Solvency II Valuation Metrics

Using SII to improve business decision making

Ed Morgan, FIA

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Milliman

Agenda

1 **Introduction**

2 Development of S_2AV

3 New business value and profitability

4 Asset Liability Management

5 Conclusions

Introduction (2)

- Focus on valuing insurance companies under Solvency II (e.g. for M&A)
- Investors often interested in shareholder “cash-flows”, i.e. expected real world distributable profits
- Traditional this meant projection of statutory profits with “Solvency I” capital locked in for life (like TEV); discounted cash-flow models often used for non-life
- Although we recognize there can be other constraints on dividend paying capacity, we believe the most important drivers, particularly in medium to long term of distributable profits will be:
  - Required level of Solvency II capital
  - Own Funds available and eligible to cover it

Introduction (3)

- Aim is to calculate NPV (future expected distributable profits) @ investor's required rate of return
- In practice it is sometimes challenging to get long term projected Solvency II balance sheet and capital requirements (particularly in M&As)
- Our method aims to decompose the value into different components, more easily valued based on likely available information from Solvency II reporting
- Decomposition useful in understanding value of certain activities, e.g. new business sales, asset management
- Equally applicable to life, non-life and health

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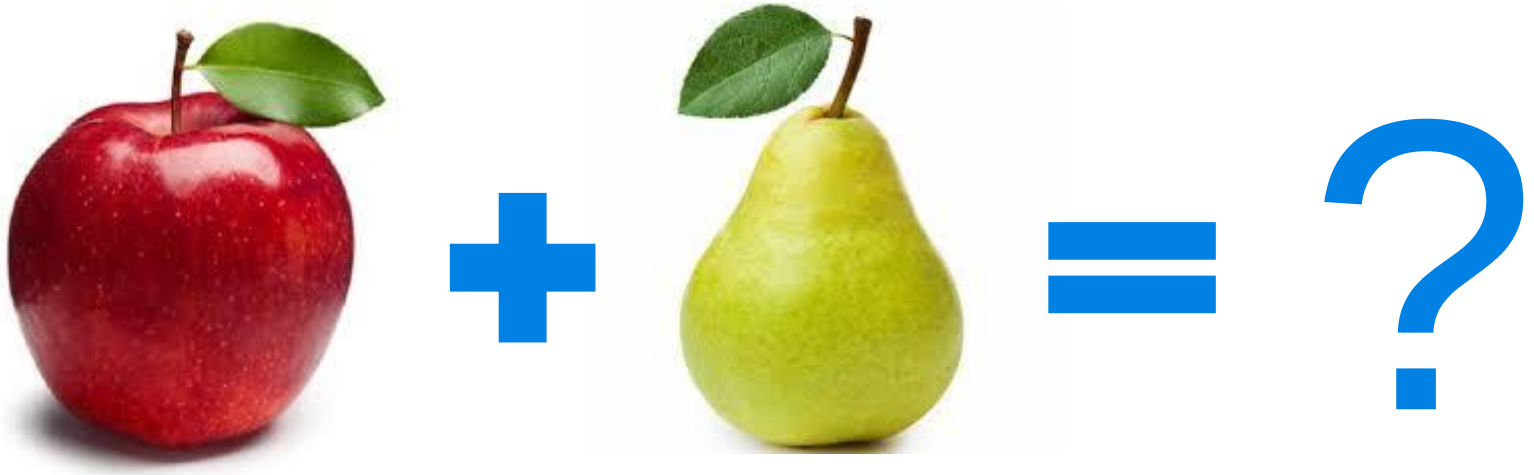
Issues with a TEV approach



Issues with a TEV approach

- Traditional Embedded Value (TEV) approaches have been widely used for M&A work, but may be less relevant under the S2 framework
- It is difficult to combine TEV approach with S2 for various reasons
- Discounting projected statutory (Solvency I) profits has various issues Required level of Solvency II capital
  - Distributable surpluses depend on movements in own funds and required capital
  - Own funds already capture expected release of prudential margins which would not emerge until the future on a statutory accounting/Solvency I basis
  - Solvency II SCR is meant to be consistent with economic value of liabilities (technical provisions), not prudent Solvency I reserves
  - Basing projected required capital on some ratio of Solvency I minimum solvency margin may result in capital running off too slowly
- It risks mixing apples (market consistent based view of capital) with pears (real world view of future profits)

Issues with an MCEV approach

- Some aspects of market consistent EV (MCEV) have never gained widespread support, particularly in the context of transactions, and MCEV generally losing credibility
- Some particular issues for M&A:
  - Not really a “projection” – rather a method of placing a “market value” on liabilities
  - No allowance for investor’s required rate of return – discounting at “risk free”
  - No cost of capital for hedgeable (market) risks – just “frictional costs”
  - No advantage of investing in other than risk free assets – projections at “risk free”
  - Only life (“covered”) business
  - Where contract boundaries differ from S2 may not give good measure of distributable profits – eg for profitable risk business with short contract boundary under S2

Why Solvency II can be very helpful in measuring business performance (e.g. M&A context)

- It is an economic valuation approach which also has the rigour of a statutory capital standard (i.e. is subject to supervisor oversight etc)
- It allows non-life and life to be looked at on a consistent standard – something not typically done under existing methodologies
- It captures a risk based view of a company
- Capital synergies can be identified (e.g. due to diversification, potential for de-risking, offsetting risks etc)
- Valuation upsides can be identified (e.g. conservatism built into approaches)

Projected distributable profits

- In our experience investors in insurance companies are interested in projected shareholder “cash-flows” = distributable profits
- This is on a “real world” basis (i.e. allowing for higher expected returns on “risky” assets)
- They then wish to discount at their required rate of return
- Main drivers of distributable profits expected to be projected Solvency II Own Funds and Required Capital
- S_2AV decomposes the value into components, based on information likely to readily available to insurers

Two different views of the same thing

Under any accounting basis, we have an equivalence (which can be proved algebraically) between:

NPV (projected profits) – CoC
("actuarial view")

NPV (distributable profits)
("investment bankers' view")

Conceptually this is because cost of capital represents the cost of delaying distribution of surplus through a need to hold capital

Solvency II Appraisal Value

- This equivalence carries through into the Solvency II world
- We define “Solvency II Appraisal Value” (S_2AV) as:

NPV (distributable profits under SII) @ investor’s required rate of return = Adjusted own funds

- Under certain conditions *(basically that the target solvency ratio is 100%, the required rate of return is 6%, the tax rate is 0% and there is no new business or non-hedgeable risks)* it can be shown that:

S_2AV = Initial Own Funds

Solvency II Appraisal Value

- Own funds are adjusted to get the estimated economic value of the shareholders' ownership
- We then allow for investors' requirements for return on capital and expected capitalisation by adjusting the risk margin/COC
- We allow for any additional value in excess of the cost of capital which the investor believes can be generated by taking hedgeable risks
- Finally we allow for the franchise value (goodwill) based on the value generated by the company in one year multiplied by a factor reflecting expected new business growth and uncertainty over future volumes and profitability
- We may need further adjustments to allow for, e.g. restrictions on distribution of capital, use of transitional measures, eligibility

This gives us a very useful value measure which reflects expected shareholder cashflows from the insurance business

Cost of Capital Adjustment

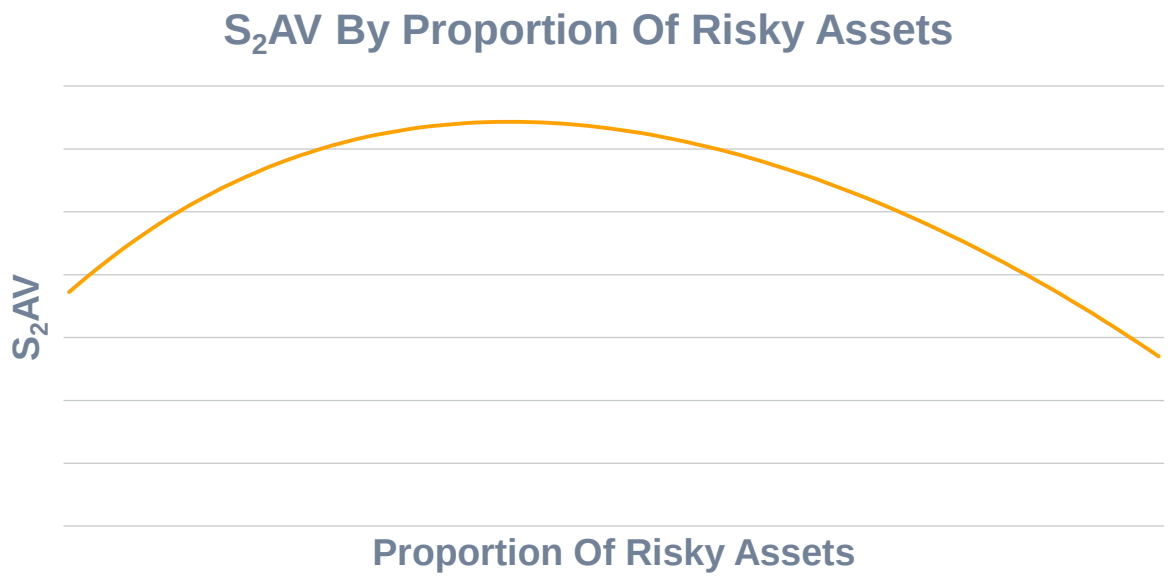
- Solvency II Risk Margin methodology includes an allowance for the cost of holding capital
- Generally investors will have a different view for the following reasons:
  - They may have a required return on capital different to the 6% above risk free inherent in the Risk Margin
  - They are likely to assume that some hedgeable risks will be taken and want a return on the capital required for these. However we handle this item with an explicit element in our valuation (see next slide)
  - They are likely to assume a need to hold more than SCR as a level of capital (it is unlikely to be possible to run a company at a 100% solvency ratio)
- An adjustment is also required in respect of tax

Value from Hedgeable Risks

- If risks are hedgeable, then logically it can be argued that the shareholder is not obliged to take them
- It may be considered that on occasions there are other constraints on investment strategy, like the requirements of participating policyholders. This may lead to the value from hedgeable risks being negative
- Hence the value calculated assuming that no hedgeable risks are taken is a minimum value. (Since if taking additional risks did not increase value then it would not be done.)
- In practice a valuation may be required including the impact of the actual expected situation, with some hedgeable risks, and hence higher real world expected investment returns and higher capital requirements
- It is convenient to separately identify this component in the valuation
- Note that the value in the case of participating business should take account of:
  - what part of the additional return will go to participating policyholders
  - the Loss Absorbing Capacity of Technical Provisions which may reduce the SCR (as well as, of course, diversification effects)

Value from Hedgeable Risks (2)

- We would expect there to be a theoretical optimum proportion of risky assets, in particular since, as more risky assets are added, the proportional diversification benefit with other risks will diminish



- For participating business the picture may be complex as the shareholders' share of additional returns may diminish as guarantees become out of the money, whereas the ability to absorb shocks under market SCRs may increase

Franchise Value

- It is possible to calculate the value that a year's new premiums adds to the own funds
- Strictly speaking this should be to own funds allowing for the same adjustments as made previously
- This is "Solvency II new business value" ("S_2NBV")
- A marginal basis should be used where possible (e.g. diversification with in-force):
  - The most appropriate way to do this is by calculating an adjusted Solvency II balance sheet and SCR with and without new business
- A new business multiplier should be applied reflecting the expected growth in new business values, trend in margins and associated risk
  - This could allow for factors like the expected underwriting cycle and the value of any distribution agreements
  - The way in which contract boundaries come into the SII valuation / adjusted own funds may impact future expected volumes and their certainty
  - It may be appropriate to use a higher pre-issue risk discount rate to reflect the uncertainty over the volumes and profitability of future new business

Participating business

- Need to allow for:
  - Profit participation for policyholders
  - Loss Absorbing Capacity of Technical Provisions (LACTP)
  - Financial cost of options and guarantees
- If we assume continental type profit sharing business, with:
  - Shareholders' proportion of additional returns = s%
  - LACTP (in respect of additional capital) = L%

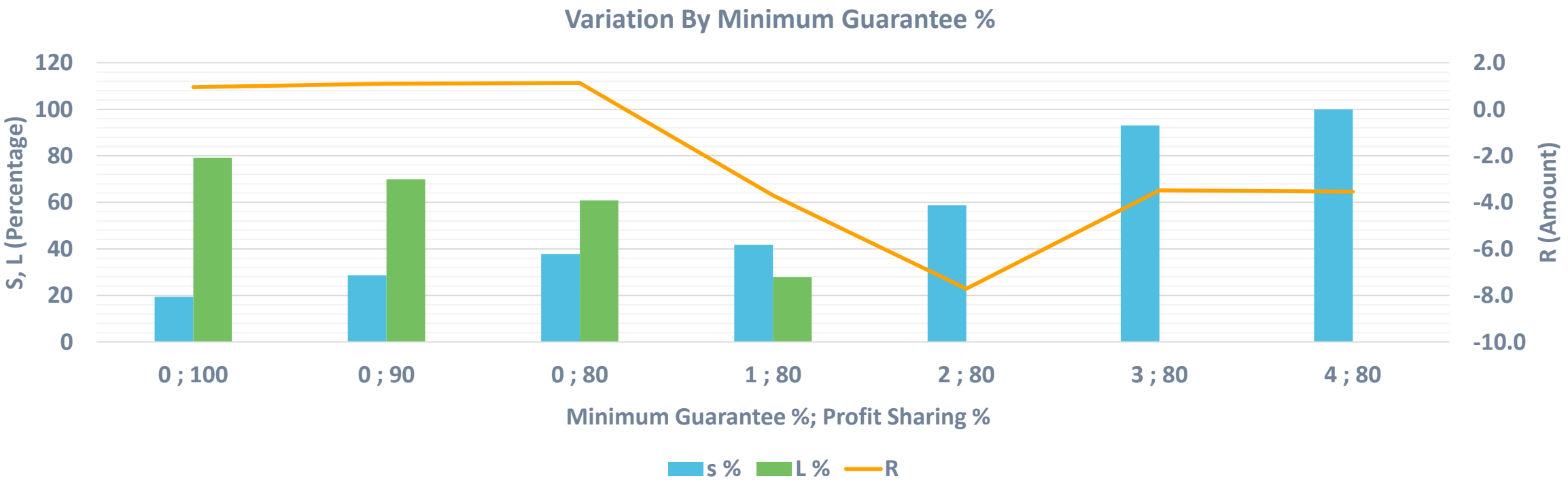
Then, R becomes:

$$NPV(\text{total risky assets})@RDR * \{m*s*(1 - tax) - (RDR - i*(1 - tax))*p*(1 - L) * TSR\}$$

