

Equity-Based Insurance Guarantees Conference

Nov. 6-7, 2017

Baltimore, MD

Hedging of Equity Risks: An Overview

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The bank at your side



Hedging of Equity Risks: An Overview

EBIG Conference

Session 1A (6 November 2017)

1045 – 1215 Hrs

Retirement planning is a marathon, not a sprint!



low interest rates

cheat days

high volatility

financial crisis

new shoes

changing regulations

consistency

uncertainty ...

Primary Risk Areas in Life Insurance Products



Risk 1

Mortality Risk

Risk 2

Marketing and customer behaviour

Risk 3

Equity Risk



Risk 4

Interest Rate Risk



How to build guarantees?

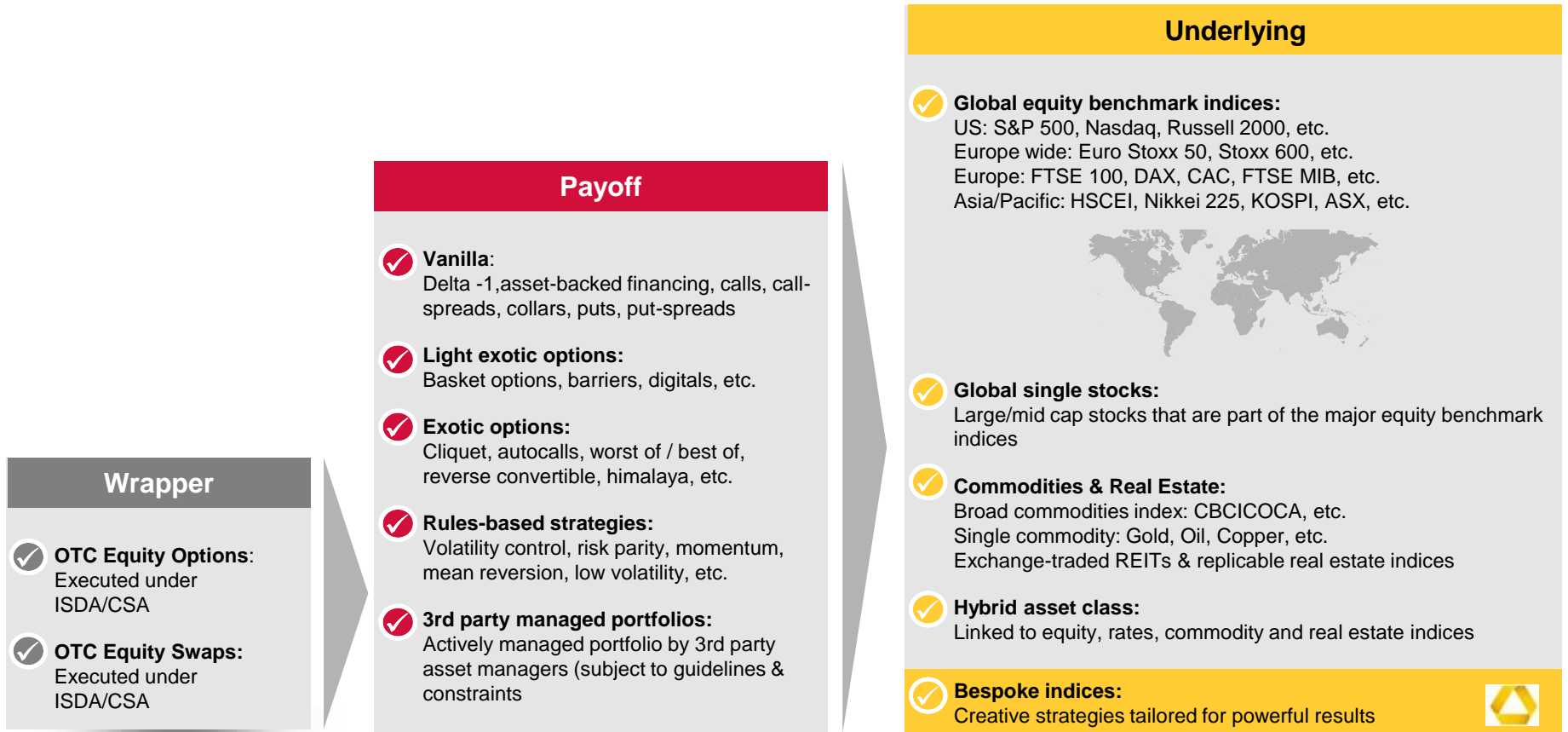
$$Ke^{-rt} + c = S_0 + p$$


Put Call Parity or the redistribution of returns

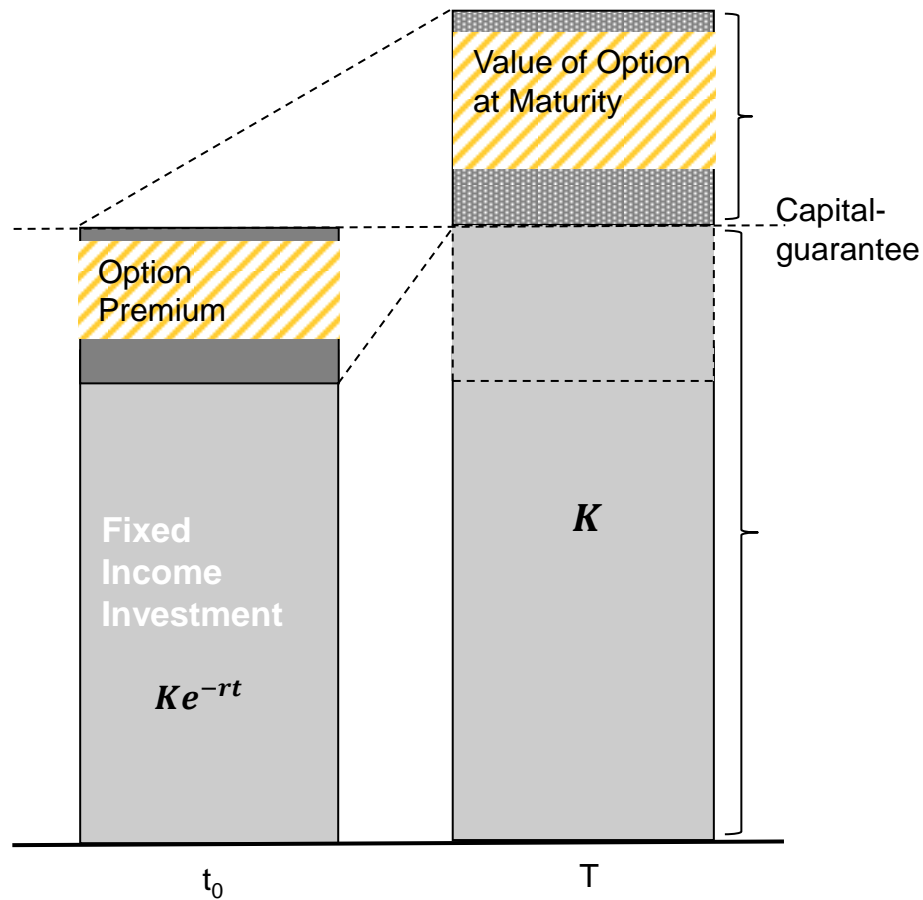
Source: John C. Hull, Options, Futures and Other Derivatives (8th ed. 2012)

A building set

› to hedge a variety of **payoffs** linked to a wide range of **underlyings** customized for your insurance product

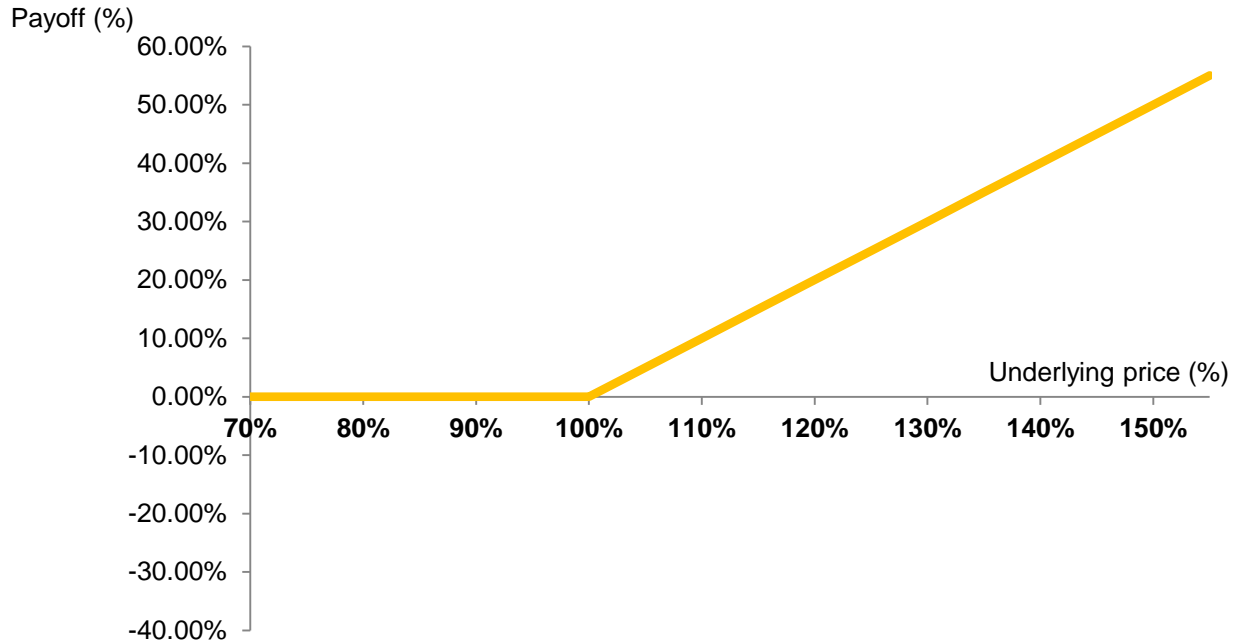


The basics of fixed index annuities



Source: John C. Hull, Options, Futures and Other Derivatives (8th ed. 2012)

