# NON-BANK FINANCIAL INSTITUTIONS REGULATORY AUTHORITY (NBFIRA)

## INSURANCE PRUDENTIAL RULES
In terms of Section 50 of the NBFIRA Act

## IPR3L
### Prescribed Capital Target (PCT) for Long-Term Insurers

Effective March 1, 2012

**Contents**

# 1.    Introduction

## 1.1. Insurance Prudential Rules

1.    NBFIRA's Insurance Prudential Rules (IPRs) set out the prudential requirements for regulated insurers operating in Botswana.

2.    This note sets out in draft form material that may form the basis of IPR3L.

3.    The approach to IPR3L is largely based on the CAR calculation as described in PGN104 of the Actuarial Society of South Africa. The terminology has been changed in order to make clear that there are some minor differences, and hence to prevent potential confusion between the South African CAR and the Botswana PCT, particularly in future if one changes at a different time from the other.

## 1.2.    Valuation of Long Term Insurance Liabilities

4.    Long Term Insurance liabilities should be valued in accordance with the requirements set out in IPR 1L. The approach is to use best-estimate valuation assumptions, adjusted by compulsory margins and possibly also by discretionary margins. It aims to ensure that the long term insurer should have sufficient assets to meet all its future liabilities in respect of its existing in-force business if actual experience deviates from the valuation assumptions.

## 1.3. *Valuation of Assets*

5.    Valuation of assets is set out in detail in IPR 2L. In principle, assets must be valued at fair value, except where IPR 2L indicates otherwise. The main exception to the use of fair value is in respect of the valuation of group undertakings.  In addition, certain assets or a portion thereof must be disregarded for solvency purposes.

6.    For the purposes of calculating the PCT, the value prescribed by IPR 2L should be used.  However, the maximum admissible percentages shown in section 3 of IPR 2L should only be applied after the PCT calculation.

## 2.    Definitions

7.    In these Requirements, unless the context indicates otherwise:

8.    "Act" means the Insurance Industry Act, Cap 46:01 and a word or expression to which a meaning has been given in the Act, has that meaning;

9.    "ASSA" means the Actuarial Society of South Africa;

10.    "best-estimate assumption" means an assumption that:

   a.  Is realistic;
   b.  Depends on the nature of the business concerned;
   c.  Is guided by immediate past experience, as modified by any knowledge or expectation of the future;

11.    "bonus stabilisation reserve", in relation to a category of participating policies, is a reliable estimate of the accumulated differences at the valuation date between the surplus attributable to policyholders and the value of bonuses already declared; the value of bonuses must be calculated on the valuation basis as described in these requirements and needs to allow appropriately for bonuses that have not already been declared;

12.    "capital requirement", in relation to a regulated financial institution, means the capital or solvency margin, as the case may be, required for that institution by the regulatory authority concerned;

13.    "compulsory margins" mean the margins that must be added, in terms of IPR1L;

14.    "discretionary margins" mean the margins that may be added, in terms of IPR1L;

   "fair value" means the fair value of an asset determined by reference to Statements of Generally Accepted Accounting Practice;";

15.    "group undertaking", in relation to an insurer, means a juristic person in which the insurer alone, or with its subsidiaries or holding company, directly holds 20% or more of the shares, if the juristic person is a company, or 20% or more of any other ownership interest, if the juristic person is not a company;

16.    "listed"  means listed on a stock exchange or similar trading facility, which is recognised generally by the international community of institutional investors;

17.    "net asset value", in relation to a group undertaking, means its net asset value calculated in accordance with IPR2L;

18.    "non-bank financial institution" means a non-bank financial institution as defined in the Non Bank Financial Institutions Regulatory Authority Act, CAP 46:08;

### 3. The Minimum Capital Target

19. The Minimum Capital Target (MCT) establishes in absolute currency terms the minimum amount of capital that an insurer is required to have for licensing and ongoing operation.

20. The MCT aims to meet several aims. It is intended to establish a minimum size for players in the insurance market. It ensures that in the absence of any premium income or on closure to new business, the insurer is able to continue operating for at least three months. A lower capital requirement is required for microinsurers so as not to prejudice small players in this segment of the market. However as the microinsurer grows in size, the MCT increases to that of an ordinary commercial insurer, so as not to unfairly advantage funeral insurers.

21. The MCT should be calculated as determined in the Regulations.

22. All Long-Term insurance companies are required to hold the greater of the MCT and the PCT.

## 4. The Prescribed Capital Target

### 4.1. The Need for the Prescribed Capital Target

23. The compulsory and discretionary margins set out in IPR1L may not protect the insurer or its policyholders in the event of substantial adverse experience variation. To protect the solvency of an insurer and the interests of the policyholders against larger experience shocks, the excess of assets over liabilities needs to be sufficient to meet liabilities even in extremely adverse times. The minimum amount of assets that an insurer should hold in excess of its liabilities (based on providing an approximate 95% confidence in its ability to meet all liabilities) is referred to as its Prescribed Capital Target or PCT. While the 95% confidence level is lower than the 99.5% confidence level utilised for short term insurance companies, a higher level of PCT cover is required – in other words long term insurers are expected to have well in excess of 100% of PCT, whereas short term insurers would target just over 100% of PCT.

### 4.2. Defining the PCT

24. The Prescribed Capital Target equals the result of the PCT formula, per 5.1 below. At some point in the future, the Regulatory Authority may permit reliance on internal capital models, but these are not permitted under the current framework. In addition to the above, the Insurance Regulations set a minimum capital target, the MCT.