Example

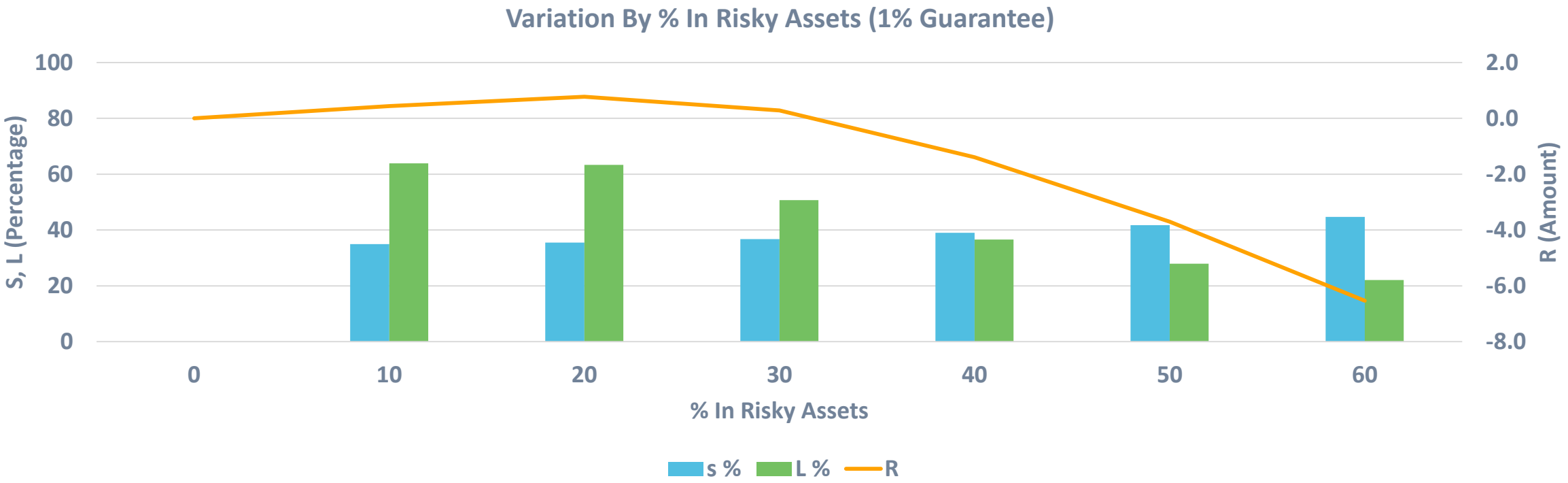
Assume the following profit sharing formula:

- Policyholder return = max(earned rate * 80% , minimum guarantee)



Example(2)

Fix guarantee at 1%, and vary % in risky assets:



Further considerations

- There may be other constraints on profits being distributable other than Solvency II, for instance
  - Formal or informal limits on dividends (e.g. related to local, statutory or IFRS profits)
  - Other asset coverage requirements
  - Non-liquid assets
  - Other shareholders/joint ventures
- Other, Solvency II related factors include:
  - Eligibility of capital/tiering
  - Ring-fenced funds
  - Group requirements
  - Transitional measures

  However, we believe, generally Solvency II will be over-riding driver of distributable profits in mid to long term

  => Better to base valuation on Solvency II metrics (than, say, local statutory profits) and adjust target solvency ratio or make other on-top adjustments

S_2AV in real-life M&A

Own Funds

- Adjust own funds to get economic value (e.g. ineligible OF, sub-debt)
- Minimum info: Solvency II balance sheet and details of own funds

Cost of capital for non-hedgeable risks

- Adjust for: investor's required rate of return, target capital (% of SCR), tax
- Minimum info: underlying calculation of Risk Margin

Hedgeable risks

- Adjust for: shareholders' share of uplift less cost of capital
- Minimum info: underlying calculation of Risk Margin; SCR built up from sub-modules incl LACTP/LACDT; asset values by type; DTA/DTL; information on mix of guarantees and profit sharing mechanism for par business

Franchise value

- One year's NBV and multiplier
- Minimum info: information on key new business products (e.g. loadings etc) or NBV on an MCEV of similar basis; details of contract boundaries; projected new business volumes

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Introduction to S_2NBV

- Our method:
  - Reflects marginal capital required for NB, together with cost of holding that capital:
    - based on shareholders' required rate of return
    - including for market risks
  - Considers projected real-world view
  - Considers marginal impact of NB on SII OF
  - Allows appropriate assessment of impact of different product designs and other management decisions
  - Applicable to life, non-life, health

  => Framework for robust decisions around new business

Introduction to S_2NBV (2)

- S_2NBV = NPV of expected future distributable profits on SII basis, discounted at shareholders' required rate of return
- This is marginal impact of writing new business, e.g.:
  - Diversification benefit with capital on existing business
  - Impact on ALM position (e.g. pooled fund)
  - Tax position
  - Spreading of overhead expenses
- Standalone view can introduce material distortions
- New business consistent with SII contract boundaries
- Framework is consistent with S_2AV

Introduction to S_2NBV (3)

- S_2NBV =
  - Initial OF (OF_{NB})
  - Less COC from non-hedgeable risks (compared with RM)
  - Plus impact of taking hedgeable risks
- Under certain conditions:

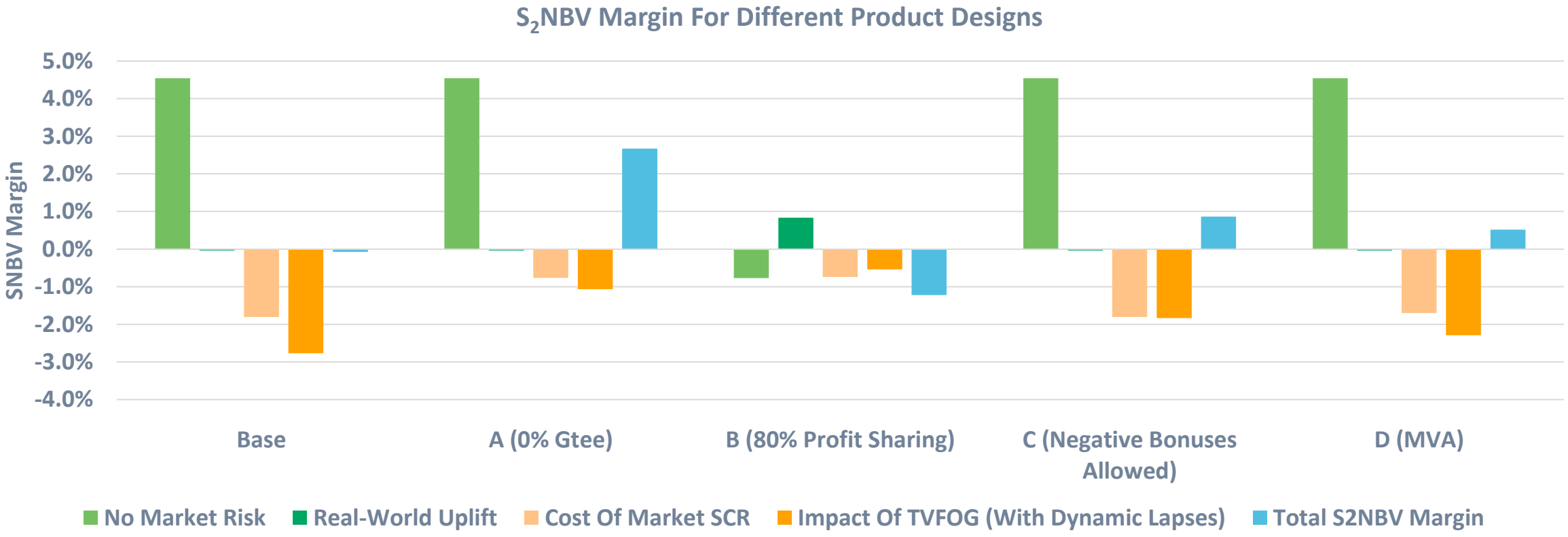
  $S_2NBV = OF_{NB}$
- Impact of taking hedgeable risks includes:
  - Cost of additional capital
  - Additional real-world returns above risk-free
  - Impact on value of liabilities (e.g. TVFOG)
- S_2NBV margin = S_2NBV / PVNBP

Product design and risk management

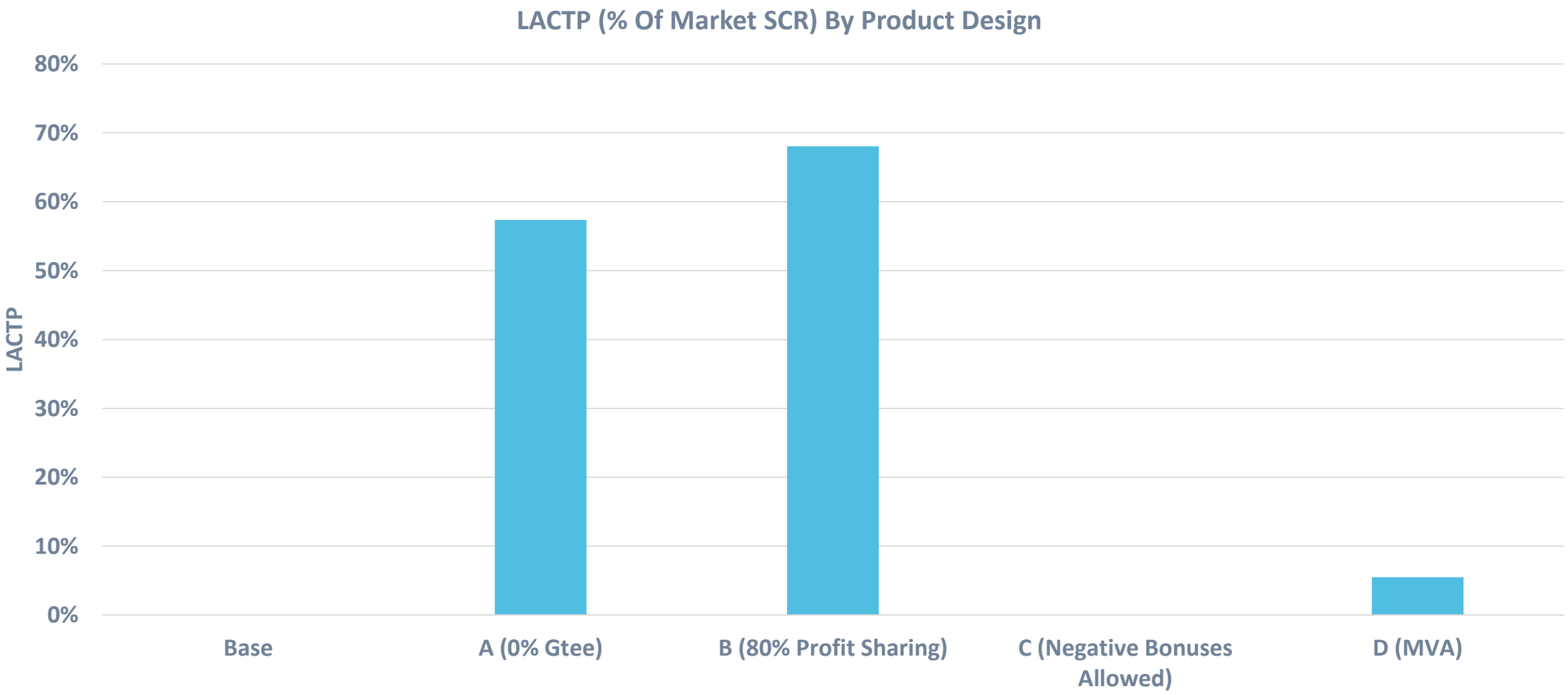
- SII attempts to reflect actual risks taken in capital requirements (although Pillar I Standard Formula doesn't reflect all risks)
- Market-consistent approaches to NB profitability don't allow appropriately for taking market risks, shareholders' return on capital, or potential upside from management decisions (in fact in products with symmetries in liabilities leading to TVFOG a completely de-risked strategy will always give the highest value of new business under MCEV)
- Under S_2NBV various factors influence value, including:
  - Product design and pricing (including policyholder options and guarantees)
  - Management actions
  - Policyholder behaviour
  - Existing SII balance sheet
  - Assumed volume and mix of new business
  - Prevailing economic conditions

Life Participating example

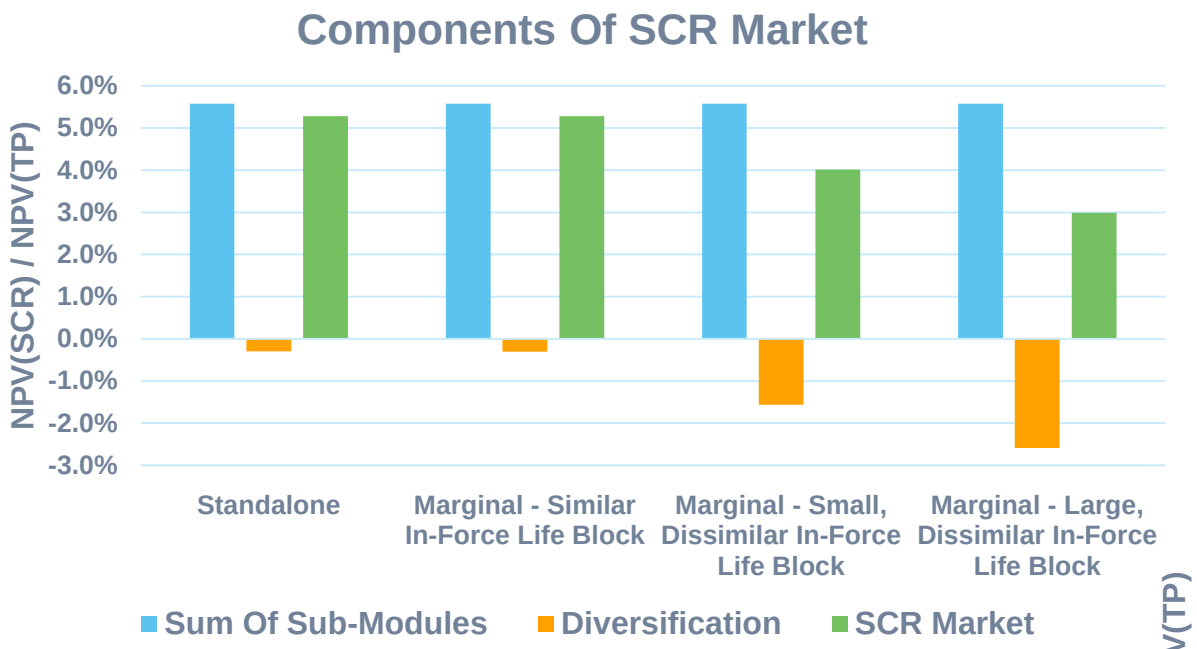
- Simplified example, profit sharing based on book value returns, subject to a 1% minimum guarantee, four different designs, standalone basis:



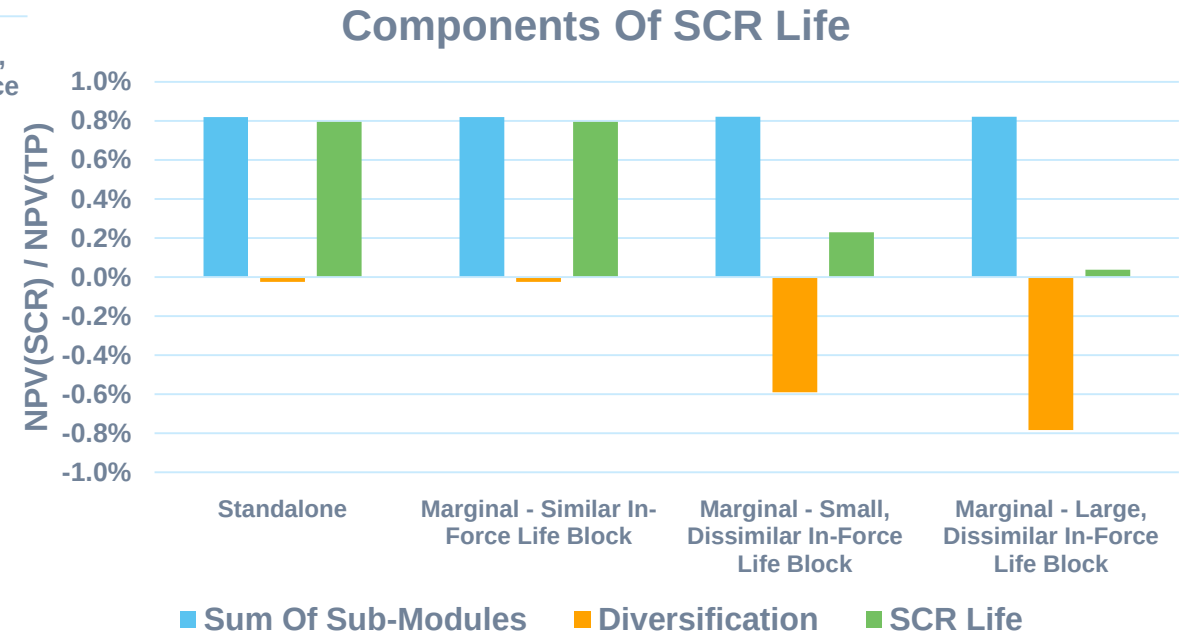
Life Participating example (2)



Life Participating example (3) – marginal basis for capital



Further diversification benefit also achievable between BSCR modules (not shown)



Life Participating example (4) – marginal basis, further aspects

- In our example, new business can be written in a pooled fund with in-force
- Can have significant impact on ALM position, e.g. premium cash-flows reducing the need to sell assets to meet liability outgo
- Impact of pooling returns to calculate profit sharing
- If book value yields on in-force are higher than “new money yields” related to new business, can get:
  - Lower profit sharing on in-force (depending on guarantees) => positive impact on shareholder profits
  - Higher profit sharing on new business (depending on guarantees) => negative impact on shareholder profits

  Overall impact on value dependent on relative level of yields and guarantees and can be positive or negative

Non-life

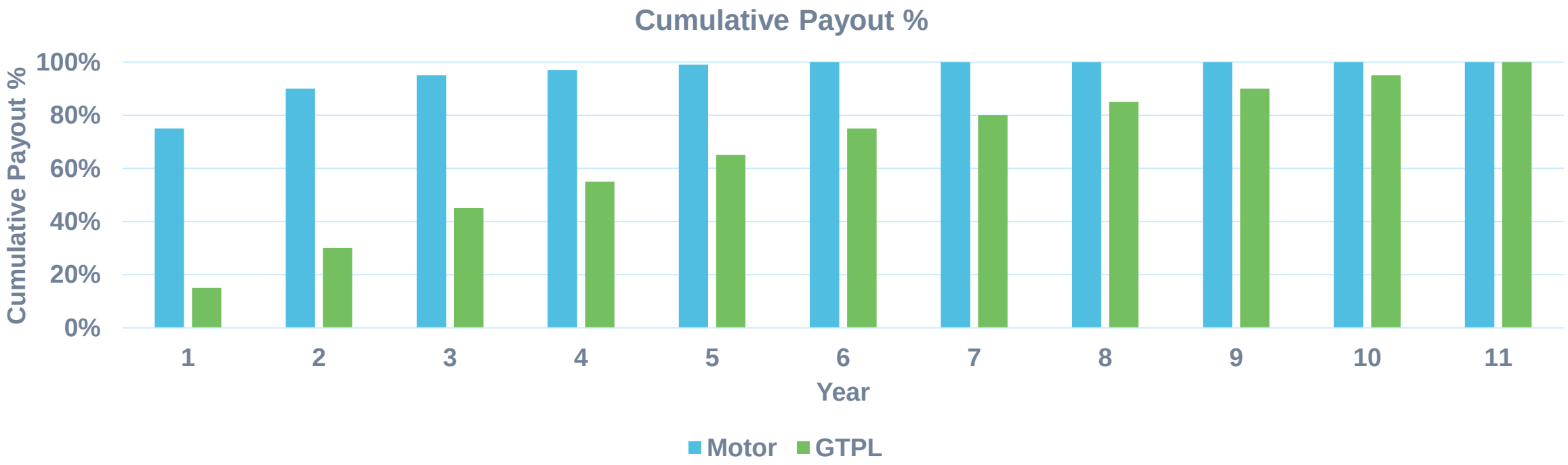
Application in Non-life

Life and non-life come together

- It has been less common in non-life use to use projected cashflow approaches to assessing business performance and driving business decisions. The advent of SII makes this not advisable as the timing of the emergence of distributable profits can be quite variable depending on factors such as:
  - Gross and net risk profile of business
  - Payment pattern
  - Reinsurance
  - Diversification benefits
- Applying S_2AV style techniques to non-life business allows much more insights into cash generation of business than traditional accounting measures such as combined operating ratios

Non-life example

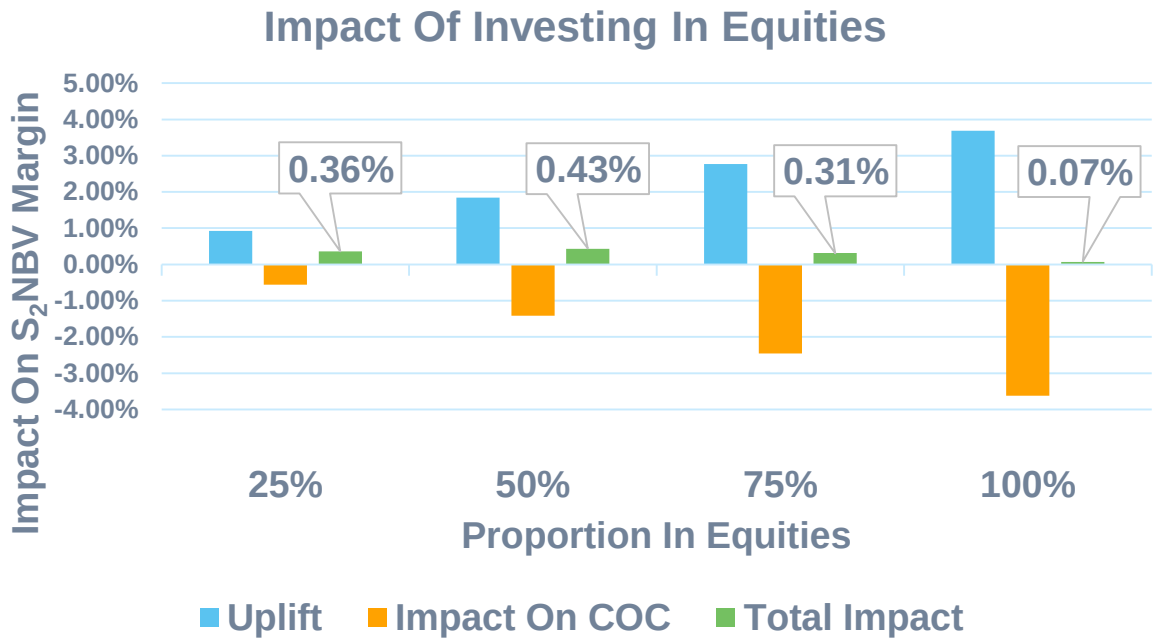
- Assume two business lines:
  - Motor Other, i.e., excluding MTPL
  - GTPL
- Payment pattern has an impact on timing of capital release

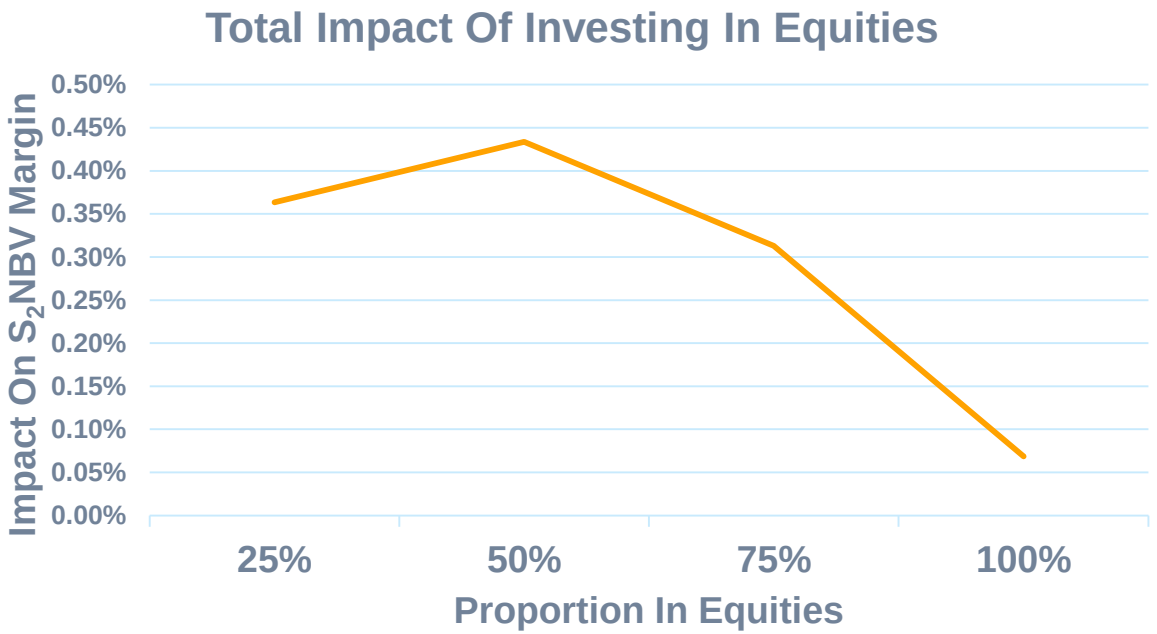


Non-life example (2)

Analsis of difference in S_2NBV margin between Motor and GTPL	OF_{NB} (before impact of RM_{NB}*(1- tax))	- RM_{NB}*(1-tax)	COC non-market risks in excess of RM_{NB}*(1- tax)	S_2NBV margin
Motor	9.1%	-2.1%	-2.1%	4.9%
GTPL	11.4%	-6.1%	-5.3%	0.0%
Mix	10.3%	-3.6%	-3.1%	3.5%
impact on cost of capital of σ FACTORS	0.0%	-1.7%	-1.5%	-3.1%
impact on cost of capital of settlement speed	0.0%	-2.3%	-1.7%	-4.0%
impact on initial BEL * (1-tax) of different settlement speed	2.3%	0.0%	0.0%	2.3%
total difference	2.3%	-4.0%	-3.2%	-4.9%

Non-life example (3) – impact of investing in equities





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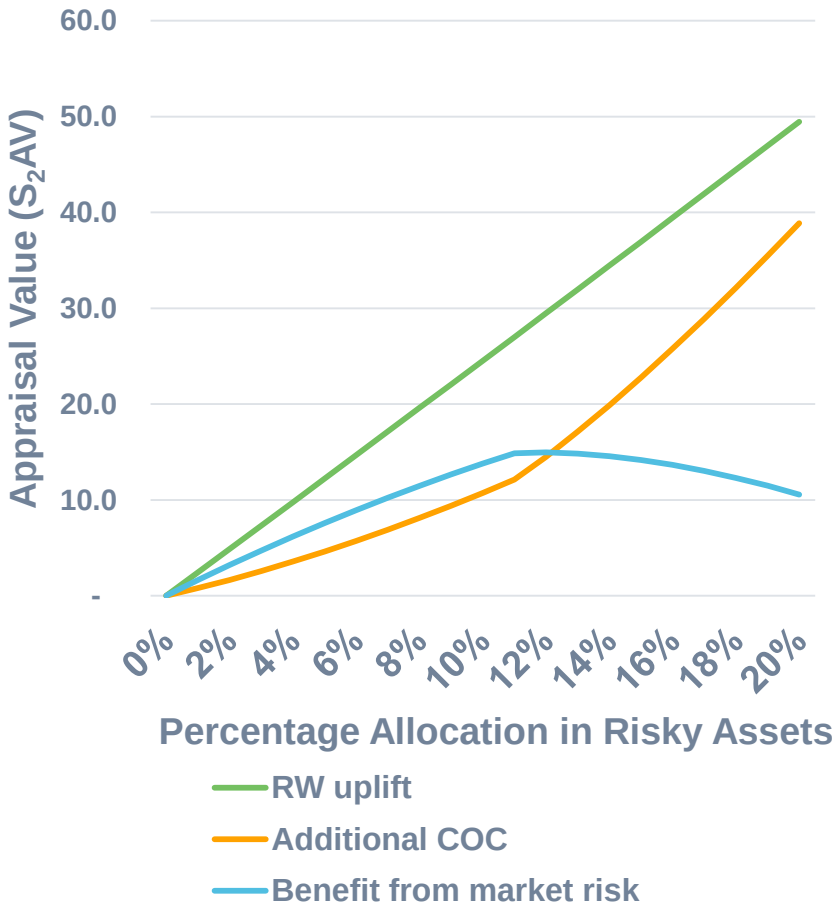
Using SII Metrics in Asset Liability Management

- One area where Solvency II-based approaches can be particularly valuable is in asset liability management (ALM), particularly for businesses with embedded options and guarantees and/or profit participation features.
- The S_2AV approach, and in particular the isolation of the "impact of market risks", can be helpful in understanding the implications of different approaches to ALM on shareholder returns. By testing "what if" scenarios we can assess the financial impact of different investment strategies, product designs, policyholder crediting strategies, new business volumes etc.
- For the liabilities in respect of products without profit participation the impact of taking market risks is given by a fairly straightforward payoff arising from the additional expected return on the assets (i.e. above risk-free) less the cost of the capital charges associated with them. For participating business however, we need to allow for the impact of the participation features, which may reduce the shareholder benefits from risk premia in asset returns, but it can also reduce the SCR for market risks.
- This is because the SCR is calculated by looking at the reduction in the value of assets after a market shock, net of the reduction in the value of liabilities. If all policyholder benefits are guaranteed then something like a spread or equity shock will not lead to a reduction in the value of liabilities, because these are only sensitive to a change in risk-free interest rates.
- However, if there are profit participation features, the net impact of the shock will be reduced to the extent to which expected future profit participation can be reduced in adverse market conditions. This is the so-called "loss absorbing capacity of technical provisions", which can sometimes have a material impact on the SCR for market risks.