Long Call – 1Year S&P 500 Index

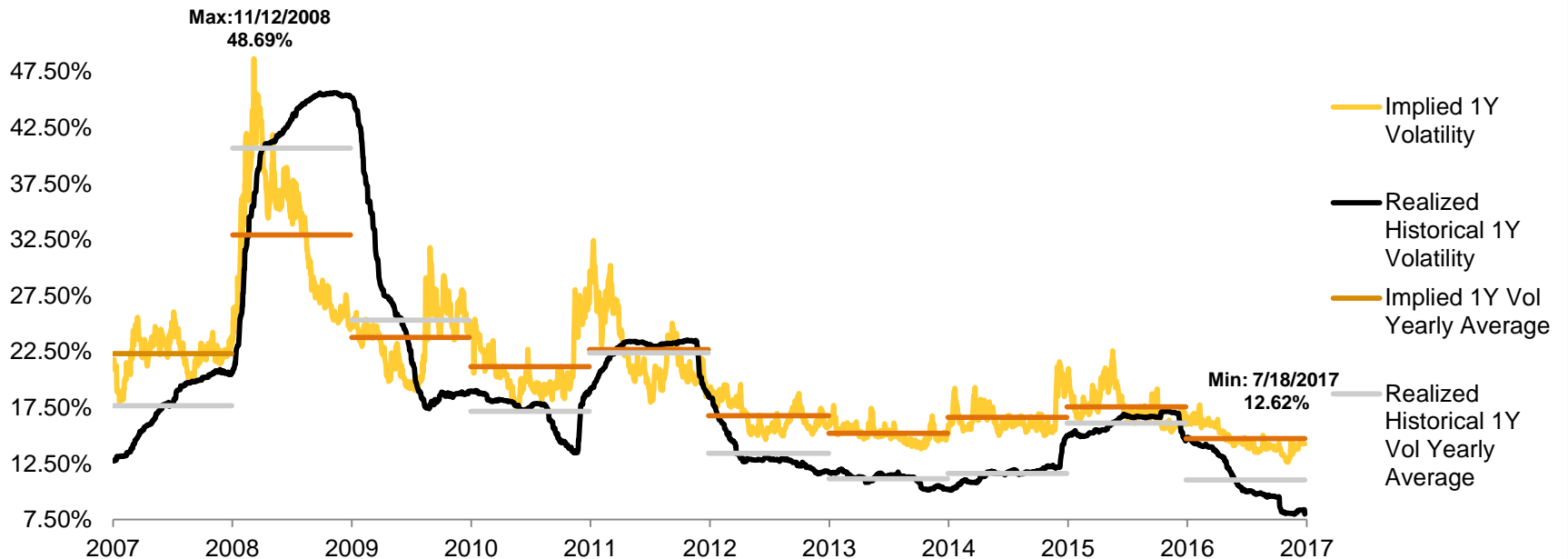


Strike	Price	Implied Vol.	Vega	Rho (+10BPS)
100%	5.2%	13.2%	0.39%	0.047%

Source: Commerzbank AG, Bloomberg (Date October 16th)

