Capital management - volatility adjustment (VA)

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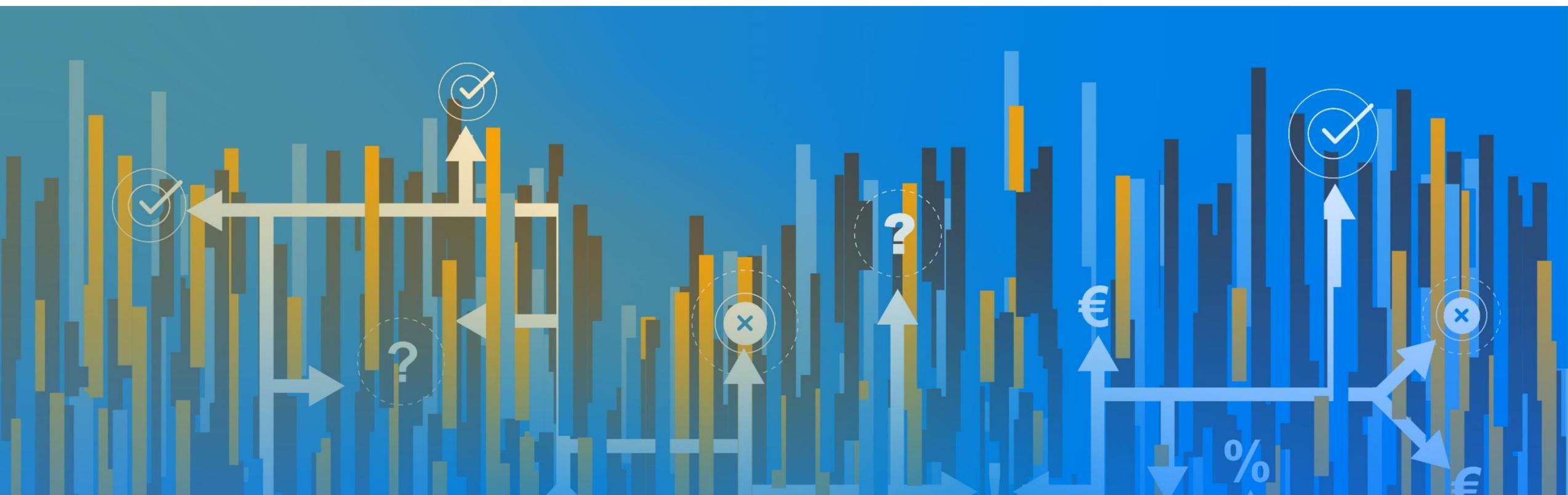
Agenda

- Introduction to spread and spread risk
- What is the VA and why do we need it
  - Introduction
  - Purpose
  - Implementing the VA
- Calculating the VA
  - Reference portfolios
  - Formula and example
- The impact of the VA on Solvency II balance sheets
- Regulation of the VA
- Issues with the current VA
- Proposed alternative design

Spread and spread risk
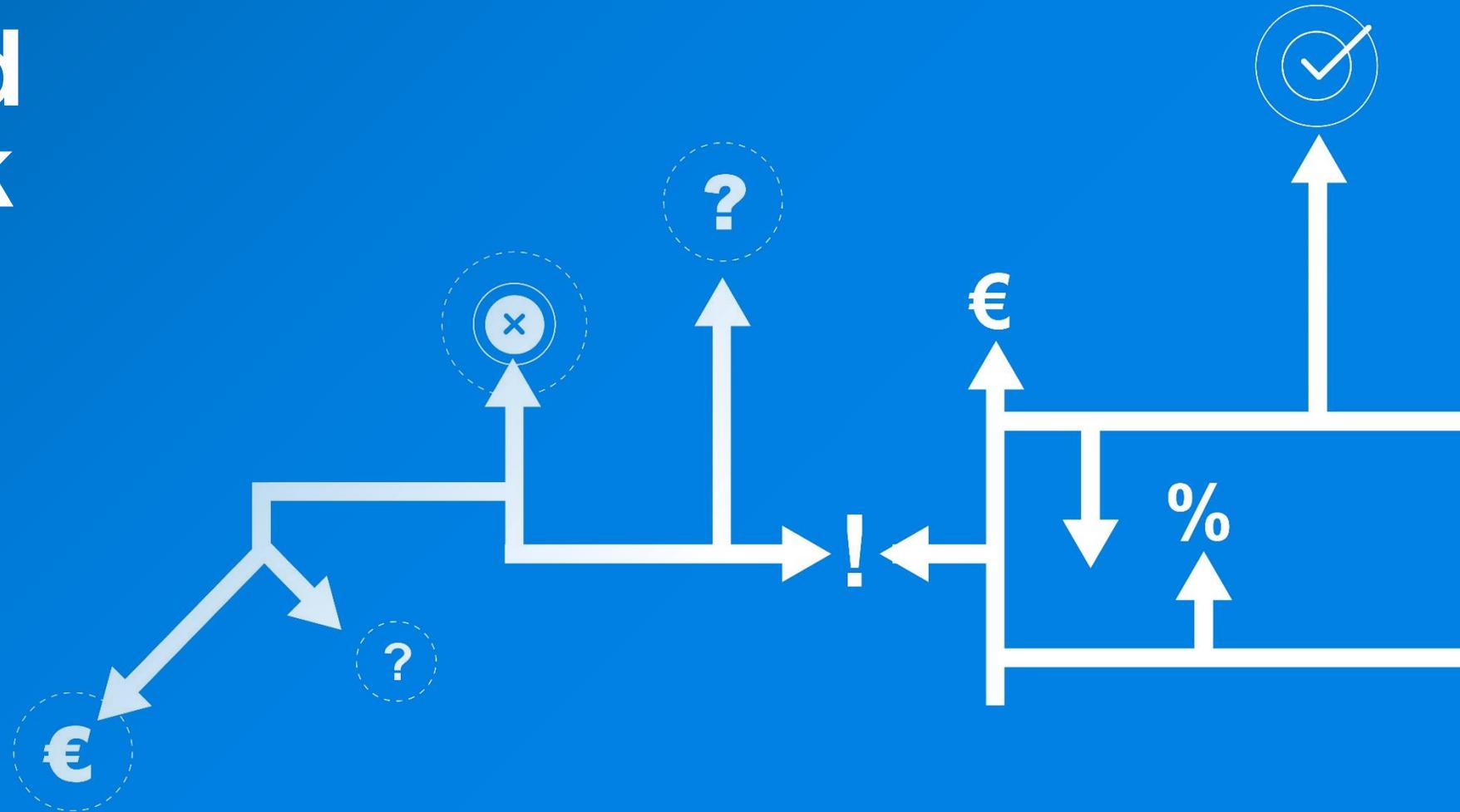
Price, yield, and spread

- The price of bonds or fixed interest securities are determined by supply and demand and market forces

- Assume a bond worth 99 per 100 nominal pays a dividend of 0.5 in 6 months and matures in 1 year with a final dividend payment. Determine the return:

Time	Cash Flow	Discounted Value
0.5	0.5	0.5
1.0	100.5	98.5
Total		99.0
Yield		2.07%

- The return is the yield needed to make the sum of the discounted cashflows equal the price of the bond.

- This is the return, gross redemption yield or simply just yield of the bond.
  It is the reward investors earn for taking on the risk of owning the bond and lending the issuer money.

Price, yield, and spread

- Price and yield will have an inverse relationship. If price falls yield is going up.
- Let's imagine there are two bonds now both of which will be redeemed at 100 nominal in 1 year and pay a dividend of 3 in 6 months as per our previous example.
- The first is issued by the German government, the second is issued by a Mexican Tobacco company.
- The price of the German bond is 96 per 100 nominal, the price of the Mexican bond is 90 per 100 nominal
- Both bonds produce the exact same cashflows in 6 and 12-months time.
- However, the price reflects the uncertainty and risk around each bond.
- The credit and liquidity risk on the Mexican bond is far greater, investors will require a greater yield to hold this bond so the price must be lower than the German bond.

Price, yield, and spread

- Spread is the excess yield over the risk-free rate. In my previous example if the risk-free rate is 0.5% the spread is 1.57%

- It represents all the risks an investor faces in holding the fixed interest security and how much they are compensated for this.

- Typically, as actuaries we focus on credit risk and liquidity risk but for any investor there can be a number of different components to spread risk.