	Direct impact	Offset by
Upside from taking avoidable market risk	Additional expected real world investment return	Proportion of additional returns which are expected to be passed onto policyholders as profit participation
Downside from taking avoidable market risk	Additional cost of capital for market risks	Loss absorbing capacity of technical provisions

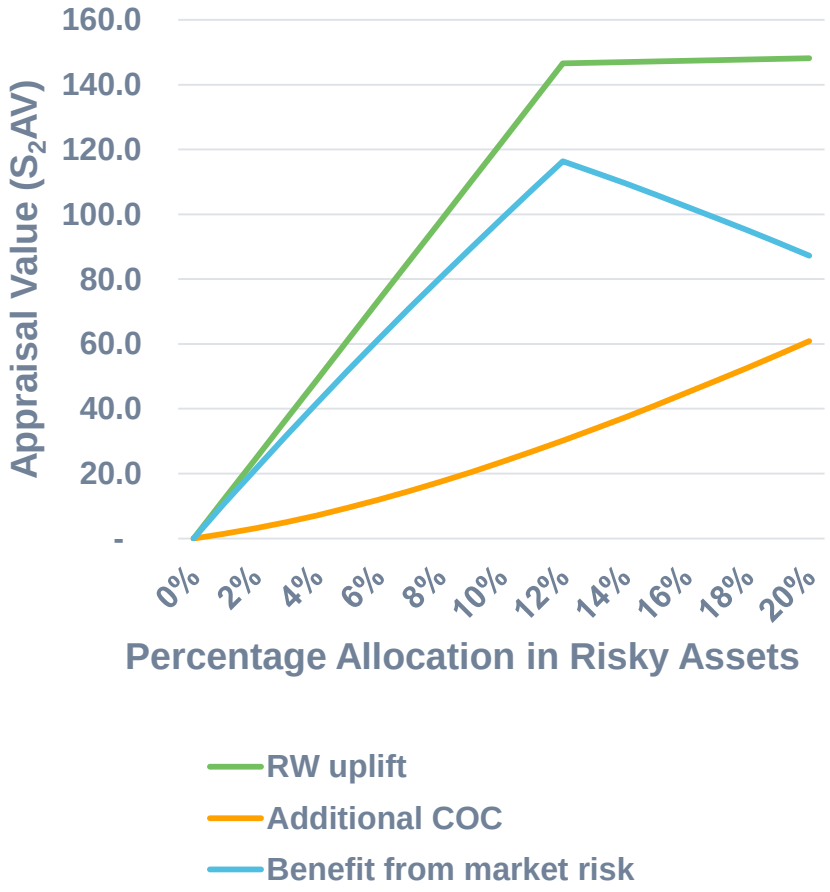
Using SII Metrics in Asset Liability Management (2)

- The interaction between the additional return from taking market risks and the associated cost of capital can be illustrated by looking at how the value on the S_2AV basis of a portfolio of participating business varies according to the proportion of assets which is invested in risky assets—in this case corporate bonds.
- The Company provides a guarantee on the annual credited rate of return and takes a management fee and a share of excess returns.
- As we increase the proportion of risky assets, the additional return for the shareholders increases more or less linearly, although this will be dependent on the nature of the profit participation mechanism and the in-the-moneyness of the guarantee.
- On the other hand, the additional cost of capital is not linear due to the diminishing diversification benefits as market risk becomes larger relative to other risks and also because above a certain level of risky assets there is no longer any additional LACTP, since the post shock liability cannot reduce below the minimum guaranteed benefits. This leads to a steepening of the "additional COC" curve at around 10% of risky assets in the graph above.
- This results in being able to determine an optimal asset allocation from the perspective of maximising shareholder value, measured as S_2AV.



Using SII Metrics in Asset Liability Management (3)

- We can now consider a second case where the Company provides a guarantee on the annual credited rate and takes a fixed margin on the investment return, but once the guarantee rate and the margin are achieved, passes on 100% of the excess investment returns to the policyholder.
- Further, we assume that at risk free rates of return, the guarantee is in the money. In this case the impact of different levels of assets allocated to corporate bonds is as follows:
- Once again, there is a fairly linear benefit from increased investment in risky assets, but only up to a certain point because beyond that 100% of additional returns are passed on to policyholders as profit participation so that beyond this level there is no direct shareholder benefit.
- The cost of capital shows a similar increasing curve as diversification benefits diminish proportionately, but because the guarantees are in the money, there is no possibility of loss absorbing capacity of technical provisions in this example.



Using SII Metrics in Asset Liability Management (4)

- In real life the picture will be more complex than that because often there will be a heterogeneous mix of liabilities to consider and the management actions under consideration will be more complex than just the weightings of two different asset classes.
- Sometimes there will be other constraints related to this type of decision such as commercial and other considerations related to policyholder expectations on crediting rates (e.g. the rates of profit participation). It may, for example, be necessary to weigh up the cost of a more aggressive investment strategy compared to the additional new business sales it may generate and the value which that might add.
- The above graphs look at the position on a deterministic basis, but it will usually be important to look at ALM questions across a wide range of scenarios using a stochastic approach. More extreme stochastic scenarios will make consideration of the possibility of dynamic policyholder behaviour important. Investment strategies which optimise the shareholder position under a central scenario may trigger dynamic lapses under negative scenarios and thereby worsen the ALM position.
- Companies using the Standard Formula approach to determine the SCR will need to decide whether to base their decision making on metrics calculated under this approach or whether they want to allow for areas in which the Standard Formula does not fully capture their own view of risk. An obvious question would be whether to allow for some risk on government bonds, since these do not attract any capital charge (in respect of credit or default risk) under the Standard Formula approach.

Using SII Metrics in Asset Liability Management (5)

- Nevertheless, this framework can still be the basis of decision making even when the situation is more complex. This approach allows ALM management to be approached both from the asset and liability sides using the same metrics to guide decision-making, across a range of different areas including:

Asset side	Liability Side
Strategic asset allocation	Product design (e.g. guarantee levels and definitions, surrender value rules)
Duration matching	Crediting rates for participating business
Hedging strategies, for example based on derivatives to manage guarantee exposures	Management of dynamic policyholder behaviour risks through product design or client servicing actions
Timing of realisation of losses and gains when book value investment returns are a driver of policyholder participation	Planning of new business volumes (e.g. when profit participation is based on book value returns over all assets, new business may dilute book value returns which are based on historic bond holdings)

- In turn this allows a move towards a more holistic and integrated approach to ALM compared to the fragmented approach often used in the past which has led to the thought that “liability people create problems and asset people try and fix them”. When companies can use Solvency II metrics to better understand risk and value and improve their decision making accordingly, the investment in putting Solvency II in place will start to be paid back.

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Conclusions / Recap

S_2AV = NPV(distributable profits) @ shareholders' required rate of return

- Assume most important drivers of distributable profits are required SII capital and OF
- Can express in terms of:
  - Initial OF
  - Less COC from non – hedgeable risks (compared with RM)
  - Plus impact of taking hedgeable risks
- Allowing for:
  - Target solvency ratio
  - Real-world uplifts and capital charge from "risky" assets
  - Policyholder profit sharing on par business
  - Tax

Conclusions / Recap (2)

- Components more easily valued based on information likely available from Solvency II reporting (which also has the advantage of objectivity/supervisory oversight)
- Decomposition useful in understanding value of certain activities
- Departure from market-consistent methodology
- Equally applicable to life, non-life, health
- Other constraints on profit distribution best allowed for approximately, e.g. via target capital

- S_2NBV and S_2NBV margin based on same framework
- Allows robust approach to product design
- Takes marginal approach
- Depends on new business volumes, existing balance sheet, etc.

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Thank you

Ed Morgan
ed.morgan@milliman.com

Quantitative aspects of SFCRs

Marcin Krzykowski

19 JUNE 2018

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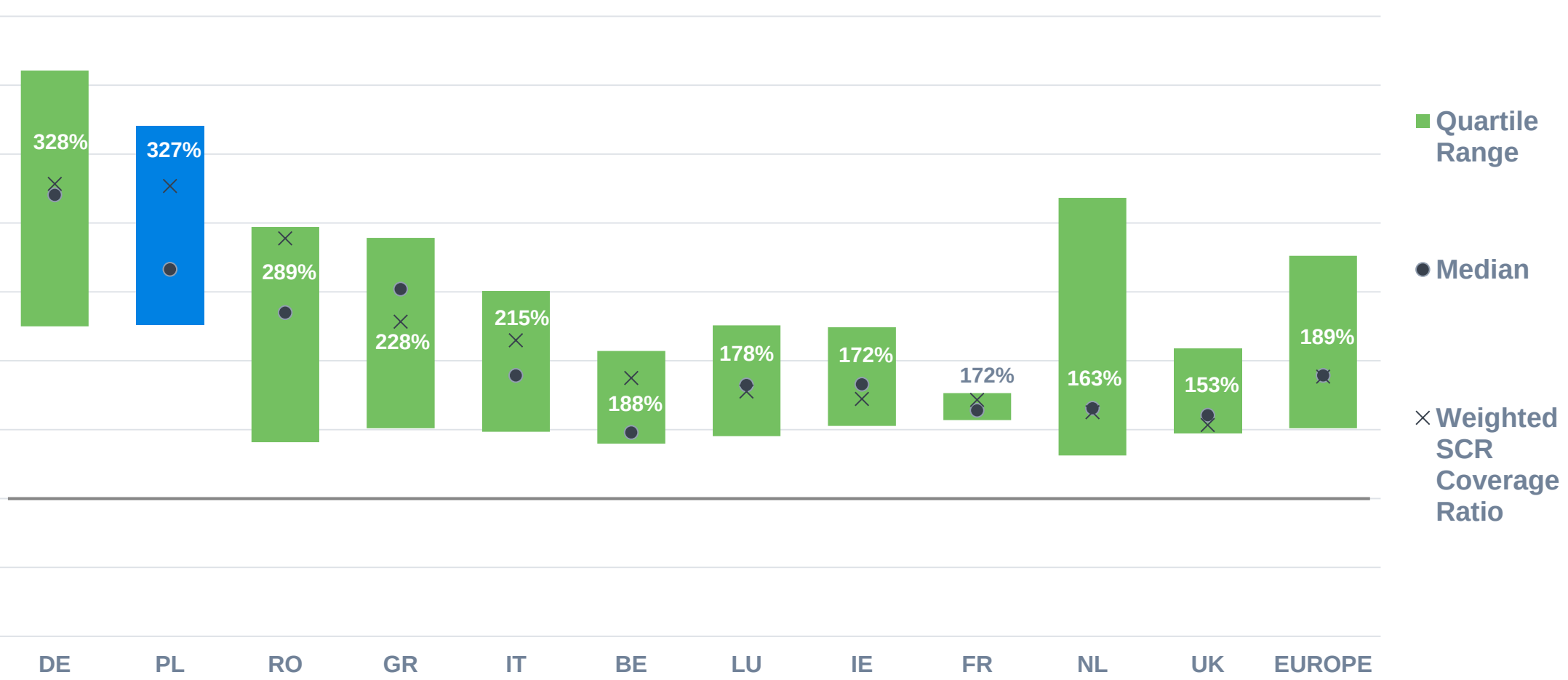
Agenda

