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STAFF PAPER

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Project	Insurance Contracts
Paper topic	Illustrative examples of book yield and effective yield approaches

CONTACT(S)	Conor Geraghty	cgeraghty@ifrs.org	+44 (0)20 7264 0553
	Joanna Yeoh	jyeoh@ifrs.org	+44 (0)20 7462 6481

Purpose of paper

1. In previous board discussions, the IASB directed staff to explore two approaches for determining the interest expense presented in profit or loss and amounts presented in other comprehensive income. These were the book yield and effective yield approaches. Agenda Paper 5A *Book yield and effective yield approaches to presenting interest expense in profit or loss*:

    (a)   describes the different views in how the book yield and effective yield approaches to determining interest expense would be applied; and

    (b)   proposes how to define each approach.

2. This paper illustrates the staff proposed book yield approach and proposed effective yield approach in a number of scenarios in worked examples to assist the IASB in understanding the consequences of each approach. The staff are not making recommendations in this paper.

3. Agenda Paper 5C *Use of OCI for contracts with participating features* and Agenda Paper 5D *Should there be a book yield approach for determining interest expense in profit or loss?* then consider the applicability of the book yield and effective yield approaches, and consider what approaches should be applied in what circumstances.

Structure of paper

4.   This paper is structured as follows:

(a)   In paragraphs 5 to 35 we compare and contrast the results for both approaches in each scenario;

(b)   In paragraphs 36 to 39 we summarise the results and the key points from the illustrative examples; and

(c)   In Appendix A we show workings and the detailed results for each of the illustrative examples.

Examples applying book yield and effective yield approaches in a range of scenarios

5.   The staff have applied the book yield and effective yield approaches to determining interest expense in P&L for contracts with participating features in a range of scenarios.

6.   The main simplified assumptions used in the examples are as follows:

(a)   A single premium of CU1,000 paid at contract inception is immediately invested in zero coupon bonds.

(b)   The contract is a participating contract with duration of six years.

(c)   The entity maintains an account balance for the policyholder. In scenarios 1 to 5 the entity credits an amount each year equal to 90% of the amortised cost returns on the assets (the effective interest rate). The final balance of the account is paid to the policyholder at the end.

(d)   The yield curve is flat throughout the coverage period, ie the same interest rate for all durations at each period end.

(e)   The current interest rate and effective interest rate of the bonds purchased at contract inception is 10% per annum. Market interest rates fall to 9% on the last day of Year 2 in Scenarios 1 to 5.

(f)   There is no guaranteed annual crediting rate on the contract in Scenarios 1 to 5.

(g)   In Scenario 6:

      (i)   Interest rates fall from 10% to 8% at the end of Year 2; and

      (ii)   There is a guaranteed crediting rate of 8.5% pa.

(h)   The risk adjustment is assumed to be immaterial.

(i)   The contractual service margin (CSM) is released on a straight line basis over the contractual term. There is no accretion of interest on the CSM. The examples do not incorporate unlocking of the CSM.

7.   The scenarios are as follows:

(a)   **Scenario 1** Duration match between assets and liabilities – with assets measured at FVOCI.

(b)   **Scenario 2** Duration match – with assets measured at FVPL.

(c)   **Scenario 3** Duration match – with assets measured as a mix of FVOCI and FVPL.

(d)   **Scenario 4** Duration match, assets measured at FVOCI, assets sold and immediately repurchased.

(e)   **Scenario 5** Duration mismatch between assets and liabilities – with assets measured at FVOCI.

(f)   **Scenario 6** The effect of guarantees that are in the money.

8.   The following paragraphs provide a summary of the results of each of the scenarios. Further details, including the balance sheets, are included in Appendix A.

Illustrative examples of the book yield and effective yield approaches in a range of scenarios

9.   The staff discuss the outcome for the book yield and effective yield approaches in each scenario by considering the following:

   (a)   key features of the scenario;

   (b)   comprehensive income over the coverage period;

   (c)   the mechanics of applying each approach; and

   (d)   other relevant points.

Scenario 1: Duration match between assets and liabilities – with assets measured at FVOCI

10.   The key features of the scenario are:

   (a)   Coverage period for the insurance contract and the underlying items— the bonds have the same six year duration, ie there is no mismatch between duration of assets and liabilities.

   (b)   The bonds mature at CU1,772. Policyholders are credited with a return of 9% in each period. In the example, the effective interest rate of the bonds is 10%. Policyholders are paid CU1,677 at the end of Year 6 [CU1,000 x 1.09^6 = CU1,677].

   (c)   The effect of a fall in market interest rates at the end of Year 2 causes amounts to be recognised in OCI for both the bonds and insurance liabilities.

