STAFF PAPER

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Project	**Macro Hedge Accounting**		
Paper topic	Valuation of the risk position (steps 4 to 6) – Cover paper		
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Introduction

1. The purpose of this paper series is a 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 2011 IASB meeting. It relates to steps 4 to 6 explained there[1]:

   (a) **Step 4**: Portfolio as unit of account

   (b) **Step 5**: Open portfolios to be included

   (c) **Step 6**: Applying repricing risk for periods rather than days

2. The focus of the papers is how to determine the cash flow pattern for the purpose of valuing the risk position. This relates to situations where the contractual cash flows are subject to change due to embedded optionality risk, eg resulting from prepayment options.

3. Risk managers have to deal with this uncertainty in managing their exposures. The papers discuss how risk management approaches that are based on the expected behaviour of a portfolio could therefore be used for accounting purposes. This relates to:

   (a) using portfolios as units of account for hedge accounting purposes; and

[1] Please refer to the appendix for an overview of all the steps as outlined in paper 7A of the November 2011 IASB meeting.

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(b) bottom layer approaches.

4. For illustrative purposes the discussion is based on pre-payable instruments. This is one of the main optionality risks in the context of interest rate risk management. However, the issues discussed also apply to other risk positions that are managed on the basis of expected behaviour like core demand deposits or pipeline trades.[2]

5. The papers are structured as follows:

   (a) **Agenda paper 3A** is based on a *closed* portfolio of pre-payable loans, ie no further additions to the original population are assumed. – **Step 4**.

   (b) **Agenda paper 3B** expands the discussion to *open* portfolios where the population is subject to ongoing changes and illustrates the additional ramifications compared to closed portfolios. – **Steps 5&6**.

6. Both papers capture *gross* as well as *net* risk positions. The accounting alternatives discussed are:

   (a) (Portfolio) fair value hedge accounting in accordance with IAS 39 *Financial Instruments: Recognition and Measurement.*

   (b) Valuation of the entire risk position on a portfolio basis.

   (c) Valuation of the risk position on the basis of bottom layer approaches.

7. As a starting point this cover paper provides some pre-considerations regarding the management of prepayment risk and the interaction with the pricing of pre-payable loans.

8. There are no questions to the Board in this paper series.

Background: Management of prepayment risk

9. The discussion in agenda papers 4 to 4B of the December 2011 IASB meeting was based on instruments with a fixed maturity where interest rate risk actually was equivalent to repricing risk (being the risk of the interest rate that will be

[2] "Pipeline trades" are a colloquial term for financial products that are advertised with particular terms and conditions but not yet entered into (a type of forecast transaction). For a more detailed explanation of these transactions refer to agenda paper 9A of the September 2011 IASB meeting.

available on maturity of the initial instruments)[3]. The next level of complexity is introduced when instruments with variable maturity (like prepayable loans) are considered.

10. As already explained in earlier papers, various risk management approaches are applied to address optionality risk. Beside the possibility to use option-type hedging instruments that mirror the optionality included in the risk position (eg by using options that themselves allow flexibility in timing of payments) alternative strategies view the risk position based on the expected prepayment behaviour of the customers. This view can be used for deciding the term of hedging instruments in order to reduce the option premium to be paid (ie purchase options for a fixed maturity profile of the risk exposure).[4] Alternatively, an expected cash flow pattern for a portfolio could be developed to address repricing risk. Prepayment risk is then addressed separately, eg by pricing an additional spread to cover those prepayment scenarios that have a real likelihood of occurring.[5]

11. Consequently interest rate risk is split into components that might be subject to different risk management approaches. A fair value measurement of pre-payable instruments treats the optionality as an interest rate option which is priced accordingly. This leads to volatility due to remeasurement whenever this optionality risk is not hedged in its entirety with mirroring (ie with fully offsetting) options.

12. From there one could draw the conclusion that this volatility is representative of the performance of the entity in the respective period. This is because the volatility results from leaving a potentially significant element of interest rate risk unhedged (the prepayment risk) speculating that the risk will not materialise. This is the same argument used in agenda paper 7A of the November 2011 IASB meeting when analysing the accounting treatment of derivatives.

[3] Except for the discussion on the sub-Libor issue, which could be seen as addressing optionality risk as well.

[4] The fixed maturity does not necessarily correspond with the contractual one. It could also be based on an expected (model-based) maturity profile to reduce the volume of the options required and therefore the premiums to be paid. For further detail reference is made to the Education Session with the Board in June 2011 where this approach was explained.

