Subject SP1

CMP Upgrade 2024/25

CMP Upgrade

This CMP Upgrade lists the changes to the Syllabus, Core Reading and the ActEd material since last year that might realistically affect your chance of success in the exam. It is produced so that you can manually amend your 2024 CMP to make it suitable for study for the 2025 exams. It includes replacement pages and additional pages where appropriate.

Alternatively, you can buy a full set of up-to-date Course Notes / CMP at a significantly reduced price if you have previously bought the full-price Course Notes / CMP in this subject. Please see our 2025 *Student Brochure* for more details.

We only accept the current version of assignments for marking, *ie* those published for the sessions leading to the 2025 exams. If you wish to submit your scripts for marking but only have an old version, then you can order the current assignments free of charge if you have purchased the same assignments in the same subject in a previous year, and have purchased marking for the 2025 session.

This CMP Upgrade contains:

- all significant changes to the Syllabus and Core Reading
- additional changes to the ActEd Course Notes and Assignments that will make them suitable for study for the 2025 exams.

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1 Changes to the Syllabus

This section contains all the ***non-trivial*** changes to the syllabus objectives.

Many instances of 'health and care contracts' have been replaced by 'health and care insurance products'.

Words have been added / altered in some places to aid flow, but the meaning of the objectives remains the same.

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2 Changes to the Core Reading and ActEd material

This section contains all the ***non-trivial*** changes to the Core Reading and ActEd text.

The summaries to all the chapters have been updated.

Chapter 1

Section 1.3

In the 'Underwriting and claims management' section, the words 'including experts outside the insurance industry such as medical experts' have been deleted from the first sentence of the third paragraph of Core Reading so that it now reads:

These difficulties present even more opportunities than usual for actuaries to become involved in multi-disciplinary teams with non-actuaries.

Section 2.4

The paragraph beginning 'Some 30 years ago …" has been replaced by the following sentence:

Risks relating to occupation should be reviewed from time to time as requirements of that role and/or job pressures change.

Section 2.5

In the first sentence of the 'Residence and location' section, the word 'country' has been replaced with the word 'jurisdiction' so that it now reads:

In many territories, policies typically make no allowance for the residence or location of the policyholder within the jurisdiction of insurance under individual IP insurance contracts.

Chapter 2

Section 1.1

The first bullet point in this section has been amended slightly to read:

- **upon the occurrence of an event, independent of its extent,** …

Section 2.1

The solution on page 9 has been updated. A replacement page is attached.

Section 2.3

The final sentence of the fifth paragraph of Core Reading has been amended to read:

If the disability elements failed do not compromise a major or substantial part of the role then failure is not considered total.

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Chapter 4

Section 2.1

A paragraph of Core Reading (plus accompanying ActEd text) has been added to the end of the section. A replacement page is attached.

Chapter 6

Section 2.5

The second sentence of the first paragraph has been updated as follows:

This will meet needs directly where there are limited State-funded alternatives available to the policyholder – these scenarios may arise because State-funded alternatives do not exist, or because the policyholders do not meet eligibility criteria (*eg* related to residency status, personal wealth, *etc)*.

In the bullet list below this, the third bullet point has been amended to read:

- **medical attention with a doctor or in a facility of their choice**

Section 2.6

Two paragraphs of Core Reading have been added and ActEd text amended. A replacement page is attached.

Section 3.5

The second bullet point has been amended to read:

- **Where there is a cap on the fees paid by the insurer for certain procedures, meaning that the benefit will not fully indemnify the policyholder. The policyholder may need to cover the difference if the hospital and/or consultant are charging more than the maximum.**

Chapter 7

Section 1.6

In the section on 'Systems implications', the first bullet point has been amended to read:

- **computer systems must record all processes or decisions made in insurance**

Section 3.1

Core Reading (and ActEd text) has been added to the section on 'Problems in pricing the benefits'. A replacement page is attached.

