STAFF PAPER

IASB Meeting

Reposted 10 November for minor corrections to pages 13, 20 and 21.

November 2015

Project	Insurance Contracts		
Paper topic	Comparison of the general model and the variable fee approach		
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Purpose of this paper

1. This paper analyses the similarities and differences between the general measurement model and the variable fee approach for insurance contracts, to consider to what extent they can be regarded as a single model. The paper also considers whether further specification is needed for one aspect of the general model, the treatment of discretionary changes that can arise in participating contracts.

Staff recommendations

2. The staff recommend that:

   (a) the variable fee approach should not be amended to include financial guarantees embedded in the insurance contract in the underlying items. This is discussed in paragraphs 7 to 14;

   (b) the general model should not be amended to require or permit the remeasurement of the contractual service margin (CSM) using current discount rates. This is discussed in paragraphs 15 to 27.

3. The results of the recommendations in (a) and (b) would be that there are differences between the general model and the variable fee approach, but the staff think that those differences can justified, as follows:

(a) the different treatment of financial guarantees embedded in the insurance contract follows from the focus of the variable fee approach on contracts under which the entity *shares* the returns on some underlying items with policyholders; and

(b) the remeasurement of the CSM using current discount rates would add complexity to the general model without sufficient benefits to justify it.

4. The staff also recommend that the general model should specify that the effect of discretion to be recognised in the CSM is the change in the expected discretionary cash flows other than that which offsets the effect of a change in market conditions. This is discussed in paragraphs 28 to 41.

Staff analysis

Comparison of general model and variable fee approach

5. Paragraph 19 of Agenda Paper 2 gives a description of the general model and variable fee approach that reflects the different perspectives they take on the entity's obligation to the policyholder. As a result of those different perspectives, the description of the two methods looks very different. However, the overview of the models in Appendix A of Agenda Paper 2 demonstrates that the two methods produce the same measurement for insurance contracts, except for:[1]

(a) the recognition of the effect of changes in market variables on financial guarantees embedded in insurance contracts: under the general model these are recognised in the statement of comprehensive income, under the variable fee approach they unlock the CSM (see paragraphs 7 to 14).

(b) measurement of the CSM after initial recognition: under the general model, the CSM is accreted at a locked-in discount rate and any unlocking adjustments are measured at the locked-in discount rate, under the variable fee approach the CSM is remeasured using current discount rates (see paragraphs 15 to 27).

[1] There is also a difference in presentation in profit or loss and OCI for some insurance contracts under the variable fee approach that qualify for the current period book yield presentation.

6. Hence, the IASB could create a single measurement model for all insurance contracts by both:

   (a) changing the treatment of financial guarantees embedded in insurance contracts under the variable fee approach, so that their effect is recognised in the statement of comprehensive income and

   (b) remeasuring the CSM using current discount rates under the general model.

Financial guarantees embedded in insurance contracts

7. Under the general model, the effect of changes in market variables on financial guarantees embedded in an insurance contract is recognised in the statement of comprehensive income. The effect of the changes will be recognised either in profit or loss, or in both profit or loss and other comprehensive income (OCI), depending on the accounting policy chosen by the entity.[2]

8. Under the variable fee approach, effect of changes in market variables on financial guarantees embedded in an insurance contract have been regarded as part of the variability of the fee for future service, and hence are recognised in the CSM.[3] Once the CSM has reached zero, further adverse effects on the entity of a financial guarantee embedded in an insurance contract will be recognised in profit or loss. At that point the effect of a financial guarantee embedded in an insurance contract will be recognised in the statement of comprehensive income under both the variable fee approach and the general model, albeit as underwriting activity in profit or loss under the variable fee approach and as insurance investment expense in either profit or loss or OCI under the general model.

9. The IASB has tentatively decided that the variable fee approach should apply to contracts for which:

[2] If the entity chooses to recognise insurance investment expense on a cost basis, the effect of using current market assumptions on the financial guarantee will generally be recognised in OCI.