1 **SFCR results**

2 Solvency II implementation

3 Attitudes to capital management

Distribution of life solvency coverage ratios by country



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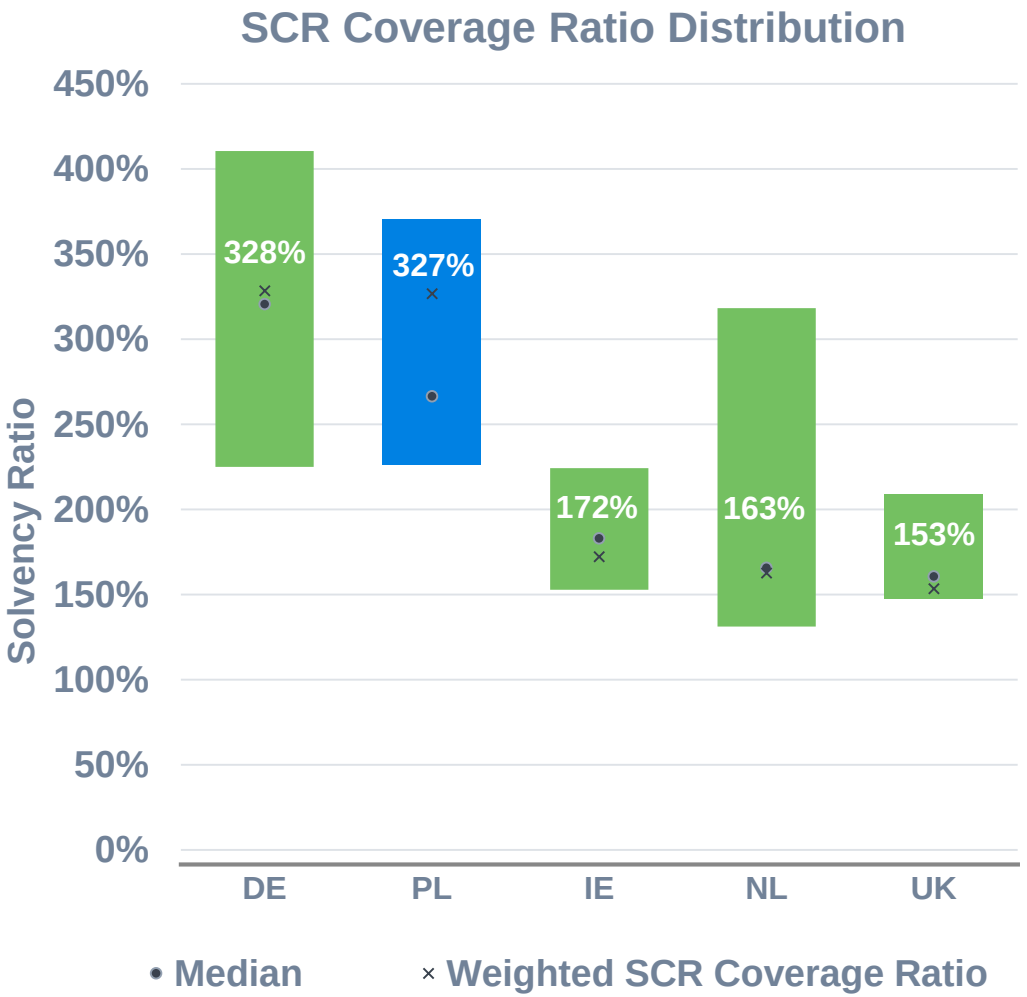
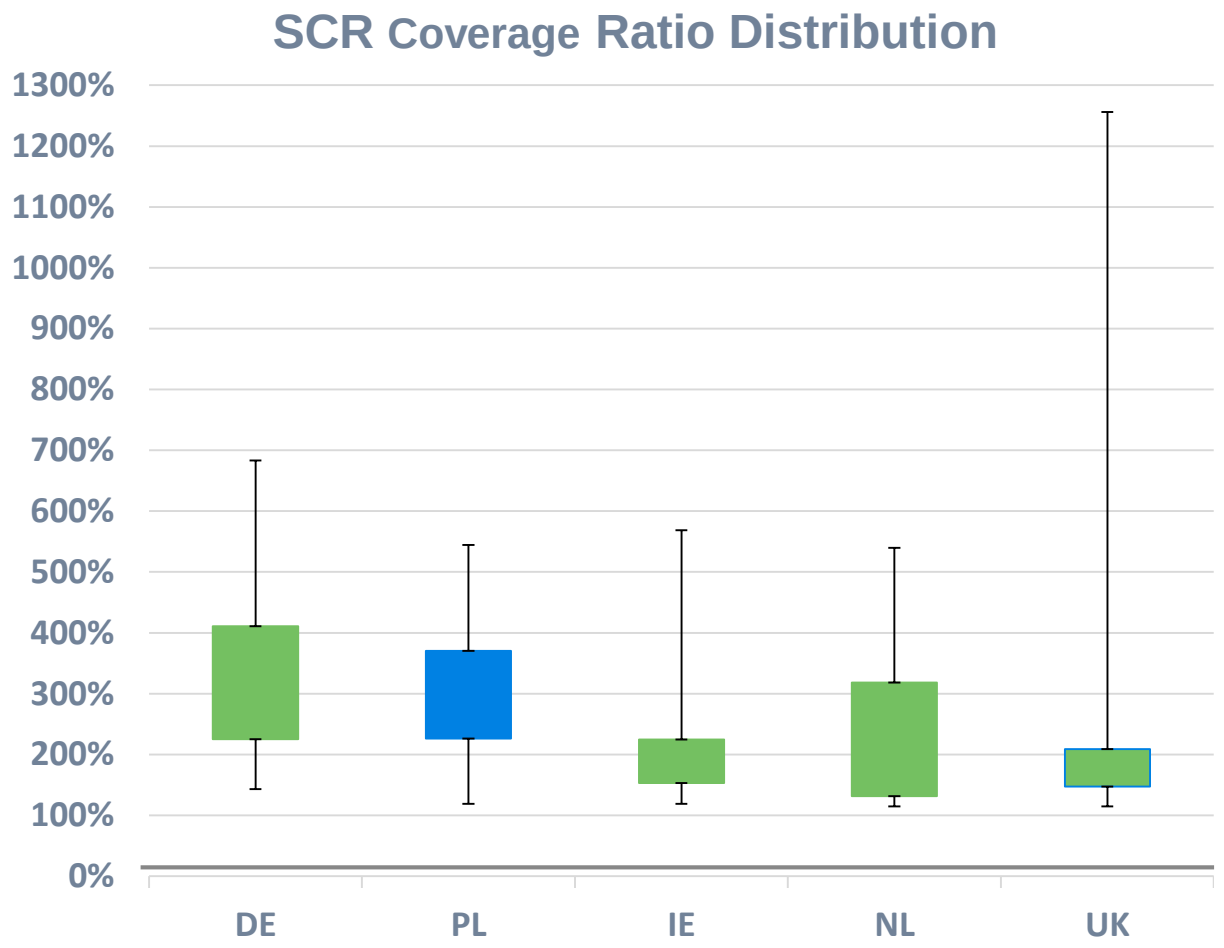
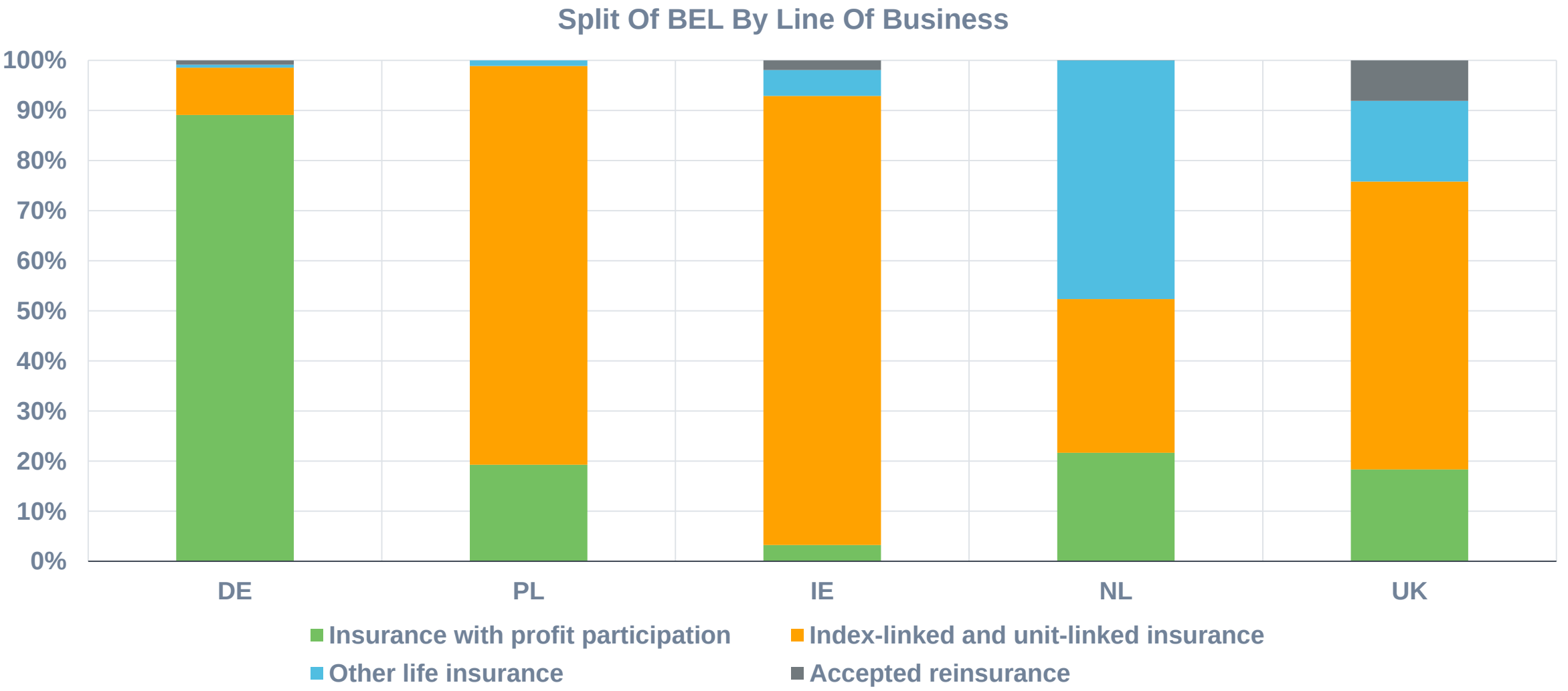
Countries of focus