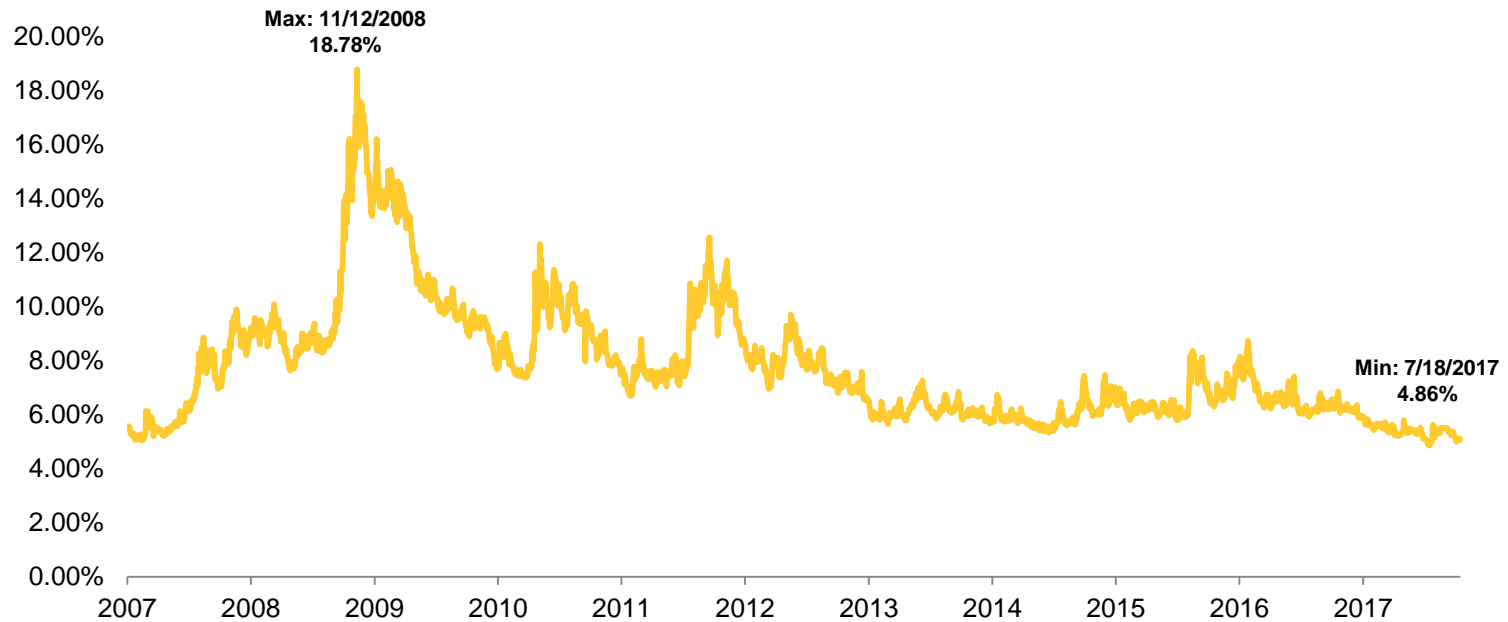
How low is volatility at the moment?

Implied vs. Historic Volatility – S&P 500 Index



Source: Commerzbank AG, Bloomberg, black line shows realized volatility over the previous trading days of 1 year

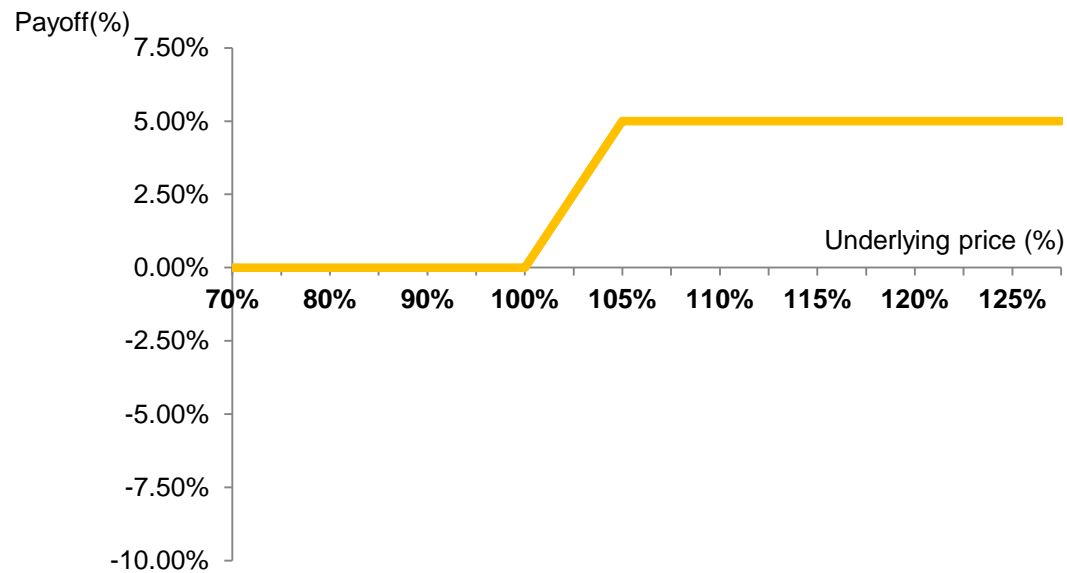
How could option prices on SPX look like?



Constant Rate	Dividend Rate
1.92%	2.07%

Source: Commerzbank AG, Bloomberg (Date October 16th), calculations based on black-scholes model with historic implied volatility using constant rate and dividend.

