

Defining the Scope of your Internal Model – GIRO Working Party

Example Model Scope – For Discussion Purposes only

GIRO 2010

Disclaimer

The following is an example model scope which has been put together by the Institute of Actuaries GIRO Working Party on Defining the Scope of your Internal Model. It is designed to stimulate debate and illustrate the arguments made by the working party, and is not designed to form guidance, minimum standards, best practice, or to provide a template to be used by any insurance firm.

This document is the result of debate between working party members, with an objective to produce an example to debate at GIRO only. It has been formed as the collective views of the working party, and, in particular, does not reflect the views of any individual member of the working party, nor their employers, nor the Institute of Actuaries.

Working Party Foreword

The Working Party set out to identify the challenges related to defining the scope of the internal model for Solvency II. In the working party's view there is, at the moment little direct advice within the officially consulted CEIOPS Level 2 advice or Level 3 guidelines to the European Commission on this matter. However, we understand that level 3 guidelines are expected after the Spring of 2011, following the publication of the QIS5 report. As such this example, which is a result of debate and consideration of practical operational matters, should not be construed as the official CEIOPS position. Instead, we hope that you will find them useful when considering how to define your internal model.

Some of the areas that we comment upon within the example provided particular challenge and robust debate, and not all members of the working party agreed on the inclusion (or exclusion) of some areas from the scope. We believe that this shows the difficulty of this consideration, and highlights that many firms may take different views, caused by their own business circumstances, cultural views and interpretations of guidance.

We would also note that each firm has a specific business and operational model, and as such the simplified mapping of the firm, against which we have identified areas for possible inclusion within the internal model scope may not fit all (or even any) business as it stands, and would require modification. This would, in turn, necessarily require modification of the internal model scope.

Undertakings are required to apply for internal model approval if they want to use their own model to calculate the Solvency Capital Requirement (SCR). As per article 112(5), the Supervisory authorities shall give approval to the application only if they are satisfied that:

- the systems of the insurance or reinsurance undertaking for identifying, measuring, monitoring, managing and reporting risk are adequate; and, in particular
- the internal model fulfils the requirements referred in Article 112(3) which require the undertaking to submit, as a minimum, documentary evidence that the internal model fulfils the requirements set out in Articles 120 to 125.

The table below summarises Articles 120 to 125 and indicates a relationship to the calculation kernel (C) and / or the wider processes (P) within the internal model system.

Article	Requirement	Key notes	Calculation Kernel (C) / Processes (P)
120	Use test	Model is widely used and plays an important role in the system of governance.	C, P
121	Statistical quality standards	Methods and data used as well as the dependencies assumed within and across risk categories shall cover all material risks.	C
122	Calibration standards	A different time period or risk measure can be used as long as it can be demonstrated that the result provides policyholders with a level of protection equivalent to that stipulated by Solvency II.	C

123	Profit & Loss Attribution	The causes and sources of profits and losses will be reviewed.	C
124	Validation standards	Regular cycle of model validation, which includes monitoring the performance of the internal model, reviewing the ongoing appropriateness of its specification, and testing its results against experience.	C, P
125	Documentation standards	The design and operational details of the internal model will be documented as well as all major changes to the internal model, as set out in Article 115 (approval of model change policy).	C, P

The link between the definition of the internal model and documentation standards (and specifically, the model change policy) creates some interesting challenges because the model change policy (Article 115) requires internal model changes to be separated into “minor” and “major” changes:

- Minor changes shall not be subject to prior supervisory approval insofar as they are developed in accordance with the model change policy; while
- Major changes (as well as changes to the model change policy) shall *always* be subject to prior supervisory approval.

As a general principle, therefore, we believe that it is impossible to define a model change policy which does not apply to *all* aspects that are considered to be in scope of the definition of the internal model. However, it is possible to define policies, e.g. validation policy, data policy etc., which would be included in the definition of the internal model, such that any changes which are governed by these ‘component policies’ need not be allocated to either ‘minor’ or ‘major’ changes (note: changes to these ‘component policies’ need to be governed by the requirements of the model change policy).

We are also mindful that the Supervisory Review Process will capture some aspects related to changes arising from changes to the model architecture, logic as well as parameters, and that risk management has taken place within insurance firms without internal models historically, and will continue outside of the scope of the internal model (and Solvency II more generally) as well as within the internal model.

