

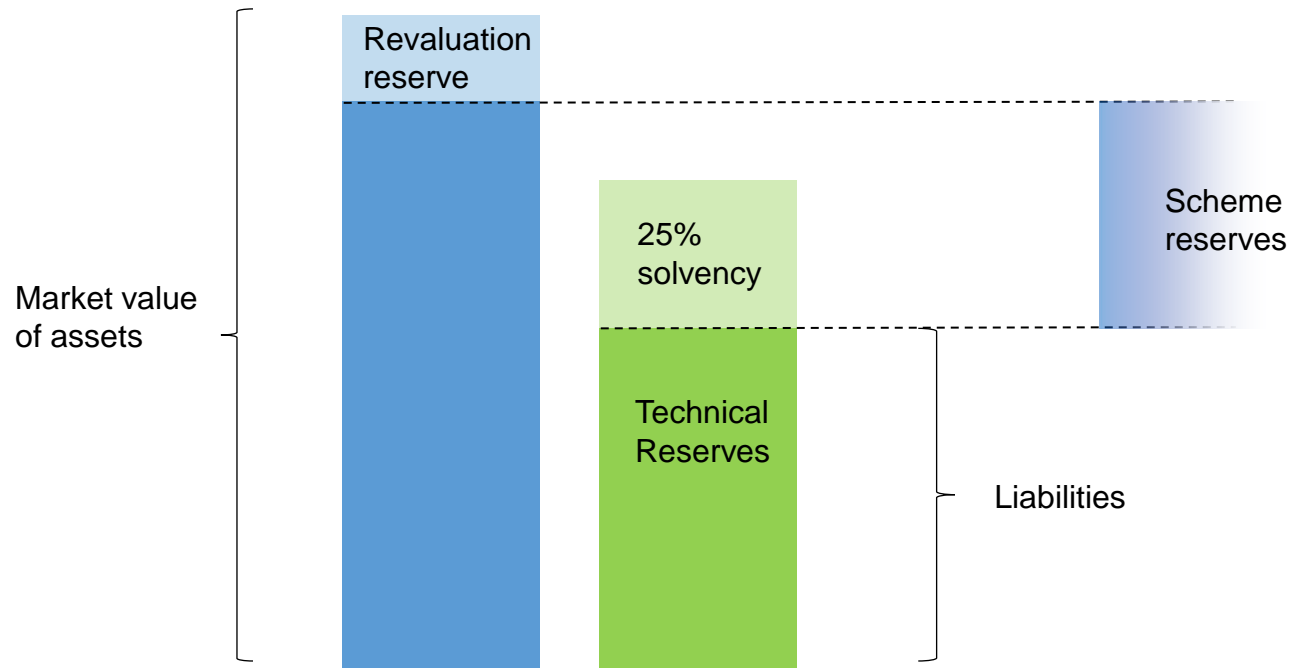


ACTUARIAL SOCIETY 2015 CONVENTION

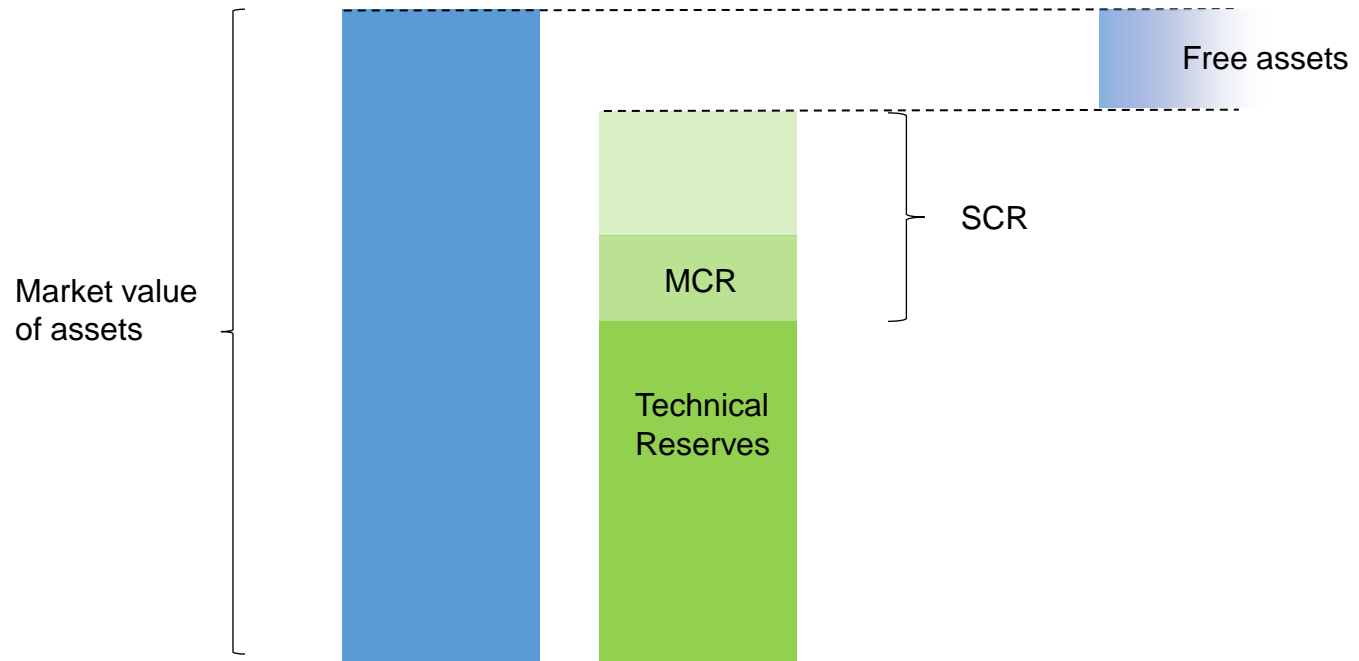
An Alternative Solvency Regime for Medical Schemes in South Africa