11. Book yield and effective yield are the same throughout the coverage period, consequently net profits and comprehensive income are the same for both approaches.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	100	110	121	133	146	161	100	110	121	133	146	161
Interest expense	(95)	(104)	(115)	(126)	(139)	(152)	(95)	(104)	(115)	(126)	(139)	(152)
Net interest income	5	6	5	6	6	7	5	6	5	6	6	7
Profit	14	15	15	16	17	17	14	15	15	16	17	17
Movements in OCI												
Assets		45	(8)	(10)	(12)	(15)		45	(8)	(10)	(12)	(15)
Liabilities		(43)	8	9	12	14		(43)	8	9	12	14
Net movement in OCI		2	0	(1)	(1)	(1)		2	0	(1)	(1)	(1)
Total Comprehensive Income	14	17	15	15	16	17	14	17	15	15	16	17

12. The net interest income under the book yield approach is constant because the assets are constant and are measured at FVOCI. The net interest income under the effective yield approach is constant because the actual and expected amounts credited to the policyholder do not change during the coverage period.

Scenario 2: Duration match between assets and liabilities – with assets measured at FVPL

13. The key features of the scenario are:

   (a) The cash flows are the same as Scenario 1.

   (b) The bonds are accounted for at FVPL.

   (c) Book yield and effective yield respond differently to a change in market interest rates.

14. The net interest income under the book yield approach are stable whereas effective yield are not

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate												
Unrealised gains on assets	100	155	113	123	134	146	100	155	113	123	134	146
Interest expense	(95)	(147)	(107)	(117)	(127)	(138)	(95)	(104)	(115)	(126)	(139)	(152)
Net interest income	5	8	6	6	7	8	5	51	(2)	(3)	(5)	(6)
Profit	14	17	15	15	16	17	14	60	7	6	4	3
Movements in OCI												
Assets												
Liabilities								(43)	8	9	12	14
Net movement in OCI								(43)	8	9	12	14
Total Comprehensive Income	14	17	15	15	16	17	12	17	15	17	16	17

15. Book yield falls from 10% to 9% in line with current yield on FVPL assets at the end of Year 2. In this example, the book yield and the discount rate used to measure the liability on the balance sheet are the same for each period. Consequently, there are no amounts recognised in OCI.

16. Effective yield is constant throughout the period because the actual and expected amounts credited to the policyholder are based on the effective interest rate of the bonds and not on the fair value gains and losses. There is an accounting mismatch between the investment income and interest expense, which impacts the net profit or loss and the amounts in OCI.

17. An entity could address accounting mismatches by electing to present the effects of changes in discount rates in profit or loss for both the assets and the liabilities.

Scenario 3: Duration match between assets and liabilities – with assets measured at a mix of FVPL and FVOCI

18. The key features of the scenario are:

    (a)   The cash flows are the same as Scenarios 1 and 2.

    (b)   The outcomes are a combination of Scenarios 1 and 2.

19. Net interest income arising from book yield are stable whereas effective yield net interest income are not

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	50	55	61	67	73	81	50	55	61	67	73	81
Unrealised gains	50	78	56	62	67	73	50	78	56	62	67	73
Interest expense	(95)	(125)	(111)	(121)	(133)	(145)	(95)	(104)	(115)	(126)	(139)	(152)
Net interest income	5	8	6	7	7	8	5	29	2	2	1	2
Profit	14	16	15	16	16	17	14	37	11	11	11	10
Movements in OCI												
Assets		23	(4)	(5)	(6)	(7)		23	(4)	(5)	(6)	(7)
Liabilities		(22)	4	5	6	7		(43)	8	9	12	14
Net movement in OCI		1	0	0	0	0		(20)	4	4	5	7
Total Comprehensive Income	14	17	15	15	16	17	14	17	15	15	16	17

20.   Book yield falls from 10% to 9.49% at the end of Year 2 in line with the weighted average accounting return on mixed FVPL and FVOCI assets. This causes a 'catch-up' adjustment in interest expense that offsets the corresponding fair value gain for the FVPL bonds. Book yield avoids accounting mismatches when underlying assets are measured on mixed bases as in this example.

21.   Interest expense calculated in accordance with effective yield is the same as in Scenarios 1 and 2 because the actual and expected amounts credited to policyholders (and hence, expected policyholder payments) do not change. There is an accounting mismatch between the investment income and interest expense, which impacts the net profit or loss and the amounts in OCI.

Scenario 4: Duration match between assets and liabilities – with assets measured at FVOCI and sale and immediate repurchase of assets

22. The key features of the scenario are:

    (a) The policyholder cash flows are the same as Scenarios 1 to 3.

    (b) There is a sale of all assets at the end of Year 3 that causes a realised gain in profit or loss.

    (c) The proceeds are immediately reinvested by purchasing bonds at 9%.