[3] Except if the entity uses a derivative measured at fair value through profit or loss (FVPL) to mitigate the financial market risk from the financial guarantee embedded in the insurance contract, in which case the entity would be permitted to recognise the change in value in the embedded financial guarantee in profit or loss.

(a) the contractual terms specify that the policyholder participates in a defined share of a clearly identified pool of underlying items;

(b) the entity expects to pay to the policyholder an amount equal to a substantial share of the returns from the underlying items; and

(c) a substantial proportion of the cash flows that the entity expects to pay to the policyholder should be expected to vary with the cash flows from the underlying items.

10. In deciding on this scope, the IASB has focused on contracts under which the entity *shares* the returns on some underlying items with policyholders. To the extent that a contract includes a financial guarantee, the entity does not share the returns. To the extent that the financial guarantee kicks in, the returns from the guarantee flow solely to the policyholders. In that respect, the financial guarantee is more like the non-investment cash flows in the contract. Taking this view, financial guarantees are not regarded as part of the underlying items, and condition (c) of the scope is met only if at inception the financial guarantees are not expected to kick in.

11. It would be possible to take a different view on financial guarantees embedded in an insurance contract, and to include them in the underlying items. Doing that would:

(a) extend the scope of the variable fee approach, because condition (c) of the scope would then apply whether or not the financial guarantees were expected to kick in; and

(b) result in the effect of changes in market variables on the financial guarantees being recognised in the statement of comprehensive income as part of the change in value of the underlying items.

So including financial guarantees in an insurance contract in the underlying items would extend the scope of the variable fee approach and make it closer to the general model.

12. However, the approach in paragraph 11 would not be consistent with the key characteristic of the contracts that has driven the IASB's development of the variable fee approach: that the entity *shares* the returns on some underlying assets

with policyholders. The staff note that although the approach in paragraph 11 would reduce the differences between the general model and the variable fee approach, it would not eliminate the differences between the two models because of the remeasurement of the CSM under the variable fee approach. That remeasurement of the CSM is an exception to the general model which the staff do not think should be extended (see paragraphs 15 to 27).

13. Hence, the staff do not recommend that the variable fee approach should be amended to include financial guarantees embedded in an insurance contract in the underlying assets.

14. This paper does not explore all the implications that might arise should the IASB tentatively decide to include financial guarantees embedded in an insurance contract in the underlying items, for example:

(a) the implications for entities choosing to disaggregate changes in market variables between profit or loss and OCI. Including financial guarantees in the underlying items may mean that the entity would not be able to apply the current period book yield as specified or that the current period book yield approach may need to be modified;

(b) the implications for entities that mitigate the financial market risk of financial guarantees embedded in an insurance contract by purchasing a stand-alone derivative. In September 2015 the IASB decided to permit such entities to recognise changes in the financial guarantee embedded in an insurance contract in profit or loss.

Question 1: Treatment of financial guarantees in the variable fee approach
Does the IASB agree that the variable fee approach should not be amended to include financial guarantees embedded in an insurance contract in the underlying assets?

Remeasurement of the CSM using current discount rates

15. Under the variable fee approach, the entity remeasures its obligation to pay the policyholder an amount equal to the fair value of the underlying items, and hence in effect remeasures:

    (a) the fulfilment cash flows; and

    (b) the shareholders' share of the underlying items.

16. Under the general model, the entity:

    (a) remeasures the fulfilment cash flows using current assumptions; and

    (b) accretes and makes adjustments to unlock the CSM using locked-in discount rates.

17. So, remeasuring the shareholders' share of the underlying items under the variable fee approach is the equivalent of remeasuring the CSM under the general model using current discount rates. This is illustrated using an example in Appendix A.

