Solvency Assessment and Management:
Steering Committee
Position Paper 70[1] (v 3)
Property Risk

EXECUTIVE SUMMARY

1. INTRODUCTION AND PURPOSE

This document discusses the structure and calibration of the property risk sub-module of the Market Risk Module The paper includes discussion of the Solvency II developments, consideration of the approaches within other jurisdictions, describes a local calibration exercise, highlights issues, considers alternatives and recommends an approach going forward in SAM - incorporating feedback and analysis of SA QIS 2 and feedback from SA QIS 3.

The task group recommends that an approach based on Solvency II be adopted for the Property risk sub-module, for comparability across companies and consistency with the way other sub-modules are treated. In line with feedback from SA QIS 1 to 3 as well as new developments in Solvency II, it is proposed that the Solvency 2 approach be retained with the following amendments/additions/clarifications:

- Where there is a direct causal relationship between property risk and policyholder behaviour, allowance for policyholder behaviour should be made within the property risk sub-module. Non-causal interrelationships should be reflected in the lapse sub-module and the correlation matrices to be used. This is discussed more fully in Discussion Document 48.

- Property risk can be assumed to arise from events that apply to the industry as a whole as opposed to company-specific events.

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  In the case that the ∆BOF calculation results in a negative capital requirement, then the property stress should be replaced by an equal but opposite stress (i.e. a 25% upward stress to property values).

- Impairments should be made to the risk mitigating effect of risk mitigating contracts, as specified in *[Reference to Impairment of risk mitigating contracts within the Market risk module/CDR module unless changed to explicit allowance in CDR module]*

The main difference of this propo**s**ed approach with the SA QIS 2 specification (except for the 4 points mentioned on the previous page and above) is that "direct or indirect participations in real estate companies that generate periodic income or which are otherwise intended for investment purposes" are now classified as equity as opposed to property.

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[1] Position Paper 70 (v 3) was approved as a FINAL Position Paper by Steering Committee on 5 December 2014.

The calibration and comparison to International Markets is complicated by the illiquid nature of the property market in each country and the part of the cycle currently experienced in each country. As such, even though the historical mean and standard deviation in local data is above that in the European calibration which might imply a higher property stress, it is proposed to not change the solvency 2 stress factor

2. INTERNATIONAL STANDARDS: IAIS ICPs

ICP17 (Capital Adequacy), the relevant ICP, does not consider property risk specifically.

3. EU DIRECTIVE ON SOLVENCY II: PRINCIPLES(LEVEL 1)

Relevant extracts from the Solvency II level 1 principles are provided below. As is the case with the IAIS core principles, these requirements are of a higher level than required for the establishment of detailed principles in the property risk sub-module of the market risk module within the capital requirement framework. However, it provides the broad framework within which these requirements are to be looked at and calculated.*Article 100*

General provisions

Member States shall require that insurance and reinsurance undertakings hold eligible own funds covering the Solvency Capital Requirement.

The Solvency Capital Requirement shall be calculated, either in accordance with the standard formula in Subsection 2 or using an internal model, as set out in Subsection 3.

Article 101

Calculation of the Solvency Capital Requirement.

1. *The Solvency Capital Requirement shall be calculated in accordance with paragraphs 2 to 5.*

2. *The Solvency Capital Requirement shall be calculated on the presumption that the undertaking will pursue its business as a going concern.*

3. *The Solvency Capital Requirement shall be calibrated so as to ensure that all quantifiable risks to which an insurance or reinsurance undertaking is exposed are taken into account. It shall cover existing business, as well as the new business expected to be written over the following 12 months. With respect to existing business, it shall cover only unexpected losses.*

   It shall correspond to the Value-at-Risk of the basic own funds of an insurance or reinsurance undertaking subject to a confidence level of 99,5 % over a one-year period.

4. *The Solvency Capital Requirement shall cover at least the following risks:*

   (a) non-life underwriting risk;

   (b) life underwriting risk;

   (c) health underwriting risk;

   (d) market risk;

   (e) credit risk;

(f) operational risk.

Operational risk as referred to in point (f) of the first subparagraph shall include legal risks, and exclude risks arising from strategic decisions, as well as reputation risks.

