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Project	Macro Hedge Accounting
Topic	Considerations for a macro hedge accounting concept Risk Management Overview

Introduction

1. This paper introduces a common interest rate risk management concept that is based on outreach with banks as well as on an education session with the Board on 1 June 2011. For simplification this paper focuses on only some typical features and leaves other topics for future discussion. Also, not all components described are used throughout the entire industry but are widely-used.
2. The risk management approach discussed in this paper forms the basis for more detailed accounting considerations that follow in agenda papers 9B and 9C.
3. There are no questions to the Board in this paper.

This paper has been prepared by the technical staff of the IFRS Foundation for discussion at a public meeting of the IASB.

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Risk Management Overview

4. Outreach and research activities as well as the education session with the Board have provided an overview of interest rate risk management in the banking industry. For this paper the following basic risk management approach is assumed:
 - (a) The key objective is to protect the net interest rate margin against changes in market interest rates.
 - (b) Each business and funding unit that enters into financial instruments with the market locks in a calculated margin by entering into internal transactions with asset-liability management (ALM).
 - (c) ALM deals with interest rate risk on the basis of these transactions and underlying transfer prices.
 - (d) Interest rate risk is managed on the basis of a net open portfolio.
5. In a second step the approach described above is enhanced by taking into account financial instruments with optionality with a focus on pre-payable loan portfolios and demand deposits.
6. Finally, an approach whereby the derivatives required for risk management purposes are not entered into with external counterparties but with the bank's own trading unit (internal derivatives) is considered.
7. For simplification the approach described above omits further risk management features like the use of an equity model book or hedging future interest rate scenarios. Those issues will be covered separately at a later date.

Hedging the net interest margin

8. The concept of hedging the interest margin results from the typical pricing of a financial instrument by a bank. For a financial asset like a loan the contractual interest rate usually can be split into elements such as the cost of funding, a

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credit risk spread and a target margin that is intended to cover administrative expenses as well as to achieve a profit. In addition, a liquidity premium and a prepayment premium might be included, depending on the product-type. For liabilities the margin is basically determined as the difference between the contractual interest expense and the return from investing the collected funds. Beside the coverage of administrative expenses the margin calculation might comprise pricing elements for liquidity risk and/or other premiums to cover optionality risk dependent on the product-type. Finally, a spread for counterparty risk is included. Whether the overall margin determined as the difference between interest expense and income is positive or negative depends on the market for which the transactions are designed as well as the product-type and terms.

9. The key objective of interest rate risk management of a bank is to protect the net interest margin earned with interest-bearing assets and liabilities against future changes of interest rates. This could be achieved if each interest-bearing financial asset was backed by a liability with corresponding terms, ie identical notional amount and maturity as well as offsetting interest rate cash flows. For example a loan granted with a term of 5 years bearing a fixed interest rate of 4.5% could be funded by entering into a liability with another bank with the same maturity at a current market rate of say 3%. As a consequence a net margin of 1.5% would be locked in.
10. However, having perfectly maturing transactions is not realistic. Rather than entering into an offsetting transaction with another bank the funding is often provided by a central unit on the basis of inter-bank market rates (so-called transfer prices).¹ As a consequence the business unit has still locked in its calculated interest rate margin—but through an internal transaction. To ensure a reasonable link between the business unit and ALM the transfer price needs to

¹ There are different transfer pricing systems in place. Having an offsetting cash transaction is one possible solution. Alternatives are to use internal derivatives or a reporting of interest rate risk to ALM. They all lead to the same economic consequence in respect of interest rate risk management.

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be determined in a way that represents actual market terms and be the basis for pricing the underlying external transaction. Following the example from above, the interest rate of the loan might have been calculated in a way that it has to cover the transfer price of 3% plus an additional margin of 1.5%.