[5] See also agenda paper 6A of the April 2011 IASB Meeting, agenda paper 9A of the September 2011 IASB meeting and the Education Session with the Board in June 2011.

13. However, it has to be considered that this would lead to a different treatment of prepayable loans dependent on whether they are hedged (for their *repricing* risk only) or not. For an unhedged prepayable loan a customary prepayment option does usually not require separation as embedded derivative or the fair value measurement of the entire loan – effectively the valuation of the option is ignored for accounting purposes. Conversely, when requiring the measurement of the unhedged prepayment optionality in profit or loss the embedded prepayment option would be accounted for at fair value through profit or loss. Given that interest rate risk management of financial institutions covers the repricing risk for the entire non-trading activity if as a result of this hedging activity the opetions were required to be measured at fair value this would lead to a de facto requirement to treat embedded prepayment options as derivatives instead of an integral aspect of an amortised cost asset or liability.

14. Furthermore it has to be considered that the option pricing[6] is not representative of the actual prepayment risk. This is because it assumes rational interest-rate only driven customer behaviour, which is not always the case—especially in retail lending.

15. But even in a situation where the customer behaviour is "purely rational" (ie driven by interest rates) one has to distinguish two different scenarios:

    (a) The "refunding" scenario assumes a customer prepays a loan whenever a cheaper funding source is available for that customer. Therefore a loan would be prepaid whenever the market rates for comparable loans decrease.

    (b) The "alternative investment" scenario assumes a customer decides whether additional liquidity available is used to prepay the loan or for investment purposes.

16. Given the spreads in interest rates between investments and financing transactions the prepayment could even be beneficial in increasing interest rate scenarios given that the interest income on the alternative investment is still lower than the borrowing's interest rate (ie saved interest expense). In addition, it has to be considered that "interest rate" from a client perspective is the entire contractual

[6] Option pricing in terms of a "plain vanilla" interest rate option.

market rate of the financial instrument rather than just a benchmark rate. Therefore the valuation would require the inclusion of all other components discussed in the context of full fair value measurement to provide the "full picture". This leads to similar conclusions as discussed in agenda paper 4A of the December 2011 IASB meeting in respect of information provided through full fair values.

17. Furthermore the impact of other factors that influence the prepayment decisions of customers have to be considered – customers are not driven by interest rates alone.[7] All those factors cannot be addressed properly with interest rate derivatives.[8] This leads to a split of risks with different strategies applied.

18. For example, the discussion above can be reflected in a risk management approach that considers the various influencing factors by deriving an expected cash flow profile (treated as if it were certain) that becomes subject to interest rate risk management for its repricing risk. In addition, (because the cash flows are in fact uncertain) a spread to cover the prepayment risk is calculated, which can be used to purchase interest rate options or to cover losses resulting from deviations between the expected cash flow scenario and actual outcomes.

19. This risk management approach is explained below with examples. They are based on the prepayment example used in agenda paper 7 of the November 2011 agenda paper but without a contractual prepayment penalty. From there alternative accounting treatments to a full fair value measurement of the entire interest rate risk can be derived.

    The table below uses the expected scenario of a prepayment as a starting scenario. As a consequence the repricing risk would be addressed for a 3-year period only resulting in choosing the same term for the swap. In addition, a simplified worst case scenario assumes that the loan is not actually repaid for at least five years and that market rates increase by 0.5 percentage points each year. As the interest rate swaps cover only three years this scenario leads to a loss of 1.5 and 2.0 for the additional periods. With an additional spread of 0.7% however a balanced result

[7] For a further discussion of those refer to agenda paper 6A of the April 2011 IASB Meeting.

[8] That applies in typical circumstances in practice (eg retail lending). In some rare situations a "perfect hedge" with derivatives would be possible (although those would not be mere interest rate derivatives in the strict sense but eg a call option on a non-prepayable bond).

could still be achieved (simplified cash flow view).[9] As a consequence the loan is priced accordingly leading to the following calculation:

Period	**0**	**1**	**2**	**3**	***4***	***5***
Benchmark Interest Rate	5.0%	5.5%	6.0%	6.5%	*7.0%*	*7.5%*
Interest Revenue		5.0	5.0	5.0	*5.0*	*5.0*
Interest Expense		(5.0)	(5.5)	(6.0)	*(6.5)*	*(7.0)*
Swap[10]		0.0	0.5	1.0	-	-
Margin		0.0	0.0	0.0	*(1.5)*	*(2.0)*
Spread for prepayment[11]		0.7	0.7	0.7	*0.7*	*0.7*

20. Now assume that on the basis of the actual interest rate development the entity assumes at the end of period 2 that the worst case scenario will actually occur. As a consequence an additional forward starting swap is entered into to lock in the current market benchmark rate of 6% for the periods 4 and 5.