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Section 5

In the final sentence of the fifth paragraph of Core Reading, the word 'costs' has been deleted so that it now reads:

The rate of medical inflation may be a function of many things, including:

In the bullet list that follows, the fourth bullet point has been shortened to read:

- **a greater propensity for policyholders to claim.**

Chapter 10

Section 1.5

The wording has changed slightly in the first line of each of the right-hand side boxes of the table:

The State funds or heavily subsidies a comprehensive system of medical services, but insurance can provide:

The State funds or heavily subsidises a limited range of medical services and leaves it to the individual to fund the balance.

Chapter 17

Section 7.4

The following bullet point has been added to the first bullet list (immediately after 'the impact of sales tax on future growth'):

- **medical inflation.**

Chapter 22

Section 1.2

The first sentence of the third paragraph of Core Reading has been amended to read:

In other jurisdictions, reserves are set up on a relatively prudent basis, …

Section 2.2

There have been some changes to the ActEd text on page 12. Replacement pages are attached.

Chapter 23

Section 1.2

The following sentence has been added to the start of this section:

Claims data that is timely, accurate and of sufficient granularity is required in order to adjudicate claims in health and care insurance as well as to price and design products correctly.

Section 2.4

The second sentence of the second paragraph has been amended to read:

As medical technology advances in the diagnostic area, and as health screening rates improve, insurers may find that they are facing claims significantly earlier than was expected on the basis of the data on which premiums were calculated.

Chapter 24

Section 6.4

The following words have been added in the brackets in the first sentence of the fourth paragraph:

(free or highly-subsidised)

Chapter 27

Section 6.2

The following words have been added to the second paragraph of Core Reading:

Equally companies have been set up that will perform other specialist activities: underwriting, claims management, actuarial functions (for example, pricing and reserving), administration, investment, marketing, systems, management of a network of health care providers and training.

Chapter 31

The following definitions have been modified slightly

International Classification of Diseases (ICD)

This is a classification of diseases and surgical operations, by both coding and wording, in order to maintain an international standard. Most jurisdictions classify diseases using ICD-9 or ICD-10 codes.

Residence

This clause limits the jurisdictions in which the policyholder may be resident to make a valid claim, to ensure effective claims management.

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3 Changes to the X Assignments

Overall

There have been no major changes to any of the X Assignments.

4 Changes to the Mock Exam

Overall

There have been no major changes to any of the mock exams.

The minor changes are described below.

Mock Exam 3

Solution 8(ii)

The fifth paragraph on page 19 has been amended to read:

The insurer will still retain the right to increase premiums on renewal in order to keep pace with medical (and expense) inflation. [½]

Solution 8(iii)

The seventh paragraph on page 21 has been amended to read:

As the insurer is new to writing PMI, it is likely to outsource certain functions, such as underwriting, claims management or the management of a network of health care providers. There is therefore likely to be significant counterparty risk (*eg* invalid claims being paid), including that from treatment providers. [1]

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If you have any comments on this course, please send them by email to **SP1@bpp.com**.

These are:

- **Creutzfeldt-Jakob disease**
- **chronic emphysema**
- **diabetes**
- **pre-senile dementia**
- **rheumatoid arthritis.**

Competition can be on price (premium levels) or quality (the extent of the cover provided).

Any additions should be considered carefully with regard to whether the addition has the characteristics of an illness or condition that make it appropriate for inclusion in a critical illness product, which were outlined in Section 1.2.

Question

Discuss whether COVID-19 could be covered by a critical illness insurance policy.

Solution

COVID-19 needs to be compared against the characteristics of an illness that make it appropriate for inclusion in a critical illness insurance product.

Perceived by the public to be serious and to occur frequently

At the time of the pandemic, COVID-19 was perceived by the public as serious and frequently occurring. However, many people had the disease without serious consequences, and for those that required medical intervention, some went on to make a full recovery. Those that died generally did do so within a reasonably short period (2-3 weeks) from diagnosis. This is less time than typical survival periods on stand-alone critical illness insurance policies.