Example Model Scope

Definition of the internal model

The internal model is never specifically defined within Solvency II guidance, but requirements for the internal model are specified, which arguably define the *minimum* scope. These are:

- The internal model is “a risk measurement system developed by an insurer to analyse its overall risk position, to quantify risks and to determine the economic capital required to meet those risks”
- The internal model needs to:
 - Calculate the SCR (Article 100)
 - Meet the six tests
 - Use
 - Statistical Quality
 - Calibration
 - P&L Attribution
 - Validation
 - Documentation
 - be an integrated part of the undertaking’s risk management process and systems of governance (Articles 43, 110.5, and 118)

Legal entities within scope

All legal entities are considered within scope.

(THIS WAS AN ASSUMPTION OF THE WORKING PARTY, THOUGH WE RECOGNISE IT MAY WELL NOT BE TRUE FOR ALL FIRMS, AND IN PARTICULAR, PARTIAL INTERNAL MODELS, OR EVEN PROPORTIONALITY MAY APPLY FOR SOME FIRMS. THIS WAS, HOWEVER, OUTSIDE OUR REMIT.)

Lines of business within scope

All lines of business planned to be written in the forthcoming year, or with non-zero claims reserves held at the as at date of the model are considered within scope.

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Risk categories within scope

Risks which could contribute to a financial loss are considered within the scope of the internal model. Risks which may threaten the ability of the firm to do business going forwards, but would not incur a financial loss themselves (such as reputational risks) are not considered within the scope of the internal model.

Specific risk areas included are:

- Non-life underwriting risk, comprising:
 - Underwriting risk
 - Reserving risk
- Health underwriting risk, comprising:
 - Underwriting risk
 - Reserving risk
- Market risk
- Credit risk
- Operational risk

Plus other areas not directly mapping to the Level 1 Directive required risk areas:

- Liquidity risk

Specific risk areas excluded are:

- Reputational risk
- Post event changes to inwards premium rates or the business plan

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Mapping of risk register to internal model

A mapping of risks identified within the risk register to the area of the model where these are considered is included.

(Note that the working party has not produced an example risk register, but has left the above as a section we consider beneficial to the internal model scope document.)

Processes included

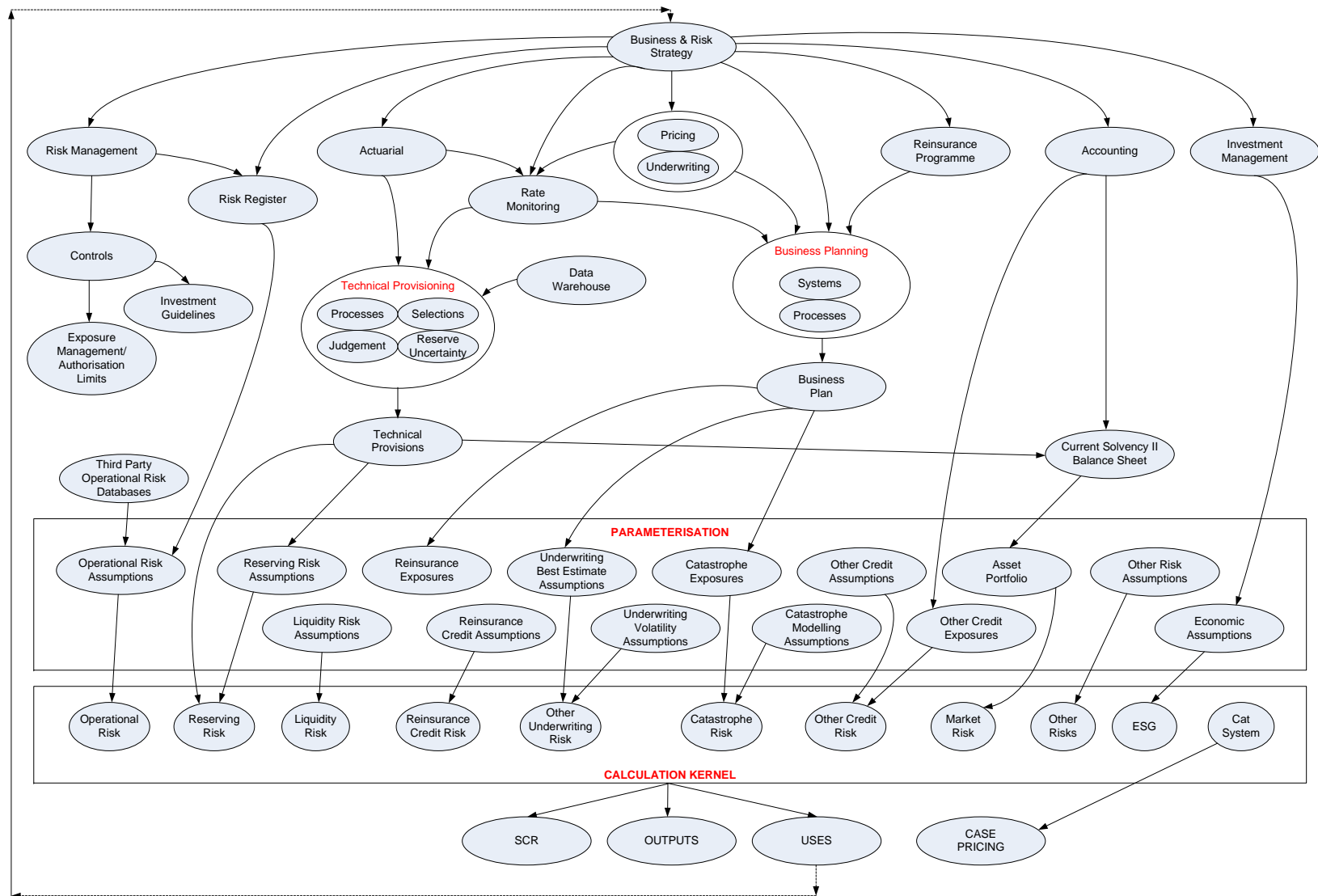
At the centre of the internal model is the calculation kernel. This is the technical model used for the quantification of capital requirements for all risk categories. As such, those parts of the technical quantification model which relate to internal model (as opposed to specific developments which are designed to facilitate the ORSA) are clearly within scope of the internal model.