21. The table below illustrates the revised scenario. For that the valuation of the loan is based on the contractual cash flows (5.7) discounted over the *expected* life at the current benchmark rate plus the spread of 0.7% for prepayment risk. The swap transactions are only illustrated for their fixed legs. This assumes a perfectly matching floating interest rate funding.

[9] The spread of 0.7% is supposed to cover the loss of 3.5 (2.0+1.5) that occurs in the described scenario when earned over 5 periods (the expected term of the loan in this scenario). In reality the determination of the spread would also consider discounting effects and would be based on various scenarios instead of only one. This is similar to considerations for an option pricing model whereby option pricing considers different interest rate scenarios and their likelihood as the only determinant of prepayment behaviour.

[10] Pay 5.0, receive current benchmark interest rate.

[11] Contractual interest rate in addition to the benchmark interest rate of 5.0.

Period	**0**	**1**	**2**	**3**	***4***	***5***
Benchmark Interest Rate	5.0%	5.5%	6.0%	6.5%	*7.0%*	*7.5%*
Loan						
Amortised Cost	100.0	100.0	100.0	100.0	*100.0*	*100.0*
Interest Revenue		5.7	5.7	5.7	*5.7*	*5.7*
Valuation (original expectation)	**100**	**99.1**	**99.1**	100		
Valuation (revised expectation)			**97.4**	**97.3**	***98.1***	***100***
Change in valuation (original)		**(0.9)**	**0.0**	0.9		
Change in valuation (revised)			**(1.7)**	**(0.1)**	***0.8***	***1.9***
Swap Transactions (fixed legs only)						
Interest Expense[12] (original)		(5.0)	(5.0)	(5.0)		
Interest Expense (forward)					*(6.0)*	*(6.0)*
Valuation Swap (original)	0.0	0.9	0.9	0.0		
Valuation Swap (forward)			0.0	0.9	*0.9*	*0.0*
Change in valuation (original)		0.9	0.0	(0.9)		
Change in valuation (forward)				0.9	*0.0*	*(0.9)*
Consolidated view						
Interest Revenue		5.7	5.7	5.7	*5.7*	*5.7*
Expense (Swaps)		(5.0)	(5.0)	(5.0)	*(6.0)*	*(6.0)*
Net Interest Income		**0.7**	**0.7**	**0.7**	***(0.3)***	***(0.3)***
Valuation Loan		(0.9)	(1.7)	(0.1)	*0.8*	*1.9*
Valuation Swaps		0.9	0.0	0.0	*0.0*	*(0.9)*
Net Valuation Impact		**0.0**	**(1.7)**	**(0.1)**	***0.8***	***1.0***
Profit or Loss		**0.7**	**(1.0)**	**0.6**	***0.5***	***0.7***

[12] In this paper references to interest expense are not all in a strict sense of interest expense as defined in IFRSs in connection with the effective interest method ("strict sense") but in a wider sense (for illustration purposes). For example, the payments on one leg of an interest rate swap as such are not interest expense in a strict sense. However, hedge accounting can result in a hedge adjustment of interest expense in the strict sense if interest expense is the hedged item.

22. The net interest income as shown above reflects the change in expectation through negative net interest income in periods 4 and 5. It reflects that the funding transaction is extended by two periods at current terms (reflecting higher interest) at the end of period 2, (at which point interest rates have risen from 5.0% to 6.0% thus interest income falls by 1.0%).