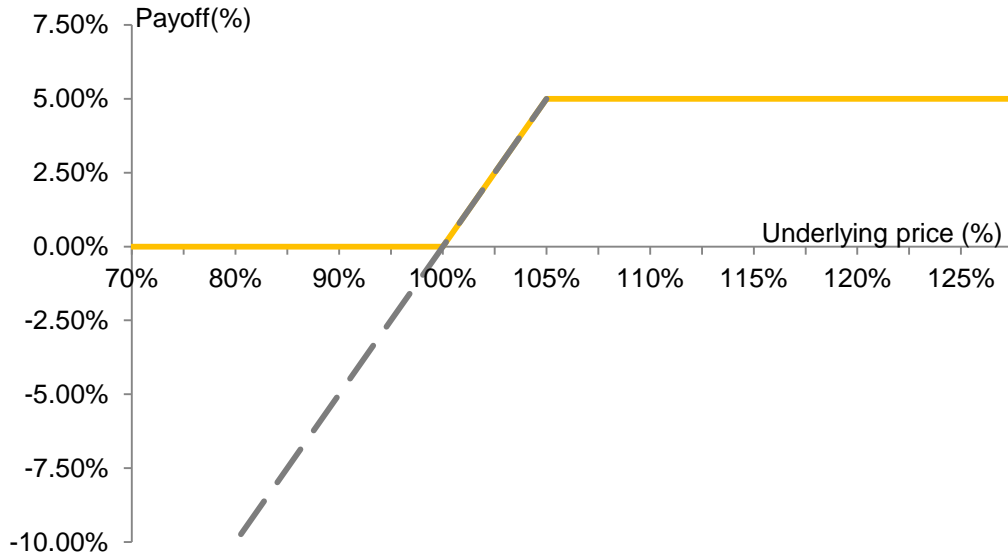
Call Spread – 1Year S&P 500 Index



Call Spread	Price	Implied Vol.	Vega	Rho (+10BPS)
100% / 105%	5.2% - 2.5% = 2.7%	13.2% / 11.3%	0.03%	0.014%
100% / 110%	5.2% - 0.9% = 4.3%	13.2% / 9.8%	0.14%	0.030%

Source: Commerzbank AG, Bloomberg (Date October 16th)

The Cliquet – 1Year S&P 500 Index



Date	SPX Closing	Performance
9/30/2016	2168.27	-0.12%
10/31/2016	2126.15	-1.94%
11/30/2016	2198.81	3.42%
12/30/2016	2238.83	1.82%
1/31/2017	2278.87	1.79%
2/28/2017	2363.64	3.72%
3/31/2017	2362.72	-0.04%
4/28/2017	2384.2	0.91%
5/31/2017	2411.8	1.16%
6/30/2017	2423.41	0.48%
7/31/2017	2470.3	1.93%
8/31/2017	2471.65	0.05%
9/29/2017	2519.36	1.93%

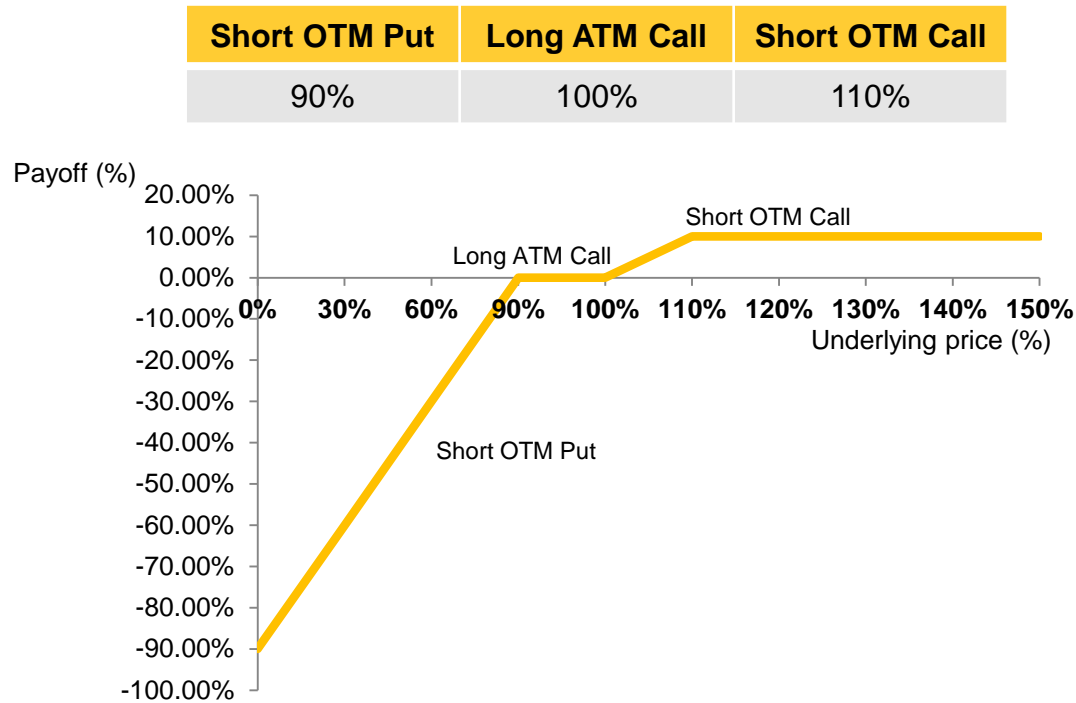
Local Cap	Global Floor	Price
2%	0%	2.6%
5%	0%	4.7%



$$Notional \times \max \left(\sum_{t=1}^{12} \min \left(\frac{Index_t}{Index_{t-1}} - 100\%, Cap \right), 0\% \right)$$