23. Net interest income arising from book yield is stable whereas effective yield is not because interest expense under the effective yield approach does not respond to the bond's realised gains.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	100	110	121	123	134	146	100	110	121	123	134	146
Realised gains on assets			37						37			
Interest expense	(95)	(104)	(150)	(117)	(127)	(138)	(95)	(104)	(115)	(126)	(140)	(152)
Net interest income	5	6	8	6	7	8	5	6	43	(3)	(5)	(6)
Profit	14	15	17	15	16	17	14	15	52	6	4	3
Movements in OCI												
Assets		45	(45)					45	(45)			
Liabilities		(43)	43					(43)	8	9	12	14
Net movement in OCI		2	(2)					2	(37)	9	12	14
Total Comprehensive Income	14	17	15	15	16	17	14	17	15	15	16	17

24.   The sale of assets realises a gain in profit or loss of CU37 that is recycled from OCI. The book yield changes when the assets are sold and repurchased because the effective interest rates of the sold and repurchased assets are different because of a fall in market interest rates at the end of Year 2. The fall in book yield from 10% to 9% when assets are sold at t_3 has the effect of increasing the book value of liabilities by CU35, even though the contract cash flows do not change. Book yield reduces accounting mismatches when the underlying assets are accounted for at cost or FVOCI and then are sold.

25. Interest expense calculated in accordance with effective yield is the same as in Scenarios 1 to 3 because the actual and expected amounts credited to the policyholder do not change. Some think that there is an accounting mismatch between the assets and the liabilities. Others think that this reflects that there is a timing difference between when the gains and losses are recognised for the assets and when those gains and losses are shared with the policyholder. Staff notes that if the gain on a sale of the asset is reflected in the amounts credited to the policyholder in the period (ie it is immediately passed to the policyholder), the effective yield approach produces similar results to the book yield approach.

Scenario 5: Duration mismatch between assets and liabilities, assets measured at FVOCI

26. Unlike scenarios 1 to 4, there is a duration mismatch because the contractual duration of assets purchased (ie four years) is not the same as the six year coverage period of the insurance contract. There is a risk that returns achieved on assets purchased at the end of the six years are less than expected when the contract was sold.

27. The key features of the scenario are:

    (a) Proceeds from asset maturity is reinvested at the end of Year 4 in bonds with an effective interest rate of 9%.

    (b) The expected policyholder payment falls from CU1,677 to CU1,650 at the end of Year 2 when the estimated reinvestment return falls from 10% to 9%.

    (c) The reduction in investment returns in Years 5 and 6 do not trigger guarantees in this scenario – please refer to Scenario 6 to see the effect of guaranteed crediting rates being applied.

28. Profits arising from book yield and effective yield approaches are stable throughout the coverage period.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	100	110	121	133	132	144	100	110	121	133	132	144
Interest expense	(95)	*(106)	(115)	(126)	(125)	(136)	(95)	(104)	(115)	(126)	(126)	(137)
Net interest income	5	4	6	7	7	8	5	6	6	7	6	7
Profit	14	13	15	16	16	16	14	15	15	16	15	15
Movements in OCI												
Assets		22	(10)	(12)				22	(10)	(12)		
Liabilities		(21)	10	12				(23)	9	11	1	1
Net movement in OCI		1	0	(1)				(1)	(1)	(1)	1	1
Total Comprehensive Income	14	14	15	15	16	16	14	14	15	15	16	16

29. The full effect of a change in discount rates and expected cash flows to policyholders is reflected immediately in the current value of liabilities in the balance sheet at the end of Year 2.

30. The effect of a change in discount rates in the reinvestment period is reflected in book yield rates that converge with current rates in the reinvestment period over time. For example, as shown in the workings for Scenario 5 in Appendix A (paragraph 0, the discount factor applied to expected cash flows at the end of Year 2 (t_2) is a product of the effective interest rate of assets held (for two years until they mature) and expected reinvestment rates, ie $1.1^2 \times 1.09^2$. At t_3 the discounting factor is 1.1×1.09^2 and at t_4 it is 1.09^2, ie the reinvestment rate. This 'grading in' of the effect of a change in current discount rates results in interest expense that matches the pattern of corresponding investment income.

31. In this example, the amounts credited to the policyholder are based on the effective interest rate of the bonds. Consequently, the interest expense reflected is consistent with the investment income recognised.

Scenario 6: The effect of guarantees that are in the money

32. The key features of the scenario are the same as in Scenario 5, set out in paragraph 6, except that

    (a) Market interest fall from 10% to 8% at the end of Year 2.

    (b) Therefore, the entity has to pay the guaranteed annual crediting rates of 8.5% per annum in Years 5 and 6.

