LLOYD'S

SOLVENCY II SYNDICATE SCR FOR 2015 YEAR OF ACCOUNT

NUMERICAL EXAMPLES TO SUPPORT THE SCR GUIDANCE

MAY 2014



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PURPOSE

This document provides numerical examples to illustrate the requirements in the <u>SCR Guidance for the</u> <u>2015 Year of Account</u>. It includes no additional requirements or guidance beyond what is covered in the SCR Guidance. It is a supporting document only.

This document incorporates the Supplementary Guidance Notes on Reserve Risk and Discounting that was issued in July 2013. It has been expanded with examples for premium risk. Lloyd's intends to add additional examples in the future. Whilst the examples may include references to specific YOA, agents should assume that they are relevant to the prospective YOA.

Please contact Eric Pizarro (<u>eric.pizarro@lloyds.com</u>) or Jerome Kirk (<u>jerome.kirk@lloyds.com</u>) if you have further questions regarding the contents of this document.

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RESERVE RISK

This note provides numerical illustrations to clarify the treatment of investment income when calculating reserve risk. This calculation must be consistent with the principle that credit for investment income is permitted on assets supporting technical provisions, but not on Funds at Lloyds (FAL). The relevant sections in the Guidance are 5.5 - 5.7. This note is for clarification only and does not introduce any new requirements.

A secondary purpose is to demonstrate two alternative allocations of reserve risk between reserve risk and market risk.

No credit for investment income on FAL

This principle is consistent with previous ICA Guidance and Minimum Standards. The basis for it is that the investment income on FAL belongs to the members; it is not available to the syndicate until FAL is utilised. Furthermore, in some instances FAL may be met in the form of non-interest bearing assets such as LOCs.

The investment income and market risk on FAL are accounted for in the Lloyd's Internal Model (LIM). It is a component of the Society ICA/SCR.

Reserve risk is defined as the risk that reserves will increase (over an ultimate or one year horizon) above current best estimates. The implication of not allowing credit for investment income on FAL is that the capital required to support reserve risk must be derived from the undiscounted reserve deterioration or stress.

Ultimate basis

We will use a highly simplified example to illustrate the treatment of discounting in the calculation of reserve risk. The assumptions are the following.

- Reserve risk is the only risk.
- The risk free rate is 5%.
- The undiscounted best estimate reserves are £100m.
- The discounted best estimate reserves at T0 (31-Dec-13) are £90.31m.
- The risk margin at T0 is £8.04m.
- The expected payments are as shown.



Assets at T0 equal to the discounted best estimate claims of £90.31m would accumulate £9.69m of risk free investment income and would be sufficient to meet the best estimate claim obligations. This is indicated in the table below by the value of nil as the final value of the assets at ultimate (the end of Year 3).

Year	Assets @ start of year	Investment income earned	Claims paid	Assets @ end of year	TOTAL
1	90.31	4.52	20.00	74.83	
2	74.83	3.74	50.00	28.57	
3	28.57	1.43	30.00	0.00	
Total		9.69	100.00		
Risk		0.00	0.00		0.00
Capital required		0.00	0.00		0.00

The "Risk" for claims paid is the excess above the expected (best estimate) claims payments; for investment income, it is the deficit against the expected income. The "Capital required" is equal to the risk on an ultimate basis; it will be equal to the discounted risk on a one year basis, as explained in the next section.

Suppose next that the 1:200 simulated ultimate outcomes for reserves is £150m on an undiscounted basis and £134.81m on a discounted basis.



If assets at T0 are equal to the best estimate liabilities, then there will be a shortfall of £51.51m at the end of Year 3 (ultimate) in the 1:200 outcome. Investment income will be reduced from £9.69m to £8.17m.

Year	Assets @ start of year	Investment income earned	1:200 Claims paid	Assets @ end of year	TOTAL
1	90.31	4.52	25.00	69.83	
2	69.83	3.49	70.00	3.32	
3	3.32	<u>0.17</u>	55.00	-51.51	
TOTAL		8.17	150.00		
Risk		1.51	50.00		51.51
Capital required		1.51	50.00		51.51

The capital requirement (before any adjustment for the risk margin – see below) is £51.51m. This is a result of the principle that no credit for investment income is allowed in the determination of the capital requirement. In other words, the full £51.51m must be held as capital, not the present value of $£51.51m/1.05^3$. The total asset requirement is £51.51m + £90.31m = £141.83m.

We can verify that this amount is sufficient, subject to the requirement that credit for investment income is allowed only on the assets supporting best estimate liabilities (£90.31m).

	Assets @	Investmen	1:200	Assets @
Year	start of	t income	claims	end of
	year	earned (*)	paid	year
1	141.83	4.52	25.00	121.34
2	121.34	3.49	70.00	54.83
3	54.83	<u>0.17</u>	<u>55.00</u>	0.00
TOTAL		8.17	150.00	

(*) Earned on assets supporting non-stressed liabilities only

Lloyd's would accept either of two alternative presentations on the LCR of the total risk of £51.51m (prior to the adjustment for the risk margin).

- The entire £51.51m is allocated to reserve risk.
- £50.00m is allocated to reserve risk and the remaining £1.51m is allocated to market risk.

It is expected that agents will make the allocation that is most convenient in terms of their model design. Agents should state which allocation method they have used in their SCR methodology document. Lloyd's does not intend to make adjustments for different allocation methods when comparing syndicates, due to the low materiality of the foregone investment income component.

With regards to the second allocation method, it is worth noting that the £1.51m does not represent true market risk. This method will simplify the LCR calculations for models in which it is not straightforward to assess the amount by which the total return on assets has been reduced by stressed claim payments alone, and to then reallocate this amount to reserve (or premium) risk.

As noted in 5.6, the discounting credit (or investment income) in the stressed scenario should not exceed the £9.69m realised in the best estimate scenario, which could occur if for example the payment pattern were extended beyond three years.

Next, an adjustment must be made for the assets supporting the risk margin. The risk margin is a liability that must be held on the Solvency II T0 balance sheet under the presumption that it will be paid to a buyer of the claims liabilities at the end of the year. There is no transfer of liabilities on an ultimate basis; therefore, the assets supporting the risk margin (and the returns earned on them) are available to pay claims exceeding the best estimate liability of £90.31m. These assets can be treated as part of the £51.51m that is already funded (see 5.97). (The risk margin is part of the technical provisions, so the interest earned on the supporting assets may be credited to the syndicate. We will not consider this interest here, in order to keep the illustration simple. It is covered in more detail in an FAQ at the end of this note.)



The risk margin must also be offset against the component risks of the SCR in order to ensure that the total agrees with the SCR. The Guidance 5.12 indicates that the risk margin should be offset against reserve risk. Using the second allocation method listed above, the reserve risk shown on the LCR will therefore be \pounds 50.00m - \pounds 8.04m = \pounds 41.96m. The total asset requirement is \pounds 98.35m + \pounds 43.48m = \pounds 141.83m.

LCR Form 309: Ultimate			
Reserve risk 42.0			
Market risk	1.5		
SCR	43.5		

The first allocation method would result in an LCR with both reserve risk and the SCR equal to £43.5m.

A more realistic illustration would include other sources of market risk. For example, if the risk free rate were 3% vs. the expected 5%, the investment income would fall, resulting in an additional market risk.

No diversification credit is shown in this example, since the market risk of £1.51m in the second allocation method varies directly with the reserve risk.

The SCR of £43.5m would be supported by FAL. As stated in 3.6, the market risk on FAL is modelled centrally by Lloyd's.

The following graph summarises the components of the total asset requirement.