Source: Commerzbank AG, Bloomberg (Date October 16th)

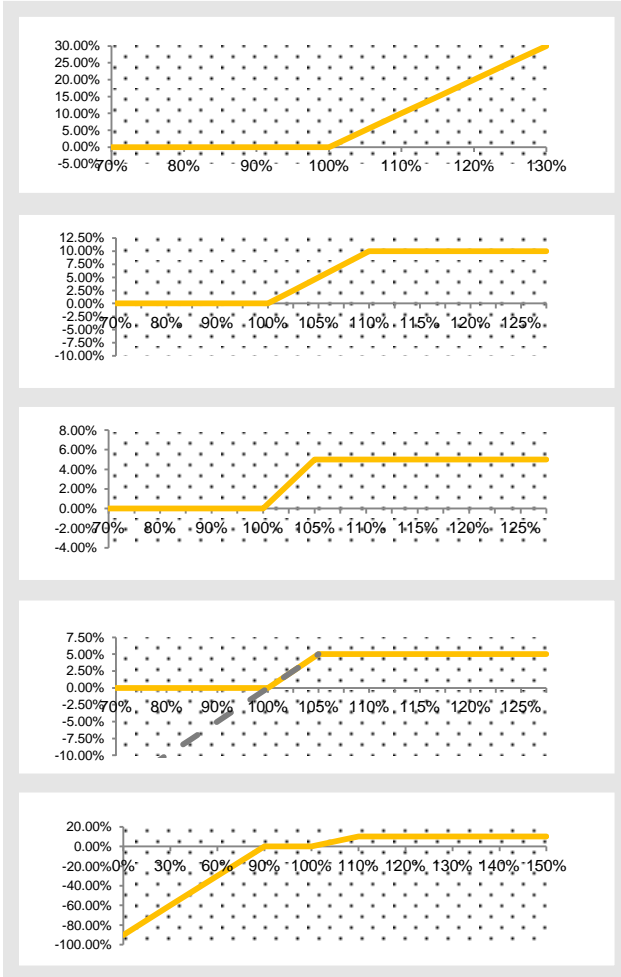
Call Spread Collar – 1Year S&P 500 Index



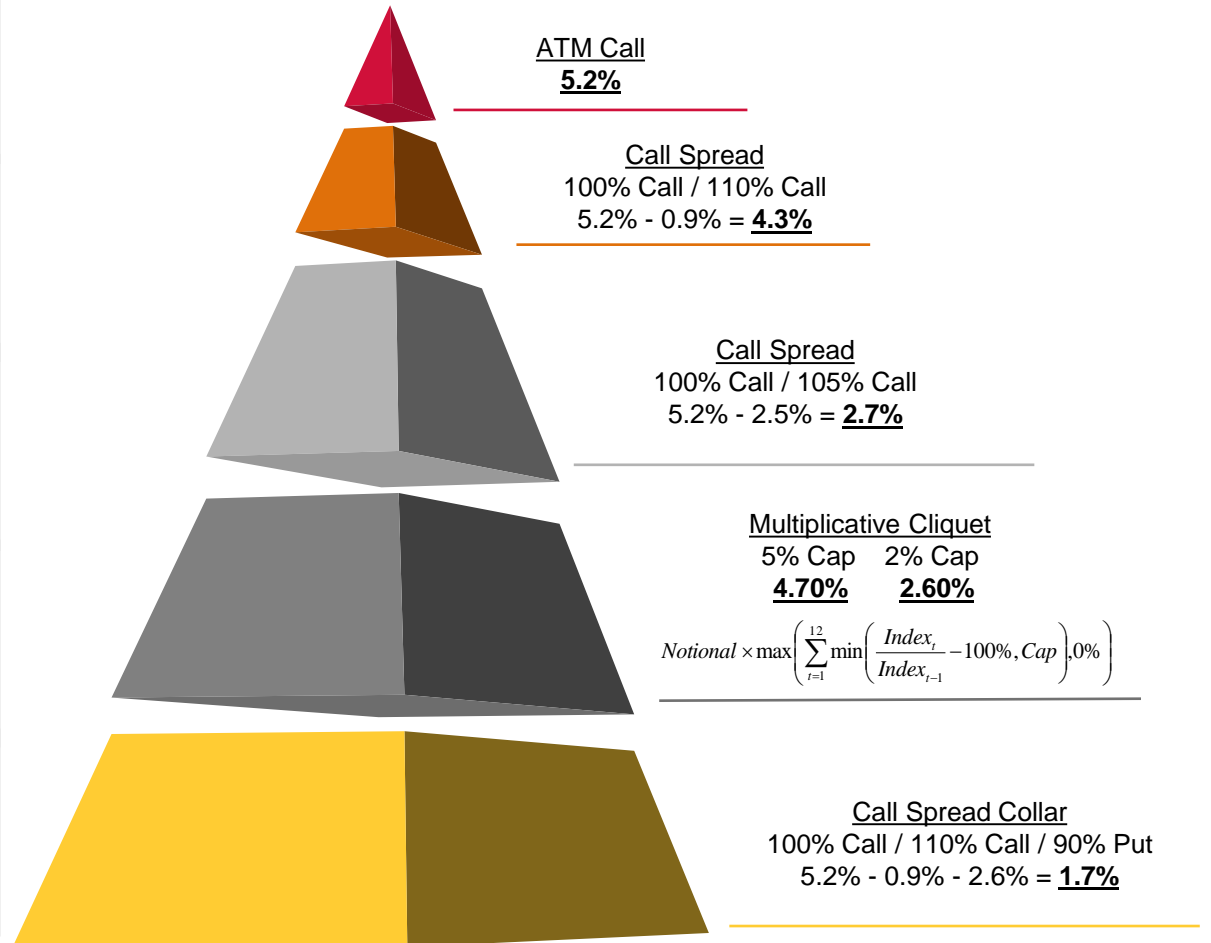
Call Spread Collar	Price	Implied Vol.	Vega	Rho (+10BPS)
90% / 100% / 110%	$- 2.6\% + 5.2\% - 0.9\% = 1.7\%$	17% / 13.2% / 9.8%	-0.17%	0.057%