33. Book yield and effective yield give rise to different patterns of net interest income and OCI.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	100	110	121	133	117	126	100	110	121	133	117	126
Interest expense	(95)	(136)	(118)	(130)	(114)	(123)	(95)	(104)	(115)	(126)	(132)	(144)
Net interest income	5	(26)	3	3	3	3	5	6	6	7	(15)	(18)
Profit	14	(17)	12	12	12	12	14	15	15	16	(6)	(9)
Movements in OCI												
Assets		45	(20)	(25)				45	(20)	(25)		
Liabilities		(44)	20	24				(76)	17	20	18	21
Net movement in OCI		1	0	(1)				(31)	(3)	(5)	18	21
Total Comprehensive Income	14	(16)	12	12	12	12	14	(16)	12	11	12	12

34. Under the book yield approach, the loss in Year 2 can be considered as the effect of a fall in expected asset returns and therefore, the expected losses arising when the guaranteed minimum rate is higher than the asset returns (ie that the guarantee is in the money). In Years 5 and 6 when the asset returns are lower than the guaranteed minimum crediting rates, the net interest income and therefore, net profit or loss, reports a gain. This is because the loss has been previously recognised in Year 2 when it was expected that the asset returns would be lower than the guaranteed minimum crediting rate.

35. The effective yield approach reports losses in Years 5 and 6 when interest expense exceeds investment income – that is the asset returns are insufficient to fund guaranteed policyholder returns. In Year 2 when it was expected that in Years 5 and 6 the asset returns could be lower

than the minimum crediting rate, the effective yield approach recognises a loss in OCI. The staff think that this is consistent with the objective of a cost approach—that the net interest income would record a loss in the years when the actual asset returns are lower than the minimum guaranteed crediting amounts.

Observations

36. In situations when the crediting to the policyholders follows the gains and losses of underlying items arising in profit or loss, both the book yield and the effective yield approaches may produce similar results.

37. However, the book yield reduces more accounting mismatches, in comparison with effective yield, when there are timing differences between when the gains and losses arising from the underlying items are recognised in profit or loss and the amounts credited to the policyholder. This is the case, for example:

    (a)   When the underlying items held are a combination of items accounted for at cost and items accounted for at fair value through profit or loss and the amounts credited to the policyholder are on a 'cost' basis. This is because the book yield approach would reflect the effect of the combination of items. This is illustrated in Scenarios 2 and 3. However, this benefit is only when specified underlying items are at cost (eg bonds, and investment properties when the policyholder shares only in rental yields).

    (b)   When the underlying items are accounted for at cost and a gain or loss is recognised on its sale in profit or loss and those gains and losses are not immediately credited to the policyholder. This is because the book yield approach would result in a corresponding amount recognised in profit or loss for the liability. This is illustrated in Scenario 4.

38. How about when returns on underlying items are lower than the minimum return guarantees? That is the entity credits more to the policyholder than it would based solely on asset returns. In Scenario 6, the entity recognises an immediate loss, with a book yield

approach, when it expects guarantees to result in payments higher than the asset returns. It also results in a positive investment margin, and therefore, profit or loss in the periods when the actual returns are lower than the guaranteed minimum credited rate.

39. The effective yield approach does not result in an immediate loss in profit or loss when guaranteed minimum rate payments are foreseen. Effective yield results in a net loss in the investment margin in the actual periods when the investment returns are lower than and therefore, insufficient to fund the minimum crediting guarantee. A debit is presented in OCI when losses are foreseen and a loss is recognised in the periods when investment income is insufficient to fund the guaranteed minimum rate promised.

Question 1: Illustrative examples

Do the IASB members have any comments or questions on the illustrative examples of the book yield and effective yield approaches in this paper?

Appendix A –Illustrative examples

A1. This appendix provides workings and detailed results to supplement the examples illustrated in the paper.

Scenario 1—duration match and assets at FVOCI

A2. Bonds with six year duration, ie no mismatch between the duration of assets and liabilities.

A3. The bonds mature at CU1,772. Policyholders are paid CU1,677 at the end of Year 6.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	100	110	121	133	146	161	100	110	121	133	146	161
Interest expense	(95)	(104)	(115)	(126)	(139)	(152)	(95)	(104)	(115)	(126)	(139)	(152)
Net interest income	5	6	5	6	6	7	5	6	5	6	6	7
Profit	14	15	15	16	17	17	14	15	15	16	17	17
Movements in OCI												
Assets		45	(8)	(10)	(12)	(15)		45	(8)	(10)	(12)	(15)
Liabilities		(43)	8	9	12	14		(43)	8	9	12	14
Net movement in OCI		2	0	(1)	(1)	(1)		2	0	(1)	(1)	(1)
Total Comprehensive Income	14	17	15	15	16	17	14	17	15	15	16	17

Scenario 1 (continued)