18. The disadvantage of remeasuring the CSM using current discount rates under the general model is that doing so would introduce complexity into the model. The CSM is not the present value of future cash flows. It is the difference between the initial estimate of the fulfilment cash flows and the premium (ie the profit in the contract), updated for changes in cash flows and risk-adjustment that relate to future service. Accreting the CSM at a locked-in discount rate introduces the time-value of money into the allocation of the profit over the life of the contract, and as such is consistent with IFRS 15 *Revenue from Contracts with Customers*. Remeasuring the CSM using current discount rates is harder to explain.

19. First, remeasuring the CSM is not the same as simply accreting the opening balance of the CSM using a current rate. It also involves a catch-up adjustment for the effect that would have arisen if the current discount rate had always applied (see example in Appendix A).[4] Second, remeasuring the CSM can be seen as remeasuring the unrecognised profit in the contract, but the result may not be the same as the profit that would arise in the same contract if issued today. This is because the remeasurement would assume that the specification of the

[4] Entities choosing to present insurance investment expense in profit or loss on a historical cost basis would also need to split the interest accreted at a current rate into a historical cost amount and the remainder.

premium for that contract had not changed in response to changes in market or entity-specific conditions (ie the premium for a contract that had been priced so the entity expected to earn a profit of 10% of the premium would be remeasured on the basis of a 10% profit, even if the market participants or the entity itself were now pricing such contracts using a different percentage profit).

20. For participating contracts under the general model, there are additional complexities in identifying the discount rate to be used. Consider a contract with some fulfilment cash flows that arise from the insurance cover, and some additional cash flows over which the entity has discretion, perhaps linked indirectly to a portfolio of assets. Assume the expected cash flows are as set out below and that the discount rates appropriate to the two sets of cash flows do not change.

	Expected cash flows in 10 years' time	Discount rate	Present value of cash flows t0	Present value of cash flows t1
	A	B	A discounted using B = C	C accreted for one year using B
Insurance cash flows	148	4%	100	104
Discretionary cash flows	79	7%	40	43
Total	227	4.95% (Weighted average of 4% and 7%)	140	147
CSM		?	30	?
Premium		?	170	?

21. The question is what is the appropriate rate to apply to the CSM? If the contract were such that the variable fee applied, the premium would effectively accrue at the rate applicable to the underlying assets, say at 7%, to 182. To achieve the same result, the CSM would need to grow to 35, ie at a rate of 16%, to compensate for the insurance cash flows that accrue only at 4%. At present, under the general model, the CSM is accreted at the rate applicable to the fulfilment cash flows, ie 4.95% in the above example. If we were to require remeasurement of the CSM using current discount rates under the general model, there would be a greater need to specify which rate to use.

22. The advantage of remeasuring the CSM under the general model is that doing so minimises the difference between that model and the variable fee approach. Having a single measurement model for all insurance contracts would reduce complexity in both the Standard and in financial statements. Preparers and users would need to understand only one model rather than two. Further, there would be no need to develop a scope to determine which of the different models applies, avoiding accounting arbitrage issues.

Feedback from constituents

23. The 2013 ED did not specifically ask for feedback on whether the CSM should be remeasured using current discount rates. However, some respondents commented on the matter, or at least on the accretion of interest, some agreeing with the use of the locked-in rate and some disagreeing. (See Agenda Paper 2B July 2014.) We have also received comments since the 2013 ED from some constituents arguing for remeasurement of the CSM. They think that doing so would be:

    (a) more consistent with the measurement of the fulfilment cash flows at current rates;

    (b) better reflect the change in economic cost of adjustments to the CSM;

    (c) be more consistent with the variable fee approach; and

    (d) obviate the need to track locked-in discount rates.

    (See Agenda Paper 2D May 2015 for more detailed discussion.)

24. The ASAF also discussed in July 2015 a paper presented by the AASB and NZASB which proposed accreting and making adjustments to unlock the CSM using current rather than locked-in discount rates. ASAF members had differing views on which rates should be used.