One year basis

The one year risk horizon is based on the presumption that liabilities will be transferred to a buyer at the end of the year (T1), who will then put up capital to support the risk of deterioration in the liabilities beyond T1. The buyer will require a price equal to the best estimate liabilities at T1, plus a risk margin that will provide additional returns (above the risk free rate) on the capital that must be held over the expected lifetime of the claims. The capital required at T0 by the current holder of the liabilities is an amount sufficient to cover a 1:200 deterioration in the liabilities from T0 to T1, plus any resulting increase in the risk margin. The best estimates and risk margins at T0 and T1 are calculated as they would be for the Solvency II balance sheets, i.e. on a discounted basis. The calculations for the one year basis capital requirement must therefore also consider discounting, as well as the risk margin cashflows¹.

First we will look at the best estimate scenario. The risk free rate and T0 best estimate claims and risk margin are the same as in the ultimate illustration. The timeline has been expanded from the ultimate illustration to show the risk margin release. For example, £4.06m would be released at T1, £3.37m at T2, and so on. The release of the risk margin provides interest payments to the capital provider on the capital held over the preceding year. The present value of these payments at T0 (£8.04m) is the T0 risk margin.

For convenience, assume that reserves are re-estimated immediately before claims are paid and the risk margin is released. For example, in the timeline below, the discounted reserve held at 31-Dec-14 would be £94.83m. Immediately after booking this amount, £20m would be paid and £4.06m of risk margin released.

¹ The purpose of the illustration is not to demonstrate a rigorous calculation of the risk margin and SCR. The risk margin has been derived using a simple percentage of best estimate reserves.

<u>Risk margin release</u>				
Undiscounted:	8.72	4.06	3.37	1.29
PV @ 31-Dec-13:	8.04	3.87	3.05	1.11
PV @ 31-Dec-14:	8.44	4.06	3.21	1.17
Claims payments				
Undiscounted:	100.00	20.00	50.00	30.00
PV @ 31-Dec-13:	90.31	19.05	45.35	25.92
PV @ 31-Dec-14:	94.83	20_00	47.62	27.21
Year:		0 1	2	3
				(Ultimate)

We can verify that a fund at T0 equal to technical provisions of $\pounds 98.35m$ ($\pounds 90.31m + \pounds 8.04m$) would reduce to an amount equal to technical provisions of $\pounds 79.20m$ ([$\pounds 47.62m + \pounds 27.21m$] + [$\pounds 3.21m + \pounds 1.17m$]) at T1, and that this amount would be sufficient to cover the best estimate liabilities.

Year	Assets @ start of year	Investment income earned	Claims paid	Risk margin released	Assets @ end of year	TOTAL
1	98.35	4.92	20.00	4.06	79.20	
2	79.20	3.96	50.00	3.37	29.80	
3	29.80	1.49	30.00	1.29	0.00	
TOTAL		10.37	100.00	8.72		
Risk		0.00	0.00	0.00		0.00
Capital required		0.00	0.00	0.00		0.00

The table above follows the same format as that used for the ultimate illustration, with the addition of a column for the risk margin release.

Next consider the 1:200 outcome at T1, shown below. The undiscounted claims are £125m. (This is less than the ultimate 1:200 deterioration since the risk horizon is one year vs. three.) The risk margin at T1 is $\pounds 5.35m$ (£3.80m + £1.55m) vs. £4.37m in the best estimate scenario.

<u>Risk margin release</u>					
Undiscounted:	9.77		4.06	3.99	1.71
PV @ 31-Dec-13:	8.97		3.87	3.62	1.48
PV @ 31-Dec-14:	9.42		4.06	3.80	1.55
Claims					
Undiscounted:	125.00		30.00	55.00	40.00
PV @ 31-Dec-13:	113.01		28.57	49.89	34.55
PV @ 31-Dec-14:	118.66		30.00	52.38	36.28
Year:		0	1	2	3
					(Ultimate)

If initial assets at T0 are equal to the best estimate technical provisions, then at T1 the fund will be $\pounds 69.20m$. This is less than the 1:200 technical provisions of $\pounds 94.02m$ ([$\pounds 52.38m + \pounds 36.28m$] + [$\pounds 3.80m + \pounds 1.55m$]) and will be insufficient to cover liabilities by $\pounds 27.36m$, as indicated by net asset value at the end of Year 3.

Year	Assets @ start of year	Investment income earned	1:200 Claims paid	Risk margin released	Assets @ end of year	TOTAL
1	98.35	4.92	30.00	4.06	69.20	
2	69.20	3.46	55.00	3.99	13.67	
3	13.67	0.68	40.00	<u>1.71</u>	-27.36	
TOTAL		9.06	125.00	9.77		
Risk		1.31	25.00	1.05		27.36
Capital required		1.18	22.68	0.95		24.81

The one year capital requirement is the amount that must be held above technical provisions at T0 that is sufficient to ensure that the net asset position at the start of T2 is nil in the 1:200 scenario. This is equivalent to £69.20m plus the "Risk" of £27.36m discounted at the risk free rate to the start of T2, or £24.81m. This amount is FAL, so it cannot be discounted over Year 1, the risk horizon. The one year "Capital required" at T0 is therefore £24.81m. The total asset requirement is £98.35m + £24.81m = £123.16m. The fund at the start of Year 2 will then be equal to the stressed technical provisions of £94.02m.

Note the important distinction: the balance sheets at T0 and T1 are set on a discounted basis; the capital which must be held over the risk horizon is not. (The risk horizon is Year 1 in the one year illustration, and the full three years in the ultimate illustration.)

Year	Assets @ start of year	Investment income earned (*)	1:200 Claims paid	Risk margin released	Assets @ end of year
1	123.16	4.92	30.00	4.06	94.02
2	94.02	4.70	55.00	3.99	39.73
3	39.73	1.99	40.00	1.71	0.00
TOTAL		11.06	125.00	9.77	

(*) Earned on non-stressed liabilities only during Year 1

As with the ultimate case, there are two alternative presentations on the LCR. Under the second allocation method (see the Ultimate illustration), stand-alone reserve risk capital would be £22.68m ("1:200 Claims paid" column in the table above). The £1.18m arising from loss of investment income would be allocated to market risk, as in the ultimate illustration. There is an additional £0.95m of capital arising from increased risk margin release; these reflect the additional returns required by the buyer after T1 as a result of the additional capital held in the 1:200 scenario. This amount should also be allocated to market risk. (In this illustration, the risk margin at T1 is smaller than at T0; in some modelling scenarios, it could be larger, in which case additional capital would be required.)

There are no offsetting adjustments for the risk margin to the total capital required in the one year scenario.

Form 309 would appear as follows (using the second allocation method).

LCR Form 309: One year			
Reserve risk	22.7		
Market risk	2.1		
SCR	24.8		

The first allocation method would result in the full £24.8m being allocated to reserve risk.

The unwinding of the discount is the change in the discounted value of a given liability over time due to changes in the discount factor. In the best estimate scenario at the beginning of this section, the unwind of the discount is from T0 to T1 is £94.83m - £90.31m = £4.52m from reserves and £8.44m - £8.04m = \pounds 0.40m from the risk margin. The Guidance 5.5 states that the unwinding of the discount should not be shown as reserve risk but should be offset against the (equal) returns earned on the supporting assets. The above numerical illustrations implicitly allow for the unwinding of the discount. In the best estimate scenario, the increase in ultimates from T0 to T1 is entirely due to the unwinding of the discount; reserve risk is nil when this is excluded. In the 1:200 scenario, the increase is (£118.66m + £9.42m) – (£90.31m + £8.04m) = £29.73m. This is reduced to £24.81m (the capital required) when the £4.92m unwind is excluded. In both cases, this would offset the return earned on the assets supporting the technical provisions (£98.35m * 5%) over Year 1.