### 4.3. *Purpose*

25. The purpose of the Prescribed Capital Target is to quantify the minimum level of assets in excess of liabilities that will provide a sufficient cushion against random negative fluctuations in experience in any of the variables used in the statutory valuation. The quantum of this cushion is set in such a manner that in the majority of cases a negative experience variation will lead to a reduced cushion rather than to a deficit under the statutory valuation. The existence of a Prescribed Capital Target cannot provide a guarantee against future financial difficulty – it can only help to make it less likely.

26. A secondary function of the Prescribed Capital Target is to act as a regulatory warning system.

27. Inability to cover the Prescribed Capital Target would mean that the long term insurer would be subject to further investigation and regulatory intervention by the regulator as set out in the Insurance Prudential Rules.

### 4.4. Schematic Illustration

28.    The place of the Prescribed Capital Target in the overall financial position of a long term insurer can be illustrated schematically as follows:

| Inadmissible assets | | |
|---|---|---|
| Admissible assets | Free admissible assets | Excess admissible assets |
| | Prescribed Capital Target | |
| | Policy Liabilities on Prescribed Valuation Method | Prescribed Valuation Method Liabilities |
| | Other Liabilities | |

### 4.5. Conditional Nature of Prescribed Capital Target

29.    A portion of long term assurance policies in Botswana allow the long term insurer to adjust:

   a.    Charges for risk benefits;

   b.    Expense charges;

   c.    Policy value bases; and

   d.    Bonus rates.

30.    As such, the size of the Prescribed Capital Target is dependent on the expected management actions resulting from adverse experience.  Therefore, the financial effect of the management actions assumed needs to be determined for purposes of the calculation (see Section 8 below).

### 4.6. Principles Underlying the Prescribed Capital Target

31.     A balance is needed: in aggregate the Prescribed Capital Target should be large enough to provide a significant cushion against adverse experience, but not so large as to endanger the viability of the long term insurance industry. Since it would be too conservative to assume that all adverse events occur together, the following approach is adopted:

a.  The size of a number of cushions to cover specific events is assessed assuming only that event occurs. Statistically, where practical, the target confidence interval for the size of the cushion is 95%, i.e. owing to random fluctuations alone, the cushion is expected to be adequate nineteen years in twenty.

b.  The overall cushion is not merely the sum of the individual cushions, but rather a lower amount since it is not expected that all unfavourable conditions will occur at the same time. Some simplifying assumptions are made as to the correlation between events, and these assumptions result in the adding together of the cushions in a hierarchical structure where the total is less than the sum of the parts.

c.  The simplifying assumptions made with respect to correlations are as follows:

i.  Two events may be strongly negatively correlated, e.g. the occurrence of A precludes the occurrence of B. In this case the higher of the two cushions is required.

ii.  Two events are strongly correlated e.g. the occurrence of A will lead to the simultaneous occurrence of B. In this case the sum of the cushions is required.

iii.  The two events are uncorrelated. In this case the square root of the sums of the squared cushions is required.

## 5.     The Prescribed Capital Target Calculation

### 5.1.    *The Prescribed Capital Target Formula*

32.     The basic PCT formula is as follows. The two components are described below.

$$PCT = maximum\ (TCT, OCT)$$

### 5.2.    Termination Capital Target ("TCT")

33.     The TCT ensures that a long term insurer is in a position to survive a very selective "run-on-the-bank" scenario. The calculation is based on liabilities in the event of surrender or lapse (if not surrender value). A case could be made for taking the effect of a fall in asset values into account in calculating the TCT.  However, the lapse and surrender assumptions have been set conservatively at immediate termination of all policies where the insurer will suffer a loss and further additions are unnecessary.

34.     The basic TCT formula is:

$$TCT = LCT + SCT$$

#### 5.2.1.        Lapse Capital Target ("LCT") (no surrender values)

35.     The Lapse Capital Target equals the amount required to ensure that no policy has a negative liability, where liability refers to the statutory liability before taking any other Prescribed Capital Targets into account.

#### 5.2.2.        Surrender Capital Target ("SCT")

36.     The Surrender Capital Target equals the amount required to ensure that no policy's liability is less than its current surrender value.  For policies which cannot be surrendered or transferred from the long term insurer the amount is zero.

### 5.3. Ordinary Capital Target ("OCT")

37. The OCT formula comprises a factor-based approach that isolates each major risk category and establishes what capital needs to be held in respect of that risk. The results are summed with an adjustment to the sum to recognise independencies and diversification (hence the "summing and squaring" approach involved in the calculation of IOCT described below).

38. The OCT needs to allow for the effect of a fall in the fair value of the assets backing it as well as the credit risk associated with those assets, so that a sufficient level of capital is maintained even after such a fall in asset values.

39. A fall in the fair value of assets is allowed for by initially calculating an Intermediate Ordinary Prescribed Capital Target ("IOCT"), and then grossing up the IOCT for the effect of the assumed fall in fair value of the assets backing the OCT and the credit risk of those assets. This then equals the OCT.

40. The grossing up factor will be based on the assumed change in asset values contained in the resilience scenario envisaged in the Investment Capital Target item (Item g) and the losses arising from credit risk as envisaged in the Credit Risk Target Capital item (Item h) , and will depend on the assets assumed to be backing the PCT. This is described further in 6.7.2.

41. The relationship between OCT and IOCT can be described as

$$OCT = \frac{IOCT}{(1-j)}$$

Where j = $\sqrt{\left(g*+\frac{1}{2}h*\right)^2 + \frac{3}{4}h*^2}$

Items g* and h* are calculated using the factors for the capital target items described in sections 6.7.1 and 6.8 respectively.