25. The staff note that the arguments in 23(a)–(c) all flow from the view of the CSM taken in the variable fee approach, ie that it can be regarded as similar to a stream of future cash flows, which we discuss further in paragraph 26. On 23(d), the IASB previously noted two finely balanced views relating to complexity:

    (a) The locked-in rate would not introduce additional complexity for entities that track locked-in discount rates to present insurance investment expense at cost in profit or loss. However, it would impose an additional burden on entities that decide to present changes in the discount rates in profit or loss.

    (b) The current rate would be simpler for those entities that decide to present changes in the discount rate in profit or loss. However, if an entity presents the effects of changes in discount rate in OCI, the IASB would need to specify how amounts would reverse from OCI.

Staff conclusion

26. Despite the advantages that would come with a single measurement model, the staff do not recommend remeasuring the CSM under the general model. The staff think that remeasuring the CSM is different from other remeasurements in IFRSs because it treats a residual amount recognised at inception as if it were a future cash flow. The staff think that this exception is justifiable for contracts that fall within the scope of the variable fee approach because:

    (a) the direct link with underlying assets allows the remeasured fee to be explained in a relatively easily understandable way; and

    (b) where the entity and the policyholders share in variable returns, the remeasurement of the fee provides relevant information.

    However, the staff do not think that the exception should be extended beyond the scope of the variable fee approach as currently agreed by the IASB. For contracts

outside that scope, the staff think that remeasurement of the CSM adds substantial complexity that exceeds the benefit of the resulting information.

27. This paper does not explore all the implications that might arise if the IASB tentatively decided to remeasure the CSM under the general model, for example:

    (a) whether entities choosing to present insurance investment expense in profit or loss on a historical cost basis would also need to present:

        (i) in profit or loss the effects of remeasuring the CSM using a cost discount rate; and

        (ii) in OCI the difference between remeasuring the CSM using a current and cost discount rate.

    (b) whether under the premium allocation approach the decision to use the locked in rate to remeasure the liablity for remaining coverage when there is significant financing should also change to a current discount rate.

Question 2: Remeasurement of the CSM in the general model
Does the IASB agree not to require or permit in the general model the remeasurement of the CSM using current discount rates?

Treatment of discretion in participating contracts under the general model[5]

28. In considering the issues discussed above, we identified one aspect of the general model that we think needs to be better specified—the treatment of discretionary cash flows. Participating contracts under the general model will often include cash flows that the entity expects to pay, but which it has the discretion to change. Such cash flows are included in the fulfilment cash flows. The question is how to treat changes in expectations of those discretionary cash flows.

[5] This section assumes that the IASB agrees with the staff recommendation that under the general model the CSM should not be remeasured using current discount rates. The staff have not considered whether such remeasurement would change the conclusions reached in this section.

29. The 2013 Exposure Draft was not explicit on this point, but the implicit understanding was that changes in discretionary cash flows would be recognised in the CSM, because they relate to future service. The issue was further discussed in Agenda Paper 2D May 2015, but no decisions were asked for.

30. We think there are a number of ways of identifying the effect of changes in discretionary cash flows, and that we may need to specify how this should be done.

31. Consider the following simplified example. An entity issues an insurance contract for a premium of 1000 CU and a maturity of 20 years. There is a guaranteed return to policyholders of 2%, with additional return at the entity's discretion. At inception of the contract the entity expects to generate 5% return on assets and to retain a spread of 0.5%, ie to return 4.5% to the policyholders. The entity invests in assets that return a fixed rate of 5% for two years. One day after inception, interest rates fall to 1%. The entity then expects to give the policyholders 4.5% for two years, and then the guaranteed return of 2% thereafter.

32. The fulfilment cash flows and CSM at t0 and t1 are: [6]

	t0		t1 (one day after t0)	
	Cash flows	PV @5%	Cash flows	PV @1%
Cash flow for 2% minimum return	1486	560	1486	1218
Additional cash flows	926	349	74	60
Total	2412	909	1560	1278
CSM		91		
Premium		1000		

[6] As a simplifying assumption, the present value of the guaranteed cash flows and the present value of the additional cash flows are measured using the same discount rate. Under the general model, the entity would measure the cash flows using discount rates that reflected the characteristics of the cash flows.