11. The same approach is applied for funding (borrowing) transactions. To lock in a margin on the funding side each liability is backed with an internal investment at a transfer price. As the transfer price is usually determined on the basis of an inter-bank interest rate index like Libor the margin determined for a liability could be positive or negative dependent on the type, counterparty and term of the product as well as the credit risk of the issuing bank. Products for the retail market usually lead to a positive margin, ie the interest rate on the external liability is below the internal transfer price which creates the so-called sub-Libor-issue. For example, when the transfer price of 3% is also used as a benchmark for the funding unit that enters into a 3-year fixed rate deposit with a retail customer at an interest rate of 2% a positive margin of 1% is locked in.²
12. The transfer pricing system has two effects. First, it ensures that internally the calculated margin of each financial instrument (whether an asset or a liability) is fixed in comparison to a benchmark interest rate (the transfer price). Second, each financial instrument is represented on the basis of its transfer price within a central unit (ALM) and as such the transfer price becomes a substitute for the interest rate risk that is subject to risk management. In this example, ALM ends up with a 5-year asset and a 3-year liability, both on the basis of the same transfer price. The way the transfer prices are determined defines the interest

² The example assumes that the same benchmark for setting the transfer prices is used for both transactions and it ignores differences in the interest rate structure for different maturities (flat yield curve assumption) as well as bid-offer-spreads.

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rate risk that is managed centrally.³

13. To reach the overall objective of a fixed interest margin at a group level, ALM has to balance its positions in a way that interest rate changes do not affect the margin. In the example above the position is already balanced for the first three years in respect of interest income and interest expense to the extent that the notional amounts of both instruments are equal.⁴ However, there is a risk that the replacement of the 3-year liability once it matures will bear a higher or lower interest rate reflecting then current market conditions leading to an overall loss or gain within ALM and consequently a lower or higher margin on group level.
14. Regarding the replacement after three years, the following alternatives are possible:
 - (a) The funding unit enters into a new liability with the same interest margin as the matured one (1%) but on the basis of the then current transfer price.
 - (b) The funding unit enters into a new liability but with a lower margin (0.8% for example) due to changes in the level of market competition, a higher interest rate level, or other factors.
 - (c) There is no new liability from the funding unit so the funding gap has to be bridged by entering into a transaction with another bank on inter-bank market terms.

³ In this simple example the only risk that is transferred to ALM is the repricing risk resulting from different maturities, ie the mismatch caused by having a 5 year asset and a 3 year liability such that the margin for years 4 and 5 is uncertain. However, a transfer price could also be set in a way that further risks like differences in reference rates (using different interest rate indices for setting transfer prices dependent on the external products), yield curve risk (transfer price takes into account the impact of different original maturities on interest rates) or even foreign exchange risk are transferred to be managed centrally.

⁴ This is a simplified view as ALM usually earns a bid-offer spread from the transfer prices which is in line with the practice of the inter-banking market.

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15. The following table summarizes the three alternatives assuming an increase of inter-bank market interest rates to 3.7%. For comparison it also illustrates the situation for the first three years.

	Alternatives for Year 4			Years 1 to 3
	(a)	(b)	(c)	
Business Unit (Asset side)				
Interest Income	4.5%	4.5%	4.5%	4.5%
Transfer Price	(3.0%)	(3.0%)	(3.0%)	(3.0%)
Business Margin	1.5%	1.5%	1.5%	1.5%
Asset-Liability Management (ALM)				
Interest Income	3.0%	3.0%	3.0%	3.0%
Interest Expense	(3.7%)	(3.7%)	(3.7%)	(3.0%)
ALM Margin	(0.7%)	(0.7%)	(0.7%)	0.0%
ALM Hedge	0.7%	0.7%	0.7%	-
Funding Unit (Liability side)				
Transfer Price	3.7%	3.7%	n.a.	3.0%
Interest Expense	(2.7%)	(2.9%)	n.a.	(2.0%)
Funding Margin	1.0%	0.8%	n.a.	1.0%
Consolidated Group				
Interest Income	4.5%	4.5%	4.5%	4.5%
Interest Expense	(2.7%)	(2.9%)	(3.7%)	(2.0%)
Group Margin	1.8%	1.6%	0.8%	2.5%
Hedge Impact	0.7%	0.7%	0.7%	0.0%
Hedged Margin	2.5%	2.3%	1.5%	2.5%