- The next slide shows an example of the components which may make up the total spread

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Components of spread for our example
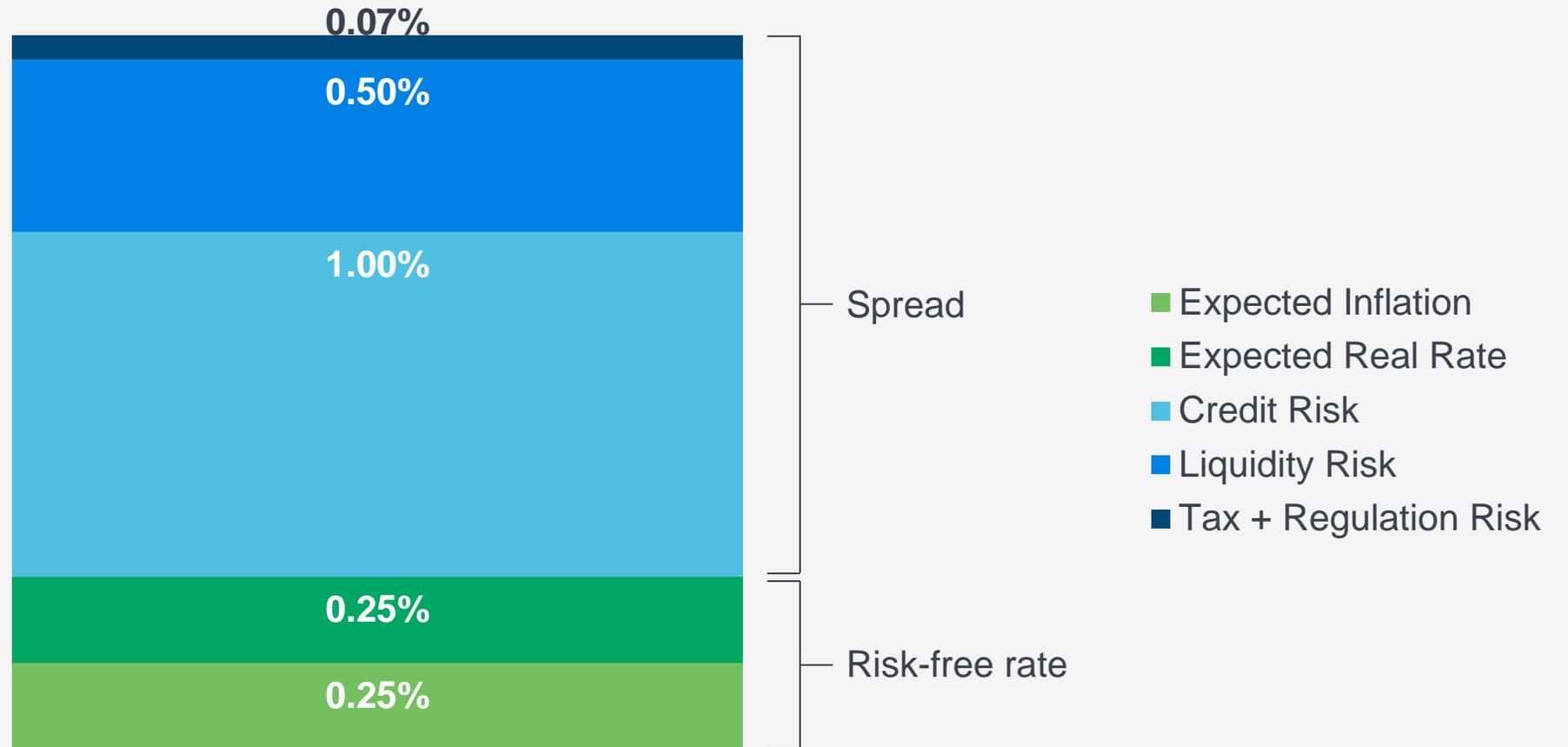
What is the VA and why do we need it
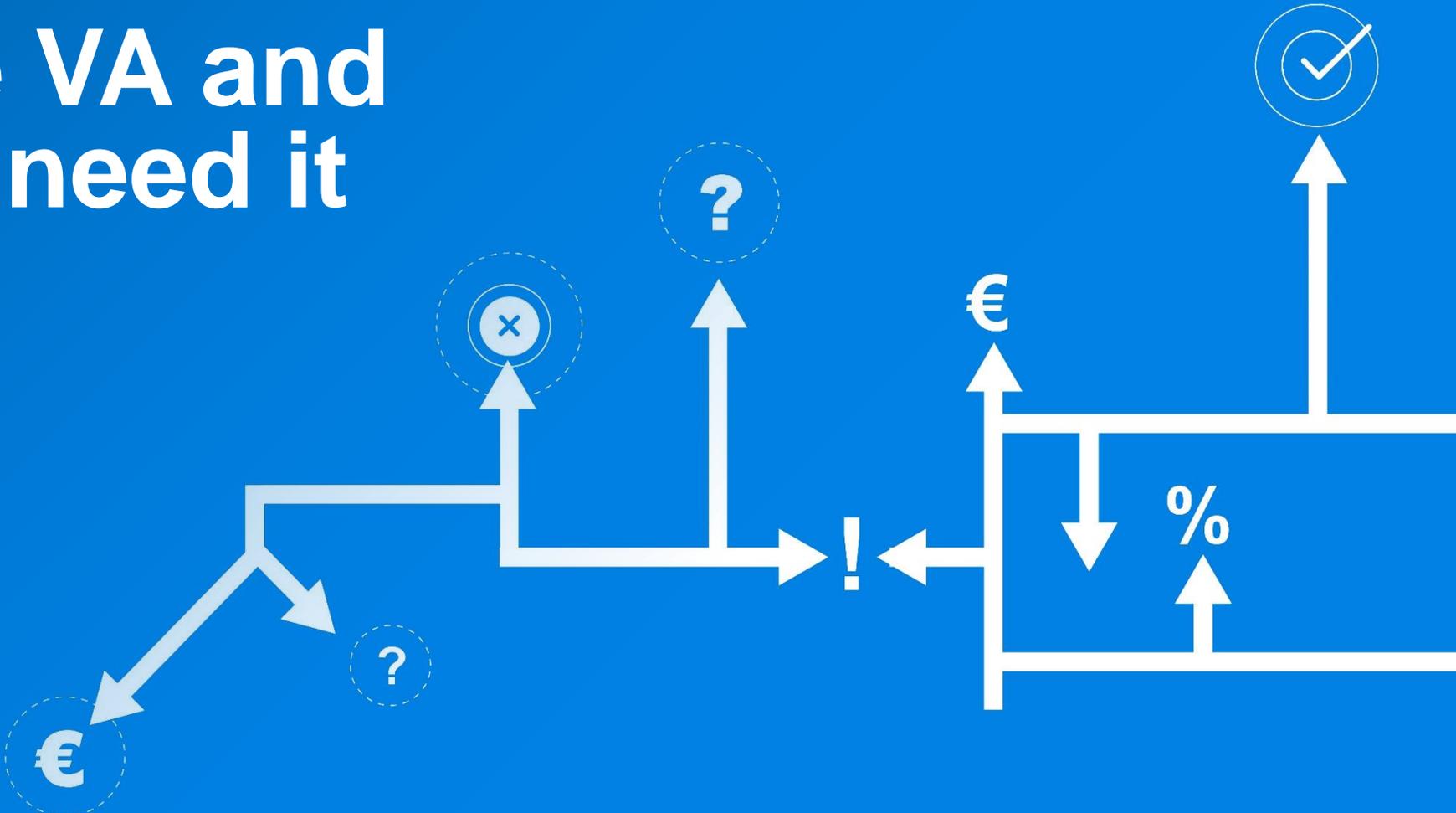
Volatility Adjustment (VA) and Solvency II

The need for market consistency

A key concept in the Solvency II framework is the need for market consistent valuation

For assets this is usually straight forward and means valuing assets at market price

A market price usually doesn't exist for most liabilities, so these are valued by projecting cashflows forward using best estimate assumptions and discounting these back using risk-free rates

If we consider an interest rate up shock, on the asset side of the balance sheet the value of any fixed interest assets will fall. Liabilities will also be impacted through the risk-free discount curve

But if we consider an increase in spread where the risk-free rate remains unchanged, fixed interest asset values will fall but there will be no change in liabilities

We therefore need some way in which to reflect market spreads in liabilities.