The g* factor allows for the resilience risk associated with assets backing OCT and the h* factor allows for the credit risk associated with those assets. The g* factor is calculated by weighting the assumed percentage fall in fair value of each type of asset backing the OCT by the percentage of OCT backed by that type of asset. The weighted percentage falls in fair value for each type of asset backing OCT are then added together to produce the g* factor. The assumed falls in fair value are those described in section 6.7.1.The h* factor is calculated as follows:

h* = $\sum_{i} f_i \times \%OCT_i$

Where $f_i$ is the factor for credit rating i as given in the table in section 6.8; and $\%OCT_i$ is the percentage aggregate holding of assets with credit rating i backing OCT.

Example

1. If cash, fixed interest and equities are available as free assets. For purpose of this example assume falls in fair values of 0%, 10% and 30% respectively. Further assume that the credit risk factors for the cash and fixed interest assets are 0.5% and 2% respectively. Assume that OCT is backed as follows:

| Type of asset | Percentage backing OCT |
|---|---|
| Cash | 20 (let this be x) |
| Fixed interest assets | 30 (let this be y) |
| Equities | 50 (let this be z) |

Then: $g^* = 10\%\,y + 30\%\,z = 0.18$

$h^* = 0.5\%\,x + 2\%\,y = 0.007$

So, $j = 0.1836$

Hence, $OCT = \dfrac{IOCT}{0.8164}$

42. It is not necessary to take into account the fall in the fair value of the excess assets that are not needed to cover the OCT.

43. Where an insurer uses foreign currency denominated assets to back IOCT, the same grossing up factors should be used as for similar Pula denominated assets, but subject to a minimum grossing up factor of 0.8 per asset class. This means that a minimum 20% volatility allowance is to be made on each class of foreign currency denominated assets (refer to 6.7.2).

44. Each of the components of the IOCT formula is described in detail in section 6.

45. The IOCT is calculated according to the following formula:

$$IOCT = \sqrt{(a^2 + b^2 + ci^2 + cii^2 + ciii^2 + d^2 + e^2 + f^2 + (g + \tfrac{1}{2}h)^2 + \tfrac{3}{4}h^2} + i$$

Where $a$ to $i$ refer to the Prescribed Capital Target items described in Section 6.

46. Summing the individual requirements would produce the capital requirement necessary if each independent risk event was assumed to occur simultaneously (i.e., with a probability much lower than 5%). Therefore, the IOCT is calculated as the square root of the sum of the square of the individual capital requirements to allow for the independence of the risks.

47. The sum of all groups must be taken in respect of an item before squaring. If in respect of lapses (item a), there are 2 subgroups namely x and y, then $a^2 = (a_x + a_y)^2$, where $a_x$ and $a_y$ are the lapse capital targets for groups x and y respectively. The Prescribed Capital Target should generally be higher where groups are used instead of bundling all policies, since expected profits in one group may not be used to reduce expected losses in another group (i.e. the Prescribed Capital Target for a group in respect of an element, e.g. $a_x$ must be greater than or equal to 0.)

## 6. IOCT components

### 6.1. Item a:  Lapse Risk (when no surrender values)

48. Calculated as 40% of the amount required to ensure that no policy has a negative liability, before taking account of the effect of any negative bonus stabilisation reserve.

49. The lapse risk component has been chosen to provide for roughly a doubling of lapse rates (ignoring any allowance already contained within the liability calculation). Thus, on the assumption that typical base lapse rates could be 20%, the lapse risk Prescribed Capital Target has prudently been set equal to 40%.

50. Additions to the above amount must be considered where:

- the office's lapse experience fluctuates significantly from year to year or the trend in lapses has been worsening over time;
- the typical level of base lapses is in excess of the requirement outlined above.

### 6.2. Item b: Surrender Risk

51. Calculated as 20% of the amount required to ensure that no policy's liability (before taking into account the effect of any negative bonus stabilisation reserve) is less than its current surrender value.  For policies which cannot be surrendered or transferred from the long term insurer, the amount is zero.

52. Similarly to lapse risk, the surrender risk component has been chosen to provide for roughly a doubling of the surrender rates (ignoring any allowance already contained within the liability calculation).  Thus, on the assumption that base surrender rates are 10%, the surrender risk Prescribed Capital Target has been set equal to 20% of the amount required to ensure that no policy's liability before taking into account the effect of any negative bonus stabilisation reserve is less than its current surrender value.  For policies which cannot be surrendered or transferred from the long term insurer the amount is zero.

53. Additions to the above amount must be considered where:

a. material surrender values are guaranteed;

b. the office has created expectations of stabilised future surrender values at the point of sale or in regular correspondence with policyholders;

c. the typical level of surrenders is in excess of 10% pa of in-force policies.

### 6.3. Item c: Mortality, Morbidity and Medical Fluctuation Risk

54.   The required OCT provides for fluctuations in experience over the year up to the next valuation.  In the case of mortality, ASSA Guidance is based on Monte Carlo simulations that have been performed for the business spread of two large South African long term insurers, taking into account a 95% confidence level to derive the requirements. A similar calculation has been performed for morbidity, ignoring the dependency between morbidity and mortality lump sum benefits.  The offset was ignored to make some provision for the moral and economic risks which also influence morbidity claims. The same guidelines have been adopted for Botswana, although recalibration may be considered in future.