5. *When calculating the Solvency Capital Requirement, insurance and reinsurance undertakings shall take account of the effect of risk-mitigation techniques, provided that credit risk and other risks arising from the use of such techniques are properly reflected in the Solvency Capital Requirement.*

Article 104

Design of the Basic Solvency Capital Requirement

1. *The Basic Solvency Capital Requirement shall comprise individual risk modules, which are aggregated in accordance with point (1) of Annex IV.*

   It shall consist of at least the following risk modules:

   (a) non-life underwriting risk;
   (b) life underwriting risk;
   (c) health underwriting risk;
   (d) market risk;
   (e) counterparty default risk.

2. *For the purposes of points (a), (b) and (c) of paragraph 1, insurance or reinsurance operations shall be allocated to the underwriting risk module that best reflects the technical nature of the underlying risks.*

3. *The correlation coefficients for the aggregation of the risk modules referred to in paragraph 1, as well as the calibration of the capital requirements for each risk module, shall result in an overall Solvency Capital Requirement which complies with the principles set out in Article 101.*

4. ***Each of the risk modules referred to in paragraph 1 shall be calibrated using a Value-at-Risk measure, with a 99,5 % confidence level, over a one-year period.***

   Where appropriate, diversification effects shall be taken into account in the design of each risk module.

5. *The same design and specifications for the risk modules shall be used for all insurance and reinsurance undertakings, both with respect to the Basic Solvency Capital Requirement and to any simplified calculations as laid down in Article 109.*

6. *With regard to risks arising from catastrophes, geographical specifications may, where appropriate, be used for the calculation of the life, non-life and health underwriting risk modules.*

7. *Subject to approval by the supervisory authorities, insurance and reinsurance undertakings may, within the design of the standard formula, replace a subset of its parameters by parameters specific to the undertaking concerned when calculating the life, non-life and health underwriting risk modules.*

   Such parameters shall be calibrated on the basis of the internal data of the undertaking concerned, or of data which is directly relevant for the operations of that undertaking using standardised methods.

   When granting supervisory approval, supervisory authorities shall verify the completeness, accuracy and appropriateness of the data used.

Article 105

Calculation of the Basic Solvency Capital Requirement

1. *The Basic Solvency Capital Requirement shall be calculated in accordance with paragraphs 2 to 6.*

    …

5. *The market risk module shall reflect the risk arising from the level or volatility of market prices of financial instruments which have an impact upon the value of the assets and liabilities of the undertaking. It shall properly reflect the structural mismatch between assets and liabilities, in particular with respect to the duration thereof.*

    It shall be calculated, in accordance with point (4) of Annex IV, as a combination of the capital requirements for at least the following sub-modules:

    …

    *(c) **The sensitivity of the value of assets, liabilities, and financial instruments to changes in the level or in the volatility of market prices of real estate (property risk);***

4. MAPPING ANY PRINCIPLE (LEVEL 1) DIFFERENCES BETWEEN IAIS ICP & EU DIRECTIVE

There are no principle differences between the IAIS principles and level 1 text applicable to the calculation of the property risk sub module.

5. STANDARDS AND GUIDANCE (LEVELS 2 & 3)

5.1   IAIS standards and guidance papers

This is covered in Section 2 of this discussion paper.

5.2   CEIOPS CPs (consultation papers)

Level 2 Advice (former CP 47) gives advice on the structure and design of *inter alia* the property risk sub module[2].This advice is summarised below:

Property risk arises as a result of a sensitivity of assets, liabilities and financial investments to the level or volatility of market prices of property.

> A Delta-NAV approach is proposed for the calculation of the property risk capital charge with the capital charge Mkt_{prop} calculated as the result of the predefined scenario:
>
> $$Mkt_{prop} = \Delta NAV | PropertyShock$$
>
> The property shock is the immediate effect on the net value of assets less liabilities of an x% fall in real estate values. [3]

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[2] See Paragraph 6.4 of CP47 for advice on Property Risk

The following investments shall be treated as property and their risks considered in the property risk module:

- land, buildings and immovable property rights;
- direct or indirect participations in real estate companies that generate periodic income or which are otherwise intended for investment purposes;
- property investments for the own use of the insurer

On the other hand, the following investments shall be treated as equity and considered within the equity risk sub-module:

- an investment in the company engaged in the real estate management
- an investment in a company engaged in real estate project development or similar activities
- an investment in a company which took out loans from institutions outside the scope of the insurance group in order to leverage its investments in properties

Collective real estate investment vehicles will be treated like other collective investment vehicles with a look through approach.

It should also be noted that changes in the volatility of property prices are not explicitly tested but instead should be implicitly considered when setting the actual shock levels.

5.3   Other relevant jurisdictions (e.g.OSFI, APRA)

Other jurisdictions have not been considered.