CU	Book Yield							Effective Yield						
	t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_0	t_1	t_2	t_3	t_4	t_5	t_6
Investments at fair value	1,000	1,100	1,255	1,368	1,491	1,625	1,772	1,000	1,100	1,255	1,368	1,491	1,625	1,772
Fulfilment cash flows	947	1,041	1,188	1,295	1,412	1,539	1,677	947	1,041	1,188	1,295	1,412	1,539	1,677
CSM	53	44	36	27	18	9	0	53	44	36	27	18	9	0
Total liabilities	1,000	1,086	1,224	1,322	1,429	1,548	1,677	1,000	1,086	1,224	1,322	1,429	1,548	1,677
Net assets	0	14	31	46	62	78	94	0	14	31	46	62	78	94
Retained profit	0	14	29	44	60	77	94	0	14	29	44	60	77	94
Accumulated OCI - assets			45	37	27	15	0			45	37	27	15	0
Accumulated OCI - liabilities			(43)	(35)	(26)	(14)	0			(43)	(35)	(26)	(14)	0
Accumulated OCI			2	2	1	1	0			2	2	1	1	0
Net equity		14	31	46	62	78	94		14	31	46	62	78	94
Amortised cost – assets	1,000	1,100	1,210	1,331	1,464	1,611	1,772	1,000	1,100	1,210	1,331	1,464	1,611	1,772
FVPL assets														
Total assets at book value	1,000	1,100	1,210	1,331	1,464	1,611	1,772	1,000	1,100	1,210	1,331	1,464	1,611	1,772
Liabilities at book yield/effective yield	947	1,041	1,145	1,260	1,386	1,525	1,677	947	1,041	1,145	1,260	1,386	1,525	1,677
Book/Eff' yield to maturity (per annum)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Account balance	1,000	1,090	1.188	1,295	1,412	1,539	1,677	1,000	1,090	1.188	1,295	1,412	1,539	1,677

Scenario 2—duration match and assets at FVPL

A4.   Like Scenario 1, ie no duration mismatch between assets and liabilities but bonds accounted for at FVPL.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate												
Unrealised gains on assets	100	155	113	123	134	146	100	155	113	123	134	146
Interest expense	(95)	*(147)	(107)	(117)	(127)	(138)	(95)	(104)	(115)	(126)	(139)	(152)
Net interest income	5	8	6	6	7	8	5	51	(2)	(3)	(5)	(6)
Profit	14	17	15	15	16	17	14	60	7	6	4	3
Movements in OCI												
Assets												
Liabilities								(43)	8	9	12	14
Net movement in OCI								(43)	8	9	12	14
Total Comprehensive Income	14	17	15	15	16	17	12	17	15	17	16	17

* includes a catch up adjustment of CU43 caused by a fall in book yield from 10% to 9% pa at the end of Year 2. CU43 is the difference between the present value of expected cash flows are (CU1,677/1.1^4 = CU1,145 and CU1,677/1.09^4 = CU1,188, ie a difference of CU43).

Scenario 2 (continued)

CU	Book Yield							Effective Yield						
	t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_0	t_1	t_2	t_3	t_4	t_5	t_6
Investments at fair value	1,000	1,100	1,255	1,368	1,491	1,625	1,772	1,000	1,100	1,255	1,368	1,491	1,625	1,772
Fulfilment cash flows	947	1,041	1,188	1,295	1,412	1,539	1,677	947	1,041	1,188	1,295	1,412	1,539	1,677
CSM	53	44	36	27	18	9	0	53	44	36	27	18	9	0
Total liabilities	1,000	1,086	1,224	1,322	1,429	1,548	1,677	1,000	1,086	1,224	1,322	1,429	1,548	1,677
Net assets	0	14	31	46	62	78	94	0	14	31	46	62	78	94
Retained profit	0	14	31	46	62	78	94	0	14	74	81	87	92	94
Accumulated OCI - assets										0	0	0	0	0
Accumulated OCI - liabilities										(43)	(35)	(26)	(14)	0
Accumulated OCI										(43)	(35)	(26)	(14)	0
Net equity		14	31	46	62	78	94		14	31	46	62	78	94
Amortised cost – assets														
FVPL assets	1,000	1,100	1,255	1,368	1,491	1,625	1,772	1,000	1,100	1,255	1,368	1,491	1,625	1,772
Total assets at book value	1,000	1,100	1,255	1,368	1,491	1,625	1,772	1,000	1,100	1,255	1,368	1,491	1,625	1,772
Liabilities at book yield/effective yield	947	1,041	1,188	1,295	1,412	1,539	1,677	947	1,041	1,145	1,260	1,386	1,525	1,677
Book/Eff' yield to maturity (per annum)	10%	10%	9%	9%	9%	9%		10%	10%	10%	10%	10%	10%	
Account balance	1,000	1,090	1.188	1,295	1,412	1,539	1,677	1,000	1,090	1.188	1,295	1,412	1,539	1,677

Scenario 3—duration match and mixed measurement assets

A5.   Like scenarios 1 and 2, ie no duration mismatch between assets and liabilities but 50% of assets classified as FVOCI and 50% at FVPL.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	50	55	61	67	73	81	50	55	61	67	73	81
Unrealised gains	50	78	56	62	67	73	50	78	56	62	67	73
Interest expense	(95)	*(125)	(111)	(121)	(133)	(145)	(95)	(104)	(115)	(126)	(139)	(152)
Net interest income	5	8	6	7	7	8	5	29	2	2	1	2
Profit	14	16	15	16	16	17	14	37	11	11	11	10
Movements in OCI												
Assets		23	(4)	(5)	(6)	(7)		23	(4)	(5)	(6)	(7)
Liabilities		(22)	4	5	6	7		(43)	8	9	12	14
Net movement in OCI		1	0	0	0	0		(20)	4	4	5	7
Total Comprehensive Income	14	17	15	15	16	17	14	17	15	15	16	17