55.   The medical fluctuation risk OCT is set at 3 times the mortality fluctuation risk OCT.

56.   The requirements are as follows:

(ci) Mortality
$$\frac{45p}{\sqrt{n}}$$

(cii)        Morbidity
$$\frac{65p}{\sqrt{n}}$$

(ciii) Medical
$$\frac{135p}{\sqrt{n}}$$

where:

n = number of lives assured in the category (net of lives fully reinsured), and

p = annual risk premium on the valuation basis or expected strain (net of reinsurance).

Notes:

1.   The above formulae are based on typical spreads of risks.  Where this is not the case (i.e. not a typical spread of risks), the Valuator should consider calculating separate fluctuation Prescribed Capital Targets for different homogeneous groups and holding the sum of these capital requirements.

2.   The fluctuation risk can be decreased to a large extent by suitable reinsurance. Whilst it is not practical to prescribe formulae that depend on reinsurance arrangements, the Valuator may make an adjustment for reinsurance where this can be justified (see section 8 for more specifics on the treatment of reinsurance).

3.   Mortality includes funeral benefits and accident benefits.

4.   Morbidity includes lump sum disability benefits, dread disease benefits and income protection benefits.

5.   Medical includes hospital cash plans and major medical benefits.

6.   p should include any relevant option premiums.

### 6.4. Item d: Annuitant Mortality Fluctuation Risk

57. Similar to item (c), the OCT provides for fluctuations in experience over the year up to the next valuation. For annuitant lives the ASSA Monte Carlo simulation was carried out on the same basis as for mortality. The annuitant mortality fluctuation Prescribed Capital Target equals:

$$\frac{r}{\sqrt{n}}$$

where:

r = statutory valuation method (as per IPR 1L) reserves for the relevant (i.e. where mortality plays a role) annuity portfolios on the valuation date and

n = number of annuitants in the relevant category.

### 6.5. Item e: Mortality, Morbidity and Medical Assumption Risk

58. One-third of the best estimate AIDS liability must be allowed for.

59. Based on modelling performed, allowing for item (c) (i.e. mortality, morbidity and the medical fluctuation risk) together with the mortality, morbidity and medical compulsory margins, leads to a requirement which already exceeds a 95% confidence interval. No mortality, morbidity and medical assumption Prescribed Capital Target (apart from AIDS in paragraph 58 above) is thus deemed necessary.

60. Additions to the above amount must be considered for new types of benefits, new distribution channels, insufficient experience data being available, or experience worsening over time.

61. Where the mortality risk is eliminated, for example by the use of back-to-back policies there is no mortality Prescribed Capital Target.

### 6.6. *Item f: Expense Fluctuation Risk*

62. The expense fluctuation Prescribed Capital Target has been set at 10% of all renewal expenses in the previous year (excluding commission and commission-related and other acquisition costs).

63. For a mature office, typically the volumes of business may fluctuate by about 10% from those expected in an office's annual budgeting exercise. An exceptional variance may be of the order of 20%. In such a circumstance, the office may have difficulty adjusting its cost structure to cater for the changes in flows of new business. If fixed or relatively fixed overheads constitute half of an office's expenses, then an expense overrun of 10% for the assumed renewal loading may reasonably be expected.

64. An addition to the above amount must be considered where:

   a. new business figures historically have deviated by more than 20% from budgets;
   b. the office is rapidly growing and expenses are unpredictable; or

c.  the office has recently launched a new class of contract with a substantially different expense structure to existing contracts.

### 6.7. Item g: Investment Risk

65.   The investment risk component is equal to the greater of (gi) and (gii), as defined below.

### 6.7.1. Item (gi): Resilience Capital Target

66.   The purpose of the resilience Capital Target is to test the robustness of the financial position of a long term insurer in the face of volatile market conditions. The Valuator must reconsider the valuation assuming the following fall in the fair values of the assets backing the liabilities on the valuation date:

| Type of asset | Fall in fair value |
|---|---|
| Equities<br><br>FTSE/JSE/BSE All Share dividend yield<br><br>below 4% | 30% fall in value |
| FTSE/JSE/BSE All Share dividend yield<br><br>5% or above | 20% fall in value |
| FTSE/JSE/BSE All Share dividend yield at 4% or above, but below 5% | Interpolate between 20% and 30% |
| Fixed property | 15% fall in value |
| Fixed income | Impact of 25% relative increase/decrease in yield to maturity (i.e. when yields are 10%, test resilience to both 7.5% and 12.5% yield environments) |
| Inflation linked bonds | Impact of increase/decrease in real yield to maturity by factor of 25% of real yield to maturity (i.e., a real yield of 4% increases to 5%). |
| Cash and fluctuating interest rate assets | No change in value |
| Other assets | 35% fall in value |
| Foreign currency denominated assets | Same as for domestic assets subject to a minimum of 20% fall in value |

- Note 1: For fixed income and inflation linked bonds, the Valuator needs to determine whether an increase or decrease will lead to the highest Prescribed Capital Targets on total Long Term fund. The Valuator must use the yield movement that produces the HIGHEST capital target.

- Note 2: For assets not listed in this table, for example unlisted holdings and preference shares, the Valuator should use the fall in fair value of the closest equivalent listed above.

67.	The calculation of the resilience Prescribed Capital Target is then as follows:

$L_0$ = PVM liabilities (including any bonus stabilisation reserves) at valuation date

$A_0 = L_0$	(i.e. the assets necessary to back the liabilities at valuation date)

L1 = PVM liabilities after the assumed fall in fair value (before deduction of the absolute value of any negative bonus stabilisation reserve), reduced by the effect of any proposed management actions e.g. lower bonus rates.

$A_1$ = Value of the assets ($A_0$) after the assumed fall in fair value.