This is not the only objective of the VA and we will examine the aims of the VA in the next few slides

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VA and Solvency II

The Volatility Adjustment

The VA is one of the Long-Term Guarantee (LTG) measures under Solvency II

The Matching Adjustment, the extrapolation of the risk-free rates (including the Last Liquid Point (LLP) and the Ultimate Forward Rate (UFR)), the Transitional Measure on Technical Provisions (TTP) and the Transitional Measure on Risk-Free Rate (TRFR) complete the suite of LTG measures under Solvency II (SII)

These aim to ensure the appropriate treatment of insurance products with long-term guarantees

The VA is the most widely used but does not have the greatest impact (MA and TTP)

You can't apply the VA to any liability where the MA is being applied

A bond movement scenario

Consider an insurer that holds mostly bonds to match its liabilities.

Bond spreads widen from non-default-related reductions in the market values of the bonds (for example, liquidity changes)

The value of the assets will decrease but liabilities will remain unchanged leading to a reduction in Own Funds and solvency coverage

Insurers may display pro-cyclical investment behavior: Selling bonds whose value are falling or buying more bonds to cover liabilities

The spread widening causes short term balance sheet volatility, but insurers should be focusing on the longer-term horizon

Purpose of the VA

- **Prevent the requirement for market-consistent valuation of assets and liabilities under SII from dis-incentivising insurers from investing in assets that it would otherwise hold**

- **Mitigate against 'artificial' balance sheet volatility caused by short-term volatility of bond spreads and the value of fixed interest assets**

- **Eliminate the need for the insurer to engage in pro-cyclical investment behaviour**

Why do we need a VA

- **Reduce the forced sale (or purchase) off assets in extreme bond movements**

- **Recognise the illiquidity characteristics of liabilities**

- **Immunise a company's Own Funds against movements in non-credit related spreads**

How the VA works

Since insurance companies have long-term guarantees and aim to hold their assets accordingly, SII states that their Own Funds (and their required capital calculation) should not be affected by short term market volatility.

Under the VA, insurers are allowed to adjust the risk-free interest rates used in valuing the Best Estimate Liability (BEL)

- By adding a spread to the liability discount rate, liabilities are reduced to counteract movements in asset values

- The expectation is that liability movements with application of the VA will be more in line with asset movements

- It is worth noting that companies using the standard formula are not permitted to increase the VA applied under the spread SCR shock

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Applicability of the VA

Key considerations that should be made in determining the applicability of the VA to certain lines of business include:

In theory, investment strategies employed should not be impacted by the use of the VA

In practice the VA can heavily influence investment strategy as companies have no appetite for large swings in their solvency ratio.

Sufficient liquid resources are held to avoid engaging in pro-cyclical investment behaviour

The yield on assets is sufficient to support the yield implied by the discount curve including the VA

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Other considerations

Governance

- Ongoing governance requirements to ensure proper use of the VA in calculation of the BEL are limited
- However, the company is required to calculate the Solvency II results with and without the VA
- Unlike the Matching Adjustment (MA), use of the VA does not impose very strict restrictions on a firm's asset holdings
- Firms do not have to hold the reference portfolio in order to recognise the VA

ORSA

- The Standard Formula for spread risk does not impose any capital charge on sovereign bonds issued by EU member states
- Some firms allow for a capital component in respect of the spread risk on such sovereign assets in their ORSA and so may also make some allowance for the impact of the VA on these assets

Pricing

- Companies that use the VA may include it in their pricing
- This could be done through the discount rates in the pricing basis, in profit testing or through the cost of capital assumed
- It is more common however that the company will use its own illiquidity premium in pricing rather than the VA.

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How the VA is calculated
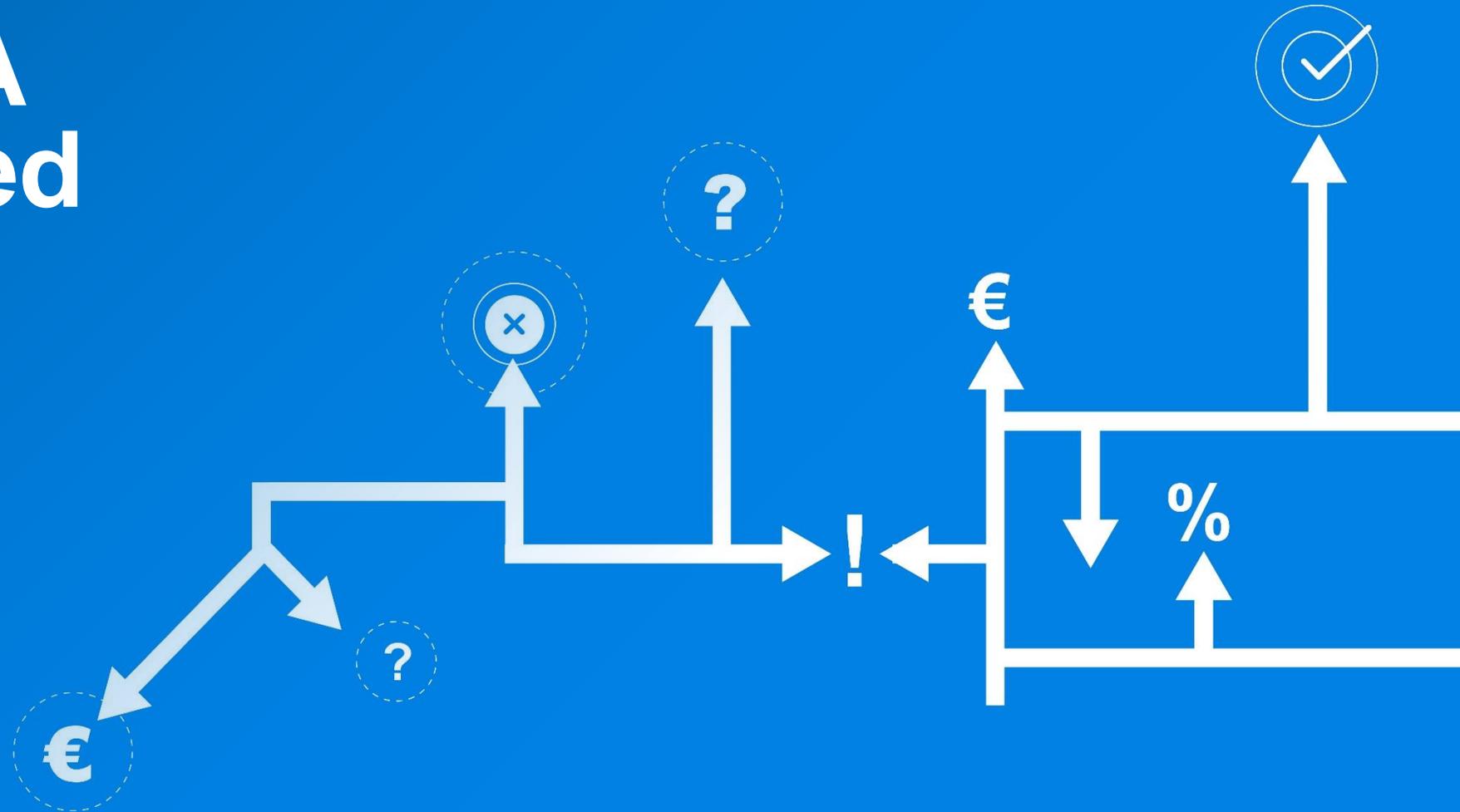
Reference portfolios

VA rates, which vary by currency and country, are determined by EIOPA and published monthly.

The VA is derived from the yield spreads of reference portfolios of assets made up of bonds, loans and securitisations for different currencies and countries.

The reference portfolio is representative for the assets which insurance and reinsurance undertakings are invested in to cover their insurance and reinsurance obligations and is weighted accordingly.

EIOPA intends to update the reference portfolios at the end of each year. The weights and durations of the reference portfolios are set out in the monthly publication of the risk-free interest rate term structures on EIOPA's website.