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16. The overview shows that for all alternatives the ALM margin is identical and negatively impacted by changes in market interest rates in comparison to the first three years. The risk management activities of ALM are focussed on balancing its portfolio so that the ALM margin is not impacted by future interest rate changes for all transactions currently managed. Assuming a perfect hedge for this example it would have resulted in a 0% margin for ALM with the consequence that the total margin on group level reflects the cumulative margin locked in by the business and the funding unit. That approach would ensure that the margin locked in by each business or funding unit for the currently existing instruments is not impacted by changes in market interest rates. The objective of ALM is not to protect the *margin of future transactions* as this is considered a risk of the respective business or funding unit and is influenced by various factors in addition to changes in market interest rates. This effect is illustrated with the example above where the margin of the funding unit is dependent on the volume and terms of new transactions even if ALM is protected from market interest rates.
17. To balance their position ALM usually identifies the net fixed rate position (here the fixed rate loan in year 4 and 5) and turns it into floating rates using swap transactions. The alternative in this example would be to focus on the (future) floating rate positions and turn them into fixed interest rates to generate a balanced portfolio. Although both approaches theoretically lead to the same result the first alternative is most common. The present value of the fixed rate financial instruments reflects the gains and losses that will be reflected in future earnings on an accrual basis. Therefore it provides a more accurate risk measurement and focuses on existing positions rather than forecast refinancing.
18. In summary, banks using a transfer pricing system operate under the assumption that each interest-bearing transaction entered into with the market has to be refinanced (financial assets) or reinvested (financial liabilities) in the inter-banking market. As a consequence, a benchmark interest rate is defined for each new transaction that determines the contribution of this transaction to the overall interest margin. The objective of interest rate risk management as described is to

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protect the margin as calculated for each product against future changes in interest rates.

Management of an open portfolio

19. The ALM position as described above is subject to constant changes because of transactions that mature and new transactions being added. Even in situations where the transfer price is always determined on the basis of the same interest rate index (ie ignoring the impact of different reference rates and maturities) the portfolio will not be entirely homogeneous. The actual timing of cash flows will be widely spread throughout the year (rather than being focussed on specific dates) and there will be differences in transfer prices dependent on the market level on the day a transaction was initiated.
20. The fact that ALM is dealing with an open portfolio that creates a dynamic risk position has the following implications on the risk management approach:
 - (a) The constant change requires on-going monitoring of the portfolio including the related hedge transactions.
 - (b) The methods used to measure and monitor the risk positions including the identification of the demand for derivative transactions have to reflect the dynamic portfolio.
21. A number of techniques are available for measuring the exposure to interest rate risk. Examples of common approaches are:
 - Gap Analysis**—Schedule that compares interest-sensitive financial instruments that are allocated to time buckets on the basis of their maturity or next repricing date to identify repricing risks.
 - (Economic) Capital / Value at Risk**—Determine the maximum adverse deviation in economic value for a particular confidence level and time horizon (long-term focus).

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Earnings at Risk—Determine the maximum adverse deviation in net interest income for a particular confidence level and time horizon (short- and mid-term focus).

Duration—Techniques to determine the price sensitivity of fixed rate financial instruments on the basis of pre-defined changes in interest rates.

None of these risk management approaches distinguish between derivative and non-derivative instruments. Instead, the focus is on the entire portfolio and its reaction to changes in market interest rates on the basis of a pre-defined objective.⁵ Furthermore the approach taken is dependent on the definition of managed interest rate risk, the time horizon of the risk management approach (short-term versus long-term), the complexity of the organisation and regulatory requirements. Often various risk measurement methods are used at the same time to address the different aspects of interest rate risk.

22. To reflect the dynamic characteristic of an open portfolio *risk limits* are used rather than static hedge percentages or hedged volumes. As long as the volatility of the value or return of the portfolio attributable to the hedged interest rate risk stays within a pre-defined corridor (the risk limits) the portfolio is considered to be balanced in accordance with the risk management strategy, ie no risk-mitigating activities are required.
23. Setting risk limits is driven by the following considerations:
 - (a) It reflects the level of accepted inaccuracy of the risk management approach taken given that it is almost impossible and not cost efficient to hedge an open portfolio entirely as each change would trigger mitigating action.