FAQ

1. Our model does not run liabilities to ultimate but instead uses a future balance sheet as a proxy for ultimate. This balance sheet shows the unpaid claims on a discounted basis, in both stressed as well as non-stressed scenarios. Is this approach acceptable to Lloyd's?

It is not acceptable to determine the capital requirement from discounted stressed claims (Guidance 5.5). It is expected that an adjustment would be made to the results from a model that does not run-off to ultimate and includes discounting on stressed claims.

The following is a simplified illustration of how such a "future balance sheet" approach might work. Referring back to the ultimate illustration for the 1:200 outcome, we had the following result.

Year	Assets @ start of year	Investment income earned	1:200 Claims paid	Assets @ end of year	TOTAL
1	90.31	4.52	25.00	69.83	
2	69.83	3.49	70.00	3.32	
3	3.32	<u>0.17</u>	<u>55.00</u>	-51.51	
TOTAL		8.17	150.00		
Risk		1.51	50.00		51.51
Capital required		1.51	50.00		51.51

Suppose that the model does not run off claims until ultimate (end of Year 3), but instead sets the balance sheet at the end of Year 2 using the discounted value of the final claim payment of £55m. If an allowance is also made for the anticipated investment income in Year 3, then the asset value at the end of Year 2 would be £3.32m + £0.17m/1.05 - £55.00m/1.05 = -£48.90m. The capital requirement would be £2.61m less than the correct figure of £51.51m.

Lloyd's would require this result to be adjusted to eliminate the discounting credit. One approximation would be to use the average date of payment of the unpaid claims then unwind the discount on the discounted claims liability and add the result to the capital requirement. In general, it is up to agents to justify the adjustment used.

To clarify, Lloyd's does not have an objection to the general methodology of using a future balance sheet as a proxy for ultimate run-off; the issue is with using discounted claims to determine the capital requirement.

2. How should we treat the investment income earned on the assets supporting the risk margin when calculating the ultimate SCR?

The risk margin is part of the technical provisions, so the assets supporting it and the investment income earned on them should be credited to the syndicate. The benefit from this income should be offset against the market risk component arising from foregone investment income.

In principle, the investment income from the risk margin could be calculated in parallel with the sequential one year calculations, with the income derived from the risk margin held in each simulation. This approach may require a level of modelling complexity not merited by the materiality of the amounts involved.

A simpler approach, illustrated below, would be to increase the investment income by an amount equal to the interest earned on the risk margin held in the best estimate scenario. For example, in the table below, the investment income in Year 2 has been increased by the interest earned on the risk margin that would be held at the start of the year: [£3.21m+1.17m] * 5%. The capital requirement is reduced from £51.51m to £50.78m; the market risk component is reduced from £1.51m to £0.78m.

Year	Assets @ start of year	Investment income earned (*)	1:200 Claims paid	Assets @ end of year	TOTAL
1	90.31	4.92	25.00	70.23	
2	70.23	3.73	70.00	3.96	
<u>3</u>	3.96	<u>0.26</u>	<u>55.00</u>	-50.78	
TOTAL		8.91	150.00		
Risk		0.78	50.00		50.78
Capital required		0.78	50.00		50.78

(*) includes interest on best estimate risk margin

3. Form 314 table 2 shows several sub-risks for market risk. Under which category should the market risk arising from foregone investment be included?

Agents should use the category within market risk that they believe is most appropriate, based on their asset holdings. Please include an explanatory comment in the SCR methodology document.

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PREMIUM RISK

The following examples illustrate the application of discounting to premium risk in a Solvency II environment at Lloyd's. The format is the same as that of the reserve risk illustration.

No credit for investment income on FAL

As stated in the reserve risk example, the investment income on FAL belongs to the members; it is not available to the syndicate until FAL is utilised. For reserve risk, this means that the stand-alone capital must equal the undiscounted 1:200 loss on the run-off of the reserves, plus the undiscounted loss on investment income that occurs at the 1:200 as a result of accelerated claim payments. Conversely, the technical provisions shown on the balance sheet are held on a discounted basis; these assets are part of the syndicate balance sheet.

The same principles apply for premium risk. The future cash flows from policies that have already been bound (i.e. unexpired risks and ULOs) are held on the balance sheet at the mean and discounted at the risk free rate. The capital supporting these policies cannot be discounted. The future cash flows from policies that have not been bound (i.e. new policies to be written in the prospective YOA) is not held on the balance sheet and is not discounted. The syndicate can however claim credit for investment income earned at the risk free rate on the premiums associated with these policies, since the premiums are credited to the syndicate, not members.

In summary: discounting applies to the balance sheet, not to risk.

Ultimate premium risk: LCR definition

Ultimate premium risk is the ultimate loss and allocated expense from cashflows on future claims incurred from coverage provided on unexpired contracts or contracts incepting in the prospective YOA, less the future premiums to be received, net of reinsurance and undiscounted. The mean and 1:200 values of the ultimate premium risk distribution are reported on the LCR.

Ultimate basis: examples

We will consider a single policy that has been written or bound under three different conditions.

- The policy is bound and incepts in the proposed YOA
- The policy is a ULO that is bound in the current YOA and will incept in the proposed YOA
- The policy is an unexpired risk that incepts in the current YOA and will expire in the proposed YOA

As with the reserve risk illustration, these examples are not intended to be realistic representations of syndicate underwriting. Their purpose is to demonstrate the principles of the premium risk calculation for the purposes of reporting on the LCR.

Example 1: Policy incepting in the proposed YOA

The assumptions are the following.

- Premium risk is the only risk.
- The risk free rate is 5%.
- A single one-year policy is written on 1 July 2015.
- The total premium of £100,000 is received on 1 July 2015.
- The expected loss and allocated expense ratio (ULR) is 80%.
- The 1:200 ULR is 150%.
- Claims are incurred and premiums are earned evenly throughout the policy year.
- Claims are paid on 31 December.
- The payment patterns are as shown in the schematic diagrams.

The following schematic summarises the cash-flows for the best estimate scenario.



The cash-flows and balance sheet positions are summarised in the following table.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Assets @ end of period	Profit released @ end of period	Balance sheet contri- bution
Pre-risk horizon amounts already recognised						
Balance sheet position @ T0		0.00	0.00			0.00
Risk horizon						
Cashflows occurring						
Year 1	0.00	-2.47	-96.00	98.47		
Year 2	98.47	-4.92	28.00	75.39		
Year 3	75.39	-3.77	32.00	47.16	31.92	
Year 4	15.24	0.76	<u>16.00</u>	0.00		
TOTAL		-11.92	-20.00			-31.92
Provision for future cashflows on claims incurred		0.00	0.00			0.00
Post-risk horizon						
Provision for future cashflows on unexpired risk		0.00	0.00			
Change in balance sheet during risk horizon		-11.92	-20.00			-31.92
Balance sheet position @ end of risk horizon		-11.92	-20.00			-31.92

(*) Premium received at 1 July of Year 1

The same table will be used for all three premium risk examples, both ultimate and one-year. It contains elements from both the balance sheet and the P&L. It will be suitable for the examples, but is not intended to represent a pro-forma that would be used in a syndicate internal model. We will begin by explaining the contents, line by line.

The Period/item column has been divided into three periods or points in time, as indicated by the shaded rows. The first shaded row relates to the point in time immediately before the start of the risk horizon, i.e. time 0 or T0. The risk horizon is ultimate (i.e. four years). In this example, the policy has not been bound at the start of the risk horizon, so no amounts are recognised at T0. (This will not be the case in the next two examples, which are for a ULO policy and an unexpired risk.) There are no other assets or liabilities to consider at T0, so the balance sheet position is nil.