23. Absent of discounting effects the example shows a constant profit of 0.7 for the periods except for the second one. The additional accumulated interest expense of 2.0[13] due to the extended period is reflected with its present value in period 2 leading to a one-time loss of 1.7. Economically, it represents a non-chargeable extension penalty. The difference of 0.3 resulting from the discounting effect of the present value calculation is reversed in future periods leading to a deviation from the originally planned margin.[14]

24. Another alternative scenario is that due to a significant decline in interest rates the loan is already prepaid after the first period. This would lead to the following results (periods 2 and 3 in italics are added for illustrative purposes):

Period	**0**	**1**	***2***	***3***
Benchmark Interest Rate	5.0%	4.0%	*3.5%*	*3.0%*
Interest Revenue (Loan)		5.7	*5.7*	*5.7*
Interest Expense (Swap fix leg)		(5.0)	*(5.0)*	*(5.0)*
Margin		0.7	*0.7*	*0.7*
Valuation (Loan)	100.0	101.9	*101.4*	*100.0*
Swap (Swap)	0.0	(1.9)	*(1.4)*	*0.0*

25. As a consequence of the prepayment, the valuation of the loan on the basis of an expected three year term of 1.9 has to be released through profit or loss (ie the

[13] This reflects the extension of the term by 2 periods at higher funding cost than originally planned (6% rather than 5%).

[14] The valuation of the loan is based on the contractual cash flows discounted over the expected life at the current benchmark rate plus the original additional spread of the contractual interest rate (over the original benchmark interest rate). This refers to alternative 3 discussed in agenda paper 4A of the December 2011 IASB meeting.

loan "worth" 101.9 is repaid for 100 crystallising a loss) leading to a one-time loss in that period.[15] It also shows that *any* deviation from the expected prepayment scenario leads to a negative impact on interest income when corresponding to interest rate movements.[16]

26. In respect of the swap transaction after period 1 there are three possible scenarios:

    (a) The swap is closed out due to the change in the risk profile, which does not lead to any further impact on net interest income.

    (b) The swap is not closed out but rather serves as hedging instrument for another loan (a substitute of the repaid loan). This is the most likely scenario in an open portfolio.

    (c) The swap is not closed out but there is also no new offsetting risk position (eg the risk limits are not breached). In that scenario the swap would impact profit or loss in the two remaining periods. This would also be in line with the general assumption regarding the treatment of stand-alone hedging instruments as described in agenda paper 7A of the November 2011 IASB meeting.

27. The second scenario in the preceding paragraph is described in more detail below. For that it is assumed that a non-prepayable loan with a two year term and an interest rate of 4.0% replaces the original loan. This leads to the following overview:

[15] To simplify this example it is assumed that the occurrence of prepayments is completely unrelated to interest rate changes. This explains the valuation of 101.9 (above par). In contrast, prepayment behaviour solely driven by interest rate change would lead a valuation at 100 or lower as one could assume that the loan would be prepaid immediately when a scenario occurs that would (otherwise) result in a value above par. In reality it is a combination of both as explained earlier in this paper.

[16] In other words: more loan prepayments in line with decreasing interest rates and less prepayments in line with increasing interest rates both lead to losses. Therefore under-hedging by over-estimating prepayments is not necessarily addressing the entire risk.

Period	**0**	**1**	**2**	**3**
Benchmark Interest Rate	5.0%	4.0%	3.5%	3.0%
Interest Revenue (original loan)		5.7		
Interest Revenue (replacement loan)			4.0	4.0
Interest Expense (swap fixed leg)		(5.0)	(5.0)	(5.0)
Net Interest Income		**0.7**	**(1.0)**	**(1.0)**
Release valuation adjustment		**(1.9)**		
Valuation of the loans		1.9	0.5	(0.5)
Valuation swap		(1.9)	0.5	1.4
Net Valuation Impact		**0.0**	**1.0**	**0.9**
Profit or Loss		**(1.2)**	**0.0**	**(0.1)**

28. As a result, net income of the first year is hit by the release of the valuation adjustment. This loss represents the present value of the negative impact on the margin which becomes obvious in the following two periods. In addition, the net valuation leads to a rather balanced profit or loss for the remaining two periods.

29. The risk management approach to use internal transfer pricing transactions could result in a significantly different accounting outcome in this scenario (for example if the prepaid loan was replaced but the internal transfer pricing transaction is not touched at all). The idea behind that is that although there is a deviation in the cash flow profile the *interest rate sensitivity* of the original transfer price transaction re-valued at the current market rate and a new transaction at current interest rates is similar. This is like the relationship between a loan granted at a discount and a loan granted at par—both lead to the same interest revenue absent

discounting and unwinding differences.[17] As a consequence the net valuation result would have been balanced for all periods and there would have been no one-time impact from the release of the hedge adjustment. This aspect will be discussed in more detail in the context of layer approaches.

[17] See also the explanation in agenda paper 7B of the July 2010 IASB meeting on "late hedges". This refers to the same topic from the perspective of an interest rate swap with and without upfront payments.

Appendix: The 11 Steps