Then the resilience Prescribed Capital Target equals:

$$= (A_0 - L_0) - (A_1 - L_1) = L_1 - A_1$$

Notes:

1.	Assume that fair values will not recover (within a short period).

2.	For options and futures the long term insurer's exposure to the relevant assets (e.g. equities) must be taken into account when calculating this requirement. A long term insurer might, for example, hedge an equity portfolio by selling futures. Should the composition of the portfolio and the future index sold be identical, a fall in fair value of say 30% would make a resilience Prescribed Capital Target unnecessary for the hedged portion of the portfolio. As the composition will normally not be identical the Valuator would have to consider what offset to allow. In an extreme case, the fair value of the equity portfolio may even fall while the index rises.

3.	Although the Valuator must consider liquidity when valuing and reporting on a long term insurer, there is generally no particular Prescribed Capital Target for lack of liquidity.

4.	Where share capital invested in foreign assets is used to cover the IOCT, assume that these foreign assets have the same assumed fall as the Pula denominated assets, but with an allowance for exchange rate volatility and subject to a minimum fall of 20% per asset class. This in turn implies that any offshore assets used will result in a minimum "up-ratio factor" of 20% in the determination of OCT from IOCT.

5.	Refer to section 6.10 below for the treatment of group undertakings in the calculation of the resilience Prescribed Capital Target.

6.	Refer to section 9 for the treatment of embedded derivatives in the calculation of the resilience Prescribed Capital Target.

### 6.7.2.	Item (gii): Worse Investment Return

68.	The "worse investment return" scenario assumes that future investment returns would be equal to 0.85x the valuation assumption (test for a 15% relative reduction). This implies that the valuation interest rate used in valuing both assets and liabilities and

the assumed growth rates for future dividends and rentals where applicable must all be reduced to 0.85x valuation rate per annum.

Calculation of the worse investment return Prescribed Capital Target is then:

$L_0$ = PVM liabilities (including any bonus stabilisation reserves) at valuation date

$A_0$ = L0 (i.e. the assets necessary to back the liabilities at the valuation date)

$L_1$ = PVM liabilities assuming the worse investment return scenario (before deduction of the absolute value of any negative bonus stabilisation reserve), reduced by the effect of any proposed management actions e.g., lower bonus rates.

$A_1$ = The value of the assets (A0) taking into account the worse investment return scenario. (It is expected that fixed interest assets will be revalued).

Then the worse investment return Prescribed Capital Target equals:

$$= (A_0 - L_0) - (A_1 - L_1) = L_1 - A_1$$

69.     For the calculation of $A_1$ fixed interest assets must be revalued.

70.     Refer to section 9 for the treatment of embedded derivatives in the calculation of the worse investment return Prescribed Capital Target.

### 6.7.3.     Further Notes on Investment Risk

71.     Item (g) of the Prescribed Capital Target deals with a change in the value of assets relative to liabilities that are backed by those assets in certain resilience scenarios. To the extent that liabilities may be backed by negative reserve "assets", the same rules apply, i.e., for the resilience test allow for a 25% relative change in yields, for the worse investment return scenario allow for a return equal to 0.85x the valuation rate. This will essentially mean revaluing the liabilities (positive and negative) at the new rate. If the change in assets (i.e. negative reserves) relative to liabilities results in a strain (increase in the reserves), the strain will be reflected in item (g).

72.     With respect to allowing for a fall in assets backing the OCT, a similar logic should apply. That is, one must use the fall in assets prescribed by item (g)(i) (the resilience test) and apply that to any negative reserve assets backing the OCT. Applying this to the IOCT will lead to the usual increase to get to the OCT.

73.     Note that the first point above applies to negative reserves backing positive reserves (i.e. policyholders' funds), while the second point applies to negative reserves backing the Prescribed Capital Target itself (i.e. shareholders' funds).

### 6.8.     Item h: Credit Risk

74.     The credit risk component takes into account the credit risk that is inherent in the various assets held to back the insurer's liabilities. Credit risk is defined as: "The inability or unwillingness of a counterparty to fully meet its on- or off-balance sheet contractual financial obligations."

75.     The component of OCT for credit risk is calculated for assets backing discretionary participation liabilities (e.g. Smooth Bonus and With-Profit Annuities) and non-profit

liabilities. Assets backing other reserves (e.g. Maturity Guarantee reserves and AIDS reserves) are to be included in non-profit liabilities. Linked business is excluded.

76. For each of the discretionary participation and non-profit components the credit risk OCT is calculated as follows:

$$\sum_i f_i \times MV_i$$

Where:

$f_i$ is the factor for credit rating i as given in the table in section 6.8.1 below and $MV_i$ is the market value of the aggregate holdings of all assets with credit rating i that back each of the non-profit and discretionary participation policy liability portfolios.

### 6.8.1. Table of credit risk factors

| Credit Rating i | Factor ($f_i$) Duration greater than 1 year | Factor ($f_i$) Duration shorter than 1 year |
|---|---|---|
| AAA | 1.0% | 0.250% |
| AA | 1.0% | 0.250% |
| A | 4.1% | 1.025% |
| BBB | 5.0% | 1.250% |
| BB | 13.6% | 3.400% |
| B | 22.4% | 5.600% |
| CCC | 44.8% | 11.200% |

77. The above factors were taken from the Actuarial Society of South Africa's Professional Guidance Note PGN104. Credit ratings are based on Standard and Poor's International Scale, Local Currency rating. Where other rating agencies and methods have been used, the Valuator must use a factor that corresponds to the comparable S&P International Scale, Local Currency rating.