* includes a catch up adjustment of CU22 caused by a fall in book yield from 10% to 9.49% pa.[1]

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[1] Present value of expected cash flows are CU1,145 discounted at 10% and CU1,167 discounted at 9.49%, ie a difference of CU22

Scenario 3 (continued)

CU	Book Yield							Effective Yield						
	t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_0	t_1	t_2	t_3	t_4	t_5	t_6
Investments at fair value	1,000	1,100	1,255	1,368	1,491	1,625	1,772	1,000	1,100	1,255	1,368	1,491	1,625	1,772
Fulfilment cash flows	947	1,041	1,188	1,295	1,412	1,539	1,677	947	1,041	1,188	1,295	1,412	1,539	1,677
CSM	53	44	36	27	18	9	0	53	44	36	27	18	9	0
Total liabilities	1,000	1,086	1,224	1,322	1,429	1,548	1,677	1,000	1,086	1,224	1,322	1,429	1,548	1,677
Net assets	0	14	31	46	62	78	94	0	14	31	46	62	78	94
Retained profit	0	14	30	45	61	77	94	0	14	51	63	74	84	94
Accumulated OCI - assets			23	18	13	7	0			23	18	13	7	0
Accumulated OCI - liabilities			(23)	(17)	(13)	(7)	0			(43)	(35)	(26)	(14)	0
Accumulated OCI			1	1	1	0	0			(20)	(17)	(12)	(7)	0
Net equity	0	14	31	46	62	78	94		14	31	46	62	78	94
Amortised cost – assets	500	550	605	666	732	805	886	500	550	605	666	732	805	886
FVPL assets	500	550	628	684	746	813	886	500	550	628	684	746	813	886
Total assets at book value	1,000	1,100	1,233	1,349	1,478	1,618	1,772	1,000	1,100	1,233	1,349	1,478	1,618	1,772
Liabilities at book yield/effective yield	947	1,041	1,167	1,278	1,399	1,532	1,677	947	1,041	1,145	1,260	1,386	1,525	1,677
Book/Eff' yield to maturity (per annum)	10.00%	10.00%	9.49%	9.50%	9.50%	9.50%		10%	10%	10%	10%	10%	10%	
Account balance	1,000	1,090	1.188	1,295	1,412	1,539	1,677	1,000	1,090	1.188	1,295	1,412	1,539	1,677

Scenario 4—realisation of gains

A6.   Like Scenario 1, ie 100% FVOCI assets at the outset with duration that matches contract liability of 6 years, but, in this scenario, the entity sells the bonds at the end of Year 3 and immediately repurchases them.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	100	110	121	123	134	146	100	110	121	123	134	146
Realised gains on assets			37						37			
Interest expense	(95)	(104)	*(150)	(117)	(127)	(138)	(95)	(104)	(115)	(126)	(140)	(152)
Net interest income	5	6	8	6	7	8	5	6	43	(3)	(5)	(6)
Profit	14	15	17	15	16	17	14	15	52	6	4	3
Movements in OCI												
Assets		45	(45)					45	(45)			
Liabilities		(43)	43					(43)	8	9	12	14
Net movement in OCI		2	(2)					2	(37)	9	12	14
Total Comprehensive Income	14	17	15	15	16	17	14	17	15	15	16	17

* includes a catch up adjustment of CU35 caused by a fall in book yield from 10% to 9% pa at the end of Year 3.

Scenario 4 (continued)

CU	Book Yield							Effective Yield						
	t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_0	t_1	t_2	t_3	t_4	t_5	t_6
Investments at fair value	1,000	1,100	1,255	1,368	1,491	1,625	1,772	1,000	1,100	1,255	1,368	1,491	1,625	1,772
Fulfilment cash flows	947	1,041	1,188	1,295	1,412	1,539	1,677	947	1,041	1,188	1,295	1,412	1,539	1,677
CSM	53	44	36	27	18	9	0	53	44	36	27	18	9	0
Total liabilities	1,000	1,086	1,224	1,322	1,429	1,548	1,677	1,000	1,086	1,224	1,322	1,429	1,548	1,677
Net assets	0	14	31	46	62	78	94	0	14	31	46	62	78	94
Retained profit	0	14	29	46	62	78	94	0	14	29	81	87	92	94
Accumulated OCI - assets			45							45				
Accumulated OCI - liabilities			(43)							(43)	(35)	(26)	(14)	0
Accumulated OCI			2							2	(35)	(26)	(14)	0
Net equity	0	14	31	46	62	78	94		14	31	46	62	78	94
Amortised cost – assets	1,000	1,100	1,210	1,368	1,491	1,625	1,772	1,000	1,100	1,210	1,368	1,491	1,625	1,772
FVPL assets														
Total assets at book value	1,000	1,100	1,210	1,368	1,491	1,625	1,772	1,000	1,100	1,210	1,368	1,491	1,625	1,772
Liabilities at book yield/effective yield	947	1,041	1,145	1,295	1,412	1,539	1,677	947	1,041	1,145	1,260	1,386	1,525	1,677
Book/Eff' yield to maturity (per annum)	10%	10%	10%	9%	9%	9%		10%	10%	10%	10%	10%	10%	
Account balance	1,000	1,090	1.188	1,295	1,412	1,539	1,677	1,000	1,090	1.188	1,295	1,412	1,539	1,677