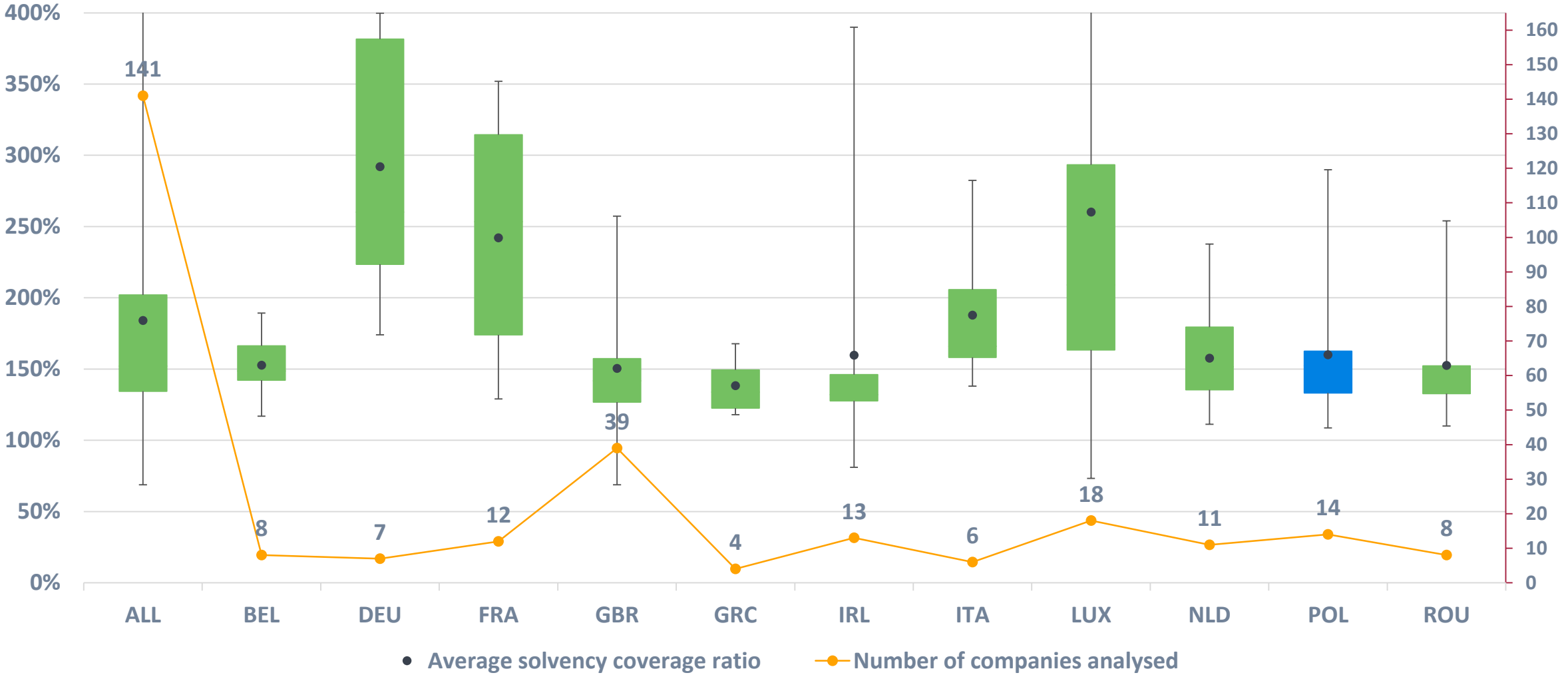
Product mix

Each country has A different mix of business



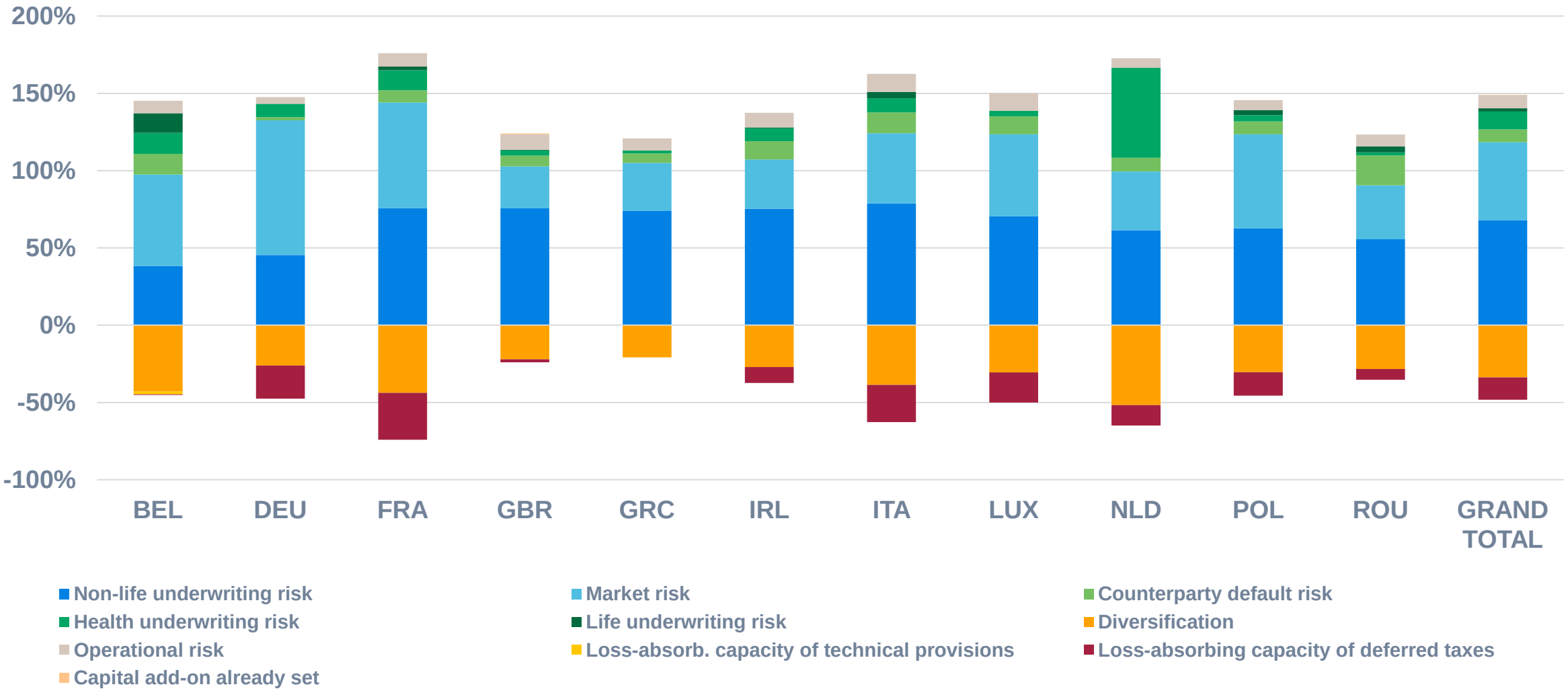
P&C results

Distribution of P&C solvency coverage ratios by country

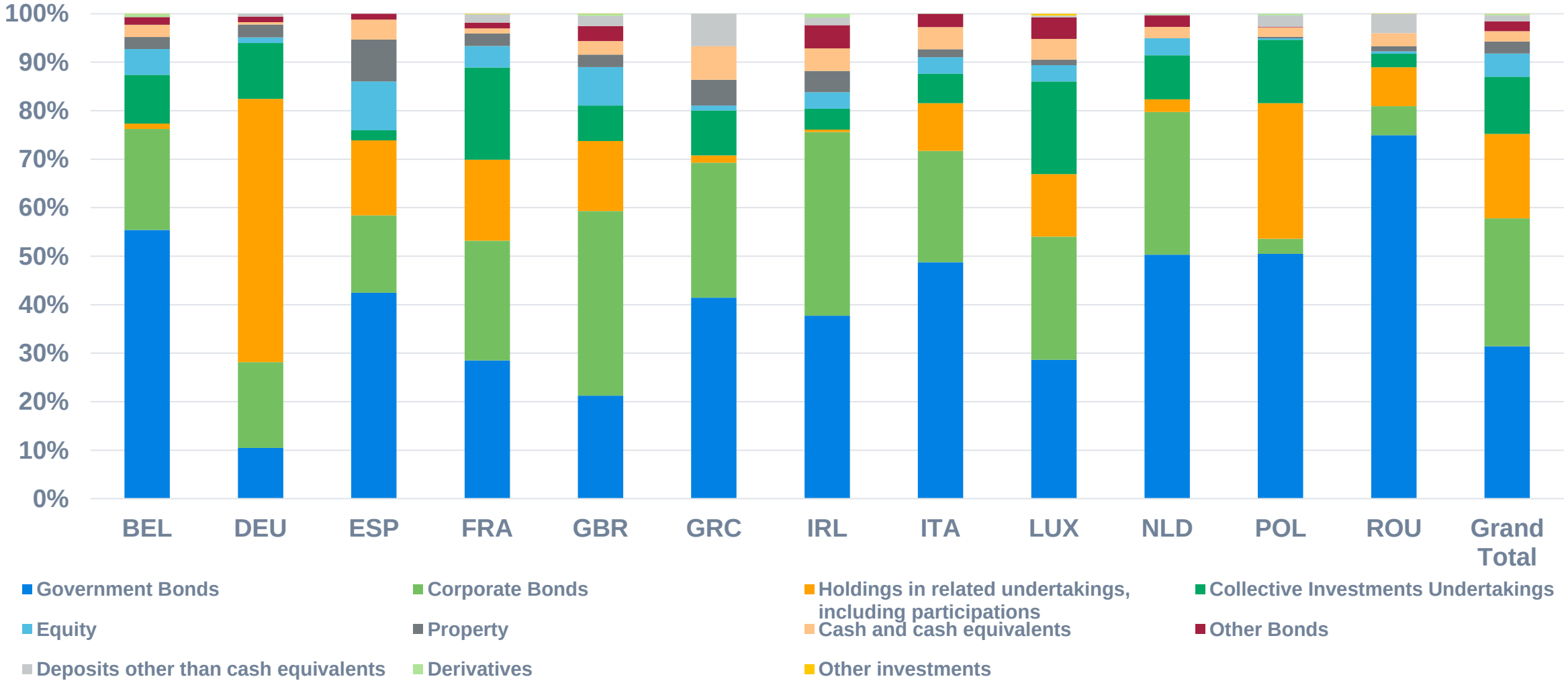


SCR ratios and SCR calculation methods across Europe

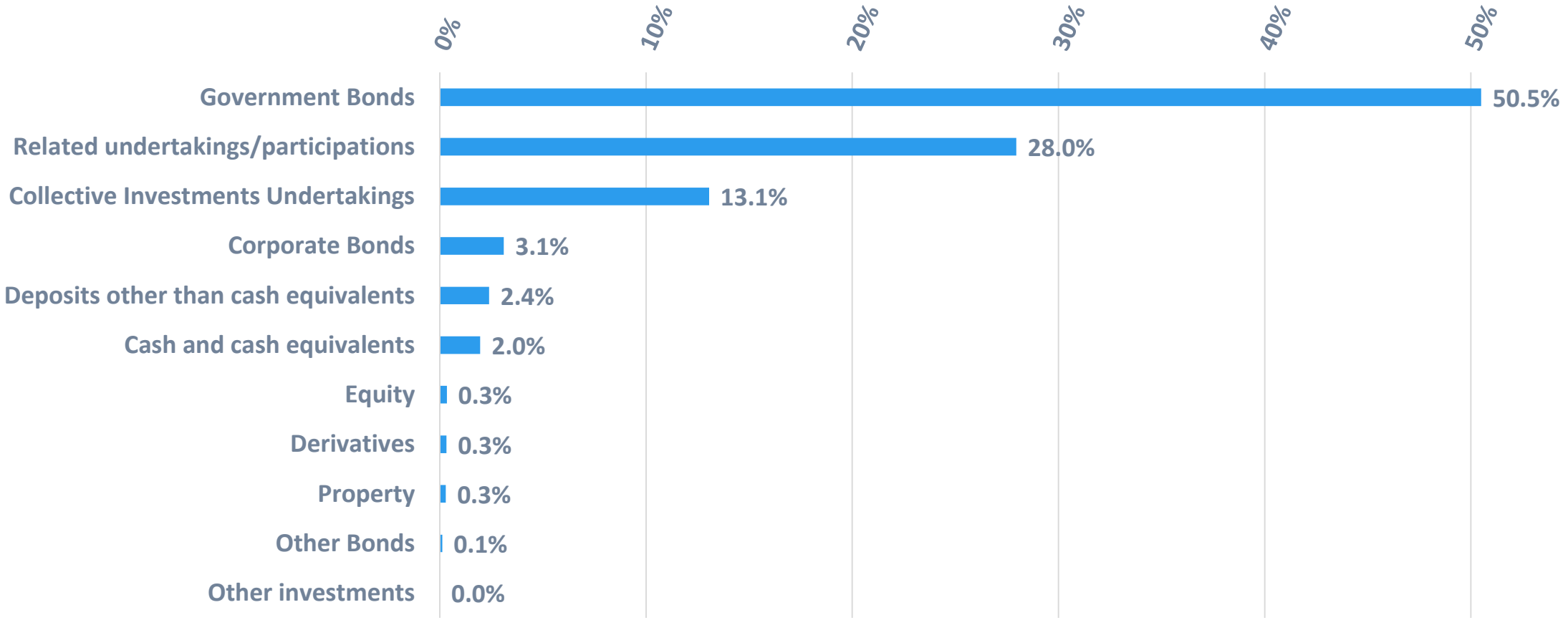
SCR breakdown by country



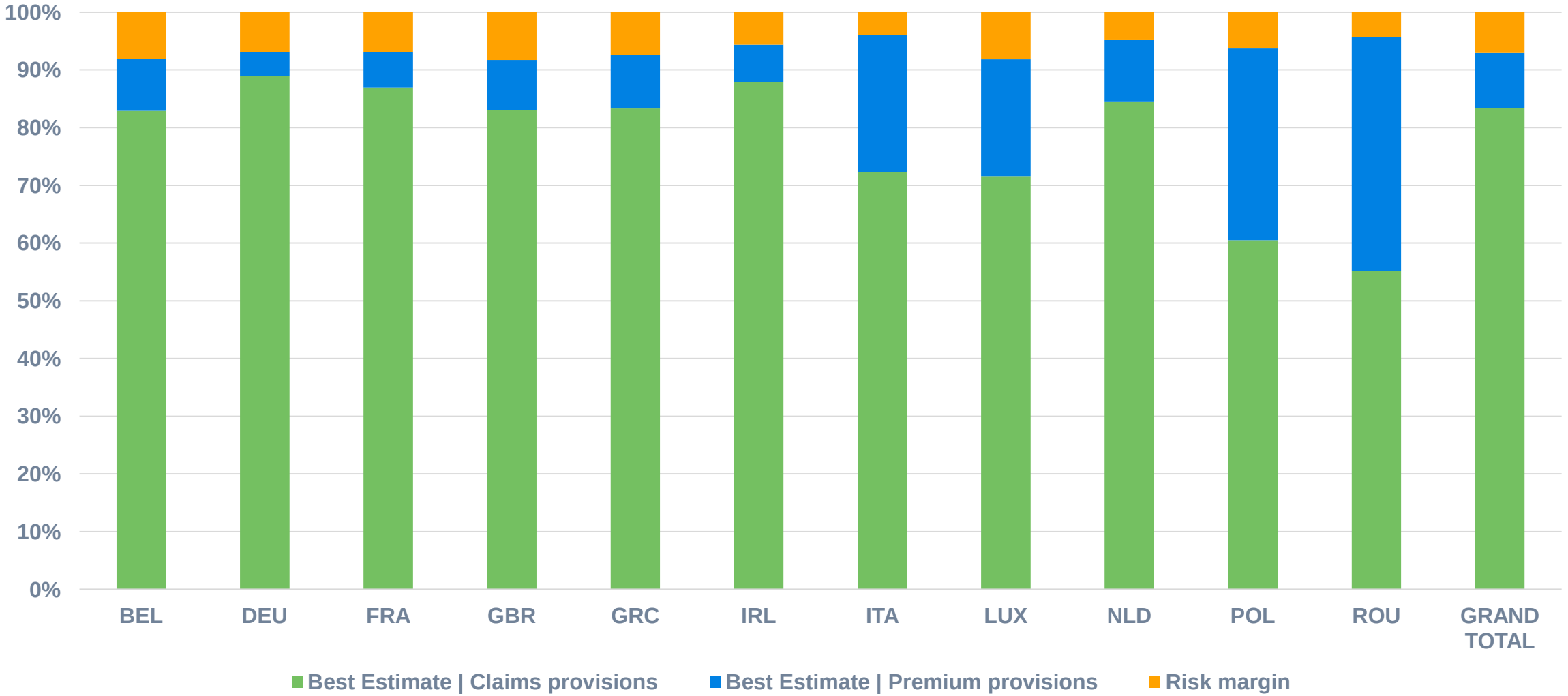
Investment breakdown, aggregated by country



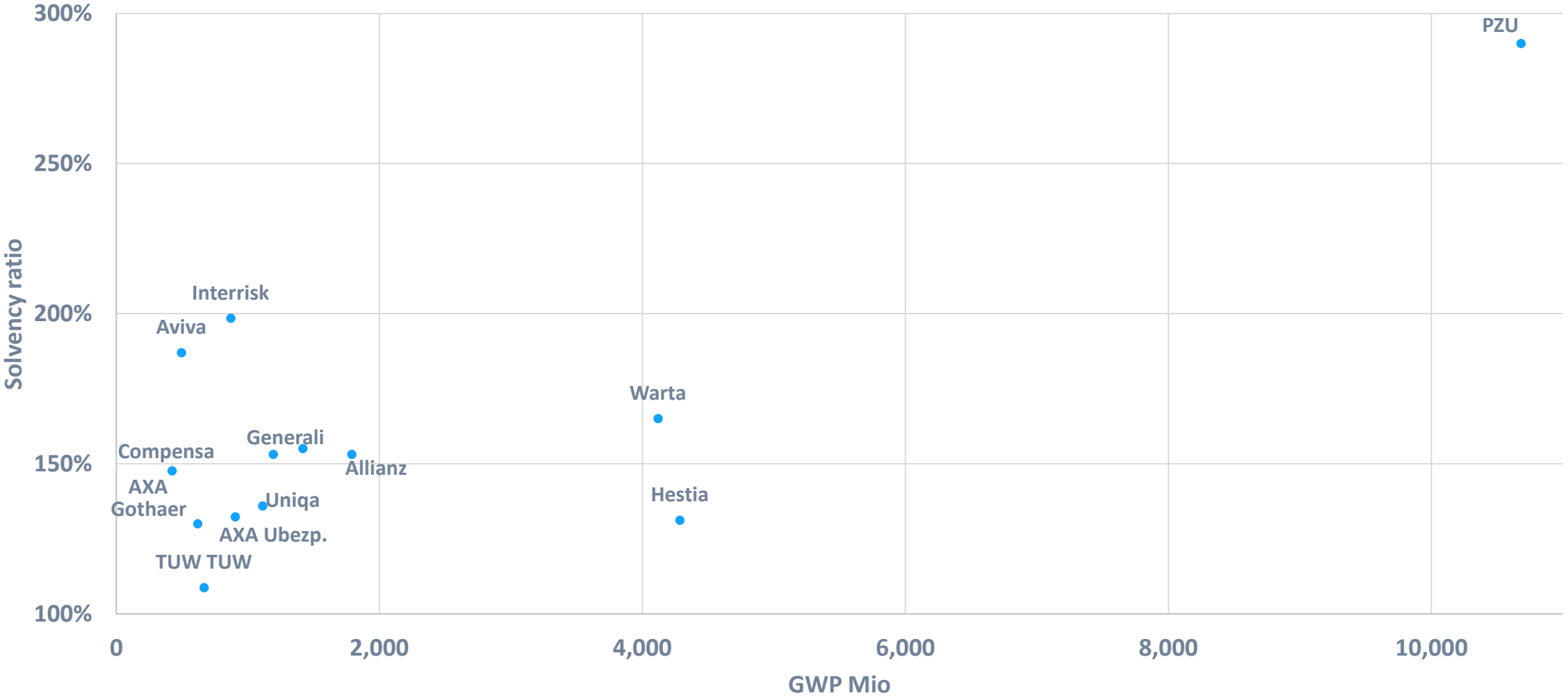
Split of investments by asset class (Poland)