5.4   Mapping of differences between above approaches (Level 2 and 3)

The following table considers the property shock as per QIS4, Level 2 Advice, QIS 5, JSE calibration.

Parameter	Property Shock
QIS4	20.0%
Level 2 Advice (CP 70)	25.0%
QIS5	25.0%
JSE Calibration	23.24%

The calibration of the property shock is considered in the following section.

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[3] Section 6 considers the calibration of the amount of the x% fall in real estate values.

6. CALIBRATION

The level II advice (former CP 70) provides guidance on the calibration of the actual property shock referred to in Section 5.2. This process was followed in calibrating the SA property shock using property data provided by the JSE.

6.1 Data

The level II advice uses UK data provided by the IPD[4] indices to calibrate the stress factor for property risk. According to level II advice the IPD indices are the most widely used commercial property indices and is produced directly from survey data collected from institutional investors, property companies and open-ended investment funds. Data is produced for most European markets as well as for some markets outside Europe, including South Africa.

In the level II advice it was decided to use the UK data for the calibration of the property risk as there was a "lack of long time series across most European markets" with the UK IPD total return indices providing the "greatest and most detailed pool of information".

The various IPD indices have differing reporting frequencies and covers differing time horizons (i.e. the year the index starts) which depend on the local market practices. The IPD index for UK has monthly reporting frequencies and data is available from 1987 onwards.

In contrast to this the SA IPD index only has semi-annual reporting frequencies and data is only available from 1995 onwards.

For the calibration it was therefore decided to use the FTSE/JSE SAPY Index, which consists of the top 20 market capitalisation weighted SA property funds which are listed on the JSE.

The index provides daily property values from 2005 which in turn consists of a total of 1693 of daily values and 1442 year-on-year return values.

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[4] "Investment Property Databank"

SA LISTED PROPERTY INDEX (SAPY)

Source: JSE SAPY Index
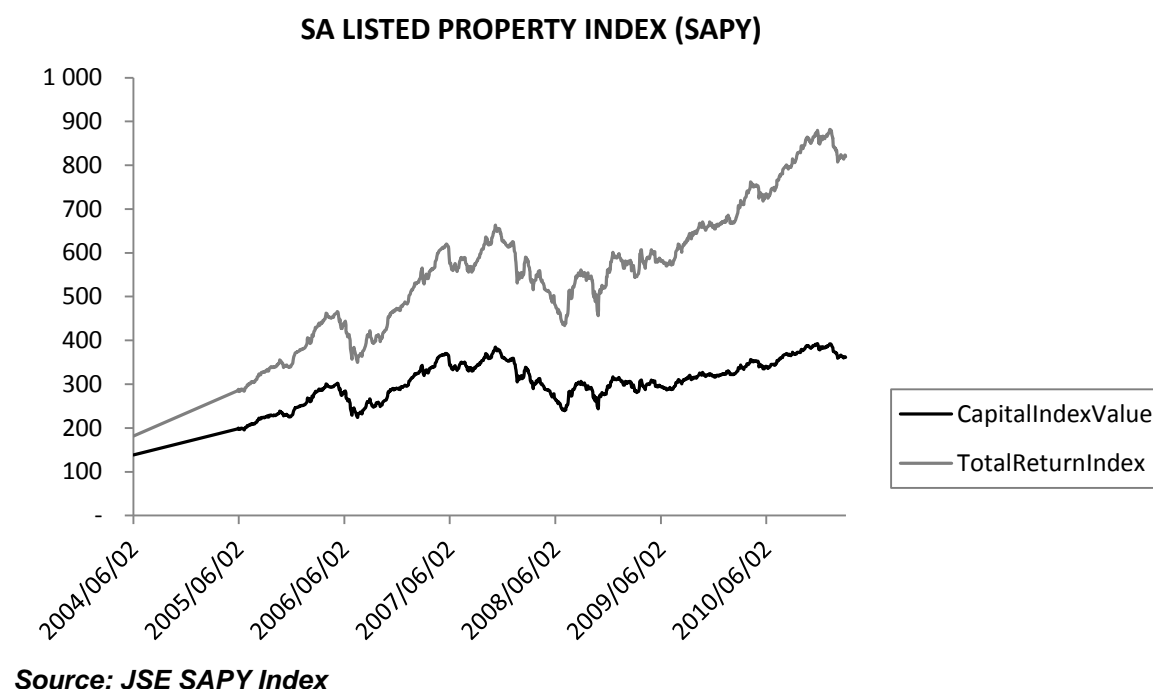
6.2 Methodology

The approach followed in the level II advice calibrates the property shock by deriving the lower percentiles of the unadjusted index data (using non-parametric methods), as opposed to fitting a particular distribution. The main reason for this was due to problems experienced with the "de-smoothing" of data sets.[5]

Annual returns were derived by calculating year-on-year total returns for the daily SAPY Index values.