Risk correction and risk corrected spreads

Starting with the currency reference portfolio:

- Portfolio yield in excess of the risk-free rate is determined (the total spread)
- The proportion of the spread related to default or credit risk is referred to as the risk correction
- The risk corrected currency spread is the total spread minus the risk correction
- The currency volatility adjustment is 65% of this risk corrected currency spread

Country reference portfolio:

- Where the risk corrected spread of a country-specific reference portfolio is at least 100 bps above the risk-free rate and exceeds twice the spread of the currency-specific reference portfolio:
- A country specific volatility adjustment is added equal to 65% of the excess of the national spread over twice the currency spread

Risk correction and risk corrected spreads

Yield of the reference portfolio

65% of risk-corrected spread = VA

Risk correction (credit risk and other risks)

Risk-free interest rate
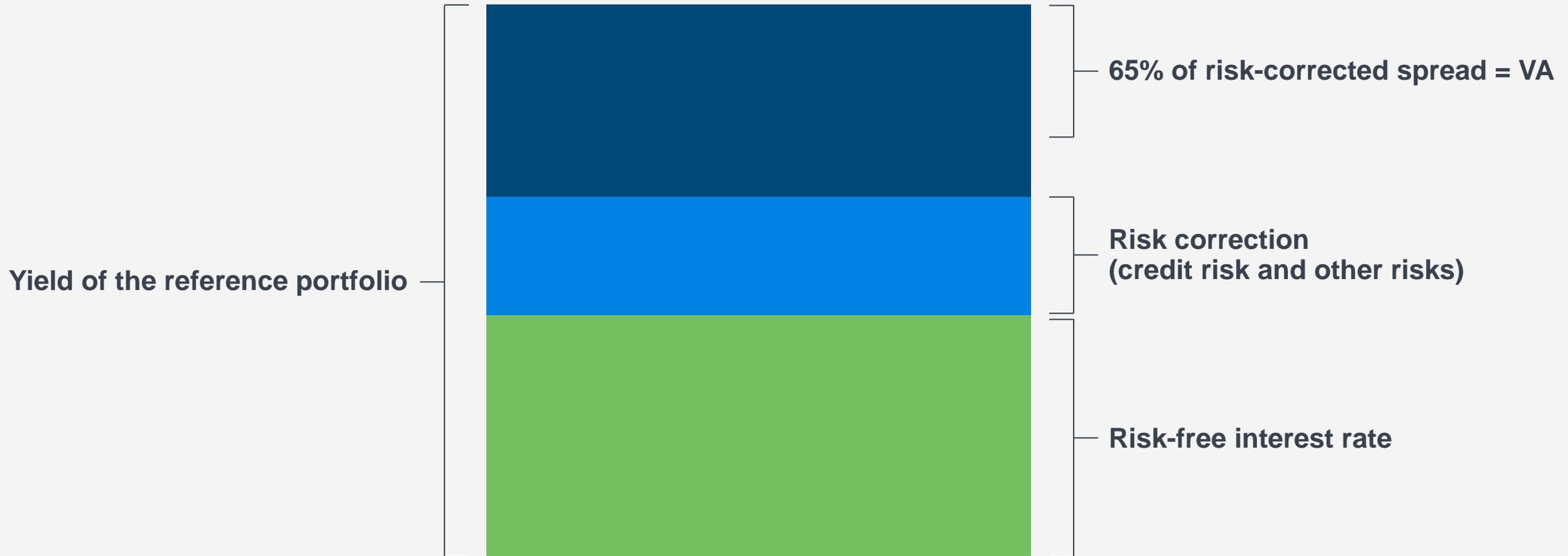
A worked example

Currency reference portfolio

- Looking at the EUR reference portfolio, suppose there are only 2 assets, 1 government bond and 1 corporate bond
- The government bond makes up 60% if the portfolio, has a yield of 4% and has a risk correction of 2%
- The corporate bond makes up 40%, has a yield of 5% and has a risk correction of 3%
- Suppose the risk-free rate is 1%
- Gov_Spread = 4% - 1%   Corp_Spread = 5% - 1%
- Portfolio Spread (S)   = 60% x MAX(3%,0) + 40% x MAX(4%,0) = 3.4%
- Portfolio Risk Correction (RC)   = 60% x MAX(2%,0) + 40% x MAX(3%,0) = 2.4%
- The risk corrected currency spread for the EUR reference portfolio = S – RC = 1.0%
- The EUR VA is 1.0% x 65% = 65bps

A worked example

Country reference portfolio

- Looking at Greece's reference portfolio suppose there are only 2 assets, 1 government bond and 1 corporate bond

- The government bond makes up 30% if the portfolio, has a yield of 6% and has a risk correction of 4%

- The corporate bond makes up 70%, has a yield of 10% and has a risk correction of 6%

- Suppose the risk-free rate is 1%

- Portfolio Spread (S) $\quad = 30\% \times MAX(5\%,0) + 70\% \times MAX(9\%,0) = 7.8\%$

- Portfolio Risk Correction (RC) $\quad = 30\% \times MAX(4\%,0) + 70\% \times MAX(6\%,0) = 5.4\%$

- The risk corrected country spread for Greece's reference portfolio = S – RC = 2.4%

- This is greater than 100bps and greater than twice the risk corrected currency spread for the EUR portfolio

- The additional country specific spread is 65% X (2.4% - 2 X 1%) = 26bps

- The total VA for Greece is 91bps (26 + 65)

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Risk correction

- For government bonds, the risk correction is simply calculated as 30% of the long-term average spread (LTAS) for exposures to EU member states or central banks or 35% for all other governments of central banks

- LTAS is long term average spread of the risk-free rate calculated over the last 30 years for that asset class

- For corporate bonds the risk correction also includes an allowance for the probability of default (PD) of the asset and the cost of a credit downgrade (CoD) in addition to the LTAS

- The PD and CoD spreads are calculated by projecting credit downgrades and defaults over time with fixed assumptions for scaling factors and the recovery rate of bonds on default

- As the inputs to the risk correction calculation are relatively stable (given they are based on long term averages) or are completely fixed the value of the risk corrections tends to be stable also

Euro currency VA in recent years

The chart below shows the VA over the last few years

Progression of the VA

Other points to consider in the calculation of VA (1/2)

VA can be negative

- The VA could turn negative when observed spreads are lower than the risk correction
- In practice bonds would maintain a positive spread, as investors could hold swaps as an alternative (with reduced credit risk)

Maximum VA

- The VA is capped at 350bps
- This value would have been reached during the 2008-2009 banking crisis

65% factor

- As a result a fall in assets due to increased risk corrected spread is only partially offset by a fall in liabilities. All else equal, Own Funds would still fall

Spread risk SCR

- The VA is not recalculated as part of the spread risk SCR for standard formula
- The VA should be assumed to be the same before and after the application of the spread risk SCR shock

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Other points to consider in the calculation of VA (2/2)

DVA

- Internal model companies may use a dynamic volatility adjustment (DVA)
- Here the VA changes when modelling credit spreads in their SCR calculations

w_{gov} vs w_{corp}

- Corporate bonds generally make up a higher proportion of the reference portfolios so the VA is typically more sensitive to changes in corporate bond spreads than government spreads

Interest risk SCR

- The size of the VA will, in relative terms, be smaller in the upwards scenario and larger in the downwards scenario as a percentage of the stressed interest rates
- Hence the VA will dampen the effect of the stresses in the liability valuation

LLP and UFR

- The VA is only applied to risk-free rates before the LLP after which it converges to 0
- Changes to the LLP and UFR contribute to the impact of the VA on liability valuation

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EIOPA's derivation of the VA

EIOPA back tested the methodology to derive the VA by applying it to market data from 2005 to 2014.

As well as the collection of current market data relating to the risk-free rates and spreads, the derivation of the VA requires decisions by EIOPA on the following items:

- The range and granularity of assets, credit quality steps and durations for which the risk corrections are calculated.
- The source data and method for deriving the probability of default calculation.
- The source data and method for deriving the cost of downgrade calculation.
- The source data for the LTAS calculation.
- The method of constructing missing data of the 30-year spread history.
- The treatment of currencies for which source data are not available.