In the years that followed the peak of the pandemic, while the frequency of occurrence was still significant, the view of the seriousness of the illness changed, with the majority of people perceiving it to be a mild illness.

Can be clearly defined so that there is no ambiguity at the time of claim

While an objective diagnostic test can be carried out, any suitable definition of COVID-19 would need to consider the *seriousness* of the illness, and so may need to consider the medical interventions used rather than a positive test result alone.

Sufficient data are available to price the benefit

At the time of writing (May 2025) there is still relatively limited data available on the long-term consequences of the disease and our understanding of it is still developing.

It is therefore unlikely to be specifically included under a CI insurance policy. However, if an individual had life changing consequences of the illness, such as those that may result from the effects of 'long COVID', then this could be covered under a clause of a CI policy (such as total and permanent disability) outlined later in this chapter.

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Lengthening the list of illnesses for which the benefit is paid out might only provide a minimal increase in the cover for the client. For example, the incidence of some conditions may be low at the ages where the benefit is available. In other cases, the illness may already be covered by a total and permanent disability (TPD) benefit (see Section 2.3), although perhaps at a later stage of the illness. Many insurers are not attempting to cover every conceivable condition. Around 90% of all claims arise from the major illnesses, and the availability of a cheaper product with less depth of coverage may increase the sales penetration across the public in general.

Some insurers have offered policies that restrict cover to high profile illnesses such as cancer and heart-related conditions. These policies will be cheaper and provide 'budget' cover resulting in sales to a wider market than the more comprehensive policies.

2.2 Terminal illness

Terminal illness is often added to complete the overall cover. It does not pay out on diagnosis of a specified disease but instead the claim definition involves the severity of a condition and its effect on life expectancy (*eg* any condition that is expected to result in the person's death within a 12 month period).

Terminal illness cover ensures that all conditions that significantly reduce life expectancy are covered, albeit at a late stage. Many perceive this as an equitable benefit – a policyholder could otherwise suffer a severe illness that reduces life expectancy significantly but does not qualify for benefit.

The extent to which terminal illness extends the cover provided and hence its additional cost depends very much on what other benefits are provided by the product. Although terminal illness can be used to fill some apparent gaps in the cover, in some cases these will be small.

The key question is the extent of the residual benefits provided by the terminal illness cover.

As discussed, CI cover can be provided as a rider to a term insurance contract or on a stand-alone basis. The addition of a terminal illness benefit will have a different impact in each of these cases.

For an acceleration product, the main effect of terminal illness cover is to bring forward (or accelerate) the payment of the death benefit and therefore the cost of the benefit is very small.

This is because the effect is only to change the time of a benefit that is already included in the cover provided by the policy.

For defined term products (*ie* claim acceleration products with a fixed policy term) **there may also be a few additional claims towards the end of the policy that will impact cost more significantly. If the terminal illness benefit ceases 12 (or 24) months prior to the end of the term, these additional claims can be avoided.**

Question

Why is it that the terminal illness benefit only gives rise to additional claims for events close to the end of the policy term?

2 Related PMI products

Where State provision of healthcare is an alternative, sale of comprehensive cover insurance products will not have mass-market appeal. Insurers have therefore been inventive in developing alternatives to increase sales.

The standard product as outlined above will have most attraction in the higher socio-economic groups and thus cheaper options may be made available to widen distribution. Simple examples of this are products where policy cover is adjusted by restricting the availability of out-patient treatment or by restricting the range of hospitals in which the policyholder can be admitted (preferred provider arrangements).

By using 'preferred providers', from whom they buy in bulk, insurers can control claim costs.

Some examples of how out-patient cover may be restricted include:

- limits on the monetary level of claims (*eg* per year or per claim) or on the number of treatments covered
- only covering treatment directly related to in-patient treatment, often with a time restriction, *eg* within 6 months of discharge from hospital
- only providing initial consultations and diagnostics, but no follow-up treatment.