Consistent with the level II advice, the property shock isn't calculated for each of the property classes individually (i.e. office, retail, industrial, city and warehouse) as the historical UK values at risk do not diverge significantly.

The SAPY index does not give the above breakdown and for practical reasons the shock for SA data is also only applied to property collectively. It is however acknowledged that this is a limitation with the JSE data as it is unclear whether these classes (i.e. office, retail, industrial, city and warehouse) are also very similar for SA data.

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[5] Paragraph 4.104 of CEIOPS level II advice for "SCR Standard Formula, Article111b, Calibration of Market Risk Module", dated 29 January 2010 (former CP70)

6.3 Descriptive Statistics

The following table provides both descriptive statistics as well as the lower percentiles of the year-on-year annual returns for property data. For comparative purposes the results of the level II advice for the UK IPD values are also included.

	ALL PROPERTY	
	SAPY	**UK IPD Index**
Maximum	73.95%	29.51%
50%	27.99%	9.78%
Mean	26.69%	8.79%
1 in 10 or 10%	-6.60%	-5.26%
1 in 100 or 1%	-22.57%	-25.28%
1 in 200 or 0.5%	-23.24%	-25.74%
Minimum	-27.63%	-25.88%
Std. Dev	23.39%	10.51%
Skewness	-0.1447	-0.8973
Excess Kurtosis	-0.4678	1.3253
Historical VAR	23.24%	25.74%

It should be noted that in spite of the Historical VAR values being of similar amount the SAPY data has a much higher variance.

The following graph compares the actual distribution of SA property returns with that of the normal distribution (with same mean and standard deviations.) A disparity from the normal distribution is obvious, and this was also evident in the UK IPD data sets.
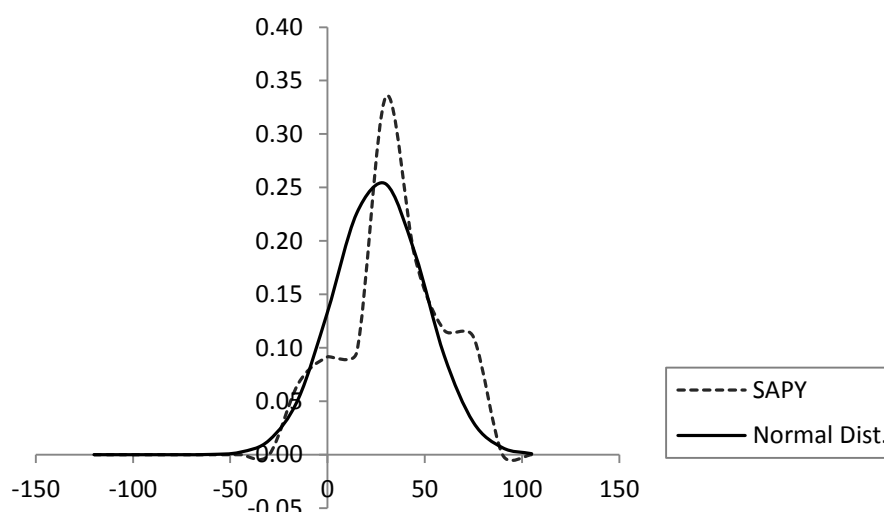
Based on the JSE SAPY total return index the 99.5% VAR (over a 1 year time horizon) is therefore equal to 23.24% for all types of property.

7. ASSESSMENT OF AVAILABLE APPROACHES GIVEN THE SOUTH AFRICAN CONTEXT

7.1 Discussion of inherent advantages and disadvantages of each approach

This section considers some of the limitations with using the JSE data for calibration purposes. It should be noted that the approach used in the calibration of the SA property shock is the same as that used in the level II advice. The choice of data to be used for the calibration is therefore the key issue.

a. The JSE SAPY total return index only covers 6 years as opposed to UK data covering approximately 22 years. The number of data points is similar as the JSE provides daily values. The part of the cycle which each market experience and has experienced may also differ by economy.

b. The JSE data does not give a breakdown for all property classes, so it is not really possible to determine whether the different property classes are also similar within the SA property market (as is the case in the UK property market).

c. The distribution of data does not conform to normal distribution and appears to be leptokurtic in nature (i.e. peaked around the mean and fatter tails). It is however expected that this will tend to normality as the time horizon and hence amount of data increases.