⁵ For the example used for this paper the objective is to balance the entire portfolio. However, other approaches might be taken that target a certain return or cash flow structure for the portfolio as a combination of fixed and floating interest rates.

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- (b) Furthermore, the risk limits can be set to allow open (un-hedged) positions dependent on the bank's risk appetite.
24. Finally, the meaningfulness of any approach taken is dependent on the stress scenarios used to test whether the exposure is still within the risk limits. The scenarios should correspond to the elements of interest rate risk managed and reflect conditions for which the bank's conditions are most vulnerable.

Risk management of financial instruments with embedded optionality

25. The next level of complexity is added to interest rate risk management when financial instruments are involved that provide optionality regarding their term (maturity) to one of the counterparties. The most common examples in this context are pre-payable loans and demand deposits.

Pre-payable financial instruments

26. Prepayment risk occurs whenever a financial instrument can be repaid before its maturity and the repayment amount does not reflect the current fair value of the instrument.⁶ A prepayment option at other than fair value contradicts the objective of a fixed interest margin. Taking the above example of a fixed rate loan at 4.5% financed to its contractual maturity at 3.0% the resulting margin of 1.5% is only fixed as long as no prepayment occurs. Even if the prepaid loan is replaced with a new one with the same spread between the then current transfer price and the contractual interest rate the overall margin is only identical if the transfer price is still 3.0%. It is likely that the margin will be lower because decreasing market interest rates provide an additional incentive for exercising a

⁶ The amount of prepayment risk to which banks are exposed varies by jurisdiction owing to variations in products.

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prepayment option.⁷

27. However, while an interest rate option on a stand-alone basis assumes rational behaviour of the counterparties, ie the option will be exercised when advantageous, the actual prepayment behaviour especially of retail customers does not support this assumption. Although a certain correlation between interest rate movements and prepayment speed exists, it can be observed that a prepayment option is not always exercised when beneficial and that prepayments occur even in situations when the market environment does not support this decision.⁸
28. To reflect the prepayment risk of a financial instrument, typically an additional spread component is added when calculating the contractual interest rate of the loan. This additional spread is supposed to cover potential losses resulting from prepayments (ie no hedging activity or limited hedging may occur) or it can be used to enter into arrangements to mitigate the prepayment risk. For example, a pre-payable loan can be hedged by entering into an American-style receive fix swaption when the loan is originated. When the loan is prepaid and replaced by a new loan at lower market interest rates the swaption is exercised and combined with a pay fix swap. The difference in fixed rates of the hedging instruments in effect adjusts the interest rate of the substitute loan to compensate for declines in market interest rates. It does not address other (non-interest rate driven) factors that might have influenced the contractual interest rate.
29. Various approaches can be taken to determine the additional spread. The easiest but also the most expensive one would be to take the required premium for an American-style interest rate option for the entire term to the contractual maturity of the loan as a benchmark. Alternatively the term of the option can be aligned

⁷ Assuming that the transfer price declined to 2.3% the contractual interest rate for a potential substitute of the prepaid loan on otherwise identical terms would be 3.8% (transfer price of 2.3% and the original margin of 1.5%). Replacing the old loan with one on current market terms would therefore be beneficial for the borrower. For the bank however, this replacement leads to a decline of the margin on the asset to 0.8% (3.8% for the new loan versus the transfer price of the original funding of 3.0%).

⁸ See also agenda paper 6A of the 11-15 April 2011 IASB meeting that contains a more detailed discussion of this topic.

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with the expected shorter prepayment date which requires a lower option premium. As a result the bank is only protected for the situation that the prepayment occurs earlier than expected. Finally, it must be considered that the additional spread for accepting prepayment risk is earned on an on-going basis but only for as long as the loan is not prepaid, unless the payment of the entire prepayment spread is ensured, eg by granting the loan at a discount. As the option premium for the hedging instrument is usually paid up-front it also has an impact on achieving a stable interest rate margin.