33. Under the general model, we need to identify separately changes caused by market variables (that are recognised in the statement of comprehensive income), and changes in discretionary cash flows (that are taken to the CSM). To do that, it is necessary to identify what should be regarded as discretion. The staff identified (at least) four ways of doing that in this example, as set out below.

    (a) The entity has promised a 4.5% return but uses its discretion to reduce that return, subject to the guarantee.

    (b) The entity has promised the return on assets it holds, less 0.5% spread, or the guaranteed return if higher. Under this view, it has not used its discretion to change the promise.

    (c) The entity has promised a return based on market conditions, less 0.5% spread, or the guaranteed return if higher. Under this view, it uses its discretion to increase the return to policyholders to 4.5% for the first two years.

    (d) The entity has promised the guaranteed return of 2%. Everything else is the effect of discretion.

34. Having identified what should be regarded as discretionary, we think that the general model would require an entity to:

    (a) measure the expected cash flows assuming that there is no change in the original promise at the current interest rate (recognised as insurance investment expense in profit or loss or OCI), then

    (b) measure the effect of any change in the discretionary cash flows, split into:

        (i) the effect measured at the locked-in rate applicable to the CSM (recognised in the CSM) and

        (ii) the remainder (recognised as insurance investment expense in profit or loss or OCI).

    We think (a) followed by (b) is the appropriate order because often the change in discretionary cash flows will be caused by changes in market variables.

35. Applying that process to the different views of discretion in paragraph 33, gives the following results, which are discussed in paragraphs 36 to 41.

	(a)	(b)	(c)	(d)
Opening fulfilment cash flows (FCF)	909	909	909	909
Change in PV caused by change in discount rate assuming no change in discretionary cash flow, recognised in the statement of comprehensive income (SCI)	1068	369	309	658
Effect of discretion				
• measured at locked-in rate recognised in CSM	(321)	-	28	(321)
• difference between the effect of discretion measured at the locked-in rate and at the current rate, recognised in SCI	(378)	-	32	32
• total effect of discretion	(6998)	0	60	(289)
Closing FCF	1278	1278	1278	1278
Total CSM (see note 1)	(321)	-	28	(321)
Total SCI	690	369	341	690

The calculation of the figures is explained in Appendix B.

Note 1: Two points on the CSM adjustments:

(a) The original CSM was 91 (see paragraph 32). So these adjustments are substantial.

(b) In this example, the adjustments in (a) and (d) are Dr fulfilment cash flows, Cr CSM, in (c) Dr CSM, Cr fulfilment cash flows. So in (a) and (d), the CSM increases and in (c) it is reduced but not exhausted. However, depending on the change in market variables and the change in discretionary cash flows, the adjustments could go either way. If the CSM were reduced to zero, the remainder of any adjustment would be recognised in profit or loss.

36. (a) and (d) give the same overall result. This is because in both cases the total change in the undiscounted expected cash flows is regarded as the result of discretion. Measuring that change at the locked-in rate required for adjustments to the CSM therefore gives the same adjustment.

37. (b) takes the view that there has been no change in the original promise, and hence no change in the exercise of discretion. (c) takes the view that paying a return of 4.5% rather than 2% in the first two years is a change from the original promise, and hence the result of discretion.

38. The different approaches result in different amounts recognised as underwriting activity and as investment activity, because they include changes in different cash flows in the calculation of the effect of changes in market variables. That in turn will affect the timing of insurance investment expense and underwriting income, because the accretion of the CSM will be based on different amounts.

39. We think that each set of figures can be explained and justified, in terms of discretion as set out in paragraph 33. Hence, one option would be to require an entity to specify at the inception of the contract how it viewed its discretion under the contract, and to use that specification to distinguish between the effect of changes in market variables and changes in discretion. However, despite being able to explain the different results, to ensure comparability across entities we think it would be preferable to establish a principle for determining the effect of discretion.