Gary Scott and Adam Lowe

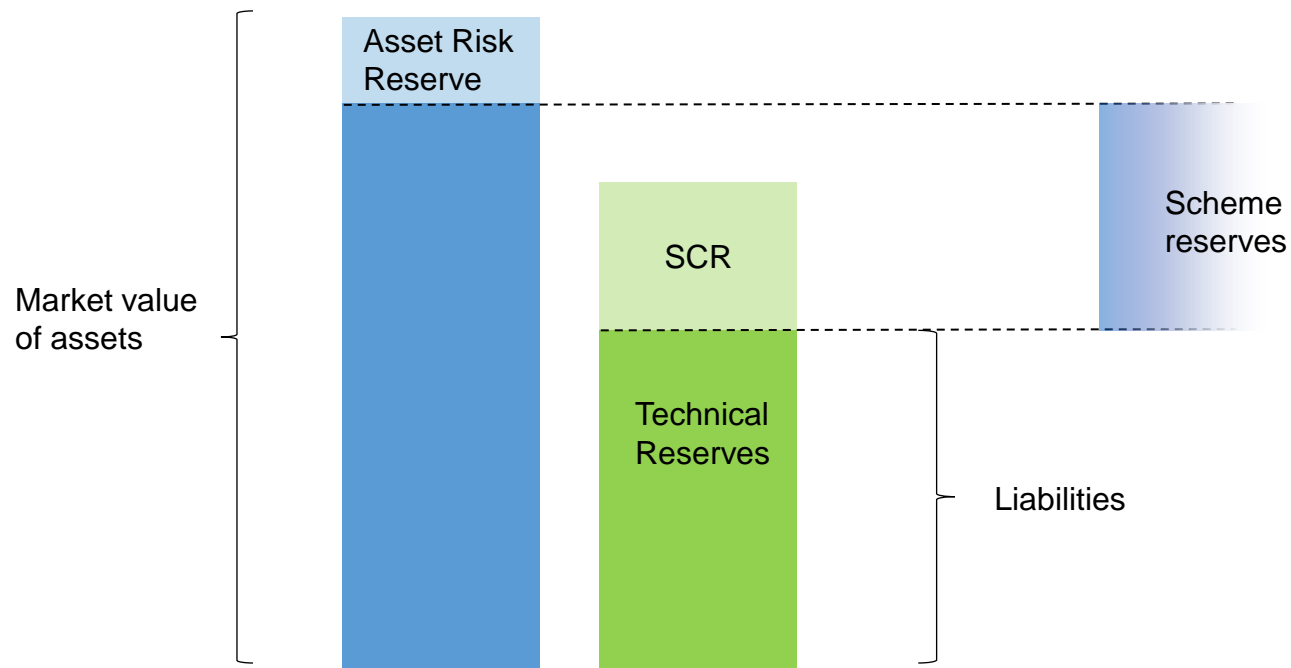
Medical Scheme Balance Sheet



SAM Regulatory Balance Sheet



Proposed Regulatory Balance Sheet



SCR

Calculation of SCR

PROVISION FOR OPERATING DEFICIT

Provision for budgeted deficit = $\text{MAX}(-\text{Prior year operating position} + \text{Seasonality allowance}, 0)$

CLAIMS (AND EXPENSES) VARIABILITY RISK

CATASTROPHE RISK

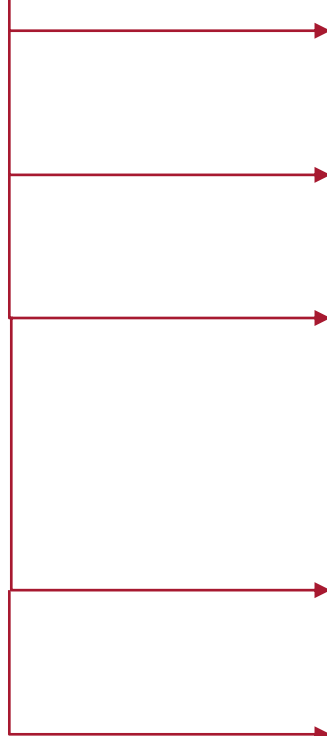
- ARENA OR STADIUM ACCIDENT
- OFFICE BLOCK ACCIDENT

OUTSTANDING CLAIMS RESERVE RISK

OPERATIONAL RISK



Calculation of SCR



PROVISION FOR OPERATING DEFICIT

CLAIMS (AND EXPENSES) VARIABILITY RISK

CATASTROPHE RISK
- ARENA OR STADIUM
- OFFICE BLOCK

OUTSTANDING CLAIMS

OPERATIONAL RISK

$$SCR_{CV} = NC * \rho(\sigma_{CV})$$

where NC = annual net contribution income

σ_{CV} = standard deviation of claims ratio (as defined below)

$$\rho(\sigma_{CV}) = \frac{e^{N_{0.995} * \sqrt{\ln(\sigma_{CV}^2 + 1)}}}{\sqrt{\sigma_{CV}^2 + 1}} - 1$$

where $N_{0.995}$ = 99.5th percentile of a standard normal distribution

$$\sigma_{CV} = \sqrt{\frac{1}{NC_{ave}} * \frac{1}{N-1} * \left(\sum_{years} \frac{1}{NC_{year}} * (RCl_{year} - NC_{year} * ACR)^2 \right)}$$