30. Another approach is to split the portfolio into various layers on the basis of expected prepayments with different hedging strategies for each layer. This includes the determination of an expected maturity structure for the entire portfolio reflecting the expected prepayment behaviour.⁹ On the basis of this structure offsetting funding transactions with ALM are agreed at the current transfer price. ALM essentially treats the resulting tranches as if they were not pre-payable and the business units keep the risk that actual prepayments might be higher or lower than expected.
31. For example, when the bank enters into 100 loans all with a term of 5 years and the expectation is that 20% of the original population will not be prepaid while the remaining part is expected to prepay constantly, the offsetting transaction with ALM would consist of a 5 year tranche of 20 while the maturities for the remaining 80 would reflect the expected prepayments. If the expectations regarding the prepayment speed prove to be right, the interest rate margin is locked in.
32. Another aspect of the described distinction between expected cash flows and prepayment risk (such that ALM manages on a basis that tranches are not pre-payable) is that it allows the management of separate and therefore more homogeneous units that can be created. For example, the repricing risk of pre-

⁹ See also agenda paper 6A of the 11-15 April 2011 IASB meeting that contains a more detailed discussion of risk management approaches addressing prepayment risk on a portfolio basis.

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payable and non-pre-payable financial instruments can be managed in one relatively homogeneous portfolio, which would not be possible without managing prepayment risk as a separate element of interest rate risk.

Core Demand Deposits

33. Similar considerations about uncertain maturity apply to demand deposits. From the perspective of the contractual terms those are short-term in nature as the customers can call balances at short notice. However, past experience usually demonstrates that a core balance of the entire deposit position is stable and long-term. In addition, the contractual interest rates of demand deposits are relatively insensitive to changes in market interest rates. Therefore, core balances of demand deposits are usually considered as mid- or long-term fixed rate positions for risk management purposes. Treating them as short-term positions in line with the contractual terms would ignore the economic behaviour of the position. The assumption that the entire balance could be called on any day would consequently lead to a floating rate position to reflect the potential need for a substitute refinancing at market rates. This approach would contradict the objective of a fixed interest margin given that the expectation regarding the long-term behaviour ('stickiness') is appropriate.
34. The funding unit that holds the demand deposits with the external customers reinvests the proceeds with ALM on the basis of the expected stickiness of the balances or contractual interest rates, if applicable. A typical simple strategy would be to invest a current balance of demand deposits on a roll-over basis in a way that each month or quarter tranches mature that are reinvested. For a portfolio with a balance of 120, an original investment horizon for each tranche of 5 years and monthly maturities of tranches the investment portfolio consists of 60 tranches with a notional of 2. Every month the maturing tranche is reinvested for a new 5 year term. This approach reflects that a core balance is stable in nature as well as the decelerated adjustment of interest rates to changes in market conditions.

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35. As with pre-payable loans there is a correlation between changes in market interest rates and client behaviour. With increasing market rates more investors will look for alternative investment possibilities leading to declining deposit balances unless the interest rates of the deposits are adjusted to retain customers. Also each change in expectation leads to a change in the originally calculated interest margin. ALM manages interest rate risk on the basis of the internal investment portfolio and agreed transfer prices while the risk on the margin from changes in expectations stays with the funding unit. This risk can be mitigated by the use of options or managed on the basis of scenario analyses.
36. The risk management perspective is not to hedge the fair value change of the demand deposits attributable to changes in a benchmark interest rate but to lock in an interest rate margin on the basis of the expected cash flows embedded into an institution-wide strategy.

Other instruments

37. Although pre-payable instruments and demand deposits are the main areas discussed when talking about management of embedded optionality there are other situations in which interest rate risk is managed on the basis of expected cash flows. Examples are:
- (a) **Loan commitments and other liquidity facilities as well as options to extend the term of an existing loan at current terms**—The bank has the obligation to provide funding at fixed interest rates when exercised. They are managed on the basis of the expected behaviour of the customers regarding volume and timing. Similar considerations apply as for pre-payable loans regarding the interaction with changes in interest rates and other factors that might influence customer behaviour.
 - (b) **Financial instruments that provide termination rights to the bank, for example callable liabilities**—In this case the bank can control the early termination (long option), which makes the behaviour easier to predict and manage.