   In addition, the SAPY results have a much higher variance than that of the UK data.

d. Considering the issue of proportionality it is important to note that in spite of the calculation of the property risk capital charge being straight forward it still makes up a significant proportion of the total capital requirement. This should be taken into account when deciding on the level at which the property shock be set at.

e. Property markets are highly illiquid and may have infrequent observation points.

7.2 Impact of the approaches on EU 3rd country equivalence

It is not expected that the approach should have bearing on 3rd country equivalence.

7.3 Comparison of the approaches with the prevailing legislative framework

The current CAR (Capital adequacy requirement) require a stress of 15% to property values as part of the resilience CAR. It should be noted that this is not directly comparable to the Solvency 2 approach of stressing 1 risk at a time, nor is it in line with the level of confidence required by SAM and Solvency 2.

7.4   SA QIS 2 report

The following is extracted from the SA QIS 2 report:

"Property risk capital makes up a small part of the overall market risk capital for both life and non-life insurers. No significant comments were made on the treatment of property risk from the SA QIS2 approach."

This comment is relevant to property-specific issues, but some comments e.g. around risk-mitigating contracts and policyholder behaviour were taken into account in the recommendation below in a similar way as to other risk modules and sub-modules. These are not specifically highlighted further in this document.

7.5   SA QIS 3 feedback

- A suggestion was made that Real estate investment trusts (REITs) should be classified as property and a category added to the CIC table. The task group, however, are of the opinion that the general principles underlying the look-through approach should be used and no changes are therefore proposed.

7.5   Conclusions on preferred approach

In view of limitations of a South African calibration it is proposed that the property shock should be set equal to the 25% value (based on the UK data set) recommended for Solvency II.

In the case that the ∆BOF calculation results in a negative capital requirement, then the property stress should be replaced by an equal but opposite stress (i.e. a 25% upward stress to property values).

8. RECOMMENDATION

Mkt_{prop}(Property Risk)

Description

Property risk arises as a result of the sensitivity of assets, liabilities and financial investments to the level or volatility of market prices of property.

The following investments should be treated as property and their risks considered accordingly in the property risk sub-module:

- land, buildings and immovable-property rights;
- property investment for the own use of the insurance undertaking.

Otherwise, the following investments should be treated as equity and their risks considered accordingly in the equity risk sub-module:

- an investment in a company engaged in real estate management, or
- direct or indirect participations in real estate companies that generate periodic income or which are otherwise intended for investment purposes, or
- an investment in a company engaged in real estate project development or similar activities, or
- an investment in a company which took out loans from institutions outside the scope of the insurance group in order to leverage its investments in properties.

Collective real estate investment vehicles should be treated like other collective investment vehicles with a look-through approach.

Impairments should be made to the risk mitigating effect of risk mitigating contracts, as specified in *[Reference to Impairment of risk mitigating contracts within the Market risk module/CDR module unless changed to explicit allowance in CDR module]*

100% of property risk should be assumed to arise from industry-wide events.

Dynamic policyholder behaviour should be allowed for in the calculation of Mkt_{prop} where a causal relationship exists between the changes in the property values and the behaviour under consideration.

Non-causal relationships are reflected in the lapse risk module and the correlation matrices make allowance for these interrelationships.

Input

The following input information is required:

BOF = Basic Own Funds

Output

The module delivers the following output:

Mkt_{prop} =   Capital Requirement for property Risk

Calculation

The capital requirement for property risk is determined as the result of a pre-defined scenario:

$$\max\left(\Delta BOF \mid PropertyShock; 0\right)$$

Where PropertyShock is the immediate effect on the Basic Own Funds (BOF) expected in the event of an instantaneous decrease of 25 % in the value of investments in real estate, taking account of all the insurer's individual direct and indirect exposures to property prices. The property shock takes account of the specific investment policy including e.g. hedging arrangements, gearing etc.

In the case that the ΔBOF calculation results in a negative capital requirement, then the property stress should be replaced by an equal but opposite stress (i.e. a 25% upward stress to property values). In this case, all short positions in property should be taken account of, whether it is classified as risk mitigation techniques or not.

The result of the calculations should be determined under the condition that the value of future discretionary benefits can change and that the insurer is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital requirement is Mkt_{prop}.