These reduced benefit plans are sometimes called 'budget plans'.

In many cases, these products would have different names to enhance marketability, although the change from the original comprehensive product was in one discrete area only.

Other cheaper options include the following broad types of product:

2.1 Major medical expenses (UK)

This product provides a lump sum when the policyholder undergoes surgery. The size of the lump sum varies with the class or severity of the procedure and is estimated to be sufficient to cover the in-patient costs with a balance for incidentals and recuperation expenses. There is no guarantee that the benefit will cover extreme surgical complications within the class, unless the policy states this expressly (and the insurer has an agreement with particular hospital chains for fixed price surgery).

The product does not cover out-patient episodes and this may be seen as a serious marketing disadvantage; however the compensation is a significantly lower premium. One big advantage to the insurer lies in the simplicity of a fixed benefit schedule that limits the work to be performed at the claims stage.

Major medical expenses (MME) policies can (and have) existed as both:

- a short-term, annually renewable product
- a long-term, reviewable premium product.

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Question

What are the main differences between the benefits available under such an MME policy compared to those available under a CI policy?

Solution

The qualifying event for MME is having one of the operations on the insured list. The operation may be needed to cure a serious illness (*eg* heart-bypass operation) or may be to relieve a condition that is serious, but not life-threatening (*eg* hip-replacement operation).

Some CI benefits are payable when a specified operation is required – these tend to be very serious operations (*eg* heart-bypass) – and so there is some overlap with MME in this respect. However, most CI benefits are payable on diagnosis of a specified serious illness and in these cases, there is no requirement to have an operation. While CI may pay a sum insured for a condition *related* to some operations, it would not pay for other conditions that may require operations on the MME list.

It should be noted that in the USA, the term 'major medical expenses' is used to mean a comprehensive PMI product type offering reimbursement for the costs of primary, secondary and tertiary care as defined in the policy.

In many Asian markets, supplementary MME is used in a group context – this is additional cover that is triggered when limits on individual benefits have been exhausted and is a more affordable alternative for employers than offering comprehensive cover to all members.

This supplementary cover may be offered where individual cover is a basic medical plan. Once the incurred expenses exceed the limits on this cover, the supplementary plan comes into effect. It may cover a proportion of the additional costs, *eg* 80%.

Group products are covered in more detail in Chapter 5.

2.2 Waiting list plans

Another approach to cover limitation to reduce premiums is to provide standard medical insurance benefits in circumstances where the public health service is not in a position to provide treatment within a specified period (often six weeks). If policyholders can find free public healthcare for their condition in that period and within a reasonable distance from their residence, the insurance will not reimburse private expenses; otherwise the policy operates as a normal comprehensive PMI policy.

This approach supposedly meets the customer needs where the desire to buy insurance is to avoid waiting for treatment. If the customer's reasoning is different, this alternative is unlikely to be attractive.

2.3 Health cash plans

Health cash plans are a defined-benefit, defined-premium insurance product. For a low level of premium, the policyholder and family are entitled to a range of specific payouts dependent on certain healthcare-related events.

2.5 Private medical insurance

Private medical insurance aims to assist the policyholder in covering the cost of medical care. This will meet needs directly where there are limited State-funded alternatives available to the policyholder – these scenarios may arise because State-funded alternatives do not exist, or because the policyholders do not meet eligibility criteria (*eg* related to residency status, personal wealth, *etc)*.

In many territories, the State will provide some level of healthcare to all; PMI is then bought when the individual wants a higher level of care, such as:

- **medical attention without waiting**
- **medical attention in higher standard of accommodation *eg* private room**
- **medical attention with a doctor or in a facility of their choice**
- **medical attention in a local hospital.**

Recall that PMI is a contract that focuses on normal hospital needs, though it can also cover private doctor charges or primary care in some territories.