where NC = net contribution income

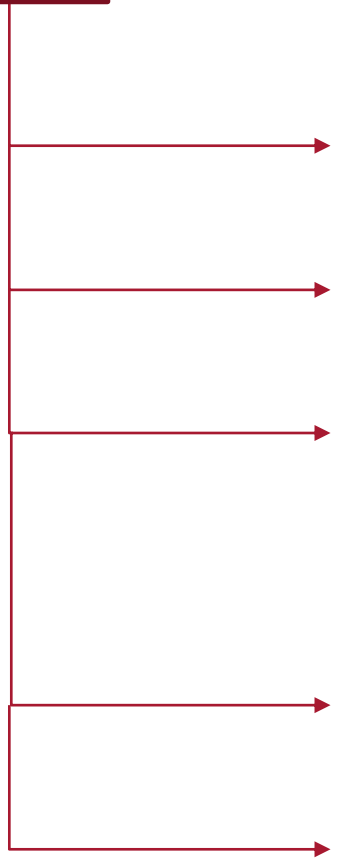
RCl = risk claims incurred

N = number of years' data

ACR = average claims ratio across all years

SCR

Calculation of SCR



PROVISION FOR

$$SCR_{cat,arena} = S * I_p * x_p * E_p * MS_p$$

where $S = 50\%$ of capacity of largest stadium in the country

$I_p =$ insurance penetration

$x_p =$ proportion of affected people injured

$E_p =$ exposure i.e. average cost of treatment

$MS_p =$ market share of scheme

CLAIMS (AND

- CATASTROPHE RISK
- ARENA OR STADIUM ACCIDENT
 - OFFICE BLOCK ACCIDENT

$$SCR_{cat} = \sqrt{SCR_{cat,arena}^2 + SCR_{cat,conc}^2}$$

OUTSTANDING CLAIMS RESERVE RISK

$$SCR_{cat,conc} = S * x_p * E_p$$

where $S =$ largest concentration of members in a single building

$x_p =$ proportion of affected people injured

$E_p =$ exposure i.e. average cost of treatment

OPERATIONAL

SCR

Calculation of SCR

PROVISION FOR OPERATING DEFICIT

CLAIMS (AND EXPENSES) VARIABILITY RISK

$$SCR_{IBNR} = NC * \rho(\sigma_{IBNR})$$

where NC = annual net contribution income

σ_{IBNR} = standard deviation of forecast accuracy

$$\rho(\sigma_{IBNR}) = \frac{e^{N_{0.995} * \sqrt{\ln(\sigma_{IBNR}^2 + 1)}}}{\sqrt{\sigma_{IBNR}^2 + 1}} - 1$$

OUTSTANDING CLAIMS RESERVE RISK

OPERATIONAL RISK

SCR

Calculation of SCR

PROVISION FOR OPERATING DEFICIT

CLAIMS (AND EXPENSES) VARIABILITY RISK

CATASTROPHE RISK

- ARENA OR STADIUM ACCIDENT
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OUTSTANDING CLAIMS RESERVE RISK

OPERATIONAL RISK

$SCR_0 = 3\% \text{ of gross contributions} + 3\% \text{ of any increase in gross contributions over } 20\%$

Calculation of SCR

$$SCR_{Total} = SCR_L + SCR_O$$

where SCR_L

$$= \sqrt{SCR_{under}^2 + SCR_{cat}^2 + 2 * 0.25 * SCR_{under} * SCR_{cat} + \text{Provision for budgeted deficits}}$$

$$SCR_{under} = \sqrt{SCR_{CV}^2 + SCR_{IBNR}^2 + 2 * 0.5 * SCR_{CV} * SCR_{IBNR}}$$

and $SCR_O = 3\%$ of gross contributions + 3% of any increase in gross contributions over 20%