Impact of the VA on the SII balance sheet

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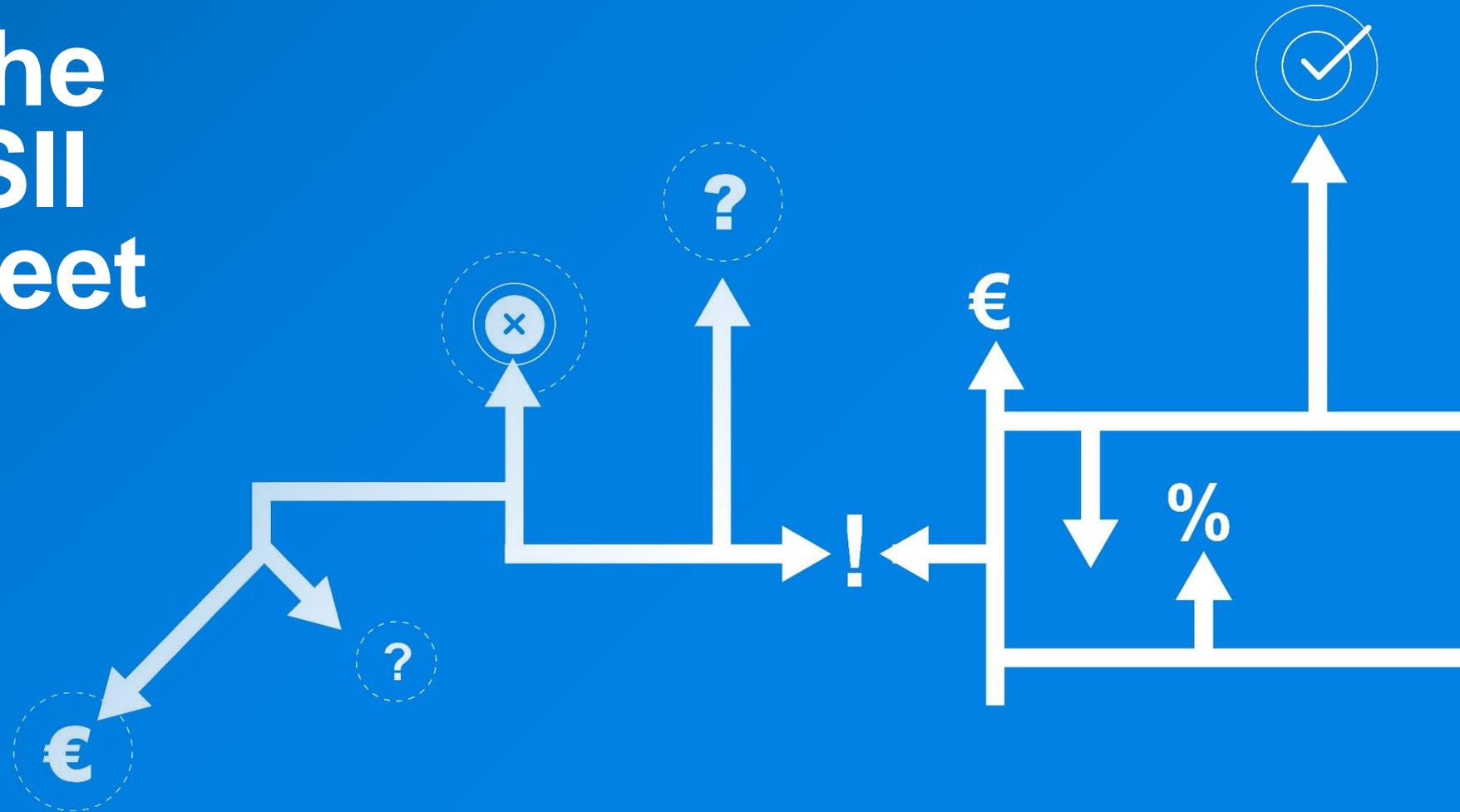
Impact of applying VA (1/2)

If a company invested in a similar way to the reference portfolio, the fall in asset values from spread widening would be partially offset by the reduction in liabilities (BEL) from the increase in VA, assuming a duration matching portfolio.

The VA does not impact the risk margin which must be calculated assuming the VA is not applied.

The VA is likely to reduce the SCR by reducing life underwriting risks and increase Own Funds.

The modelling of a DVA typically results in a significantly lower SCR for spread risk for internal model companies.

Impact of applying VA (2/2)

The VA may also impact some assumptions made in the calculation of TPs e.g., the amount of future discretionary benefits for with profit participation.

Use of the DVA may also permit more flexible investment strategies with more freedom to take on credit and government spread risk in backing liabilities.

The impact of removing the VA is typically larger than the impact of the VA moving to zero as spreads fall. This is because there is no offsetting benefit from increases in asset prices when the VA is removed.

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Impact on Irish and European markets

Irish insurers

- At YE 2020 3 Irish Life insurers were applying the VA as well as 4 reinsurers, 2 non-life insurers and 2 composite insurers. The 3 Irish Life insurers were:
  - Aviva (impact is a 5% improvement in solvency ratio)
  - Irish Life (impact is a 3% improvement in solvency ratio)
  - New Ireland (impact is a 2% improvement in solvency ratio)

European market

- According to EIOPA statistics at YE 2017, removal of the VA reduces the overall solvency ratio of EU insurance undertakings from 239% to 230%
- Excluding undertakings that do not use the VA at all, the equivalent average solvency ratio falls from 239% to 222%
- The impact was greatest for markets with long term guarantees and internal model firms using DVA

Regulation of the VA
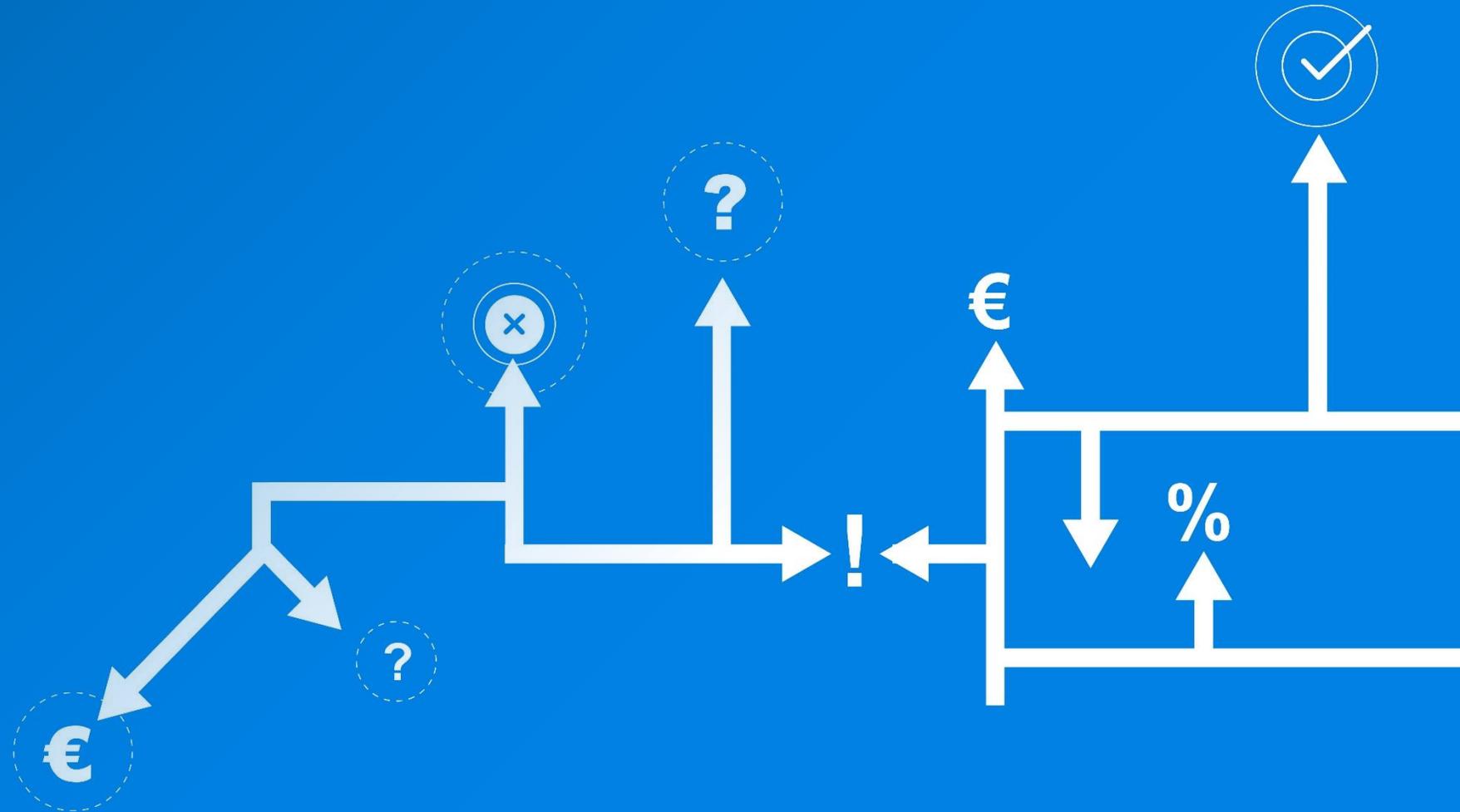
Approval process

- The requirements to use the VA are not as involved as those for gaining approval to use the MA