However the internal model is wider than the technical quantification model and various other business processes are affected. This is a result of the requirement that the internal model comprises the system developed to analyse its overall risk position, quantify risks and determine economic capital required to meet those risks. Thus any process which assists in analysing or quantifying risk should arguably be (at least) considered for possible inclusion within scope.

The over-riding approach taken here is that the internal model should be those processes which determine the capital requirement to meet risks within the firm. That is, business processes focussed on *managing* risk (which has already been separately identified and quantified) are not within scope.

However the internal model must be able to determine an SCR, in particular, and produce outputs to facilitate the uses. The technical model cannot do this in isolation, but requires contextual information (such as business volumes and volatility parameters). These additional items are critical to the internal calculations, as changes in their values would change the outputs. These items, or at least the processes for setting these items, must therefore be considered as to whether they should be included or not. These issues are considered further on a section-by-section basis below.

A model of business processes which *may* impact the various outputs is presented on the following page. Following this, the approach taken for inclusion of each of the identified areas within the scope of the internal model is presented.



Business planning

The business planning process (defined to include the process carried out, the people involved, and the associated governance procedures) are included within scope of the internal model. Changes to the implementation process will therefore be considered as a model change. Changes to the specific individuals that perform various roles within the business planning process will be considered a minor change. However, changes to the human functions within business planning and its governance may be considered a major change.

The technical implementation of the systems and the data used within the business planning process is not considered within scope of the internal model. However changes to the scope and the detail of the business planning process will be considered to be a model change and it will be decided as to whether they constitute a major or a minor change.

The results of the business planning process have been considered under the Business Items section of this document.

(NOTE THAT THE INCLUSION OF BUSINESS PLANNING BEYOND TESTING THAT THE RISK PROFILE ASSOCIATED WITH THE PLAN IS ACCEPTABLE IS AN AREA WHICH IS OPEN TO INTERPRETATION, AND DOES NOT APPEAR NECESSARILY CLEAR CUT.)

Underwriting risk parameterisation

The parameterisation process (that is, what data is used, what adjustments are made to this data, what analysis methods are used) is within scope and is set out within the Underwriting Risk Procedures document. Changes in this process are thus considered to be a model change, and are considered within the Model Change Policy.

(The working party would recommend that an assessment of the impact of the model change is made, quantitatively where possible, to determine whether this is a major or minor change.)