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- (c) **Pipeline trades**—Especially in the retail business the terms for new products are often calculated in advance on the basis of current market conditions. Offering these products for a period of time on the basis of those terms creates a form of constructive obligation. Similar to loan commitments the related interest rate risk is managed on the basis of the expected new transaction volume. Pipeline trades can create significant interest rate risk positions with optionality risk because they may or may not occur.
- (d) **Interaction with credit risk**—Given the segregation of duties interest rate risk management usually does not consider expected losses resulting from defaults. However, because the impact on interest rate risk resulting from a loan default is comparable to a prepayment this risk is also considered.

Internal Derivatives

- 38. Rather than entering into derivative instruments directly with the market many banks use internal transactions with their in-house trading unit as the counterparty. The advantage of this is that it permits all interest rate risk to be aggregated in one central unit. This centralised approach leads to only one unit facing external counterparties for derivatives and, due to offsetting risks, the number of external trades required is usually smaller reducing transaction costs and counterparty risk. As a consequence, counterparty risk is then managed centrally for the entire derivative position by the trading unit.
- 39. In effect, internal derivatives lead to a transfer of the hedged risk from the banking book (here represented by ALM) to the trading unit. Only the risk that results from open positions, if any, remains in the banking book. The trading unit treats the internal derivatives like external ones and incorporates them in their trading activities and risk monitoring. Dependent on the risk limit set for the trading book the risks transferred via internal derivatives are passed on to the market. Banks usually have an incentive to set reasonable risk limits to avoid

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additional capital requirements from regulatory authorities. The consequence of the internal derivative concept is that there is no direct link between the hedged items and the external transactions undertaken by the trading unit. These external transactions are done on an aggregated basis and are essentially the result of two different risk management approaches:

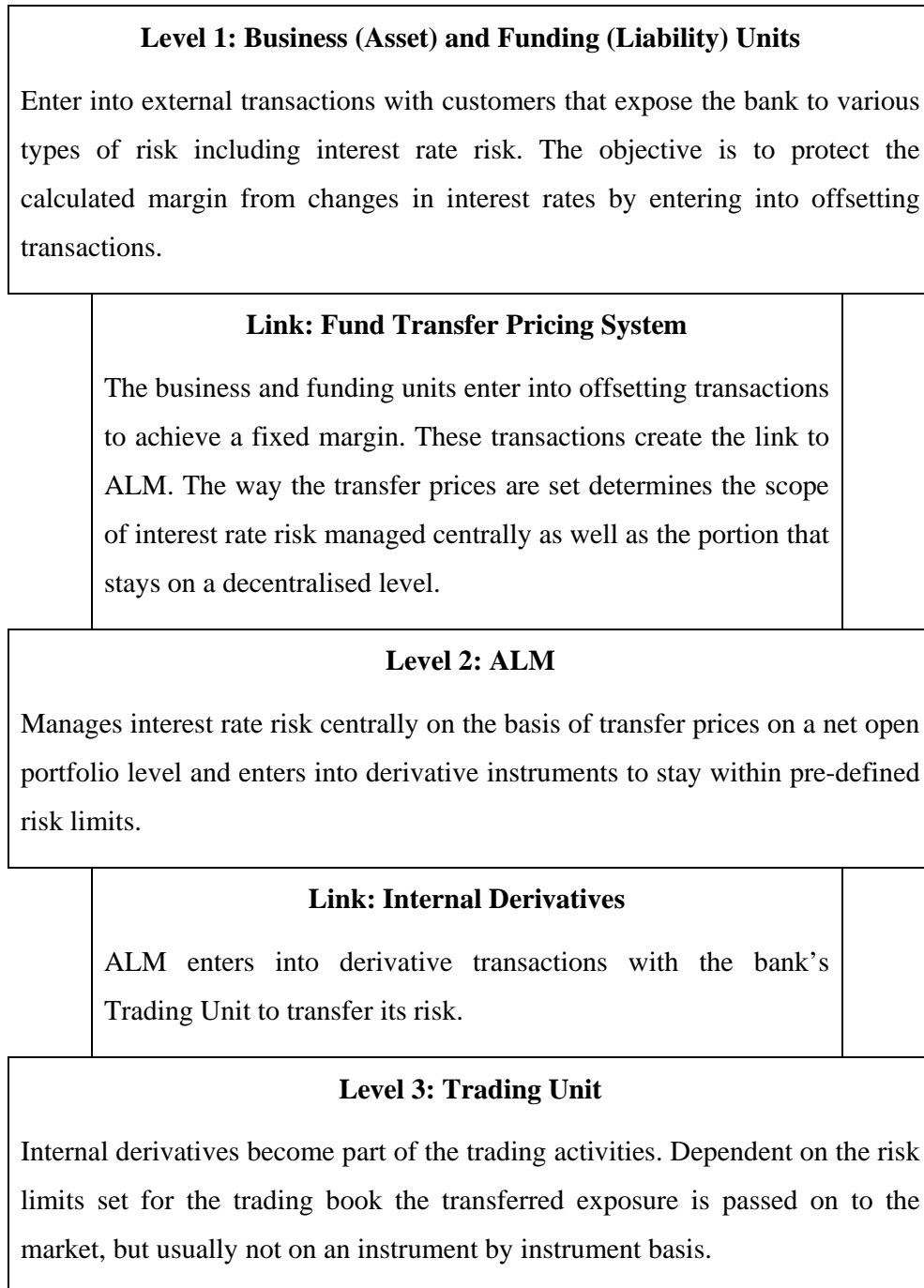
- (a) margin protection of the banking book; and
- (b) short-term profit taking from trading activities, which also leads to differences in the turn-over of the instruments.