The second time period is the risk horizon. The items in this period are divided into two parts: cashflows occurring during the risk horizon, and the provision at the end of the risk horizon for expected future cashflows occurring after the end of the risk horizon on claims incurred during the risk horizon. For the ultimate examples, the provision for future cashflows will always be nil.

Beginning with Year 1, the premiums are not received until mid-year, so the assets at the start of Year 1 are nil. The investment income earned on the premium is $\pounds 2.47k$ (= $\pounds 100k * [(1.05)^{0.5} - 1]$). The underwriting cashflows are $\pounds 100k$ of premium less $\pounds 4k$ of claims, or $\pounds 96k$. The assets at the end of Year 1 are the sum of the investment income and the underwriting profit, or $\pounds 98.47k$.

In Year 2, the starting assets are £98.47k. The risk-free rate is 5%, so the investment income is £4.92k. The underwriting cashflow is the £28k of claims paid. The closing assets are £75.39k.

At the end of Year 3, the closing assets are £47.16k. The expected profit at the end of Year 3 is £47.16k - £16.00k/1.05 = £31.92k. This amount is assumed to be returned to members, in agreement with the SCR Guidance (3.18):

"In respect of investment return, the projection to ultimate in the model may recognise compound income in respect of retained profits. We would expect the model to assume that the profit is deemed to be released as recognised annually (on a Solvency II basis) and require that this is no later in full than 36 months on RITC – this should avoid distortion in the results from inclusion of excess investment income up to the final claims payment date and would not reflect the reality of full distribution of profits at Lloyd's..."

If the profit were not released, the starting assets at the beginning of Year 4 would be £46.13k and the investment income earned would be £2.36k instead of £0.76k. The capital release would be £1.60k higher, or £33.52k.

Lloyd's does not expect agents to model the uncertainty in future profits at the time of profit release. For example, at the end of Year 3, the true value of the final claim payment in Year 4 would not be known. If it were estimated at some value other than £16k, say £12k, then the profit release would be £47.16k – \pounds 12.00k/1.05 = £35.73k. The calculated capital requirement would then change. Agents are not required to model this uncertainty, but instead should assume perfect foresight (as shown in the example).

The total cashflows over the ultimate horizon are £11.92k of risk free investment income profit and £20k of underwriting profit (£100k of premium less £80k of claims), for a total profit of £31.92k. This is the amount released at the end of Year 3. Alternatively, this can be seen as the present value of the premium less the claims at T0, accumulated until the end of Year 3 (= [£97.59k - £70.01k]*1.05³).

As noted above, the provision for future cashflows will always be nil in the ultimate case. This is because all cashflows relating to the policy will have occurred.

The third and final time period is the "post risk-horizon". This provision for future cashflows relates to expected cashflows on the unexpired portion of the policy at the end of the risk horizon. These amounts will always be nil in the ultimate case, since at ultimate there will be no unexpired risk and all cashflows will have occurred. This will not always be the case in the one year examples.

The next to last line is the "Change in balance sheet during risk horizon". This is the sum of three items: (1) the cashflows occurring during the risk horizon (£31.92k); (2) the provision for future cashflows on experience incurred during the risk horizon (nil); and (3) the provision for future cashflows on unexpired risk (nil). The total change is £31.92k, comprised of £11.92k of investment income and £20k of underwriting profit.

The final line is "Balance sheet position @ end of risk horizon". This is the change in the balance sheet over the risk horizon (\pounds 31.92k), less any amounts recognised at T0 (nil). This amount represents the expected ultimate profit at the mean. This is profit to the members (capital providers), so it is undiscounted. It is comprised of £11.92k of risk free investment income and £20k of underwriting profit.

The balance sheet position at ultimate is the difference between values at two different points in time: the change in the balance sheet position at ultimate and the balance sheet position at T0. There is no allowance for the time value of money. This is consistent with the principle that no credit is given to the syndicate for investment income on FAL.

We will discuss the presentation of these amounts on the LCR after considering the 1:200 scenario. In this scenario, the loss ratio is 150% vs. 80% at the mean.



The corresponding table for the 1:200 scenario is as follows.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Assets @ end of period	Profit released @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		0.00	0.00			0.00
Risk horizon						
Cashflows occurring						
Year 1	0.00	-2.47	-92.50	94.97		
Year 2	94.97	-4.75	52.50	47.22		
Year 3	47.22	-2.36	60.00	-10.42	0.00	
<u>Year 4</u>	-10.42	0.00	30.00	-40.42		
TOTAL		-9.58	50.00			40.42
Provision for future cashflows on claims incurred		0.00	0.00			0.00
Post-risk horizon						
Provision for future cashflows on unexpired risk		0.00	0.00			0.00
Change in balance sheet during risk horizon		-9.58	50.00			40.42
Balance sheet position @ end of risk horizon		9.58	50.00			40.42
(*) Descriptions as a fixed at 4, by the of Marcin 4	-		-	-		

(*) Premium received at 1 July of Year 1

Starting with Year 1, the investment income is unchanged from the mean scenario, but the underwriting income is £3.50k lower due to the higher claim amounts. At the end of Year 3, the assets are in deficit by \pounds 10.42k, and there is no profit to release. There is no investment income earned in Year 4. In total, the risk free investment income is £2.35k lower and there is an underwriting loss of £50k vs. a profit of £20k. There has been a loss of £40.42 vs. a profit of £31.92k at the mean.

The closing balance sheet position is £40.42k. This is the required capital. We can verify that this amount held as capital at the beginning of Year 1, when added to the assets at the start of Year 1 (nil) would be sufficient to result in a net nil position at the end of Year 4 in the 1:200 scenario, subject to the requirement that credit for risk free investment income is allowed on the premium income, but not the capital.

Year	Assets @ start of period	Investment income @ risk free rate	Underwriting cashflows	Assets @ end of period
1	40.42	-2.47	-92.50	135.39
2	135.39	-4.75	52.50	87.64
3	87.64	-2.36	60.00	30.00
<u>4</u>	30.00	<u>0.00</u>	<u>30.00</u>	0.00
TOTAL		-9.58	50.00	

Investment income earned on premium income only

The presentation of the SCR would be as follows.

Form 310: Ultimate

	Mean	Stress	1:200
SCR	-31.92	72.35	40.42

With regards to the allocation of the total SCR risk between premium and market risk, the SCR Guidance (5.24) states:

"The expected return in Market risk is the total expected returns from the syndicate's assets, allowing for net nil balance sheet at T0 **plus the new premium income**, reduced by the total risk free discounting already allowed for in the booked insurance liabilities."

In this example, the starting assets are nil, and all investment return is derived from the premium income. The entire investment income is therefore allocated to market risk. (If the booked insurance liabilities were not nil at T0, as in the reserve risk examples, then only the return above/below the risk-free rate would be shown for market risk on the starting assets.) Premium risk is shown as the undiscounted claims less premium.

Form 314: Ultimate			
	Mean	Stress	1:200
Premium risk	-20.00	70.00	50.00
Market risk	-11.92	2.35	-9.58

This presentation has the advantage of showing premium risk as the underwriting result only, i.e. exclusive of investment income. This allows for a more transparent comparison of underwriting results between syndicates, or for a given syndicate over time. It also pre-empts the need to separate out the risk free returns earned from premiums from those earned on the remainder of the portfolio. The drawback is that the amount allocated to market risk does not represent true market risk, since it does not arise from movements in market prices or indices. In this respect this presentation is like the second LCR presentation option shown in the reserve risk illustration.