Scenario 5—duration mismatch and assets at FVOCI

A7.   Premium immediately invested in zero coupon bonds with four year duration, ie there is a mismatch between the duration of assets (4 years) and liabilities (6 years).

A8.   Bonds measured at FVOCI. Bond maturity proceeds are used to purchase bonds with two year duration (to mature at t_6). Replacement bonds at t_4 have a book yield of 9%.

A9.   In this example, a constant spread of 0.917% is applied to revised projected crediting rates, for each year to maturity, when estimated returns in the reinvestment period change.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income – effective interest rate	100	110	121	133	132	144	100	110	121	133	132	144
Interest expense	(95)	(106)	(115)	(126)	(125)	(136)	(95)	(104)	(115)	(126)	(126)	(137)
Net interest income	5	4	6	7	7	8	5	6	6	7	6	7
Profit	14	13	15	16	16	16	14	15	15	16	15	15
Movements in OCI												
Assets		22	(10)	(12)				22	(10)	(12)		
Liabilities		(21)	10	12				(23)	9	11	1	1
Net movement in OCI		1	0	(1)				(1)	(1)	(1)	1	1
Total Comprehensive Income	14	14	15	15	16	16	14	14	15	15	16	16

Scenario 5 (continued)

CU	Book Yield							Effective Yield						
	t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_0	t_1	t_2	t_3	t_4	t_5	t_6
Investments at fair value	1,000	1,100	1,232	1,343	1,464	1,596	1,739	1,000	1,100	1,232	1,343	1,464	1,596	1,739
Fulfilment cash flows	947	1,041	1,169	1,274	1,388	1,513	1,650	947	1,041	1,169	1,274	1,388	1,513	1,650
CSM	53	44	36	27	18	9	0	53	44	36	27	18	9	0
Total liabilities	1,000	1,086	1,204	1,300	1,406	1,522	1,650	1,000	1,086	1,204	1,300	1,406	1,522	1,650
Net assets	0	14	28	43	58	74	90	0	14	28	43	58	74	90
Retained profit	0	14	27	42	58	74	90	0	14	29	44	60	75	90
Accumulated OCI - assets			22	12						22	12			
Accumulated OCI - liabilities			(21)	(12)						(23)	(14)	(2)	(1)	0
Accumulated OCI			0	0						(1)	(1)	(2)	(1)	0
Net equity	0	14	28	43	58	74	90		14	28	43	58	74	90
Amortised cost – assets	1,000	1,100	1,210	1,331	1,464	1,596	1,739	1,000	1,100	1,210	1,331	1,464	1,596	1,739
FVPL assets														
Total assets at book value	1,000	1,100	1,210	1,331	1,464	1,596	1,739	1,000	1,100	1,210	1,331	1,464	1,596	1,739
Liabilities at book yield/effective yield	947	1,041	1,147	1,262	1,388	1,513	1,650	947	1,041	1,145	1,260	1,386	1,512	1,650
Book/Eff' yield to maturity (per annum)	10.00%	10.00%	9.499%	9.332%	9.00%	9.00%		10.00%	10.00%	9.545%	9.394%	9.092%	9.092%	
Account balance	1,000	1,090	1.188	1,295	1,412	1,526	1,650	1,000	1,090	1.188	1,295	1,412	1,526	1,650

Scenario 5 (continued)

Workings for book yield

	Liability Current Value		Liability Book Value		OCI
	Discount factor	CU	Discount factor	CU	
t_0 PV of 1,677	1.1^6	947	1.1^6	947	0
t_1 PV of 1,677	1.1^5	1,041	1.1^5	1,041	0
t_2 PV of 1,650	1.09^4	1,169	$1.1^2 \times 1.09^2$	1,147	21
t_3 PV of 1,650	1.09^3	1,274	$1.1^1 \times 1.09^2$	1,262	12
t_4 PV of 1,650	1.09^2	1,388	1.09^2	1,388	0
t_5 PV of 1,650	1.09^1	1,513	1.09^1	1,513	0
t_6 PV of 1,650	1.0	1,650	1.0	1,650	0