40. Internal derivatives are treated like external transactions by the trading unit. To avoid bias or shifts between banking and trading book internal derivatives have to be priced on market terms and are only allowed to hedge (transfer) identified banking book risks. This is usually reflected in the risk management framework and critical for the acceptance by regulators. The consequence of the internal derivative concept is that there is no direct link between the hedged items and the external transactions of the trading unit.

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Summary of the Risk Management Approach

41. The risk management approach as described above can be split into three levels with respective links:



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42. By entering into market transactions at the first level the bank is exposed to various risks like interest rate risk, counterparty risk, liquidity risk, foreign exchange risk and operational risk. The interest rate risk is usually split into elements (repricing risk, yield curve risk resulting from different maturities, risk from different reference rates as well as prepayment risk). When pricing a new transaction the business and funding units determine margin elements that have to be earned to cover these risk elements. To ensure a fixed margin on this level offsetting transactions with ALM are entered into.
43. The terms of the offsetting transactions, especially the maturity and transfer price determine the split of risk between the business and funding units as well as ALM. The approaches taken regarding the level of risk transfer vary. Furthermore the transfer price serves as a basis for the business and funding units for the pricing of their products.
44. ALM at the second level manages the transferred risks on a net basis following an open portfolio approach. The constant change of the portfolio as well as the variety of benchmarks used to set the transfer prices that determine the transferred risk components impact the level of homogeneity of the portfolio. Furthermore, there are time gaps between the changes in the portfolio and the adjustment of the hedging instruments dependent on how closely the portfolio is monitored. Finally, the risk management objective usually is not to hedge the entire risk but to leave open positions within pre-defined risk limits and stress scenarios. These risk limits might be set in a way to reflect the level of inaccuracy one needs to accept when hedging a dynamic portfolio but they might also be widened to allow for significant under- or over-hedges dependent on the risk appetite.
45. The net risk position identified by ALM is transferred to the trading unit using internal derivatives. Usually, the terms of the derivatives have to be at arm's length and are only allowed to transfer identified risks rather than being entered into on a stand-alone basis.

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46. The trading unit serves as counterparty for ALM regarding its hedging instruments. Those are incorporated into the general trading activities in the same way as external derivatives. As a consequence the exposure transferred via internal derivatives is passed on to the market on a comprehensive basis and within pre-defined risk limits. However, as the focus is on the overall risk position and as the usual turn-over of a trading portfolio is higher than the one of the (internal) hedging instruments usually no offsetting derivative positions on an instrument by instrument-basis can be found. Finally, the risk limit concept can lead to situations where the risk transferred through internal derivatives to the trading unit is not completely passed on to the market. In addition, differences regarding the valuation of internal and external derivatives might result from counterparty risk components which have to be considered for the market transactions.