Components of net technical provisions



Solvency coverage ratios Poland



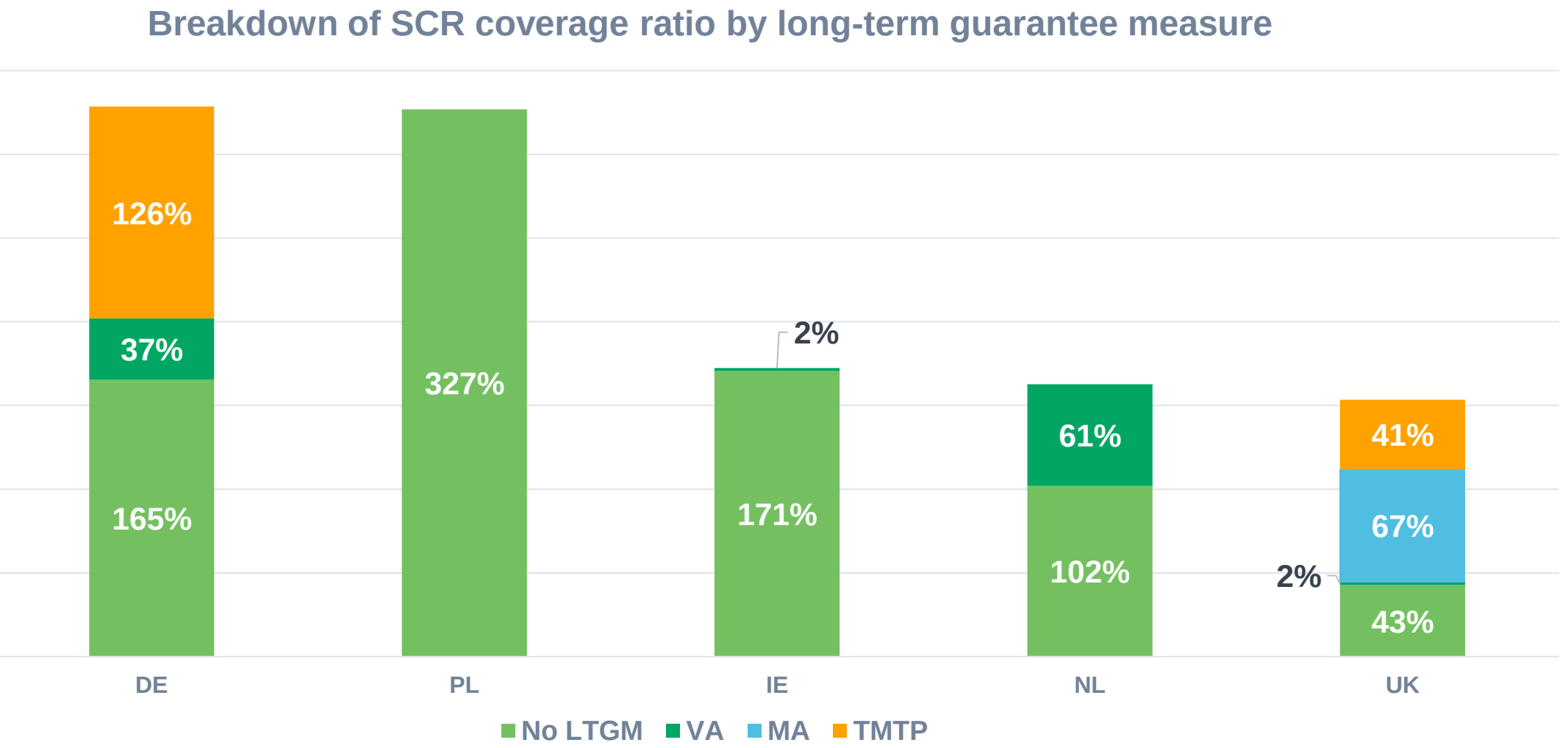
Agenda

1 SFCR results

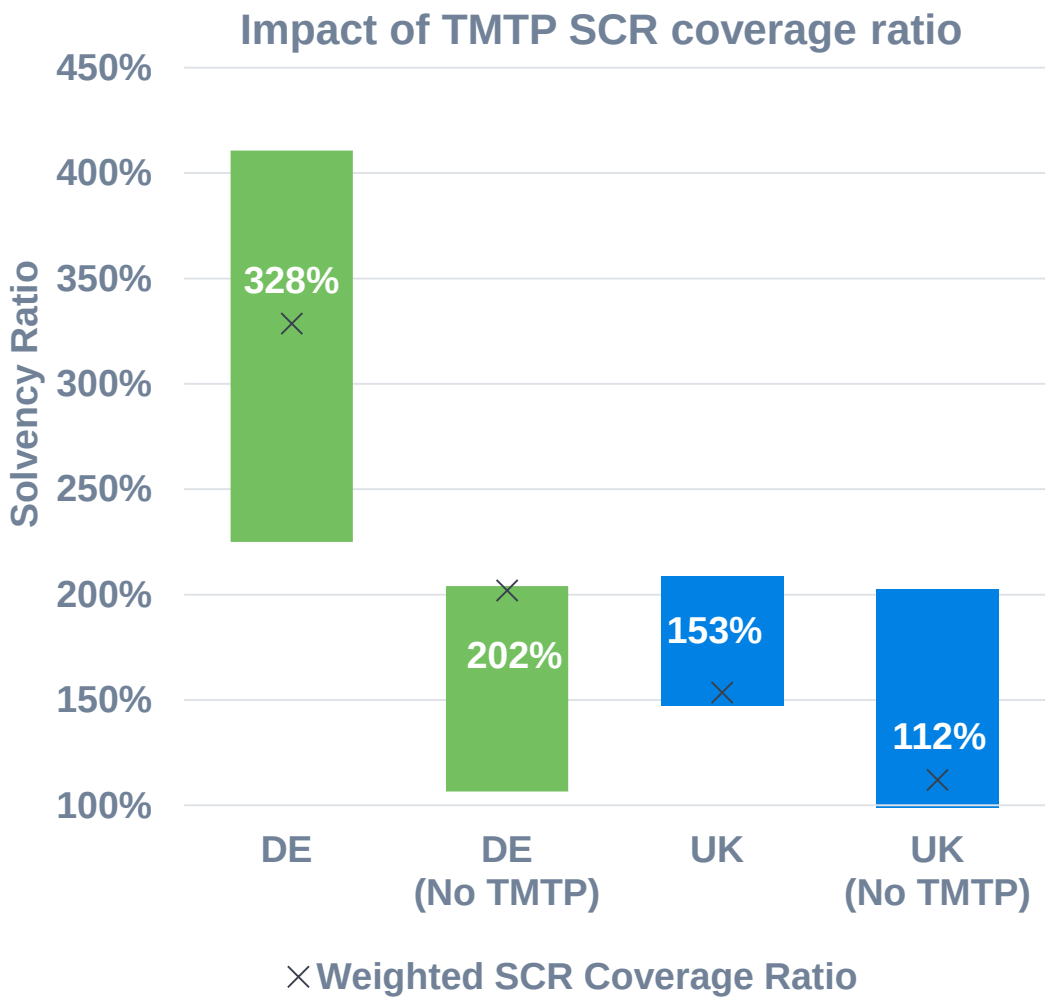
2 Solvency II implementation

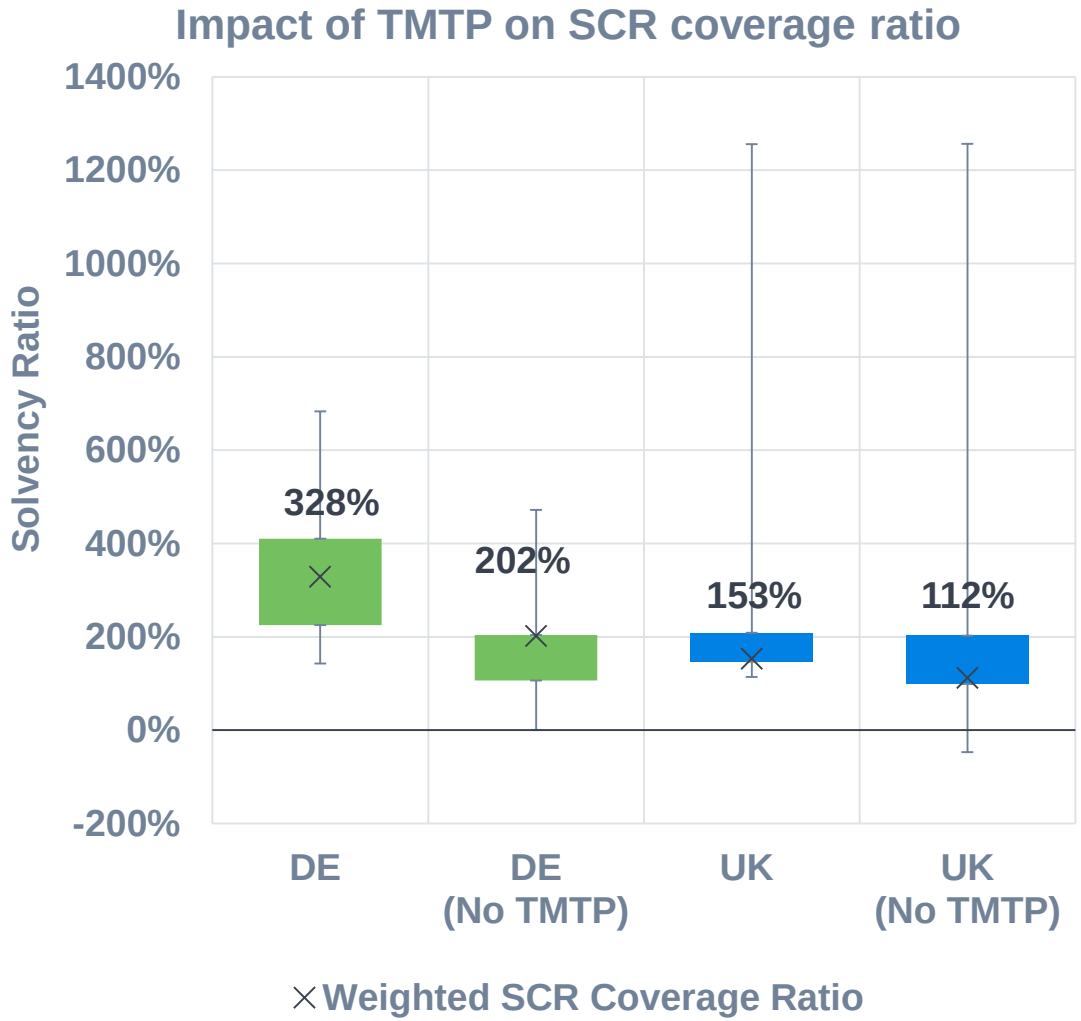
3 Attitudes to capital management

Long-term guarantee measures

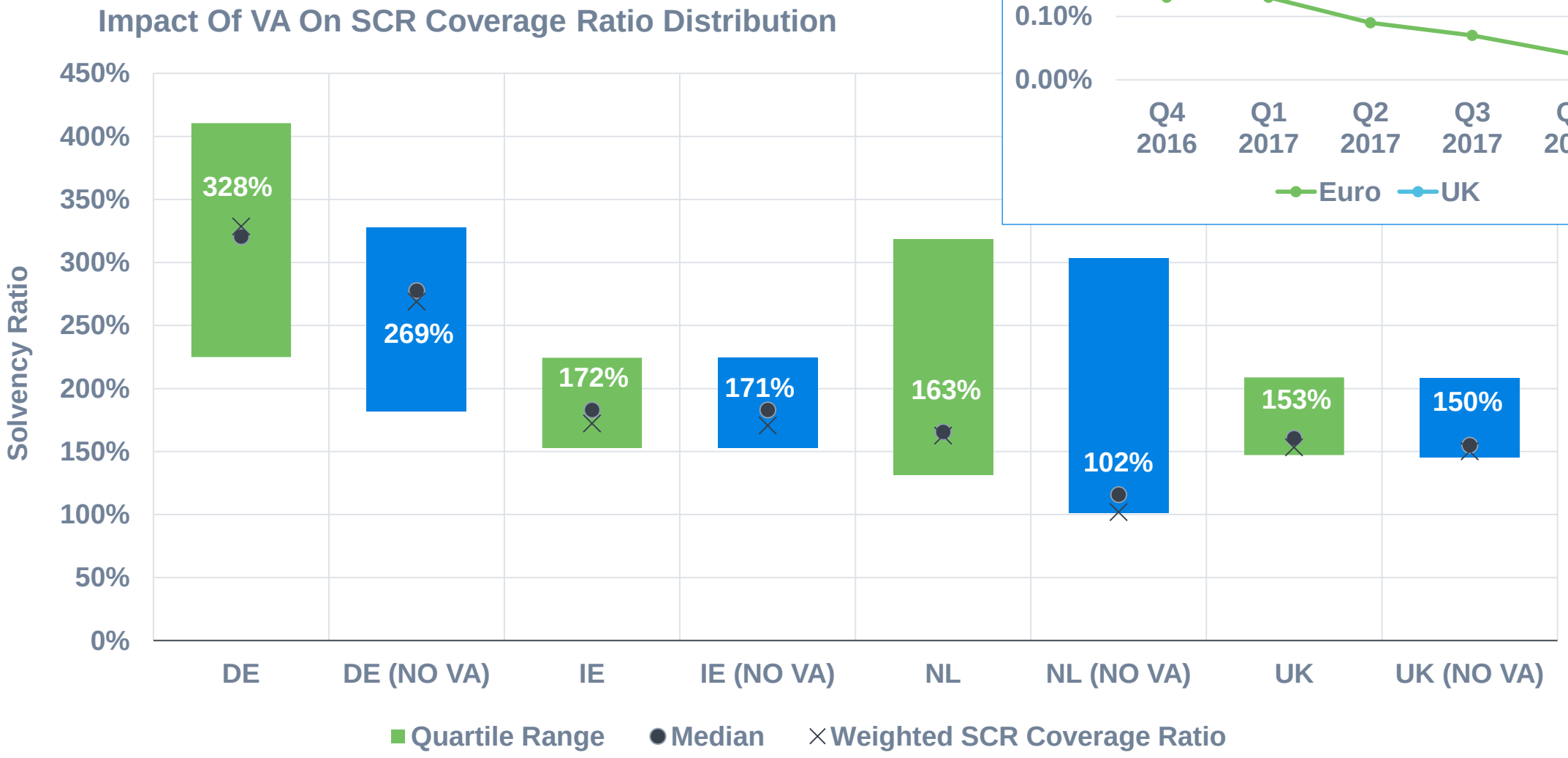


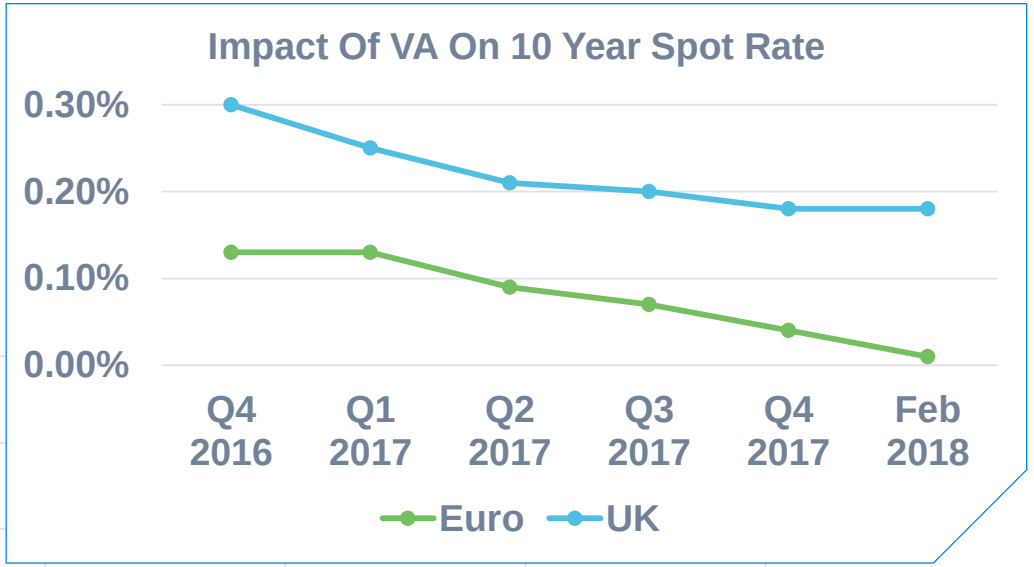
Transitional measure on technical provisions