- National supervisory authorities (NSAs) should be able to reject the use of the VA only in 'exceptional circumstances'

- Germany, Ireland and the UK are amongst the 10 countries that impose an approval process for the VA whilst France, Italy and the Netherlands do not

- The application process is generally not about putting additional barriers in place but verifying compliance with the regulatory requirements

Requirements for VA approval

EIOPA has also set out criteria for determining whether an undue capital relief is being gained for undertakings applying the VA. These include:

- The extent to which an undertaking applying the VA is exposed to a fluctuation of credit spreads
- An undertaking's potential to earn the VA
- Whether undertakings are actually earning the VA in practice
- Whether liabilities are sufficiently illiquid so that the risk of forced sales of assets is low

Liquidity plan

Confirmation VA will not encourage pro-cyclical investment

Risk management plan

Group Supervision

Confirmation VA will not encourage excessive risk taking

Demonstrate correct application to risk-free rates

Written policy on the criteria for applying VA

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Requirements for VA approval (1/2)

Requirement	Description
Liquidity plan	▪ Projections of the incoming and outgoing cash flows in relation to the assets and liabilities subject to the VA ▪ Demonstrating the firm has adequate risk mitigation and financial resources to manage the liquidity risk ▪ Demonstrating the firm has sufficient liquidity to meet claims during stressed periods without resorting to selling illiquid assets ▪ Demonstrating the possible forced sale of assets under stressed conditions would not have a material effect on the level of Own Funds
Risk management policy	▪ Impact of reduction in the VA to zero and removal of VA ▪ Sensitivity of Technical Provisions to assumptions underlying the VA

Requirements for VA approval (2/2)

Requirement	Description
Action plan	▪ To restore solvency if ORSA projections or sensitivity analysis shows that a firm may become dependent on the VA to maintain solvency.
Risk management policy	Policy on the criteria for the application of the VA which must be reviewed by the Board annually looking at: ▪ Documentation of the liabilities to which the VA is applied ▪ Documentation of the interaction between the investment policy and the application of the VA ▪ Evidence that the use of the VA does not result in pro-cyclical investment behaviour ▪ Confirmation that risks introduced by the application of the VA are listed in the risk register ▪ Requirements to have controls in place to manage the operations of application of the VA ▪ A process for the assessment of the application of the VA to new products

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Issues with the current design of the VA
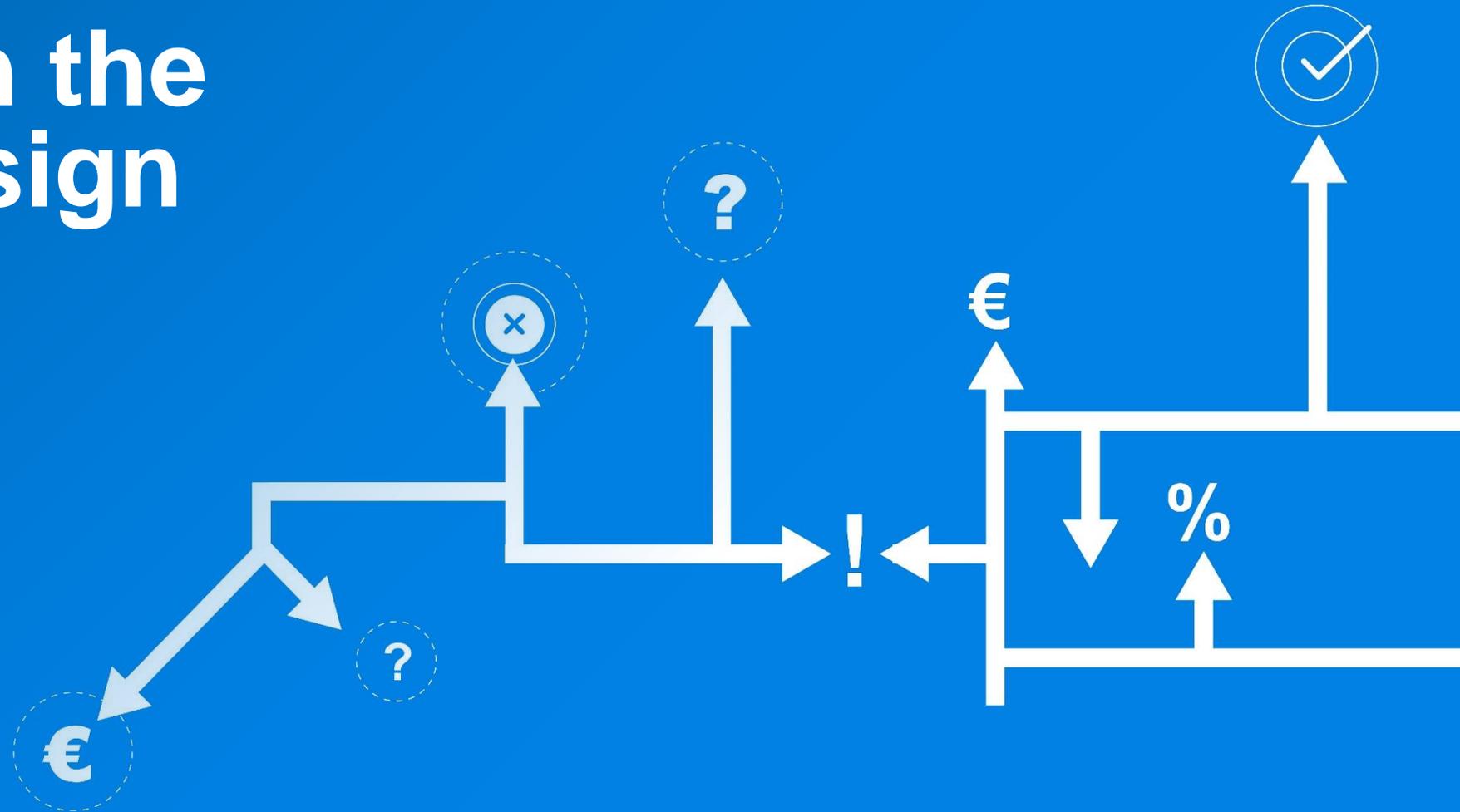
Basis risk and the reference portfolios

The firm's assets are unlikely to match the reference portfolio so the VA is not company specific

The VA is a one-size-fits-all measure

- It does not take into account the duration of a company's set of assets or liabilities nor the liquidity of the liabilities.

The VA is calibrated by EIOPA with regards to an average duration of liabilities across industry sectors

- This does not consider average asset durations let alone individual companies' asset durations
- If the duration of those assets is less than the duration of liabilities it could result in a greater fall in liabilities than in assets

The country specific VA can create a cliff-edge scenario

- A country constantly on the border of applying a country specific VA can see large up and down movement as the country specific VA is removed and applied each month

Other issues

VA is kept constant until / the LLP, after which it converges slowly to zero

- This means that the VA is applied to the full duration of the liabilities of a company regardless of whether the credit spread can be earned on the assets for such a long period.

The stability of the risk correction

- This means the risk correction is very slow to reflect the actual credit risk in the market.
- Particularly in government bonds where the risk correction is based only on LTAS

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Undershoot and Overshoot

When the VA is not as effective as it should be or too effective

There is a considerable heterogeneity of spreads being earned by firms among the countries of the eurozone, in asset mix, credit quality and duration

- Highlighted recently in the Italian market where insurers have above-average weightings in domestic securities.

- In May 2018 Italian government bond spreads increased considerably and so the asset values of Italian insurers fell.

- However Italian government bonds made up only a small proportion of the EUR reference portfolio so the increase in VA was insignificant.

At the same time, a Dutch insurer holding no Italian government bonds may have seen a reduction in their liabilities from a slight increase in VA with no reduction in their asset values at all.