If no State-funded healthcare is provided, PMI will usually pay for all forms of healthcare needs on an indemnity basis. It will cover primary care (such as visiting the family doctor or nurse) and hospital care for all forms of chronic and acute illnesses.

Question

Products need to be designed so that they are easily understood.

Describe two common misunderstandings among consumers about PMI insurance products.

Solution

Consumers believe that PMI policies will pay for all medical care and not just for care related to acute conditions.

Some consumers may believe that PMI is a long-term policy with guaranteed premiums (like some CI insurance policies), and not a one-year policy with reviewable premiums like motor insurance.

2.6 Microinsurance

***Microinsurance* is insurance that is typically targeted towards those who are working, but with low incomes.**

Microinsurance is not a product type in itself; it is the fact that it is aimed at those on low incomes that makes it microinsurance.

Those on low incomes are more vulnerable to adverse events, having less in savings to support themselves in times of need. Microinsurance helps to avoid the need for such individuals to rely on money lenders, who may be expensive and unscrupulous. Some provision of health cover can be especially reassuring to families, particularly in countries where the State welfare support system is limited.

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The main health-related microinsurance products are versions of PMI (*eg* contributing to the costs of hospitalisation, primary health insurance or maternity care), and IP (*ie* providing financial protection in the event of inability to work due to an illness or injury).

Typically, microinsurance in health and care provides access to healthcare to a person who is earning a low income when they need it, thereby avoiding or reducing loss of much needed income and keeping them from falling into debt.

It is characterised by limited benefits and very low premiums, for reasons of affordability.

It may be partially or wholly funded by individuals, their employers, workers' unions or the State.

Microinsurance is sometimes sold alongside 'microfinance' (a source of financial services for entrepreneurs and small businesses lacking access to banking and related services). So, an individual can borrow a small sum of money to help set up a business, and can insure the repayments against death or sickness. Lenders may only be willing to give such loans if insurance is in place.

The considerations set out in the following sections (providing peace of mind to dependants and the need for simplicity) are also highly relevant.

By its nature, microinsurance is particularly important for the developing world and is currently well developed in India and some parts of Africa.

It is covered in more detail at the Specialist Advanced level.

Problems in designing the benefit levels

It is difficult to define the additional stages of disease that trigger benefit that are both legally and medically objective while being understandable to the consumer.

The example given in Chapter 2, which described possible definitions for heart attacks, is a good example of claim definitions that may not be understandable to consumers.

Weaknesses in definitions could result in more claims, even if the probabilities are as anticipated.

This could be the result of disputed claims, where the decision is made in favour of the policyholder.

Problems in pricing the benefits

Finding statistics for the current (single payout) definitions is difficult enough, with historic insured experience still being relatively limited.

The first CI product came on to the market in South Africa in 1983. Over time, more diseases have been added to the cover and so the product has evolved, so there is relatively little data for products that are on the market now (based on definitions that are currently used).

Having to find four times as many rates for severity levels and transition intensities between them, for all ages, both genders (if such differential pricing is permitted) and possibly smokers and non-smokers is going to be challenging with any degree of accuracy.

This uncertainty is likely to lead to significant margins in the assumptions, which could make the product prohibitively expensive.

The underlying incidences and transitions may change frequently in the future, before credible own-experience data emerges.

So, as the product (and the definitions used) continues to evolve, relevant data will remain scarce in the future.

However, medical research can help understand these underlying issues.

There will be many overlaps between related illnesses that will make pricing more complex and the picture for the policyholder more confusing. The cross-correlation between diseases will give rise to greater potential for disallowed claims and customer dissatisfaction at various levels of proportionate benefit, particularly as comorbidities become more commonly diagnosed. In some jurisdictions, comorbidities are becoming more common.

A comorbidity is where an individual has more than one disease or condition present at the same time. Conditions described as comorbidities are often chronic or long-term conditions. An example of comorbidity is that an individual with arthritis could commonly have other chronic conditions, such as diabetes or heart disease.

