows for the three periods on the respective cash position offset by the interest payment for the liability.
- b. Column B shows the development for the cash position required to meet the obligations under the liability assuming a stable market interest rate while column C represents the development of the margin component.
- c. The basic example (unchanged conditions) would lead to a profit of 6.182 which represents the margin of 6 and additional income of 0.182 resulting from reinvestments.
- d. The decline of interest rates would lead to less profit of 1.043 in comparison to an unchanged interest rate scenario. See 'Basic example (unhedged)'.
- e. It is assumed that hedging instruments are used to address the margin risk. Those lead to a settlement gain after the first period (swap settlement) representing the measured risk position following the calculation alternatives 2 to 4.
- f. It can be seen that only alternative 3 addresses the entire decline in profit while alternative 4 is limited to the reinvestment risk of the cash position required to cover the obligations resulting from the liabilities.
- g. Alternative 2 addresses the margin risk but not entirely as it assumes that the earned margin is expensed.

Scenario B: Expense / earned margin not reinvested

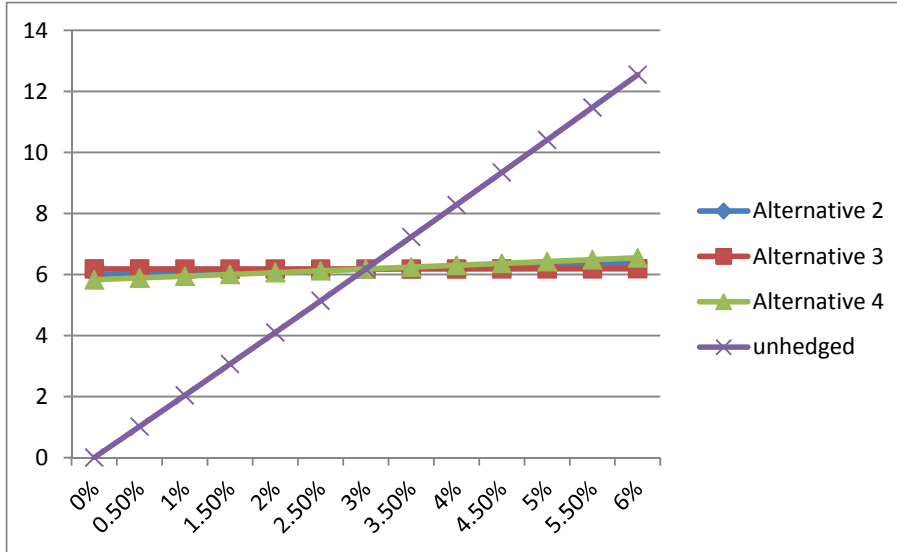
Interest Scenario	Basic Example (unchanged conditions)			Basic Example (unhedged)			Alternative 2			Alternative 3			Alternative 4		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Cash Position t0	100.000	94.343	5.657	100.000	94.343	5.657	100.000	94.343	5.657	100.000	94.343	5.657	100.000	94.343	5.657
Interest Income	3.000	2.830	0.170	3.000	2.830	0.170	3.000	2.830	0.170	3.000	2.830	0.170	3.000	2.830	0.170
Interest Expense	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-
Swap Settlement	-	-	-	-	-	-	0.964	0.936	0.028	0.993	0.936	0.057	0.936	0.936	-
Cash Position t1	100.000	94.173	5.827	100.000	94.173	5.827	100.964	95.109	5.855	100.993	95.109	5.884	100.936	95.109	5.827
Interest Income	3.000	2.825	0.175	2.500	2.354	0.146	2.524	2.378	0.146	2.525	2.378	0.147	2.523	2.378	0.146
Interest Expense	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-
Cash Position t2	100.000	93.998	6.002	99.500	93.527	5.973	100.488	94.487	6.001	100.517	94.487	6.031	100.459	94.487	5.973
Interest Income	3.000	2.820	0.180	2.488	2.338	0.149	2.512	2.362	0.150	2.513	2.362	0.151	2.511	2.362	0.149
Interest Expense	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-	(3.000)	(3.000)	-
Cash Position t3	100.000	93.818	6.182	98.988	92.866	6.122	100.000	93.849	6.151	100.030	93.849	6.182	99.971	93.849	6.122
Repayment	100.000	100.000	-	100.000	100.000	-	100.000	100.000	-	100.000	100.000	-	100.000	100.000	-
Profit	-	(6.182)	6.182	(1.012)	(7.134)	6.122	-	(6.151)	6.151	0.030	(6.151)	6.182	(0.029)	(6.151)	6.122
Original Profit				-	(6.182)	6.182	-	(6.182)	6.182	-	(6.182)	6.182	-	(6.182)	6.182
Deviation				(1.012)	(0.953)	(0.060)	-	0.031	(0.031)	0.030	0.031	-	(0.029)	0.031	(0.060)

A4.Explanations:

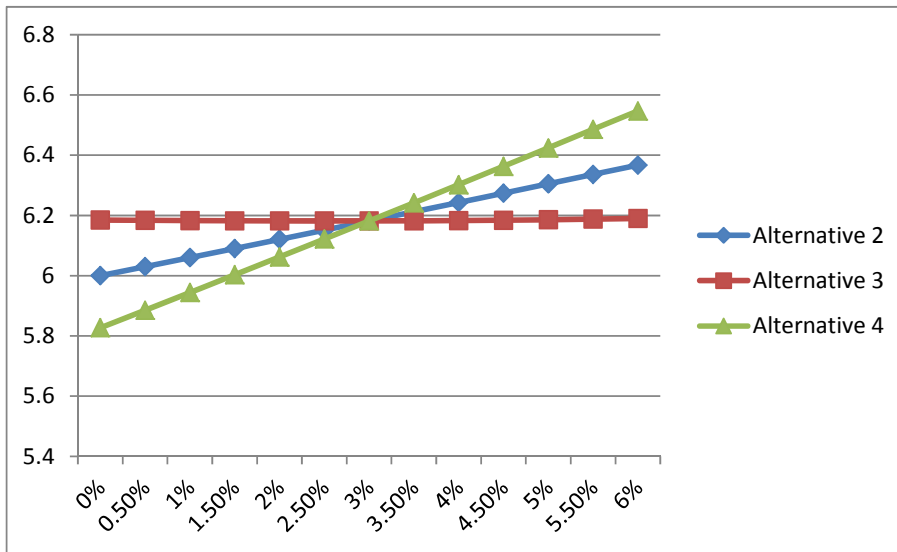
- a. The set-up of the example is identical to scenario A except for the assumption that the margin earned each period is immediately expensed. This is reflected with interest expenses of 3.000 rather than 1.000. This leads to a zero profit for the basic example with unchanged interest rates.
- b. The numbers in bold face format within the cash position after period 1 for the three scenarios represent the present value calculated for the liability when following the respective measurement alternative.
- c. In contrast to the scenario A, alternative 2 now represents the best measure for the margin risk when comparing the results to the original profit of the basic example (unchanged conditions). This is because the cash profile for the margin component is consistent with the assumption underlying this scenario.
- d. Alternative 3 now leads to an over-hedge situation, ie the loss resulting from the decline in market interest rates is more than compensated. This results from the implied accumulation assumption.
- e. As explained with scenario A, alternative 4 is most limited in its scope. It does not address any interest rate risk associated with the present value of the locked in margin.

Development of accumulated profit for interest rate movement (0% to 6%)

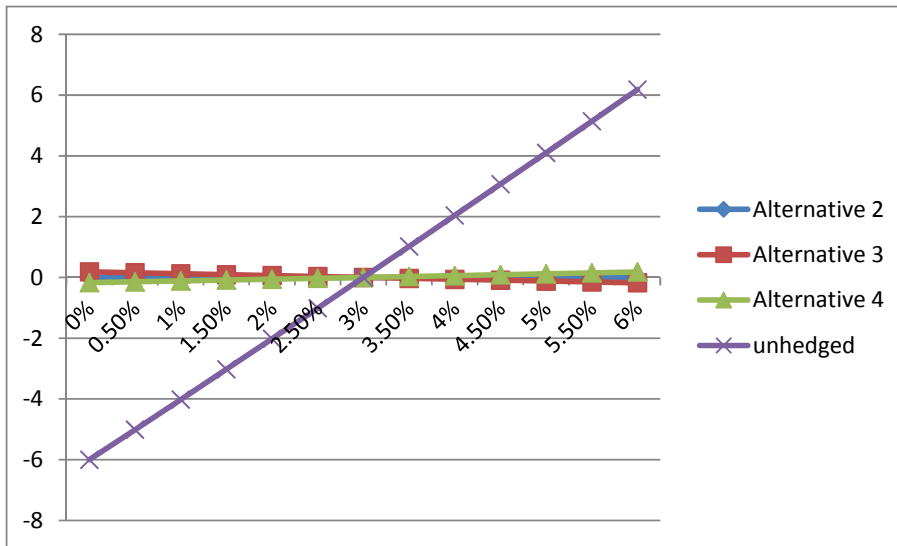
Scenario A: Development of the accumulated profit



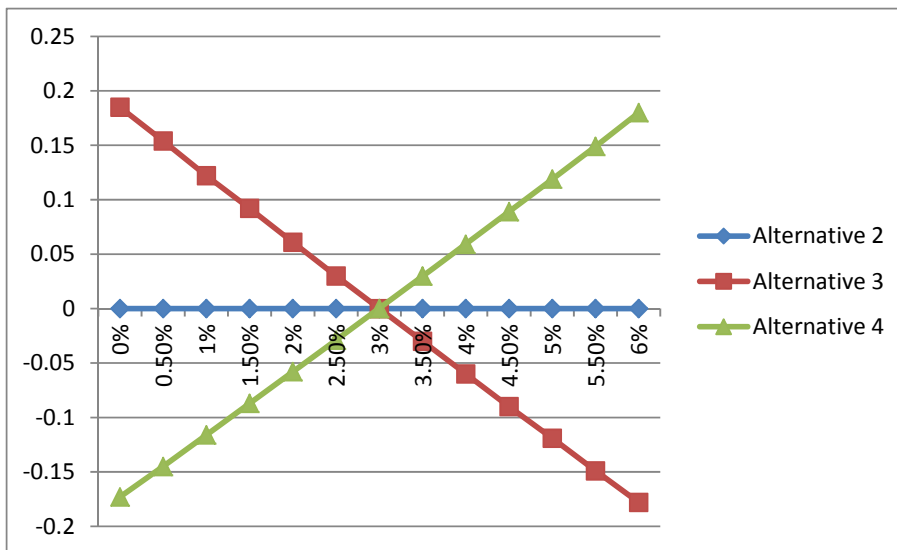
Scenario A: Focus on the three alternatives



Scenario B: Development of the accumulated profit



Scenario B: Focus on the three alternatives



A5.The analysis confirms that all three alternatives lead to similar results when compared to the unhedged situation.

A6.A closer look however shows that only alternative 3 (accumulation assumption) and alternative 2 (non-reinvestment assumption) represent the complete risk position in line with the respective business activities / objectives.