40. We think that neither (a) or (d) faithfully represent the contract, which does not promise either 4.5%, or just 2%, but includes an element of discretion that is expected to be exercised. We think that (b) implies that there is a link between the promise and an identified set of assets, those held by the entity. However, if such a link existed in the contract, the contract would fall under the variable fee approach. Hence we think that (c) gives the most faithful representation of participating contracts that fall under the general model.

41. The principle underlying (c) is that the effect of discretion to be recognised in the CSM is the change in the expected discretionary cash flows other than that which offsets the effect of a change in market conditions.

Question 3: Treatment of discretionary changes under the general model

Does the IASB agree that the effect of discretion to be recognised in the CSM under the general model is the change in the expected discretionary cash flows other than that which offsets the effect of a change in market conditions?

Appendix A: Example to illustrate the effect of remeasuring the CSM under the general model

A1. Consider an insurance contract without participating features that provides coverage for 5 years. For simplicity, assume that there is one expected cash flow, at the end of the 5 year period of 1000 CU, and that the appropriate discount rate is 5%. The premium paid at inception of the contract is 900 CU. The present value of the fulfilment cash flows at inception of the contract is 784 CU, and the CSM is therefore 116 CU. For simplicity also assume that the CSM is released to profit or loss at the end of the coverage period.

A2. Assume first that the cash flows and discount rate do not change in year 1.

A3. Under the general model, the present value of the cash flows grows by 5% and the CSM accretes at a rate of 5%.

	Dr	Cr
Statement of comprehensive income	39	
Fulfilment cash flows		39
Being the increase in fulfilment cash flows (784 x 5%)		
Statement of comprehensive income	6	
CSM		6
Being the accretion of the CSM (116 x 5%)		

A4. The contract can be regarded under the variable fee approach as an obligation to pay the policyholder the expected cash flows, which are 87% (784/900) of the underlying assets, where the underlying assets are risk-free illiquid 5 year fixed rate bonds.

	Dr	Cr
Statement of comprehensive income	45	
Fulfilment cash flows		45
Being the increase in the underlying assets (900 x 5%)		
Fulfilment cash flows	6	
CSM		6
Being shareholders' share of change in underlying assets (45 x 13%)		

A5. If interest rates do not change, the accretion of the CSM under the general model is equivalent to the change in the shareholders' share of the underlying assets in the variable fee approach. At the end of the year, the CSM under both approaches is 122 (116 + 6).

A6. Next assume that interest rates change in year 2 to 2%.

A7. The underlying assets in the variable fee approach (5 year fixed rate bonds yielding 5%) increase in value to 1082 ($900 \times 1.05^5/1.02^3$).

	Dr	Cr
Statement of comprehensive income	137	
Fulfilment cash flows		137
Being the increase in the underlying assets (1082-945)		
Fulfilment cash flows	18	
CSM		18
Being shareholders' share of change in underlying assets (137 x 13%)		

A8. Under the general model, the fulfilment cash flows are remeasured to reflect the new discount rate at 2%, to 942 ($1000/1.02^3$)and the CSM is accreted using the locked-in rate of 5%,

	Dr	Cr
Statement of comprehensive income	119	
Fulfilment cash flows		119
Being the increase in fulfilment cash flows (942-823)		
Statement of comprehensive income	6	
CSM		6
Being the accretion of the CSM (122 x 5%)		

A9. This no longer is the same as the variable fee model. However, the CSM can be regarded as the unrecognised profit in the contract, and remeasured using current discount rates. Taking this view, the CSM at inception represented profit in year 5 of 148 (116×1.05^5), discounted at 5%. That profit of 148 in year 5, discounted at 2% to the end of year 3 is 140 ($148/1.02^3$).