The actuary faced with these pricing risks is likely to prefer the absence of any guarantees, significant margins in the assumptions and co-operation with a knowledgeable reinsurer.

This could lead to a product that is unmarketable and expensive.

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With advances in medical treatment and technology, illnesses (*eg* cancer) that used to be detected at later stages are now being detected and diagnosed at earlier stages, exacerbating the likelihood of earlier claims.

While earlier claims would bring forward claim payments, so tending to increase premiums, if treatments are also accelerated, this might also prevent claimants deteriorating to more severe tiers. Furthermore, a greater focus on diagnosis could increase customer awareness of the need for tiered CI products, which might increase new business volumes.

Problems in underwriting

The underwriter is faced with the prospect that the bringing forward of potential claims situations is going to increase the importance of any pre-existing conditions and change the seriousness of any material non-disclosure.

This means that initial underwriting may have to become more stringent. This will cost time and money.

The claims manager is going to be faced with considerably more claims forms, with complex definitions and significant policyholder (and possibly insurance adviser and general practitioner) pressure to 'upgrade' to a higher level of benefit.

More expertise will be needed by claims managers, and it may be necessary to recruit new claims staff to deal with the increased workload.

Initially at least, there may be no consistency of approach within the market.

This means that judgement will need to be applied when accepting claims. Poor claims underwriting decisions could lead to bad press about the insurance company.

The market-consistent approach is based on risk-free rates, but swaps are not entirely risk free as one of the counterparties might default (although some form of collateral arrangement will reduce this risk substantially). Even government bonds are not entirely risk free, *eg* a number of countries lost their AAA credit rating in the years following the financial crisis of 2007/2008.

It would generally only be appropriate to use swap rates if there is a sufficiently deep and liquid swap market in that country, where 'deep' means that the market is of sufficient capacity that large trades would not materially affect the prices.

An interest-rate swap is a contract where one party agrees to pay a series of payments based on a fixed interest rate in exchange for a series of payments made on a variable rate of interest (usually the prevailing interest rate on short-term deposits in the market).

The fixed interest rate in the swap agreement will vary depending on the term of the swap. For example, the agreement might be to pay a fixed rate of 2% for a two-year swap, but 3% for a ten-year swap. These swap rates can then be used to derive risk-free rates as an alternative to using the yield curve of government bonds.

Market-consistent valuation methods have been increasing in importance in some jurisdictions.

2.2 Illiquidity premium

It may be possible to derive the market-consistent discount rate from corporate bonds rather than government bonds. At first sight this might appear to be an odd thing to do, because corporate bonds are more risky than government bonds: firstly, corporate bonds usually have a higher probability of default than government bonds, and secondly, corporate bond prices tend to be more volatile than government bond prices (*ie* corporate bonds are less liquid), which can be a problem if the bond needs to be sold before its maturity.

Corporate bonds typically have a higher yield than risk-free (*eg* government) bonds, where this reflects both the greater default risk and the relative illiquidity of such assets. The latter contributes the 'illiquidity premium' to the yield.

Investors will require a higher expected return on an asset to compensate them for any additional risks, *eg* the higher probability of default on a corporate bond compared to a government bond. The illiquidity premium (often confusingly called the liquidity premium) is the extra return that investors require to compensate them for the risk of greater price volatility of corporate bonds.

Even under a market-consistent approach, it may be possible in some jurisdictions to take credit for the illiquidity premium and thereby discount liabilities at a higher yield than the risk-free rate within the supervisory valuation.

For example, the yield on government bonds might be 4%, but the yield on corporate bonds might be 7%. The market may be believed to require an extra yield on corporate bonds of 2% to reflect default risk and 1% to reflect illiquidity. Some jurisdictions would then set the market-consistent discount rate at 5% (the 4% 'risk-free' government bond yield plus the 1% illiquidity premium).