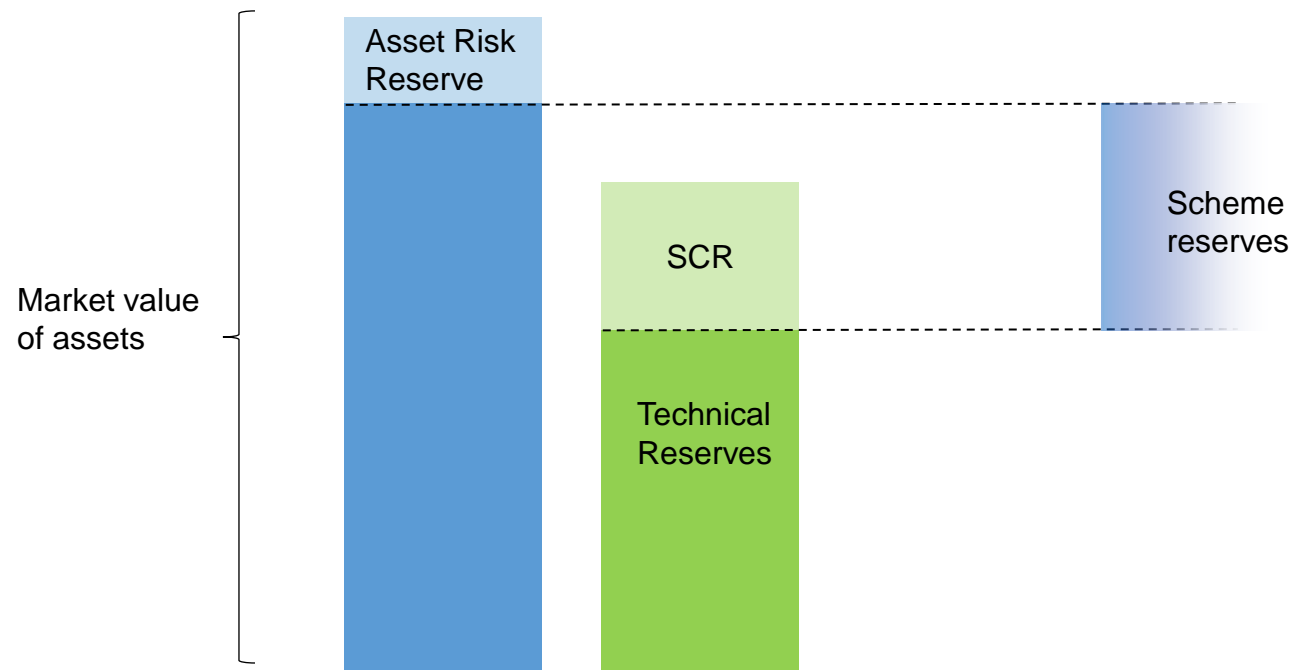
Calculation of Asset Risk Reserve



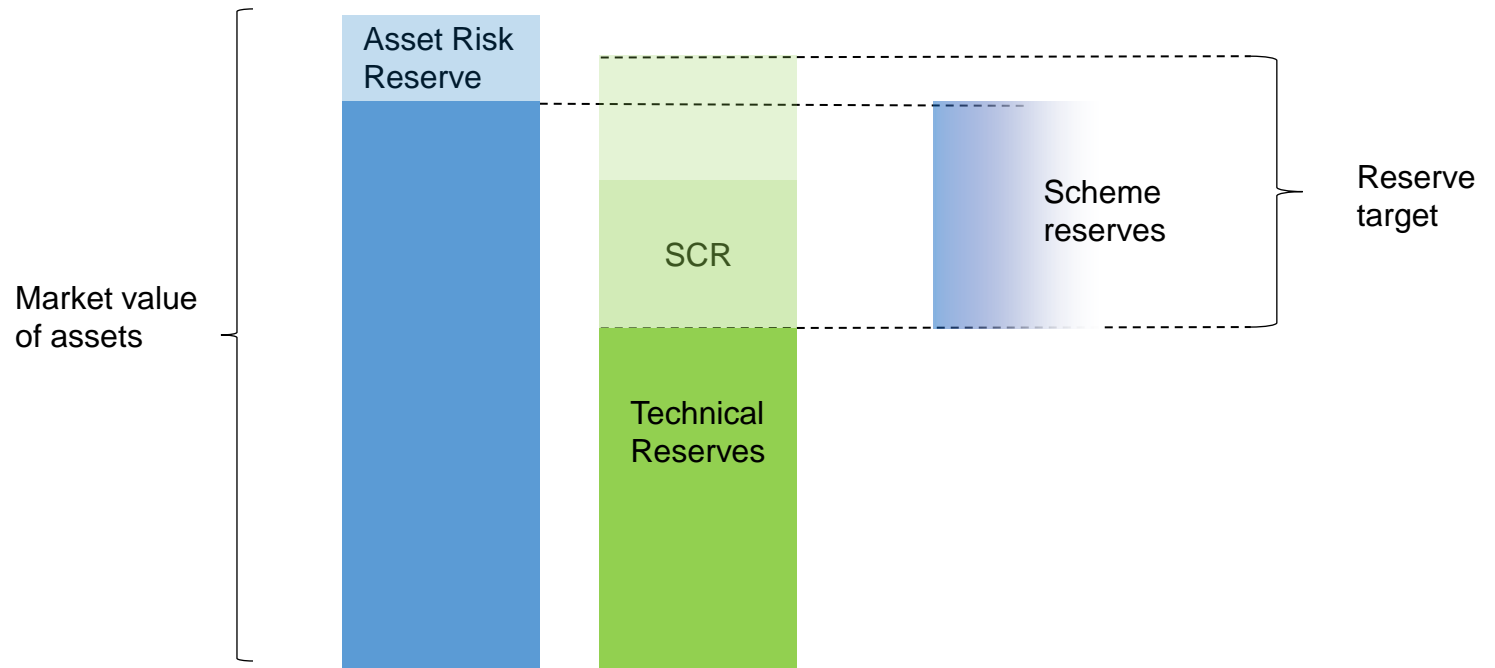
Asset Risk Reserve

$$= 0.4665 * \text{equity holdings} + 0.2280 * \text{property holdings} + 0.0755 * \text{SA bond holdings} + 0.1106 * \text{cash holdings}$$