The reserve risk illustration showed the entire risk margin deducted from reserve risk. The current SCR Guidance allows for some of the risk margin to be deducted from premium risk. This would be appropriate if the premium provisions in the technical provisions on the closing balance sheet (T1) are material relative to the claims provisions. Agents may use the allocation method they think most appropriate, and should justify their choice. The new standardised approach for determining post diversification amounts by SCR risk type on the LCR would be one option.

Example 2: ULO policy incepting in the proposed YOA

Policies meeting the Solvency II definition of "Unincepted Legal Obligation" (ULO) are treated differently in terms of the timing of the recognition of their expected profits/losses. For policies recognised as ULOs at T0 (1 January of Year 1), a credit/debit is held on the balance sheet equal to the expected profit/loss on the policy. (For non-life policies, this will normally be a profit; for some life policies it may be a loss.) This credit will be offset by a higher capital requirement of the same amount. It is important to recognise that this is an accounting convention that impacts the allocation of obligations between capital and liabilities only. The impact on the total resource requirement or "capital stack" is minimal, as the illustration will show.

For the purposes of capital modelling, it may be useful to think of a ULO as a policy backed by borrowed capital. The amount of the loan is the expected profit on the policy; this amount is shown on the balance sheet as an asset. The loan is fully collateralised since the syndicate must increase its SCR by the amount of the borrowed capital. Interest is paid to the capital providers (the members) at the risk free rate.

For Example 2, we will use the same policy that was used in Example 1. The only difference is that we will assume that the policy was "bound" in the current YOA (i.e. before the start of Year 1). In Example 1, we assumed that it would be written as part of the prospective YOA, but that it had not yet been legally bound. There is no difference in the timing or amounts of the cashflows, as shown in the timeline below.



The balance sheet positions and cashflows for the mean scenario are as follows.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Assets @ end of period	Profit released @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		-7.58	-20.00			-27.58
Risk horizon						
Cashflows occurring						
Year 1	-27.58	-1.09	-96.00	69.51		
Year 2	69.51	-3.48	28.00	44.99		
Year 3	44.99	-2.25	32.00	15.24	0.00	
<u>Year 4</u>	15.24	<u>-0.76</u>	<u>16.00</u>	0.00		
TOTAL		-7.58	-20.00			-27.58
Provision for future cashflows on claims incurred		0.00	0.00			0.00
Post-risk horizon						
Provision for future cashflows on unexpired risk		0.00	0.00			0.00
Change in balance sheet during risk horizon		-7.58	-20.00			-27.58
Balance sheet position @ end of risk horizon		0.00	0.00			0.00

(*) Premium received at 1 July of Year 1

The balance sheet at T0 shows an asset of £27.58k. This represents the present value at T0 of the expected profit on the policy. It is comprised of £7.58k of discount credit at the risk free rate on the premium and the claims (= [£97.58k - £100k] + [£80k - £70.01k]), plus an underwriting profit of £20k. It is equal to the profit in the mean scenario in Example 1, discounted to T0 (= £31.92k / 1.05^3).

As noted above, a ULO may be thought of as a policy backed by borrowed capital equal to the expected profit on the policy. The syndicate must repay this capital with interest from the profits earned on the policy. The assets shown at the start of Year 1 are therefore -£27.58k, and the investment income earned is the interest on the premium income (\pounds 2.47k as in Example 1) less interest at the risk-free rate on the \pounds 27.58k of borrowed capital (\pounds 1.38k). Since the starting assets are the negative of the expected profit, there is no profit to release at the end of Year 3, and the assets at ultimate are nil.

In the mean scenario, the change in the balance sheet position over the risk horizon is equal to the asset booked at T0. There are therefore no additional profits to release as there were in Example 1, since they have already been credited to the syndicate in the starting balance sheet. This result is indicated by the net nil final balance sheet shown in the final line.

Next, consider the 1:200 scenario.



The capital requirement is £72.35k. The balance sheet has deteriorated by £44.77k over the risk horizon; the syndicate must also return the "borrowed capital" of £27.58k. The requirement is £31.92k higher than the £40.42k calculated in Example 1. As noted, the present value at T0 of £31.92k is £27.58k, the amount already credited to the opening balance sheet.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Assets @ end of period	Profit released @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		-7.58	-20.00			-27.58
Risk horizon						
Cashflows occurring						
Year 1	-27.58	-1.09	-92.50	66.01		
Year 2	66.01	-3.30	52.50	16.81		
Year 3	16.81	-0.84	60.00	-42.35	0.00	
<u>Year 4</u>	-42.35	0.00	30.00	-72.35		
TOTAL		-5.23	50.00			44.77
Provision for future cashflows on claims incurred		0.00	0.00			0.00
Post-risk horizon						
Provision for future cashflows on unexpired risk		0.00	0.00			0.00
Change in balance sheet during risk horizon		-5.23	50.00			44.77
Balance sheet position @ end of risk horizon		2.35	70.00			72.35

(*) Premium received at 1 July of Year 1

We can verify that this amount held as capital at the beginning of Year 1, plus the starting assets of (£27.58k), would be sufficient to result in a net nil position at the end of Year 4.

Year	Assets @ start of period	Investment income @ risk free rate	Underwriting cashflows	Assets @ end of period
1	44.77	-1.09	-92.50	138.36
2	138.36	-3.30	52.50	89.16
3	89.16	-0.84	60.00	30.00
<u>4</u>	30.00	<u>0.00</u>	<u>30.00</u>	0.00
TOTAL		-5.23	50.00	

Investment income earned on premium income only

It was noted at the start of this example that there is a small difference in the capital stack when a policy is defined as a ULO vs. unincepted but not bound. The capital stack in Example 2 is £44.77k vs. £40.42k in Example 1. The difference of £4.35k can be thought of as the interest that the syndicate must pay at the risk free rate on the borrowed capital of £27.58k (£4.35k = £27.58k * $[1.05^3 - 1]$).

Form 314 would appear as follows.

Form 310: Ultimate			
	Mean	Stress	1:200
SCR	0.00	72.35	72.35
Form 314: Ultimate			
Form 314: Ultimate	Mean	Stress	1:200
Form 314: Ultimate Premium risk	Mean 0.00	Stress 70.00	1:200 70.00

As noted, the SCR is higher when the policy is deemed to be a ULO. Lloyd's will take into consideration the proportion of policies written as ULOs during the SCR review process.

Example 3: Unexpired policy

For Example 3, we will assume that the policy incepts 1 July of the current YOA (i.e. in the year prior to Year 1). The premium would be received on 1 July, but at T0 only half of the claims will have been incurred. The timeline below shows the cashflows on the unexpired portion of the policy.



In the ULO example, an asset was shown on the opening balance sheet equal to the expected future cashflows on the policy; this was offset by a (negative) starting asset of the same amount. In this example, the policy has also been bound prior to T0 (it has already incepted), so we must show a liability on the opening balance sheet equal to the expected future cashflows; this will similarly be offset by a starting asset of the same amount. (Note that in this example we are interested only in the future cashflows on the unexpired risk, not the cashflows relating to claims incurred as at T0. In Solvency II language, we are considering the premium provisions, not the claims provisions.)