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Question

What would be the impact on an insurance company's solvency position if the supervisory authority changed its rules to allow the insurance company to take credit for the illiquidity premium described above?

Solution

The insurance company's solvency position would improve.

Under the old rules, the insurance company would have to discount its liabilities at the risk-free rate of 4%.

Under the new rules, the insurance company could add in the illiquidity premium so that it discounted its liabilities at 5%. The higher the discount rate, the lower the value of the liabilities, and hence the better the solvency position.

This would normally be restricted to long-term predictable liabilities for which matching assets can be held to maturity. Since the insurer is not exposed to the risk of changing spreads on such assets (although is still exposed to default risk), it may be permitted to increase the risk-free discount rate accordingly.

The above paragraph is important, because it explains *why* insurance companies may be able to take credit for the illiquidity premium.

For example, if an insurance company selling long-term care insurance matched their long-term care cashflows with bonds of appropriate term, then they do not care about any subsequent price volatility as they will be holding the bonds to maturity. So in a sense, the extra return on these bonds from the illiquidity premium is a genuine risk-free additional return because they are not exposed to the liquidity risk.

However, the insurance company is still very much exposed to the risk that the bonds default, and so they shouldn't include the default risk premium in their risk-free discount rate.

The illiquidity premium can only normally be used in this way for *long-term predictable liabilities*. The cashflows on a large block of immediate needs long-term care contracts might be reasonably predictable if the insurer has a reliable estimate for future mortality rates. Similarly, the cashflows on a large block of income protection policies that are claiming might also be reasonably predictable if the insurer has a reliable estimate of future recovery rates.

However, other liabilities are much less predictable. For example, bonds could be held to match the expected benefit payments for a healthy income protection policyholder that is not claiming, but it is harder to predict when these policyholders will start claiming or if they might withdraw. So the insurer would be exposed to the price volatility of these bonds if it subsequently had to sell the bonds to pay benefits at a different time than originally expected.

Where this practice is permitted (within a market-consistent supervisory valuation regime), there would normally be strict rules about how and when it can be applied.

For example, the supervisory authority may restrict the types of contract for which an illiquidity premium is allowed (as described above). It might also restrict the investment strategy, *eg* there may be a requirement that bonds are held to maturity.

2.3 Risk margin

The approach described in Section 2.1 is strictly only appropriate for cashflows that are of known and certain amounts.

Question

Why will the approach described in Section 2.1 not actually give the correct market-consistent value for the immediate needs long-term care contract described earlier?

Solution

This is because the benefit cashflows are not of certain amounts, but are instead dependent upon how many (and precisely which) of the current policyholders survive to each future date. In other words, the cashflows are subject to uncertainty due to mortality.

It may be difficult to obtain a 'market-consistent' assumption for some elements of the basis, such as morbidity, persistency or expenses, for which there is not a sufficiently deep (*ie* of such capacity that large trades would not materially affect the prices) and liquid market in which to trade or hedge such risks.

In some cases, it may be possible to use some market-consistent indicators for setting the assumptions. For example:

- the mortality and morbidity assumptions could be determined from the risk premium rates quoted by reinsurance companies
- the expense assumption could be determined by reference to expense agreements available in the market, *eg* from third-party administration companies.

However, there are a number of reasons why the examples given above might not be used in a market-consistent valuation. For example, it is unlikely that third-party administration companies or reinsurers would provide a quote unless the insurer actually intended to use their services.

So with uncertain cashflows, the approach is to project their *expected* future amounts and then discount these *as if* they were known and certain, according to the principles in Section 2.1. So, in the case of the immediate needs long-term care cashflows, it would first be necessary to multiply the future benefit payments by some assumed survival probabilities, *ie* using an appropriate mortality assumption.

Question

If cashflows were projected using best-estimate assumptions for these variables, the resulting value for the liabilities would not be correct.

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Explain whether the value obtained would be higher or lower than the actual market-consistent value.