78. Where the instrument does not have a credit rating but the asset is exposed to a credit-rated counterparty (e.g. a promissory note with XYZ bank), then the exposure to the counterparty is aggregated and this constitutes $MV_i$.

79. Where there is no rating for an instrument, or the credit counterparty has not been rated, an internal company rating may be used. In this case the Valuator must be satisfied that appropriate and industry accepted techniques have been used. Alternatively, the minimum factor that can be used for unrated exposures is that as for a BB rated instrument (13.6%). This is a minimum, and the actuary should consider the credit quality of the counterparty before applying this minimum.

80. For government debt and debt instruments carrying an explicit government guarantee and issued in Pula, a factor of 0% is used.

81. For assets with a duration of shorter than 1 year, the factor used is 25% of the factor in the table.

82. The assets to be included are assets held where credit risk is assumed and include, but are not limited to:

    i. Bonds and short-term deposits (bank balances, promissory notes, letters of credit, convertibles, etc)

    ii. OTC derivative positions (considering the counterparty of the derivative and the market value of the derivative). This will include swaps, options, forwards, etc. Where collateral has been posted, credit can be taken for this collateral

    iii. Preference shares (if not allowed for as an equity investment in determining (gi) above)

    iv. Policies of insurance and reinsurance

    v. Debtors

    vi. Intermediary balances

    vii. Credit derivatives

83. Collective investment schemes should be considered on a "look through" basis, taking into account the underlying holdings of each collective investment scheme in which discretionary participation and non-profit policyholder's funds have been invested, in order to calculate the credit risk on the underlying instruments. Approximate methods that give reasonable answers may be used where the calculations are too complex.

84. The reduction in the policyholder liabilities due to approved reinsurance must be included as a notional asset in the calculation.

85. To the extent that the insurer has purchased credit derivatives (i.e. an instrument where the payoff is related to the credit-worthiness of an underlying company/entity, e.g. a credit default swap) the Valuator must consider the net of recovery nominal exposure to that counterparty (and should add it to other exposures to the same counterparty). In addition, the insurer will have exposure to the issuer of the derivative, which must also be taken into account, but in this case just the mark-to-market value of the derivative instrument needs to be considered in the calculation.

86. The Valuator should consider the extent to which the portfolio is diversified and increase the allowance for credit risk OCT if necessary, since factors detailed in 6.8.1 above are derived from a well diversified credit portfolio.

87. With derivative exposures, the Valuator should consider the additional risk that a credit failure of the counterparty could have on the nominal exposure.

88. The effect of management action on discretionary participation business to a credit event may be taken into account to reduce the credit risk OCT. It is acceptable to include this management action in the calculation of the investment resilience OCT

and not allow for it in the calculation of (h). However, the Valuator must satisfy him/herself that such action can reasonably be expected to be taken.

89. Other management actions can be used to reduce (h). One example of such a management action might include releasing prudence in the allowance for credit risk in the liability calculation (i.e. release of discretionary margins for credit risk), or elsewhere in provisions (e.g. accounting provisions for bad debt).

### 6.9. Item i: Operational risk and other risks

90. The Valuator must ensure that an appropriate level of capital is held to cover operational risk. Operational risk is defined as "the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events".

91. Should there be any other factor that could place the long-term insurer at risk, the Valuator must consider increasing the Capital Target. In making this decision, the Valuator should consider, amongst other things:

   i.   The company's mission and strategic plan

   ii.  The intended growth of the company

   iii. The risk profile of the business

   iv.  The capital levels required by rating agencies for the company to maintain its credit rating

   v.   The capital levels being maintained by competitors

   vi.  How the capital itself is invested

   vii. The relative level of the investment markets at the time of the OCT calculation

92. The formula shown in section 6.9.1 below is based on the fourth Quantitative Impact Study (QIS4) of Solvency II. This was used as a guideline for calculating the allowance in capital for operational risk. This formula should be used to determining the allowance for operational risk in OCT.

### 6.9.1. Operational risk OCT formula

93. This section sets out the formula for calculating the operational risk component of OCT.

**Input:**

The input parameters to the formula are shown in the following table.

| Parameter | Description |
|---|---|
| TP(life) | Total life insurance liabilities (gross of reinsurance) |
| TP(life_ul) | Total life insurance liabilities for unit-linked business (gross of reinsurance) |
| TL(h) | Total health insurance liabilities (gross of reinsurance) |
| EARN(life) | Total earned life premium (gross of reinsurance) |
| EARN(life_ul) | Total earned life premium for unit-linked business (gross of reinsurance) |
| EARN(h) | Total earned health insurance premium (gross of reinsurance) |
| EXP(ul) | Amount of annual expenses (gross of reinsurance) incurred in respect of unit-linked business |
| BSCR | Basic Standard Capital Requirement (similar to OCAR) |

**Calculation formula:**

The calculation formula for the operational risk component of OCT is based on the input parameters above. The formula is set out below:

$$\min\left\{\begin{array}{l} 0.30 \times BSCR; \\ \max\left\{\begin{array}{l} 0.03 \times \left[EARN(life) - EARN(life\_ul)\right] + 0.02 \times EARN(h) \\ 0.003 \times \left[TP(life) - TP(life\_ul)\right] + 0.002 \times TP(h) \end{array}\right\} + 0.25 \times EXP(ul) \end{array}\right\}$$

### 6.10. Group Undertakings Backing Elements of PCT

#### 6.10.1. Introduction

94.  Where the Ordinary Capital Target (OCT) element of the Prescribed Capital Target (PCT) is backed by group undertakings, in performing the resilience test allowance should be made for the fact that the volatility of shareholders' assets may have been reduced as a result of valuing the group undertakings at net asset value rather than fair value.

