

Portfolio Asset Return Simulator

Model Summary Document (MSD)

1. Model Purpose and Description

The main purpose of the PARS model is to simulate future annual investment returns for the Prism rating models. The underlying modelling methodology is an ARMA-GARCH model for individual asset indices, linked with a t-copula model to capture the dependence structure between individual indices. The outputs of this process are monthly price returns projected over 360 months for 10,000 scenarios, converted to an annual time step. A fixed coupon or dividend rate is added to shift the distribution curves, and return caps and floors are applied to avoid nonsensical figures. This final output for each asset class serves as input into the Prism – US Non-Life model.

2. Model Assumptions

The assumptions in the model are described in the Model Definition Document in Fitch's criteria

- Insurance Rating Criteria

3. Model Inputs

- Time series specification of the time series model for each asset index.
- Copula specification including correlation matrix and degree of freedom.
- Simulation specification such as time horizon, sample size, cut-off month and starting method.
- Output adjustment parameters including annual income adjustment, scaling factors and total return cap/floor.

4. Model Development Data

The historical monthly price return is used to calibrate most of the PARS model parameters, and the historical coupon/dividend return is used to derive the coupon adjustment to be applied in the simulation engine.

- **Source**

Most fixed-income indices were furnished by Barclays (which was recently sold to Bloomberg). A few indices were downloaded from the FACTSET database where data was unavailable through Barclays.

- **Sample period and size**

The majority of indices date back to the early 1990s and therefore provide more than 300 observations of monthly returns. Most indices include enough constituent issues throughout the observation history. Certain time periods for some asset classes were excluded where low traded volume and strange price changes during those periods indicated that data was unreliable.

- **Relevance**

The selected indices cover a diverse range of fixed income assets of different ratings, issuers and durations, plus a few hybrids and equities.

- **Completeness**

The data is complete for most indices, except for three CMBS indices, which have one missing observation. The missing information was imputed from similar return metrics.

5. Model Limitations

The model is intended only to analyse U.S. non-life insurance issuers within the scope of Fitch's "Insurance Rating Criteria".

6. Material Changes

The current model version is 1.0.x. Any future material changes will be disclosed in this section.

Contact Information

model_disclosure@fitchratings.com