The selected parameters themselves, being a result of data (which is expected to change), analytical methods, expert judgement, and, where appropriate, benchmarks, are not themselves considered within the scope of the internal model. In particular the data is expected to change from period to period (while being governed by a data policy which is within scope and expert judgement is excluded from scope (though again being applied within a framework which is within scope). Thus the parameters are expected to vary from period to period based on changes which are out of scope. As such changes to the parameters do not result in a model change. [Note that in this context analytical methods covers the logic of the technical calculations applied to data to get to (data led) parameters. While the parameters are not within scope these methods were considered in the parameterisation process above, and are themselves within scope.]

However, to aid governance, it is considered within the scope of the internal model that before any parameter is used within the calculation kernel it is subject to sign off as an actuarial best estimate for the purposes of the internal model. A full review of all underwriting risk parameters will be undertaken at least annually, to provide an actuarial opinion that the parameters are best estimates for the purpose of the calculation kernel.

Catastrophe modelling

Catastrophe modelling takes place within the firm in several different places:

- To parameterise the empirical distribution used within the calculation kernel
- To test the catastrophe exposures against risk appetite limits (defined as a use of the internal model)

(NOTE THAT THIS USE WAS AN ASSUMPTION MADE BY THE WORKING PARTY TO FACILITATE THE FOLLOWING DISCUSSION – WE NOTE THAT THIS WOULD NOT BE A USE OF THE INTERNAL MODEL FOR ALL FIRMS.)

- To assist in underwriting specific policies (not defined as a use of the internal model)

The catastrophe modelling which takes place for the first of these objectives is considered within scope, due to its closeness to, and impact on, the calculation kernel, and hence the SCR number (a key output and use of the internal model).

Modelling which takes place for the second objective (risk appetite testing) is also considered within scope, as this is also a use of the internal model (and hence needs to be within the scope of the internal model).

Catastrophe modelling which takes place for specific underwriting is not considered within scope. Note however, that the exposures which incept will be later included within the internal model via risk appetite testing or any later run of the calculation kernel.

Quantitative analysis for catastrophe modelling relies on an external model (the cat model), which in turn relies on external data (historical catastrophic events), and firm specific data (actual or planned exposures). This external model and the sources of external data that feed into it are included within scope. A change in the supplier of this external model will be considered to be a model change. Regular changes in the parameterisation of the cat model and updates to the cat model methodology by the supplier will be considered on a case-by-case basis. Also included within scope is an annual review that the theoretical and operational bases of the cat model are understood within the firm; and a review (at least every three years) that the cat model's structure, assumptions, and calculations remain appropriate for the risks to which the firm is exposed.

Catastrophe modelling is made up of the following processes:

- Collection of exposure data
- Validation of exposure data
- Setting external model assumptions (e.g. inclusion of demand surge, secondary uncertainty etc.)
- Running the external model
- Validating output
- Reporting

We consider all of these processes to be within scope.

Technical provisions

(THIS IS AN AREA WHICH THE WORKING PARTY FOUND HIGHLY DIFFICULT, AND A UNIMOUS VIEWPOINT WAS NOT REACHED.)

The technical provisioning process and procedures are within scope. These set out what data is used, what adjustments are made to this data, what analysis methods are used are within scope. Changes in this process are thus considered to be a model change, and are considered within the Model Change Policy (the working party would recommend that an assessment of the impact of the model change is made, quantitatively where possible, to determine whether this is a major or minor change).

The selected provisions themselves, and in particular the expert judgement applied, are not themselves considered within the scope of the internal model. Thus changes to the judgement do not result in a model change.

However to aid governance, it is considered within the scope of the internal model that within each review of the technical provisions (the frequency and trigger for reviews is set out within the technical provisions process and procedures documents) the provisions are subject to sign off as an actuarial best estimate.

Reserve uncertainty

The reserve uncertainty process and procedures are within scope. These set out what data is used, what adjustments are made to this data, what analysis methods are used are within scope, and reconciliation to the technical provisions. Changes in this process are thus considered to be a model change, and are considered within the Model Change Policy (the working party would recommend that an assessment of the impact of the model change is made, quantitatively where possible, to determine whether this is a major or minor change).

The selected reserve ranges themselves, being a result of data (which is expected to change), analytical methods, expert judgement, and, where appropriate, benchmarks, are not themselves considered within the scope of the internal model. Thus changes to the judgement do not result in a model change.