	Dr	Cr
Statement(s) of financial performance	119	
Fulfilment cash flows		119
Being the increase in fulfilment cash flows (942-823)		
Statement(s) of financial performance	18	

CSM		18
Being remeasurement of the CSM (140-122)		

A10. This example illustrates that for contracts without participating features, the general model and the variable approach would be the same, if under the general model the CSM were remeasured using current discount rates. The same principle applies to participating contracts, but with complications because of potential additional features that arise in participating contracts, such as financial guarantees and discretionary features. The impact of these is discussed in the main body of the paper.

Appendix B: Calculations for example of effect of discretion

The following example is given in paragraph 35.

	(a)	(b)	(c)	(d)
Opening FCF	909	909	909	909
Change in PV caused by change in discount rate assuming no change in discretionary cash flow, recognised in SCI	1068[1]	369[2]	309[3]	658[4]
Effect of discretion				
• measured at locked-in rate recognised in CSM	(321)[5]	-	28[6]	(321)[7]
• difference between the effect of discretion measured at the locked-in rate and at the current rate, recognised in SCI	(378)[8]	-	32[9]	32[10]
• total effect of discretion	(6998)[11]	0	60[12]	(289)[13]
Closing FCF	1278	1278	1278	1278
Total CSM	(321)	-	28	(321)
Total SCI	690	369	341	690

Calculations:

1 $1068 = (1000 \times 1.045^{20}/1.01^{20}) - (1000 \times 1.045^{20}/1.05^{20}) = 1977 - 909$

2 $369 = (1000 \times 1.045^{2} \times 1.02^{18}/1.01^{20}) - (1000 \times 1.045^{20}/1.05^{20}) = 1278 - 909$

3 $309 = (1000 \times 1.02^{20}/1.01^{20}) - (1000 \times 1.045^{20}/1.05^{20}) = 1218 - 909$

4 $658 = (1000 \times 1.02^{20}/1.01^{20}) - (1000 \times 1.02^{20}/1.05^{20}) = 1218 - 560$

5 $-321 = (1000 \times 1.045^{2} \times 1.02^{18}/1.05^{20}) - (1000 \times 1.045^{20}/1.05^{20}) = 588 - 909$

6 $28 = (1000 \times 1.02^{20}/1.05^{20}) – (1000 \times 1.045^{2} \times 1.02^{18}/1.05^{20}) = 560 - 588$

7 ~~$-321 = 1.05^{-20}(926-74) = 1.05^{-20}((2412-1486) – (1560-1486)) = 1.05^{-20}(((1000 \times 1.045^{20}) - (1000 \times 1.02^{20})) - ((1000 \times 1.045^{2} \times 1.02^{18}) - (1000 \times 1.02^{20})))$~~

7 ~~-321~~ $= 1.05^{-20}(74-926) = 1.05^{-20}((1560-1486) – (2412-1486)) = 1.05^{-20}(((1000 \times 1.045^{2} \times 1.02^{18}) – (1000 \times 1.02^{20})) - ((1000 \times 1.045^{20}) - (1000 \times 1.02^{20})))$ [order of terms changed to give negative rather than positive answer]

8 $-378 =$ ~~$-$~~ 69~~98~~ (see note 11) – (~~$-$~~321) (see note 5)

9 32 = 60 (see note 12) – 28 (see note 6)

10 32 = 321-~~298~~289 (see table)

11 ~~$-$~~69~~98~~ $= (1000 \times 1.045^{2} \times 1.02^{18}/1.01^{20}) - (1000 \times 1.045^{20}/1.01^{20}) = 1278 - 1977$

12 $60 = (1000 \times 1.045^{2} \times 1.02^{18}/1.01^{20}) - (1000 \times 1.02^{20}/1.01^{20}) = 1278 - 1218$

13 $-289 = ((1000 \times 1.045^{2} \times 1.02^{18}/1.01^{20}) - (1000 \times 1.02^{20}/1.01^{20})) - ((1000 \times 1.045^{20}/1.05^{20}) - (1000 \times 1.02^{20}/1.05^{20})) = (1278-1218) – (909-560) = (60-349)$