Workings for effective yield

	Estimated investment return (effective interest rate)	Policyholder share 90% (crediting rate)	Constant spread for reset at t_2 0.91734%
Year 1	10%	9.0%	
Year 2	10%	9.0%	
Year 3	10%	9.0%	10.0%
Year 4	10%	9.0%	10.0%
Year 5	9%	8.1%	9.09174%
Year 6	9%	8.1%	9.09174%

Annualised effective yield as at the end of Year 2 = $\sqrt[4]{(1.1 \times 1.1 \times 1.0909174 \times 1.0909174)}$ = 1.095449, ie 9.545%pa

Scenario 6 —the effect of guarantees that are in the money

A10.   Like Scenario 5 but interest rates fall to 8% at the end of Year 2. Guaranteed annual crediting rate of 8.5% pa is higher than the returns from the assets in Years 5 and 6.

CU	Book Yield						Effective Yield					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Release of CSM	9	9	9	9	9	9	9	9	9	9	9	9
Interest income - effective interest rate	100	110	121	133	117	126	100	110	121	133	117	126
Interest expense	(95)	(136)	(118)	(130)	(114)	(123)	(95)	(104)	(115)	(126)	(132)	(144)
Net interest income	5	(26)	3	3	3	3	5	6	6	7	(15)	(18)
Profit	14	(17)	12	12	12	12	14	15	15	16	(6)	(9)
Movements in OCI												
Assets		45	(20)	(25)				45	(20)	(25)		
Liabilities		(44)	20	24				(76)	17	20	18	21
Net movement in OCI		1	0	(1)				(31)	(3)	(5)	18	21
Total Comprehensive Income	14	(16)	12	12	12	12	14	(16)	12	11	12	12

∗ includes a catch up adjustment of CU32 caused by a fall in book yield from 10% to 8.99% pa at the end of Year 2 A large loss reported in Year 2 for book yield is caused by an increase the present value of expected cash flows discounted at book yield. If market interest rates had not fallen at

the end of Year 2, the presented value of expected cash flows discounted at book yield would have been CU1,145[2] to CU1,177[3]. The overall effect is a 'catch up adjustment' of CU32 (CU1,177 – CU 1,145).

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[2] Expected cash flows of CU1,677 discounted at book yield of 10% $(1,677/1.1^4=1,145)$

[3] Revised expected cash flows of CU1,662 discounted at book yield of 8.995% $(1,662/1.08995^4=1,177)$

Scenario 6 (continued)

Book Yield

CU	t0	t1	t2	t3	t4	t5	t6
Investments at fair value	1,000	1,100	1,255	1,356	1,464	1,581	1,708
Fulfilment cash flows	947	1,041	1,211	1,319	1,425	1,539	1,662
CSM	53	44	36	27	18	9	0
Total liabilities	1,000	1,086	1,257	1,346	1,442	1,548	1,662
Net assets	0	14	(2)	10	22	34	46
Retained profit	0	14	(3)	9	22	34	46
Accumulated OCI - assets			45	25			
Accumulated OCI - liabilities			(44)	(24)			
Accumulated OCI			1	1			
Net equity	0	14	(2)	10	22	34	46
Amortised cost – assets	1,000	1,100	1,210	1,331	1,464	1,581	1,708
FVPL assets							
Total assets at book value	1,000	1,100	1,210	1,331	1,464	1,581	1,708
Liabilities at book yield/effective yield	947	1,041	1,177	1,295	1,425	1,539	1,662
Book/Eff' yield to maturity (per annum)	10.00%	10.00%	8.995%	8.663%	8.00%	8.00%	
Account balance	1,000	1,090	1,188	1,295	1,412	1,532	1,662

Effective Yield

CU	t0	t1	t2	t3	t4	t5	t6
Investments at fair value	1,000	1,100	1,255	1,356	1,464	1,581	1,708
Fulfilment cash flows	947	1,041	1,211	1,319	1,425	1,539	1,662
CSM	53	44	36	27	18	9	0
Total liabilities	1,000	1,086	1,257	1,346	1,442	1,548	1,662
Net assets	0	14	(2)	10	22	34	46
Retained profit	0	14	29	44	60	55	46
Accumulated OCI - assets			45	25			
Accumulated OCI - liabilities			(76)	(59)	(39)	(21)	0
Accumulated OCI			(31)	(34)	(39)	(21)	0
Net equity	0	14	(2)	10	22	34	46
Amortised cost – assets	1,000	1,100	1,210	1,331	1,464	1,581	1,708
FVPL assets							
Total assets at book value	1,000	1,100	1,210	1,331	1,464	1,581	1,708
Liabilities at book yield/effective yield	947	1,041	1,145	1,260	1,386	1,518	1,662
Book/Eff' yield to maturity (per annum)	10.00%	10.00%	9.545%	9.394%	9.092%	9.092%	
Account balance	1,000	1,090	1,188	1,295	1,412	1,532	1,662