The liability shown on the balance sheet is \pounds 40k of future claims offset by \pounds 3.69k of discount credit; the total liability is \pounds 36.31k. This is matched by a starting asset of the same amount.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Assets @ end of period	Profit released @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		-3.69	40.00			36.31
Risk horizon						
Cashflows occurring						
Year 1	36.31	-1.82	12.00	26.12		
Year 2	26.12	-1.31	16.00	11.43		
Year 3	11.43	-0.57	12.00	0.00	0.00	
<u>Year 4</u>	0.00	0.00	0.00	0.00		
TOTAL		-3.69	40.00			36.31
Provision for future cashflows on claims incurred		0.00	0.00			0.00
Post-risk horizon						
Provision for future cashflows on unexpired risk		0.00	0.00			0.00
Change in balance sheet during risk horizon		-3.69	40.00			36.31
Balance sheet position @ end of risk horizon		0.00	0.00			0.00

(*) Assets supporting TPs at T0

In the mean scenario, the claims experience is exactly offset by the starting assets and the investment income earned on them. The final balance sheet position is nil; there is no profit release or loss.

Next consider the 1:200 scenario.



The asset position at the end of Year 4 will be a deficit of £36.78k. In other words, there is a deterioration of £73.08k over the risk horizon, of which £36.31k has already been recognised.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Assets @ end of period	Profits released @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		-3.69	40.00			36.31
Risk horizon						
Cashflows occurring						
Year 1	36.31	-1.82	22.50	15.62		
Year 2	15.62	-0.78	30.00	-13.60		
Year 3	-13.60	0.68	22.50	-36.78	0.00	
Year 4	-36.78	0.00	0.00	-36.78		
TOTAL		-1.92	75.00			73.08
Provision for future cashflows on claims incurred		0.00	0.00			0.00
Post-risk horizon						
Provision for future cashflows on unexpired risk		0.00	0.00			0.00
Change in balance sheet during risk horizon		-1.92	75.00			73.08
Balance sheet position @ end of risk horizon		1.78	35.00			36.78
			-	-		

(*) Assets supporting TPs at T0

As before, we can verify that a capital stack of £36.78k of capital plus the starting assets of £36.31k will be sufficient to result in a net nil balance sheet position at the end ultimate.

Year	Assets @ start of period	Investment income @ risk free rate	Underwriting cashflows	Assets @ end of period
1	73.08	-1.82	22.50	52.40
2	52.40	-0.78	30.00	23.18
3	23.18	0.68	22.50	0.00
<u>4</u>	0.00	<u>0.00</u>	0.00	0.00
TOTAL		-1.92	75.00	

Investment income earned on premium income only

The presentation on the LCR would be as follows.

	Mean	Stress	1:200
SCR	0.00	36.78	36.78

Form 314: Ultimate

	Mean	Stress	1:200
Premium risk	0.00	35.00	35.00
Market risk	0.00	1.78	1.78

One year premium risk: LCR definition

One year premium risk is the loss and allocated expense from cashflows on future claims incurred during the next calendar year from coverage provided on unexpired contracts or contracts bound in the prospective YOA, less the future premiums to be received, net of reinsurance and undiscounted. The mean and 1:200 values of the one year premium risk distribution are reported on the LCR.

One year basis: examples

We will consider the same three policies used in the ultimate examples. The tables used to calculate the capital requirement will follow the same format. Two significant differences from the ultimate examples are the risk margin requirement and a lower 1:200 ULR (135% vs. 150%).

Example 1: Policy incepting in the proposed YOA

The schematic below divides the claim and expense payments into two parts: those incurred during the horizon (i.e. as at T1), and those incurred after the risk horizon. This presentation will facilitate explanation of Solvency II valuation, according to which all bound but unexpired risk is held on the balance sheet at its expected value. The risk margin releases are divided in the same way. This division was of course unnecessary in the ultimate examples, since all claims were incurred during the risk horizon.

The mean loss ratio is 80%, as in Example 1 for the ultimate case. The total claim payments at each year end agree with those in the ultimate example.

A risk margin must be established at 31 December of the first year. It is the present value of the risk margin releases at T1. The present value of the risk margins associated with the future payments on claims incurred as at T1 is £1.43k at T0, or £1.50k at T1. The present value of the releases associated with the (expected) future incurred claims is £1.97k at T1. The risk margin at T1 is therefore £3.48k. The risk margin has been set equal to 5% of the present value of future claims payments at T1 (£35.43k*1.05 + £36.31k = £69.51k). This amount was selected arbitrarily; as in the one year reserve risk examples, the purpose of the examples is to demonstrate treatment of the cashflows, not a rigorous calculation of the margin.



The policy is not bound at T0, so no amounts are recognised on the balance sheet at that time. The cashflows in Year 1 are the same as in the ultimate example. The risk horizon ends at the end of Year 1, however, so a provision must be made on the balance sheet at T1 for future cashflows associated with claims incurred as at T1. The future underwriting cashflows are £36k for the claim payments at the end of Years 2 through 4; the future risk margin releases are £1.62k. As in the reserve risk examples, the future "investment income" is the discount credit at the risk free rate on the future claims payments and risk margin releases (£2.91k = [£36k - £33.21k] + [£1.62k - £1.50k]). The total provision related to claims incurred as at T1 is £34.71k.

Similarly, a provision must be made for the future cashflows related to claims occurring after T1. As shown in the schematic, these are £40k of future claims, £2.14k of risk margin release, and £3.86k (= $[\pounds40k - \pounds36.31k] + [\pounds2.14k - \pounds1.97k]$) of discount credit. The total provision for future cashflows on unexpired risk is £38.28k.

The total change in the balance sheet position from T0 to T1 is £98.47k from profit realised in Year 1 less £34.71k plus £38.28k of additional liabilities for future cashflows. This is a net improvement in the balance sheet position of £25.48k.

There are no amounts recognised at T0, so the balance sheet position at T1 is a net asset of £25.48k. This is the profit to members on a Solvency II basis after one year.

We can compare this amount to the mean profit in the ultimate case. If the risk margin releases and the associated discount benefit are excluded, then the one year mean profit is $\pounds 25.48k + \pounds 3.75k - [\pounds 1.62k - \pounds 1.43k * 1.05] - [\pounds 2.14k - \pounds 1.97k] = \pounds 28.96k$. The value of this amount accumulated at the risk free rate from the end of Year 1 to the end of Year 3 is $\pounds 28.96k * 1.05^2 = \pounds 31.92k$, the profit released at the end of Year 3 in the ultimate example.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under writing cashflows	Risk margin release	Assets @ end of period	Balance sheet contri bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		0.00	0.00	0.00		0.00
Risk horizon						
Cashflows occurring						
Year 1	0.00	<u>-2.47</u>	<u>-96.00</u>	0.00	98.47	
TOTAL		-2.47	-96.00	0.00		-98.47
Provision for future cashflows on claims incurred		-2.91	36.00	1.62		34.71
Post-risk horizon						
Provision for future cashflows on unexpired risk		-3.86	40.00	2.14		38.28
Change in balance sheet during risk horizon		-9.23	-20.00	3.75		-25.48
Balance sheet position @ end of risk horizon		-9.23	-20.00	3.75		-25.48

(*) Premium received at 1 July of Year 1

Next consider the 1:200 scenario. The ULR is 135% vs. 80% at the mean. The claims incurred as at T1 have increased proportionately (135%/ 80% * 40.00k = £67.5k); the risk margin releases associated with these claims have also increased, from £1.62k to £2.84k. Note however that the future claims payments and margin releases on experience after T1 have not changed from the best estimate scenario. This is consistent with the Solvency II principle that capital must be held only to cover the potential adverse outcomes on claims incurred over a one year horizon; experience on business bound at T1 beyond the one year horizon is assumed to occur at the mean (see 2.16 - 2.19 of the SCR Guidance). It may seem counter-intuitive to disregard the "earned" experience as at T1 when estimating the liability for claims incurred after T1. (For some types of policies, such as a natural catastrophe cover, it may seem more appropriate.) In Solvency II, however, there is no concept of earned vs. unearned; the distinction is between cashflows on bound vs. unbound business.