Solution

Using best-estimate mortality assumptions would produce a value that was lower than the market-consistent value. This is because a purchaser of the liability would require additional compensation, for the possibility that the liability should turn out to be more expensive than expected.

It is therefore likely that a risk margin would be included in respect of such assumptions, due to the inherent uncertainty. This risk margin would reflect the compensation required by the 'market' in return for taking on those uncertain aspects of the liability cashflows. This could be done by adding a margin to each assumption.

Question

For the immediate needs long-term care example, should an (appropriately) higher or lower mortality rate than best estimate be used in order to produce a market-consistent valuation?

Solution

Lower mortality should be assumed, as it is greater longevity that will increase the cost of these liabilities to the notional purchaser.

Alternatively, an overall reserving margin in respect of these risks could be determined using the 'cost of capital' approach.

In summary, the 'cost of capital' method for determining the additional risk margin is as follows:

- first project the required capital at each future time period (*ie* the amount required in excess of the projected liabilities)
- multiply the projected capital amounts by the cost of capital
- discount using market-consistent discount rates to give the overall risk margin.

This is discussed in more depth below.

This involves first projecting forward the future capital that the company is required to hold in respect of these risks, where this is determined at the end of each projection period (*eg* year) during the run-off of the business. The projected capital is determined according to the relevant regulatory basis, and is the amount required to be held in excess of the projected liabilities at each period.

So the amount of capital required in excess of the market-consistent estimate of the liabilities is calculated.

These projected capital amounts are then multiplied by a cost of capital rate. This rate can be considered to represent the cost of raising incremental capital in excess of the risk-free rate, or alternatively it represents the frictional cost to the company of locking in this capital to earn a risk-free rate rather than being able to invest it freely for higher reward.

The providers of capital (*eg* shareholders in a proprietary company) could have invested their money in shares earning 9% say, but instead they are backing the capital requirements with bonds earning 3% say, which implies a cost of capital of 6%.

There may also be other frictional costs, such as tax, which also affect the cost of capital.

It may for example be determined as the excess of the weighted average cost of capital over the risk-free rate, and hence may be term dependent. In some calculations it is a specified fixed rate (*eg* 6% per annum in Solvency II, the regulatory reporting environment applicable to the European Union).

The product of the cost of capital rate and the capital requirement at each future projection point is then discounted, using market-consistent discount rates, to give the overall risk margin:

$$\text{Risk margin} = \sum_t \frac{k_t \times C_t}{(1+r_t)^t}$$

where k_t is the cost of capital 'charge' for time t, C_t is the required capital at time t and r_t is the risk-free interest rate for maturity t.

So k_t would be 6% for the example mentioned above.

For some chosen regulatory frameworks, the projection of required capital can be relatively straightforward, for example where it is defined as a fixed percentage of reserves.

However, for others it can be complicated if the calculation of required capital itself requires projections, stochastic modelling and/or application of correlation matrices.

Correlation matrices were introduced in Section 1.3.

It is complex enough to use the above approaches to calculate the solvency capital required now. However, the cost of capital approach requires the insurer to project the capital required C_t at each future point in time too.

In such situations, a simplified approach can normally be used. This might involve selecting a driver (*eg* reserves or sum at risk) that has an approximately linear relationship with the required capital or its components. The initial capital requirement can be expressed as a percentage of that driver, and the projected capital is then approximated as the same percentage of the projected values of the driver.

If the capital requirements tended to be approximately 10% of the reserves, then C_t would be set to be 10% of the reserves in the calculation of the risk margin above.

In practice, more sophisticated methods using a combination of drivers and correlations may have to be used.

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It is highly unlikely that a simple model based on the reserves will be accurate enough. However, a reasonably good fit might be obtained by considering a combination of drivers, *eg* by using the projected values of the reserves, sum at risk, interest rates, inflation and so on.

You may hear these methods being described as proxy models or light models as they are a simpler alternative to the full model used to calculate the current solvency capital. These are discussed further in Subject SA1.