#### 6.10.2. Definitions and Notation

95.  Define the following notation:

- $N_0$ = Net asset value of group undertaking before resilience test scenario, as per asset valuation regulations
- $N_1$ = Net asset value of group undertaking after applying the resilience test scenario.
- $X_0$ = Excess of fair value of group undertaking over N0 (before applying the resilience test)
- $X_1$ = Excess of fair value of group undertaking over N1 (after applying the resilience test)
- $f$ = the proportion of the excess of fair value over net asset value of a listed subsidiary that is allowed to be included and counted as capital by the asset valuation regulations

#### 6.10.3. Valuation of Group Assets

96.  Then the valuation of a group undertaking as prescribed by asset valuation regulations is given by the following, assuming that fair value is represented by market capitalisation:

- Before resilience scenario: $N_0 + f* X_0$
- After resilience scenario: $N_1 + f* X_1$

97.  Then for any hypothetical resilience test scenario, the proportional change in value of the group undertaking as a result of that scenario is given by:

$$G = \frac{N_1 + f * X_1}{N_0 + f * X_0}$$

98.  If OCT is completely backed by the group undertaking, then:

- OCT = IOCT / G

Assuming that fair value of a listed subsidiary is represented by its market capitalisation, the following possibilities are worth noting:

| Nature of Group Undertaking | Likely Behaviour of Above Variables |
| --- | --- |
| **Unlisted, not a regulated financial institution** | $N1 = N0$<br>$f=0$<br>X0 and X1 irrelevant |
| **Listed, not a regulated financial institution** | $N1 = N0$<br>$(N1 + X1) = 70\%$ of $(N0 + X0)$<br>$0 < f < 1$ |
| **Unlisted, regulated financial institution** | $N1 < N0$<br>$f = 0$<br>X0 and X1 are irrelevant |
| **Listed, regulated financial institution** | $N1 < N0$<br>$(N1 + X1) = 70\%$ of $(N0 + X0)$<br>$0 < f < 1$ |

*An example that illustrates the above is in Appendix A.*

### 7. Embedded Investment Derivatives

99. IPR 1L addresses reserving for embedded investment derivatives. The method for calculating the PCT is described below.

100. The size of the liability arising as a result of embedded investment derivatives is likely to be very sensitive to adverse economic scenarios such as a substantial reduction in the level of the equity market, or a significant change in the term structure of interest rates. The minimum amount of assets the insurer needs to hold in excess of its liabilities to ensure its solvency in adverse circumstances should therefore take into account the effect of the existence of embedded derivatives.

101. The effect of embedded derivatives on the size of OCT should be quantified by including the liabilities in respect of embedded derivatives in the calculation of the (gi) item of IOCT. This implies a re-calculation of the liability in respect of embedded investment derivatives assuming changes in the values of assets and economic variables (such as interest rates) as specified in section 6.7.1 above. The assets backing the liabilities in respect of investment derivatives must also be re-valued accordingly. Management action considerations, as shown in section 10, should be taken into account where applicable.

102. It should be noted that the above requirement implies that the stochastic investment return model should be re-calibrated in order to be consistent with the shock economic conditions specified in section 6.7.1 above in a resilience test scenario. This recalibration should involve a change in the initial zero-coupon bond yield curve reflecting a 25% proportional increase or reduction in zero-coupon bond yields at all durations (whichever is more onerous to the total IOCT).

103. It is not required that any other parameters (such as risk premia, volatilities or correlations) of the stochastic model should be changed. The simulation of future investment returns and discount factors for the purposes of the OCT calculation should be consistent with this new calibration.

104. Section 6.7.2 requires a re-valuation of liabilities on a worse investment return scenario. In the context of investment guarantees, the worse investment return scenario contemplated in section 6.7.2 can be interpreted as a proportional 15% reduction in the zero-coupon bond yield curve, at all durations (with all other model parameters remaining unchanged). While it is very likely that the resilience scenario will be more onerous than the worse investment return scenario, the Valuator must consider which scenario will be more onerous for the total OCT for a specific company.

## 8.    Treatment of Reinsurance

105.    The calculation of the Prescribed Capital Target may take into account the impact of any allowable reinsurance contract entered into by the insurer.  There should therefore be sufficient capital to cover the risks retained by the insurer, net of allowable reinsurance.

106.    Allowable reinsurance is defined as reinsurance placed with a reinsurer with a credit rating of BBB or better. Credit ratings may be obtained from any acceptable credit rating agency, but the same credit rating agency must be used to provide ratings for all reinsurers. Where applicable the credit rating must be that applicable to the local office of the reinsurer.

107.    In financial or other reinsurance arrangements, where some or all of the risk is transferred back to the insurer, the insurer must hold whatever is the appropriate amount of capital in the light of the risk that is effectively retained.

108.    This is broadly based on the concept that the loss function without reinsurance is the sum of the loss distributions of each risk in the portfolio.  If one reinsures 25% of each sum at risk, then the loss distributions of the retained sums at risk have a new distribution, and one can reduce the Prescribed Capital Target to the 95% point on the new distribution.  Reinsurance with a profit share arrangement may alter the loss distribution, but with different and most likely lower impact.  The Prescribed Capital Target is then the 95% point on the new distribution.  It is not practical to prescribe formulae that depend on reinsurance arrangements, but the Valuator may make an adjustment for reinsurance where he/she believes this to be appropriate.