Source: Commerzbank AG, Bloomberg (Date October 16th)

Option Prices



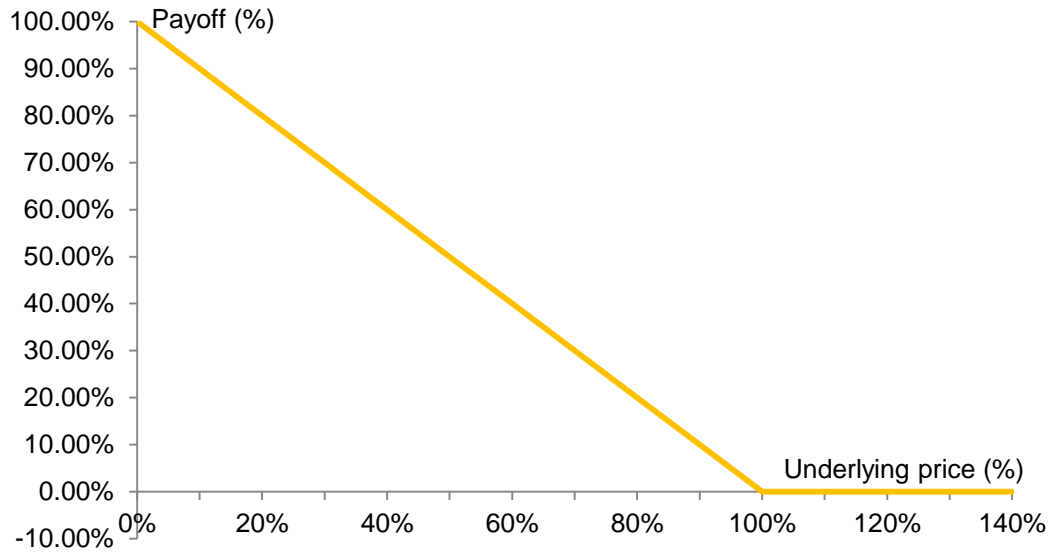
1Y SPX Index Options



$$Notional \times \max \left(\sum_{t=1}^{12} \min \left(\frac{Index_t}{Index_{t-1}} - 100\%, Cap \right), 0\% \right)$$

Source: Commerzbank AG, Bloomberg (Date October 16th)