Volatility adjustment





Extrapolation of the risk-free rate

Country	Impact on SCR coverage ratio of given change in UFR		
	-100 bps	-15 bps	-55 bps
DE	-40%	-6%	-22%
PL	-1%	0%	-1%
IE	-10%	-2%	-6%
NL	-38%	-6%	-21%

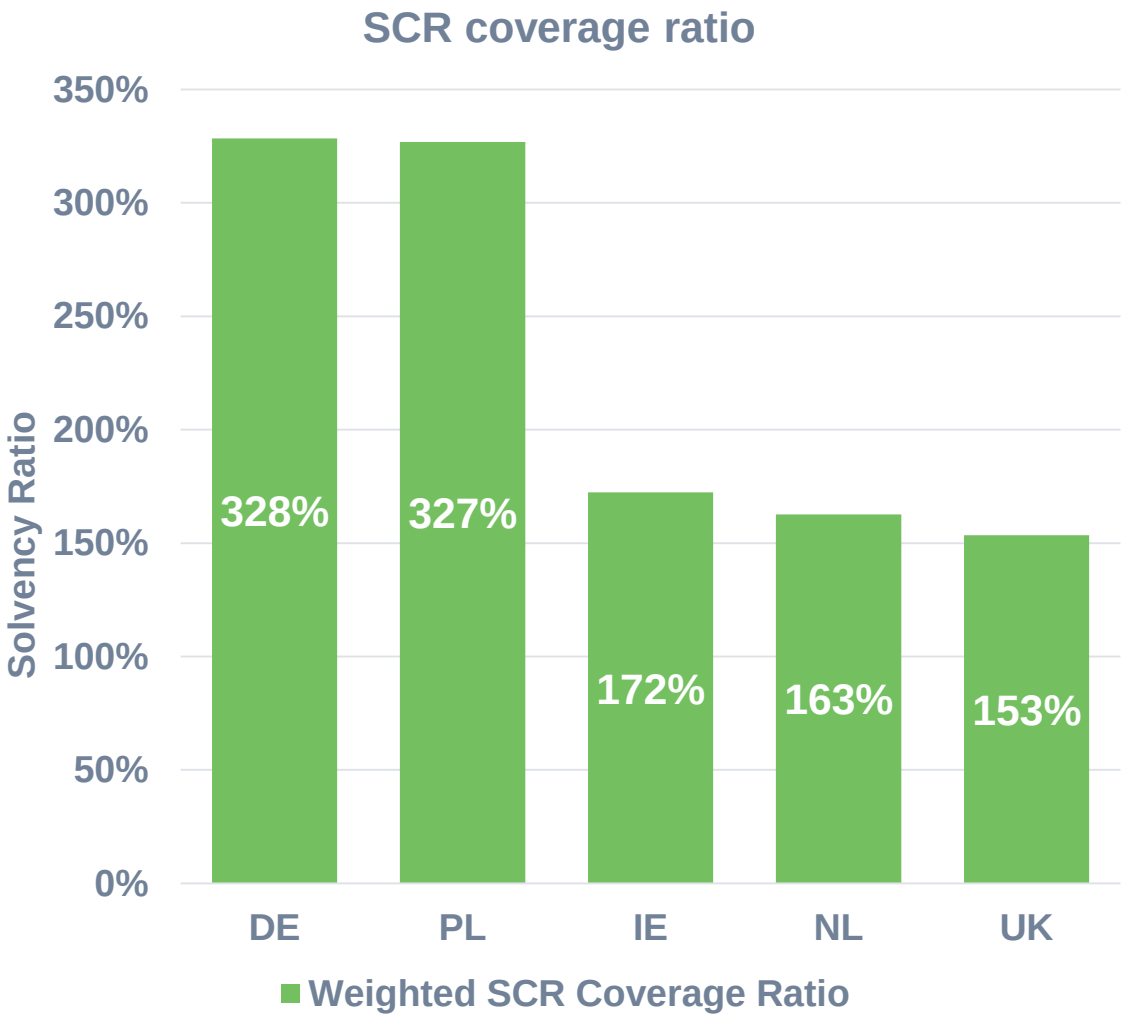
SOURCE: (-100bps) Report on long-term guarantees measures and measures on equity risk 2017, EIOPA

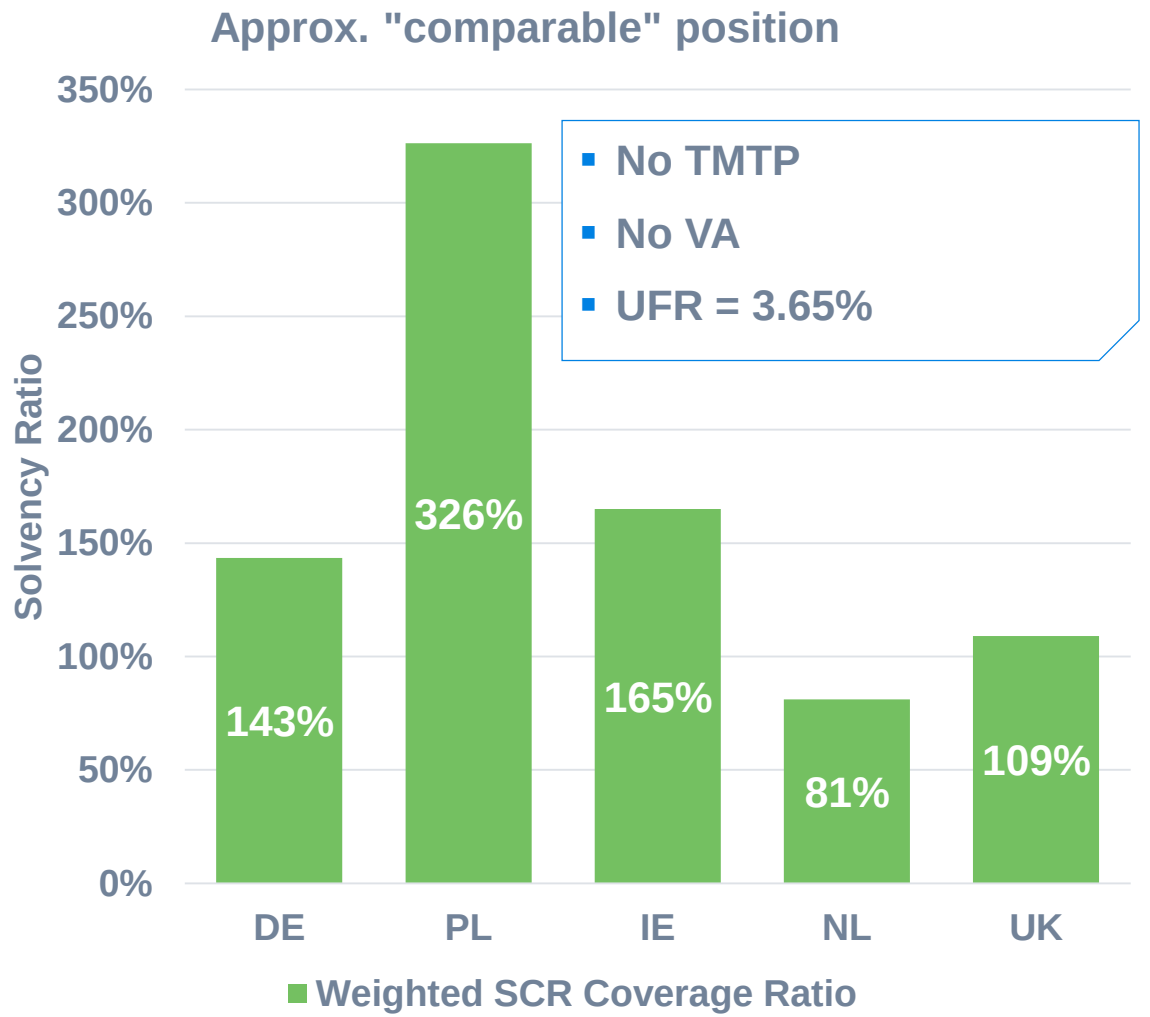
UFR

- Euro: LLP = 20, converge @ 60
- Poland: LLP = 10, converge @ 60

- EIOPA consultation 2016/2017:
  - Annually reviewed
  - Reduced to 3.65% from 4.2%
  - Cap on change of 15bps
  - UFR = 4.05% from 1 Jan 2018

Adjusting the solvency ratios





Agenda

1 Product mix

2 Solvency II implementation

3 Attitudes to capital management

Attitudes for capital management

Management's attitude

Dividend policy constraints

Capital Policy

Other influences

Actual vs target solvency ratios

Capital management for Polish companies

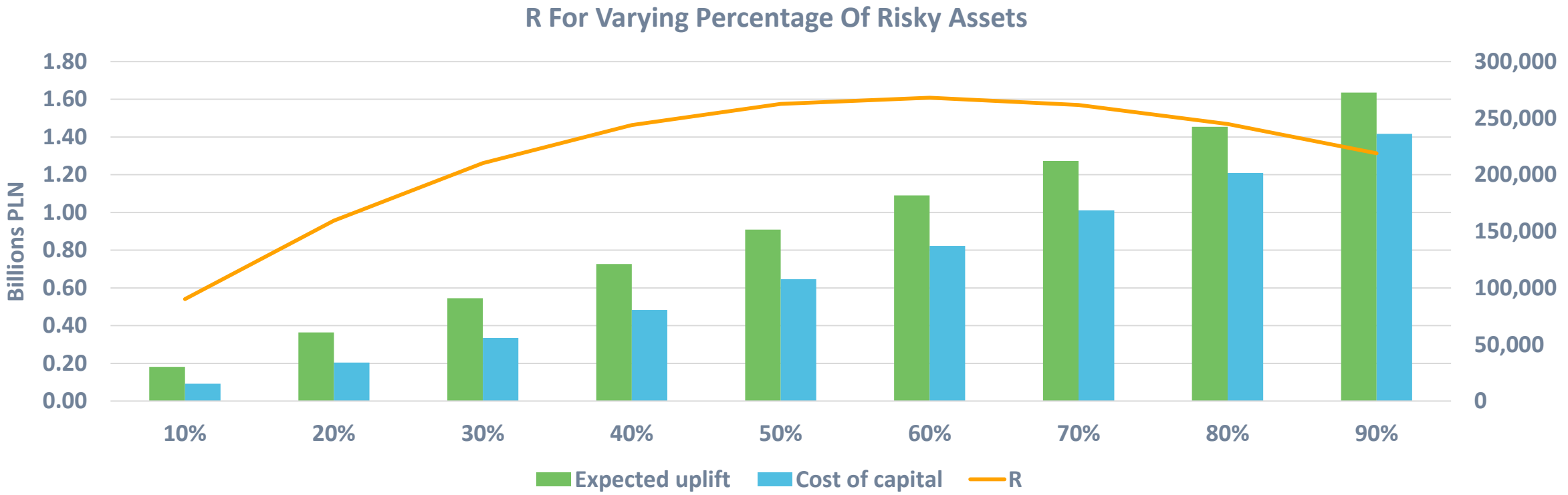
- Poland has different background, product mix and size compared to Western European countries
- In general market is relatively small compared to Western European peers
- Unit-linked is the dominant line of business and other long-term LoBs haven't been actively developed in recent years
- Polish companies have excess capital, but cannot get it out as the Polish regulator issues guidelines regarding the payment of dividends. The SCR coverage ratio must exceed 175% for life and 150% for P&C companies and the firm must receive a high score on the annual assessment. Even when a dividend can be paid it cannot be more than 75% of prior year's profit which can lead to a strengthening of solvency position over time
- However, there seems to be a number of options which can be considered for the Polish market related to high(er) risk strategy:
  - Less reinsurance (or accept more inwards reinsurance)
  - Offer more risky products such as endowment or annuities with potential higher returns
  - Accept more market risk

S_2AV Methodology – impact for Polish life business

- Based on S_2AV methodology we have created a top-down approach related to the life market, which can be quite easily replicated for the non-life business
- The case is built on 16 companies from our report (93% of the market measured by premium income)
- Own Funds: 26.9 bPLN, SCR: 8.2 bPLN
- Calculated NPV of distributable profits after cost of non-hedgeable risks, but before adjustment for hedgeable risk: 25.8bPLN
- Selected assumptions for the formula: R = NPV(total risky assets)@RDR * {m*(1 - tax) - (RDR - i*(1 - tax))*p * TSR}
  - Risk free rate of 3.2%, risk discount rate of 9.2%
  - Tax = 19%
  - Target solvency ratio 175% of SCR
  - The excess of government bonds and deposits over traditional TP is to be partially invested in risky assets earning additional rate of 3.5%
  - Standard formula equity risk charge applies to the risky asset investment with appropriate diversification effect

S_2AV Poland

- As the % of risky assets increases the cost of capital term grows at increasing pace due to diminishing diversification benefits
- For this example the optimum value is reached when the risky asset exposure is around 50-60% of the excess



Thank you

Marcin Krzykowski
marcin.krzykowski@milliman.com

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