However to aid governance, it is considered within the scope of the internal model that within each review of the technical provisions (the frequency and trigger for reviews is set out within the technical provisions process and procedures documents) the provisions are subject to sign off as an actuarial best estimate.

Investment management

The scope of the internal model includes the economic scenario generator (ESG) and the sources of external data that feed into it. Output from the ESG is considered when making strategic investment decisions such as the proportion of assets to invest in each asset class and whether to invest in an entirely new asset class. Output from the ESG is also used when considering which benchmarks to use for particular asset classes. The ESG is an external model and a change in the supplier of this external model will be considered to be a model change. Regular changes in the parameterisation of the ESG will be considered for model change on a case by case basis. Updates to the ESG methodology by the supplier will be considered on a case-by-case basis.

All day-to-day tactical investment decisions, such as whether to invest in a particular security, are excluded from the scope of the internal model. The results from the ESG are regularly tested against actual realised investment returns in accordance with the validation policy. In addition all day-to-day operational issues associated with the management of the investment portfolio are excluded from the scope of the internal model. Therefore changes in these arrangements will not be considered model changes.

Technical pricing

Technical pricing as an activity itself is not considered part of the internal model due to its lack of direct impact on any of the stated uses of the internal model. However to aid governance, it is considered within the scope of the internal model that before any parameter is used within the calculation kernel it is subject to sign off as an actuarial best estimate for the purposes of the internal model. This is within the scope of the Actuarial Function's activities.

Also within the scope of the internal model is provision for a review of the consistency between technical pricing model assumptions, and assumptions within the calculation kernel to be carried out at least every three years.

Risk framework

By risk framework we mean the setting of the business risk strategy, risk appetite and tolerances, both at the board level, and then the drilling down of these to functional risk appetites and strategies.

The risk appetite and risk strategy is intimately related to the internal model, since the internal model tests the existing business model against these criteria. However this is considered a use of the internal model, rather than necessitating the risk framework being brought within scope. In particular the risk framework is much broader than the internal model. The internal model, and more particularly the SCR, is only one driver of the firm's risk framework.

As such, we consider the risk framework to be a data input into the internal model and it is not, itself, considered to be within scope. It is noted, however, that a significant change in the risk framework (such as the decision to accept new risks currently not permitted) would necessitate changes to the internal model and calculation kernel (required under the use and statistical quality standards tests) and would hence be an internal model change.

We also note that the test that the firm's current risk profile is within the risk appetite set out is defined as a use of the internal model. The uses of the model are not themselves considered within scope.

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Operational risk

Operational risk refers to the risk that capital is required to support losses resulting from inadequate or failed internal processes, people and systems, or from external events. While operational risk is one of the categories of risk that the SCR is required to cover, in practice the focus is as much on managing and mitigating the risk as it is on modelling it. Therefore careful consideration has been

given when considering to what extent operational risk should be within the scope of the internal model.

The risk register is outside the scope of the internal model and changes to it would not be considered changes to the model. The risk register is a part of the wider risk management system and is used for monitoring and assessing risks across different business units. The process for quantifying key risks within the risk register and deriving parameters for the frequency and severity of these risks is within the scope of the model. The ability to incorporate these parameters within the internal model is part of the calculation kernel and hence is within scope. Changes to the parameters and process for deriving operational risk parameters would be covered by the model change policy.

External databases of operational risk losses will be used from time-to-time to validate output from the operational risk part of the calculation kernel. As a validation tool therefore, such data sources will not be considered to be within the scope of the model.

One of the key requirements of an internal model is that it should be able to rank risks sufficiently well to be capable of being widely integrated with the risk management system. Therefore the risk ranking process, including the use of quantitative and qualitative indicators, is within the scope of the model.

All other aspects of the operational risk process, including authorisation limits, the reporting framework, governance and other tools are excluded from scope and changes to them would not be considered changes to the model. This is because they all relate to management of the risk rather than modelling of it.

Risk management

Within risk management we mean both those quantitative and qualitative measurements of risk taken within the firm (excluding those already discussed within this document), and the setting and enforcing of risk limits (such as maintaining the risk register, aggregate exposure limits, maximum linesizes etc., HR policies, etc.).

These elements are considered to be outside of scope, as the internal model is regarded as a modelling framework for identified risks, not as the process by which the firm identifies, mitigates, or manages risks. Rather, the internal model provides additional information to feed into these processes which are, themselves, outside of the internal model.