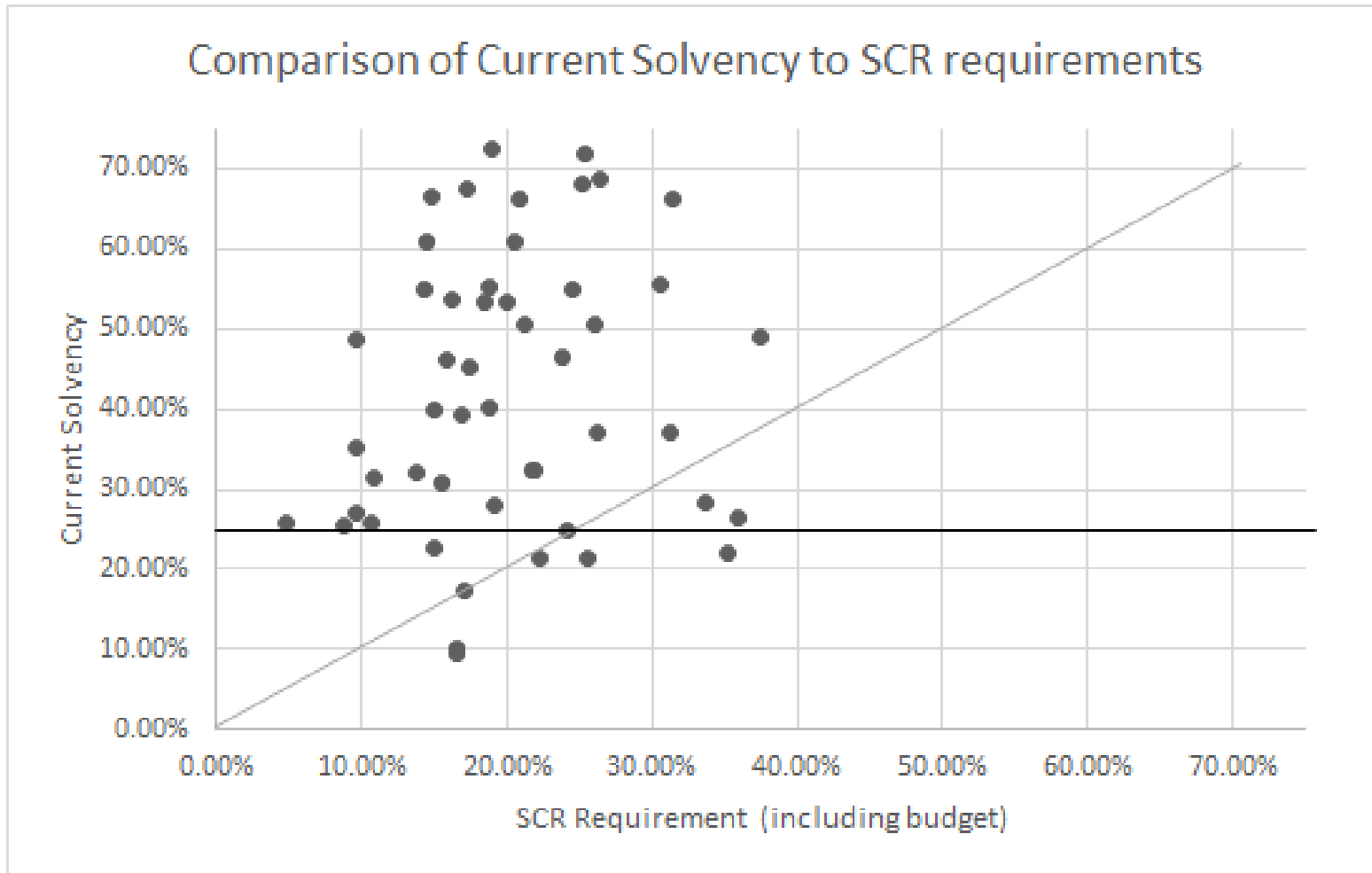
Proposed Regulatory Balance Sheet



Proposed Economic Balance Sheet



Proposed SCR versus Current Solvency



Next Steps?