- VA does not mitigate against a lack of diversification; companies need to take care when holding a concentrated portfolio of fixed interest assets

This effect can happen in both directions due to any mismatch between the firms' assets and the reference portfolio in respect of:

- Asset type exposures
- Currency and country exposures
- Duration exposures

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Lack of transparency in public disclosures (SFCR)

Some stakeholders have expressed interest in requiring the following additional public disclosure:

1

Solvency ratios with and without the VA being disclosed in QRTs

2

The impact of the use of the VA by product or line of business

3

Information on liquidity policy of the undertaking

4

The VA based on the undertaking's own assets instead of the reference portfolio

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Alternative design following the Solvency II 2020 review

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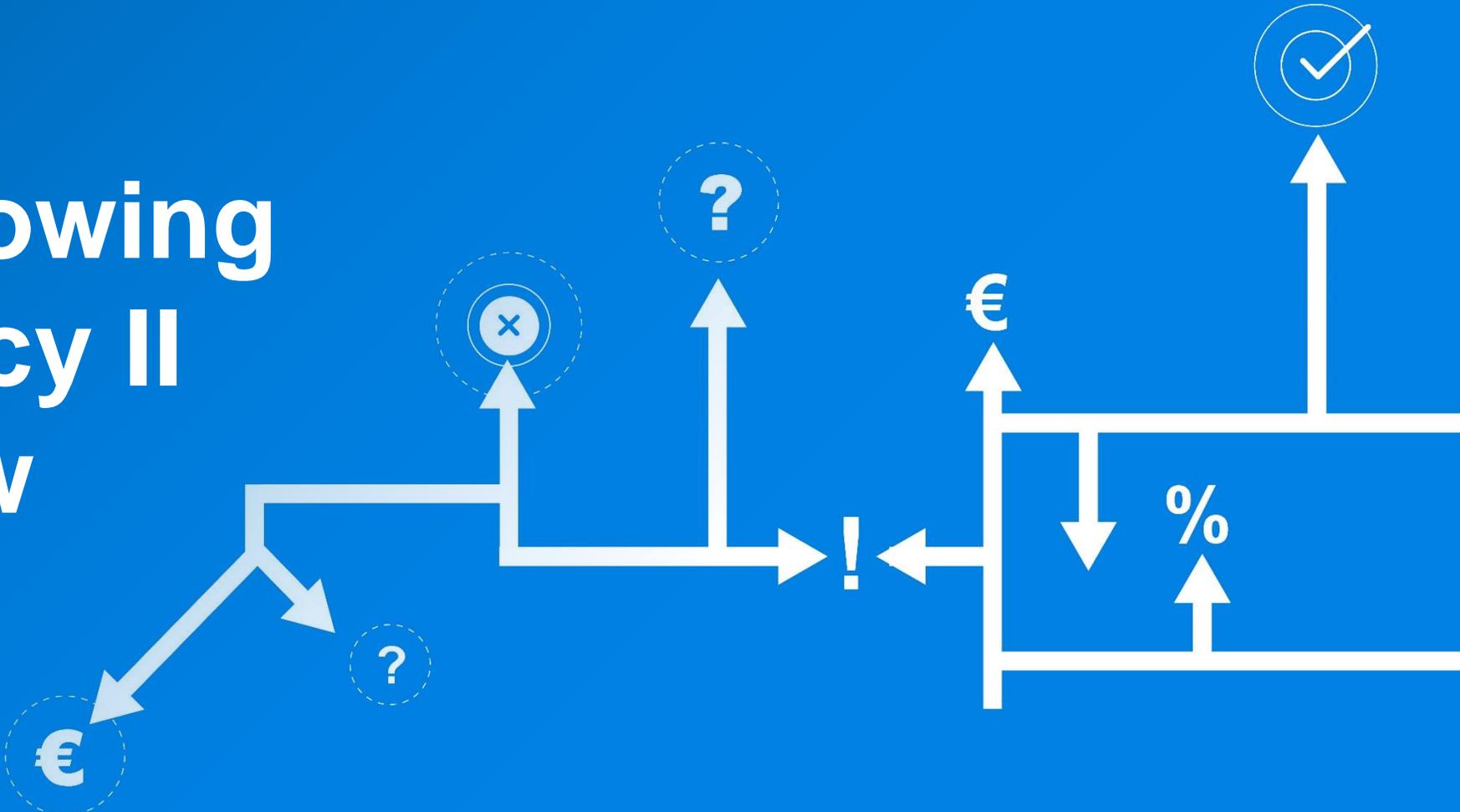
Solvency II 2020 review

As part of the 2020 review of the Solvency II regulations, EIOPA is considering several options to adjust the calculation of the Volatility Adjustment (VA).

One of EIOPA's objectives is to remove the overshooting effect.

EIOPA considered a company specific portfolio but ultimately favoured a currency portfolio with the addition of two ratios to make it more company specific.

The European Commission has not yet confirmed if it will be following the exact methodology proposed by EIOPA but it seems to be proposing a similar methodology.

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Application Ratio 4 (AR4)

This aim of this ratio is to correct for the mismatch in fixed interest assets and liabilities in terms of spread duration and volume.

It will be calculated as the sensitivity of assets to interest rate movements over the sensitivity of liabilities to the same interest rate movement.

If assets are less sensitive to interest rate movements than liabilities then AR4 < 100% and the VA for that company will be reduced. This will help to remove any overshooting effect of the VA.

One point to note is that the change in assets is only calculated on spread driven assets not interest rate swaps or other similar derivatives. This will be a key consideration for companies with large positions in interest rate swaps hoping to utilise the VA.

Application Ratio 5 (AR5)

This ratio aims to account for the illiquidity characteristics of liabilities in terms of surrender and mortality risk.

Note: At this stage, the European Commission (EC) has not clearly adopted this ratio. AR5 remains an EIOPA proposal not yet accepted by the EC.

The ratio is a weighted average of set liquidity factors weighted by the BEL for each bucket of liabilities and will be capped at 100% and floored at 60%.

Given the VA is a long term guarantee measure and aims to incentivise holding assets as such the ratio and hence VA is higher the more illiquid the liability profile.

An insurance book where the product is exclusively annuities in payment would fall into the highest illiquidity categorisation and AR5 would likely be 100%.

Products with significant mortality or lapse risk would be in the lowest category for which AR5 would be 60%.

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The new proposed formula

These two new ratios, in combination with the General Application Ratio (GAR, which is set at 85%), replace the 65% application ratio in the current design.

Combining the different elements, the new VA (which EIOPA have called permanent VA) looks like:

$$VA_{perm} = GAR \cdot AR4 \cdot AR5 \cdot Scale_{Curr} \cdot RC\_S_{Curr}$$

There is also a new scaling factor which corrects for the other assets in the reference portfolio.

It is not quite clear yet how companies will apply their calculated ratios to EIOPA's published VA but it is likely they will be left as input cells in the published EIOPA files.

Depending on the company's asset-liability management (ALM) and the characteristics of the liabilities, the new application ratios can have positive or negative one-off impact on the level of the VA.

The new proposed formula

EIOPA has also proposed to improve the country specific VA now referred to as the macro-VA.

A factor will be introduced to ensure a gradual and smooth activation of the country component and mitigating the cliff effect. It is calculated with reference to each country portfolio.

The full VA is then the sum of the permanent and macro VA.

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Risk correction change

EIOPA has also proposed an amendment to the calculation of the risk correction

In the current design, the risk correction is based on LTAS and PD of assets and is consequently stable through time

In the alternative design the risk correction is dependent both on the LTAS and on the current level of the spread and will move through time

In practice the formula implies that the RC is strongly related to the current spread levels

This should help solve issue with the current VA where the RC is very stable and insensitive to current spreads

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Key conclusions

Impacts of the proposed alternative design

1

The effectiveness of the proposed new VA is significantly reduced compared to the current design.

2

In Q1 2020 the Euro VA increased by 39 bps due to the COVID-19 crisis (from 7 bps to 46 bps), with the alternative design this would have been only 20 bps.

3

The level of spread duration matching becomes more important as it will have a direct impact on the level of the VA as well as the effectiveness in times of stress.

4

Using interest rate swaps instead of government bonds to hedge long-term interest risk can have a negative impact on the SCR Ratio and will limit the effectiveness of the VA offset in times of stress.