Turning to the capital calculation, it can be seen that the profit realised during the risk horizon has decreased slightly (\pounds 95.72k vs. \pounds 98.47k at the mean); the provision for cashflows on unexpired risk (\pounds 38.28k) has not changed, as noted. The provision for cashflows on claims incurred as at T1 has increased from \pounds 34.71k to \pounds 58.68k. The 1:200 capital requirement is \pounds 1.24k.

The total asset from risk free investment income has increased in the 1:200 scenario, from £9.23k at the mean to £11.24k. This may appear to contradict the rule that no credit for investment income is taken when determining the capital requirement. As stated in the reserve risk examples, however, this rule only applies to change in balance sheet positions over the risk horizon (from T0 to T1). The balance sheets at T0 and T1 are themselves set on a discounted basis. In this example, the discount credit on claims incurred as at T1 has increased from £2.91k at the mean to £4.91k. This credit is expected to increase, given the higher claim amounts.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Risk margin release	Assets @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		0.00	0.00	0.00		0.00
Risk horizon						
Cashflows occurring						
Year 1	0.00	<u>-2.47</u>	<u>-93.25</u>	0.00	95.72	
TOTAL		-2.47	-93.25	0.00		-95.72
Provision for future cashflows on claims incurred		-4.91	60.75	2.84		58.68
Post-risk horizon						
Provision for future cashflows on unexpired risk		-3.86	40.00	2.14		38.28
Change in balance sheet during risk horizon		-11.24	7.50	4.98		1.24
Balance sheet position @ end of risk horizon		-11.24	7.50	4.98		1.24

(*) Premium received at 1 July of Year 1

The one year requirement is significantly smaller than the £40.42k required on an ultimate basis. This is due to: (1) the lower loss ratio, and (2) the post-T1 cashflows being booked at the mean ULR instead of the 1:200. In order to demonstrate consistency between the one year and ultimate examples, we have recalculated the one year requirement below assuming: (1) a ULR of 150%; (2) that cashflows on experience beyond T1 occur at the 150% ULR; and (3) no risk margin.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Risk margin release	Assets @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		0.00	0.00	0.00		0.00
Risk horizon						
Cashflows occurring						
Year 1	0.00	<u>-2.47</u>	<u>-92.50</u>	0.00	94.97	
TOTAL		-2.47	-92.50	0.00		-94.97
Provision for future cashflows on claims incurred		-5.24	67.50	0.00		62.26
Post-risk horizon						
Provision for future cashflows on unexpired risk		-6.92	75.00	0.00		68.08
Change in balance sheet during risk horizon		-14.63	50.00	0.00		35.37
Balance sheet position @ end of risk horizon		-14.63	50.00	0.00		35.37

(*) Premium received at 1 July of Year 1

The revised capital of £35.37k accumulated to the end of Year 4 (ultimate) is $£35.37k \times 1.05^3 = £40.94k$. This is equal to the ultimate capital requirement of £40.42k plus £0.52k (= £10.42k * 5%) of negative cashflows that are excluded in Year 4 by the constraint that investment income is non-negative. This reconciliation demonstrates the consistency between the one year and ultimate treatment of the cashflows. We will not repeat the demonstration for the two remaining examples.

Returning to the one year capital calculation, we can verify that a capital stack of £1.24k plus starting assets of nil will be sufficient to cover the liabilities in the 1:200 outcome. The assets at the end of Year will be £96.96k, which is equal to the balance sheet liability of £58.68k + £38.28k = £96.96k at T1.

Year	Assets @ start of year (+)	Investment income @ risk free rate	Underwriting cashflows	Risk margin released	Assets @ end of year
1	1.24	-2.47	-93.25	0.00	96.96
(+) Earned on pre	mium income only				

The presentation on the LCR follows that in the ultimate examples.

Form 310: One Year

	Mean	Stress	1:200
SCR	-25.48	26.72	1.24

As noted above, the profit shown on market risk actually increases at the 1:200. This reflects the higher discount credit. It should be emphasised that this example shows only two sources of market risk: the return on premiums in Year 1 and the discount credit. It is not expected that market risk would show a profit at the 1:200 in a more realistic example including other sources of market risk such as changes in interest rates and foreign exchange risk.

Form 314: One Year

	Mean	Stress	1:200
Premium risk	-20.00	27.50	7.50
Market risk	-9.23	-2.01	-11.24

Example 2: ULO policy incepting in the proposed YOA

The policy is the same as that used in the ultimate example. The schematic divides the cashflows into pre- and post-T1, as in the previous one year example. The premium, claims and risk margin releases are the same.



As in the ultimate example, a credit against the liabilities equal to the present value of the expected profit on the policy is shown on the balance sheet at T0. The amount recognised for underwriting cashflows is the same as in the ultimate case; the risk margin releases are shown in the schematic. The amounts shown for investment income is equal to the \pounds 7.58k shown in the ultimate example, plus \pounds 0.44k (= $[\pounds1.62k - \pounds1.43k] + [\pounds2.14k - \pounds1.97k/1.05]$) from the discount credit on the risk margin releases. The total credit at T0 is \pounds 24.27k.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Risk margin release	Assets @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		-8.02	-20.00	3.75		-24.27
Risk horizon						
Cashflows occurring						
Year 1	-24.27	<u>-1.26</u>	<u>-96.00</u>	0.00	72.99	
TOTAL		-1.26	-96.00	0.00		-97.26
Provision for future cashflows on claims incurred		-2.91	36.00	1.62		34.71
Post-risk horizon						
Provision for future cashflows on unexpired risk		-3.86	40.00	2.14		38.28
Change in balance sheet during risk horizon		-8.02	-20.00	3.75		-24.27
Balance sheet position @ end of risk horizon		0.00	0.00	0.00		0.00

(*) Premium received at 1 July of Year 1

The credit against the liabilities is offset by an equal debit to the assets at T0. The risk free investment income earned in Year 1 is \pounds 2.47k earned on the invested premiums, less 5% on the "borrowed capital" of \pounds 24.27k. The change in the balance sheet position over Year 1 is exactly equal to the credit booked at T0. The net profit is nil, as in the ultimate case.

Next, consider the 1:200 scenario.



The capital requirement is £26.72k. This can be reconciled to the requirement of £1.24k in example 1 as follows: £26.72k less £1.21k for the interest paid on £24.27k in Year 1, less £24.27k for the amount recognised on the balance sheet at T0.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Risk margin release	Assets @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		-8.02	-20.00	3.75		-24.27
Risk horizon						
Cashflows occurring						
<u>Year 1</u>	-24.27	<u>-1.26</u>	<u>-93.25</u>	<u>0.00</u>	70.24	
TOTAL		-1.26	-93.25	0.00		-94.51
Provision for future cashflows on claims incurred		-4.91	60.75	2.84		58.68
Post-risk horizon						
Provision for future cashflows on unexpired risk		-3.86	40.00	2.14		38.28
Change in balance sheet during risk horizon		-10.03	7.50	4.98		2.45
Balance sheet position @ end of risk horizon		-2.01	27.50	1.23		26.72

(*) Premium received at 1 July of Year 1

We can verify that a capital stack of $\pounds 2.45k$ (= $\pounds 26.72k - \pounds 24.27k$) will be sufficient to cover the liabilities in the 1:200 outcome. The assets at the end of Year would be $\pounds 96.96k$, which is equal to the total liabilities ($\pounds 58.68k + \pounds 38.28k$) at T1.