109.    The following are examples of how to determine the appropriate allowance for a reduction in capital adequacy due to reinsurance:

    a.    For reinsurance cover that may only be cancelled by mutual agreement (this will normally include a termination payment from one party to another), full allowance may be made in respect of the reinsurance, as the reduction in the amount of capital required to meet the 95% criterion is irrevocable.

    b.    For reinsurance cover that may be cancelled by the reinsurer or with a limited term, the Valuator should exercise judgement in determining to what extent the insurance reduces the amount of capital required to meet the 95% criterion on a risk based approach.

    c.    For reinsurance cover with a profit share arrangement or financial reinsurance, the Valuator should exercise judgement in determining to what extent the insurance reduces the amount of capital required to meet the 95% criterion on a risk based approach, paying regard to the underlying risk that is effectively retained.

## 9. Management Actions

110. Wherever applicable, allowance for offsetting factors may be made in calculating the Prescribed Capital Target – such offsetting factors could apply to either the TCT or OCT, and to any of the individual items (a) through (h) that make up the OCT. An example of a management action impacting the TCT would be the application of a market-value adjuster to surrender values.

111. A reduction in discretionary margins can be used as an offsetting factor, i.e., such margins are reduced in the valuation basis, capitalising future profits through the change in basis.

112. Examples of management actions that could be considered when calculating the PCT include the following:

   a. Removal of a portion of non-vested bonuses applicable to with-profits business;
   b. Reduction in future bonus rates on with-profits business;
   c. Additional surrender penalties in the event of mass selective adverse withdrawals;
   d. For closed portfolios with investment reserves, removal of these reserves;
   e. The right to review premium rates, risk premiums and policy conditions could be allowed for.

113. The level of the Prescribed Capital Target is then a function of the expected management action resulting in offsets. Credit for offsets may be taken only where management action has been resolved by the Board and where the Valuator is satisfied that:

   a. The office would exercise the discretions should circumstances require it in practice.
   b. The required action is not constrained by policy guarantees.
   c. Such action is not contrary to any representations made to the policyholder (including marketing literature) that may have impacted policyholder reasonable expectations.

114. Although it is not the responsibility of the Valuator to ensure that management actions do get implemented in practice (this being a Board responsibility), it is the responsibility of the Valuator to ensure that the Board is aware of the potential consequences of any proposed management action, and in particular how it stands up against policyholder reasonable expectations.

115. In the case of the investment Prescribed Capital Target it should be taken into account that certain management actions have already been assumed to justify the use of any negative bonus stabilisation reserve. It is therefore recommended that the Board should separately resolve these management actions and any further management actions necessitated by the occurrence of the resilience or worse investment return scenario.

116. When management action is assumed all relevant assumptions should be adjusted on a consistent basis. However, where a management action is assumed on more than one item it is cautioned that double counting should be avoided or allowed for. Double counting includes double counting in respect of the Prescribed Capital Target itself, and double counting items already allowed for in the actuarial liabilities.

## 10. Additional Considerations and General Guidance

117. Approximate methods may be used to calculate the Prescribed Capital Target.

118. It has been decided to ignore the effect of future new business when calculating the Prescribed Capital Target, as is the case with the statutory valuation method in general. In considering the future financial position of the office, the Valuator will of course take expected new business into account.

119. Separate calculations must be made for business written in different countries should exchange controls apply.

120. The total Prescribed Capital Target as set out above is the minimum amount that must be available. Where the Valuator perceives that this minimum is inadequate for a particular long term insurer, he/she must set aside such higher amount as he/she regards as prudent. In the particular case of a long term insurer that runs only non-profit business with stringent guarantees, the Prescribed Capital Target that will leave a 5% chance of insolvency is too low, i.e. the total Prescribed Capital Target as set out above will have to be increased.

121. In determining the PCT, the Prescribed Capital Target of a branch of the insurer must be added to the PCT. The Prescribed Capital Target of each branch must be the higher of:

    a. The Prescribed Capital Target of the branch, calculated in accordance with IPR 3L; this requirement is calculated by taking the difference between the PCT when adding the specific branch's assets and liabilities to those of the Botswana operation and the PCT of the Botswana operation on its own;

    b. Such capital requirement as may be prescribed by the regulatory authority in the country in which the branch carries on most of its insurance business.

# Appendix A. Valuation of Group Assets Example

The following example illustrates the valuation of group assets (assume all amounts are in P'billion).

Listed, 100% owned Long Term insurance subsidiary that writes mostly linked business:

| | |
|---|---|
| Value of assets | = 1,100 |
| Value of liabilities | = 800 |
| Prescribed Capital Target | = 50 |
| Market capitalisation | = 350 |

Given $f = 0.2$

$N0 = 1,100 - (800 + 50) = 250$
$X0 = 350 - 250 = 100$

Value as per IPR 2L $= N0 + f * X0 = 250 + 0.2*100 = 270$

After resilience test:

| | | |
|---|---|---|
| Value of assets | = 900 (say) | |
| Value of (mostly linked) liabilities | = 620 (say) | |
| Prescribed Capital Target | = 45 (say) | |
| Market capitalisation | = 0.7 * 350 | = 245 |
| (resilience test assumption) | | |

$N_1 = 900 - (620 + 45) = 235$
$X_1 = 245 - 235 = 10$

Value as per IPR 2L $= N_1 + f * X_1 = 235 + 0.2 * 10 = 237$

Fall in value of group undertaking assumed by resilience scenario
$$= 1 - 237 / 270 = 12\%$$

Compare this to the 30% fall that would have been incurred under the resilience scenario if the subsidiary was treated as a pure equity investment, and one sees that the above method resulted in a slight reduction in the Prescribed Capital Target.