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Thank you

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Appendix: VA formulae

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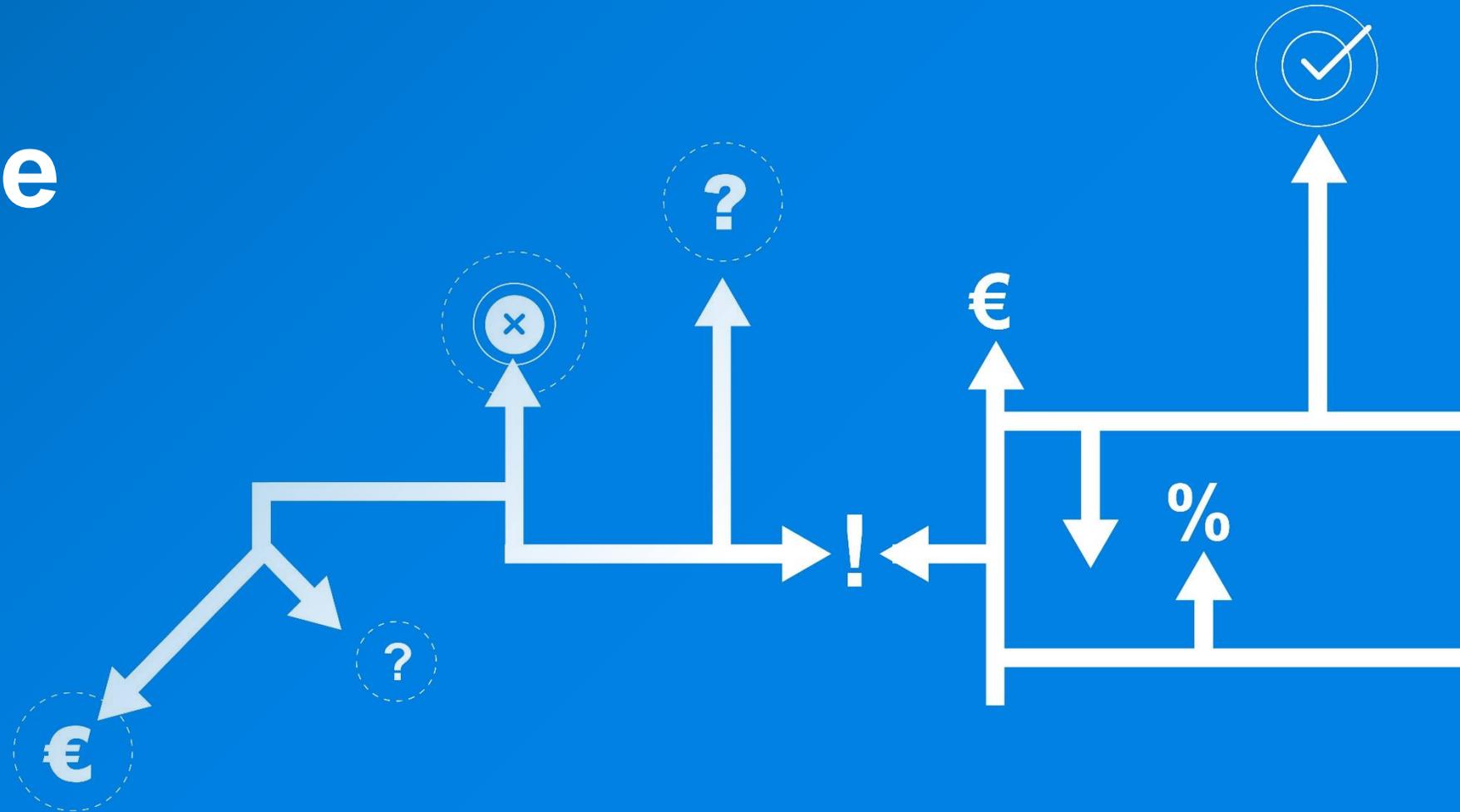
VA formula

- The currency VA is calculated as:

$$VA_{crncy} = 0.65 \cdot S_{crncy}^{RC}$$

- Where S_crncy^RC is the risk-corrected currency spread given by:

$$S_{crncy}^{RC} = S - RC$$

- Where S is the currency spread and RC is the risk correction based on the reference portfolio. These are calculated in the next slide.
- The exact same formula is then applied to the country specific reference portfolios.

VA formula

$$S = w_{gov} \cdot \max(S_{gov}, 0) + w_{corp} \cdot \max(S_{corp}, 0)$$
$$RC = w_{gov} \cdot \max(RC_{gov}, 0) + w_{corp} \cdot \max(RC_{corp}, 0)$$

where:

- w_{gov} denotes the weighting of government bonds in the reference portfolio by value.
- S_{gov} denotes the average spread on government bonds.
- w_{corp} denotes the weighting of bonds other than government bonds, loans and securitisations in the reference portfolio by value.
- S_{corp} denotes the average spread on bonds other than government bonds, loans and securitisations included in the reference portfolio.
- RC_{gov} denotes the risk correction corresponding to the portion of the spread S_{gov}
- RC_{corp} denotes the risk correction corresponding to the portion of the spread S_{corp}

VA formula

- Where the risk-corrected country spread is greater than 100 bps, the overall VA is calculated as:

$$VA_{Total} = 0.65 \cdot \left(S_{crncy}^{RC} + \max\left(S_{country}^{RC} - 2 \cdot S_{crncy}^{RC}, 0\right)\right)$$

- Otherwise:

$$VA_{Total} = VA_{crncy}$$

- So, the country specific VA is only added onto the currency VA when the risk corrected country spread is greater than 100bps and more than twice the currency risk corrected spread.

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Risk correction

The risk correction for corporate bonds is defined as:

$$RC_{corp} = Max(PD + CoD, 35\% \cdot LTAS)$$

Where:

- PD = the credit spread corresponding to the probability of default on the assets
- CoD = the credit spread corresponding to the expected loss resulting from downgrading of the assets
- LTAS = the long-term average of the spread over the risk-free interest rate of assets of the same duration, credit quality and asset class over the last 30 years.

For government bonds the risk correction is defined as:

- $RC_{gov} = 30\% \cdot LTAS$ for exposures to governments and central banks of EU member states
- $RC_{gov} = 35\% \cdot LTAS$ for exposures to all other governments and central banks
- where LTAS is the long-term average spread of the government bonds.

Application Ratio 4 (AR4) under new proposed formula

$$AR4 = \frac{PVBP(MV_{FI})}{PVBP(BEL)}, capped\ at\ 100\%$$

- PVBP is the present value of a basis point movement. So AR4 is the fall in fixed interest assets over the fall in BEL for a 1bp increase in interest rates.

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Application Ratio 5 (AR5) under new proposed formula

$$AR5 = \frac{BEL_1 \cdot AR5_1 + BEL_2 \cdot AR5_2 + BEL_3 \cdot AR5_3}{BEL_1 + BEL_2 + BEL_3}$$

$floored\ at\ 60\%, capped\ at\ 100\%$

Where the three illiquidity categories are defined with the following criteria:

Illiquidity category	Criteria	AR5i
1 – High (Annuities in payment, term assurance)	▪ No surrender options or where the take up of the surrender option can never lead to a loss in Own Funds for the insurer. ▪ Low best estimate impact mortality risk.	100%
2 – Medium (State subsidised pension products)	▪ Low best estimate impact of permanent increase in lapse rates. ▪ Low best estimate impact of mortality risk.	75%
3 – Low	▪ All other products	60%

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The new proposed formula

- The scaling factor will be calculated as:

$$Scale_{curr} = \frac{1}{weight_{Gov} + weight_{Corp}} \text{, the result will be a number} \geq 100\%$$

- Combining the different elements, the new VA (which EIOPA have called permanent VA) looks like:

$$VA_{perm} = GAR \cdot AR4 \cdot AR5 \cdot Scale_{Curr} \cdot RC\_S_{Curr}$$

The new proposed formula

- For each country j this is calculated as:

$$VA_{macro,j} = GAR \cdot AR4 \cdot AR5 \cdot \omega_j \cdot MAX(0, Scale_j \cdot RC\_S_j - 1.3 \cdot Scale_{Curr} \cdot RC\_S_{curr})$$

- Where ω is a factor designed to ensure a gradual and smooth activation of the country component and mitigating the cliff effect. It is calculated with reference to each country portfolio
- The full VA is then:

$$VA = VA_{perm} + VA_{macro,j}$$

Risk correction change

The proposed alternative design of the risk correction is given as:

$$RC_{Gov} = 30\% \cdot \min(S^+, LTAS^+) + 20\% \cdot \max(S^+ - LTAS^+, 0)$$
$$RC_{Corp} = 50\% \cdot \min(S^+, LTAS^+) + 40\% \cdot \max(S^+ - LTAS^+, 0)$$

Superscript + denotes the maximum of the number and zero

- Where S is the total spread

When S is higher than LTAS:	RC increases with 20% of delta S for government bonds and 40% of delta S for corporate bonds
When S is lower than LTAS:	RC increases with 30% of delta S for government bonds and 50% of delta S for corporate bonds