Year	Assets @ start of year (+)	Investment income @ risk free rate	Underwriting cashflows	Risk margin released	Assets @ end of year
1	2.45	-1.26	-93.25	0.00	96.96

(+) Earned on premium income only

The LCR presentation would be as follows.

Form 310: One Year							
	Mean	Stress	1:200				
SCR	0.00	26.72	26.72				

Form 314: One Year

	Mean	Stress	1:200
Premium risk	0.00	27.50	27.50
Market risk	0.00	-2.01	-2.01

Example 3: Unexpired policy

As noted in the ultimate example, the premium is assumed to have been received on 1 July of the year preceding T0. The amount recognised on the balance sheet at T0 is £37.55k. These are the technical provisions for the policy. This amount is equal to the £36.31k held in the ultimate case, plus £1.39k for risk margin releases, less £0.15k of discount credit on the releases.

The risk margin has been set at 5% of discounted claims, as in the previous examples; it is smaller however is due to the lower amount of claims outstanding.



The expected profit is nil, as in the ultimate case.

Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Risk margin release	Assets @ end of period	Balance sheet contri- bution
	-3.84	40.00	1.39		37.55
37.55	<u>-1.88</u>	<u>12.00</u>	0.00	27.43	
	-1.88	12.00	0.00		10.12
	-1.96	28.00	1.39		27.43
	0.00	0.00	0.00		0.00
	-3.84	40.00	1.39		37.55
	0.00	0.00	0.00		0.00
	Assets @ start of period (*) 37.55	Assets @ start of period (*) Investment income @ risk free rate	Assets @ start of period (*)Investment income @ risk free rateUnder- writing cashflows	Assets @ start of period (*) Investment income @ risk free rate Under- writing cashflows Risk margin release	Assets @ start of period (*) Investment income @ risk free rate Under- writing cashflows Risk margin release Assets @ end of period

(*) Assets supporting TPs at T0

Next consider the 1:200 scenario.



The required capital is £27.11k.

Period / Item	Assets @ start of period (*)	Investment income @ risk free rate	Under- writing cashflows	Risk margin release	Assets @ end of period	Balance sheet contri- bution
Pre-risk horizon: amounts already recognised						
Balance sheet position @ T0		-3.84	40.00	1.39		37.55
Risk horizon						
Cashflows occurring						
<u>Year 1</u>	37.55	<u>-1.88</u>	<u>20.25</u>	0.00	19.18	
TOTAL		-1.88	20.25	0.00		18.37
Provision for future cashflows on claims incurred		-3.31	47.25	2.35		46.29
Post-risk horizon						
Provision for future cashflows on unexpired risk		0.00	0.00	0.00		0.00
Change in balance sheet during risk horizon		-5.19	67.50	2.35		64.66
Balance sheet position @ end of risk horizon		-1.35	27.50	0.96		27.11

(*) Assets supporting TPs at T0

A capital stack of £64.66k (= £37.55k + £27.11k) would be sufficient to meet the total 1:200 liabilities at T1 of £46.29k.

Year	Assets @ start of year (+)	Investment income @ risk free rate	Underwriting cashflows	Risk margin released	Assets @ end of year
1	64.66	-1.88	20.25	0.00	46.29

(+) Earned on premium income only

The LCR presentation would be as follows.

Form	310:	One	Year
	U . U .	00	

	Mean	Stress	1:200
SCR	0.00	27.11	27.11

Form 314: One Year

	Mean	Stress	1:200
Premium risk	0.00	27.50	27.50
Market risk	0.00	-1.35	-1.35

Premium Risk Summary

We have worked through the premium risk calculation for a single policy under three alternative scenarios using two different risk horizons. We will now summarise the results for all scenarios and comment at a high level on some of the reasons for the differences in results.

	Exam New F	ple 1: Policy	Exam UL	ple 2: .O	Exam Unexpire	ple 3: ed policy
ltem	One Year	Ultimate	One Year Ultimate		One Year	Ultimate
Mean	-25.48	-31.92	0.00	0.00	0.00	0.00
SCR	1.24	40.42	26.72	72.35	27.11	36.78
Amounts in £	000					

Starting with the differences between one year and ultimate means within each example, we found that the means in Example 1 are consistent, after allowing for the accumulation of investment income from the end of Year 1 until the profit release at the end of Year 3 in the ultimate case. The means in Examples 2 and 3 are nil because the expected profit over the risk horizon is recognised on the balance sheet at T0.

The ultimate SCRs are much larger than the one year SCRs in Examples 1 and 2. This is due to the higher ultimate loss ratio in the ultimate scenario; it is also the result of the treatment of obligations on the unexpired portion of the policy, which are booked at their expected value at T1, not the 1:200. In Example 3, there was no unexpired risk at T1, and the difference between one year and ultimate is due to the higher ultimate ULR.

Next we can compare between the examples. A more consistent comparison can be obtained by considering the capital stacks (assets backing the liabilities recognised at T0, plus the SCR). This is because the policies in each example are treated differently on the balance sheet at T0, which results in a different allocation of resources between capital and liabilities.

	Example 1: New Policy		Example 2: ULO		Example 3: Unexpired policy	
ltem	One Year	Ultimate	One Year	Ultimate	One Year	Ultimate
Balance sheet assets @ T0	0.00	0.00	-24.27	-27.58	37.55	36.31
SCR	<u>1.24</u>	40.42	<u>26.72</u>	<u>72.35</u>	<u>27.11</u>	<u>36.78</u>
Capital stack	1.24	40.42	2.45	47.77	64.66	73.08

Amounts in £000

There are small difference in the capital stacks required under Examples 1 and 2. As was noted in the ultimate Example 2, the stack is higher under the ULO case because of the interest that must be paid on the "borrowed capital" that is recognised on the balance sheet at T0. Otherwise, the stacks are the same. This makes sense, given that the policy incepts at the same time in both examples; the only difference is that the ULO has been recognised on the balance sheet at T0.

The stack is significantly higher in Example 3. This is because the starting assets are much higher. The present value of the future cashflows is recognised on the balance sheet at T0, as in Example 2. In Example 3 however, all premium has been received, so the amount recognised at T0 is a liability, not a profit.



Other examples

The three examples illustrate the most commonly encountered situations in premium risk modelling. Two others are worth mentioning: (1) a ULO bound in the prospective YOA; and (2) binder policies not recognised as written during the prospective YOA and incepting after its end, but attaching to the prospective (or an earlier) YOA.

A ULO bound in the prospective YOA would be recognised on the balance sheet at T1. It would therefore make a contribution to the next to last line in the tables, "Change in balance sheet during risk horizon". The amount recognised would be equal to the expected profit. No adverse experience would be recognised until after the policy incepted in the following year (i.e. Year 2). The ULO would therefore reduce the one year SCR (and increase the profit at the mean) by the amount of its expected profit. It would not be included in the calculation of the ultimate SCR, since the ultimate SCR does not include risk on policies incepting after the prospective YOA. The policy would consequently decrease the one year SCR (and increase the profit at the mean) relative to the ultimate. The reconciliation between the one year and ultimate SCRs in table 3 of Form 314 includes a line for "Removal of PY+1 Unincepted Contracts".

Conversely, binder policies not recognised as written before T1 will be excluded from the one year calculation, even if they incept during Year 1. These policies would however be recognised on an ultimate basis, along with their downside risk (just like any other policy incepting in the prospective YOA). These policies therefore increase the ultimate SCR relative to the one year. See line 3 of table 3 on form 314.

The above cases are also discussed in the SCR Guidance, 5.95 - 5.96.