Long Put – 1Year S&P 500 Index

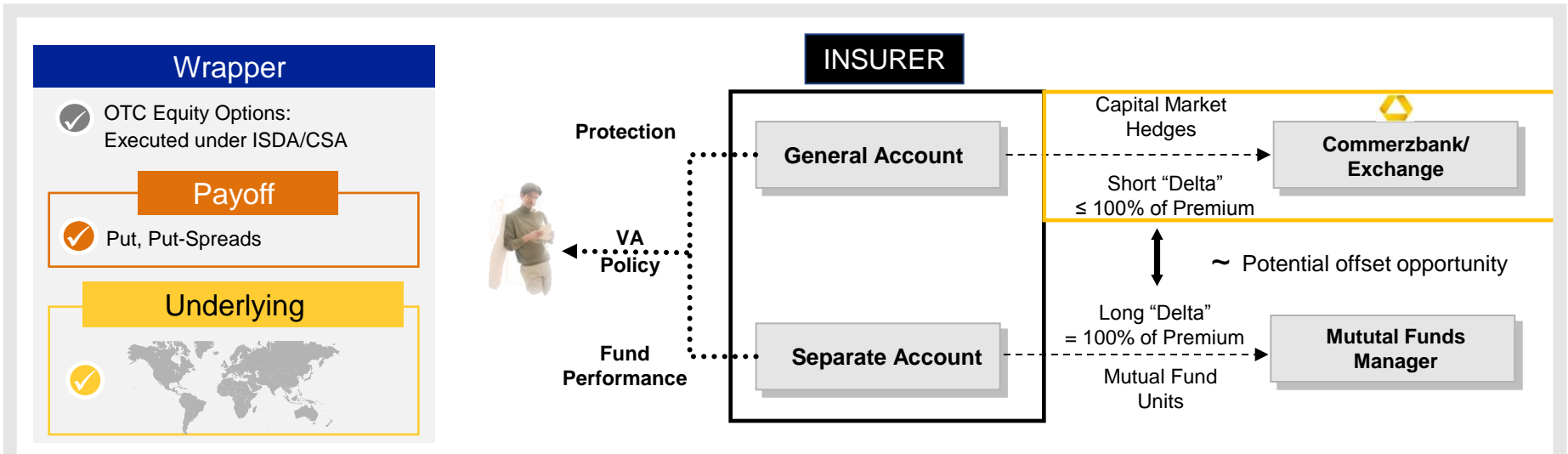


Strike	Price	Implied Vol.	Vega	Rho (+10BPS)
100%	5.27%	13.2%	0.39%	-0.052%

Source: Commerzbank AG, Bloomberg (Date October 16th)

Variable Annuities

Hedging and basis risk conundrum



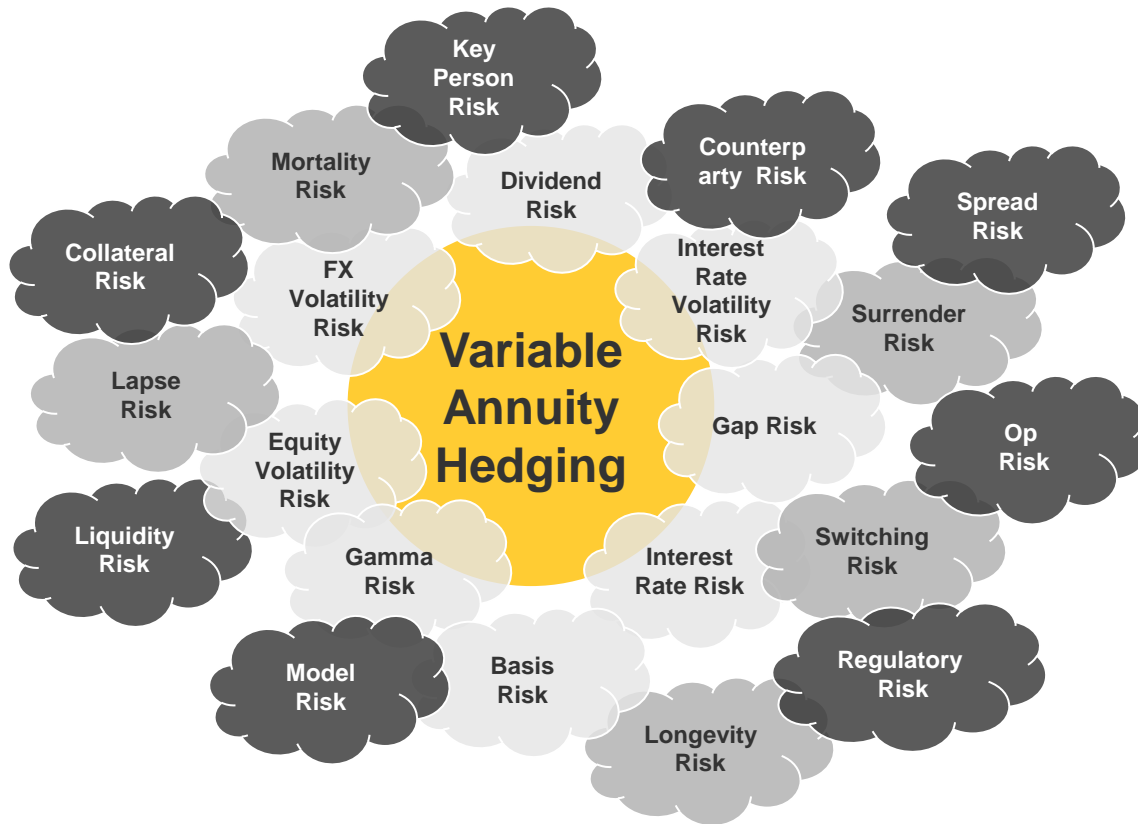
- › In a typical VA set-up, the policyholder gets “long exposure” to a single or multiple mutual funds via the separate account
- › The policyholder also gets downside guarantees (i.e. put option) on the mutual fund performance via the general account
- › The hedging of a put option requires creating a “short exposure” on the underlying asset; however, it is not possible to physically short sale a mutual fund
- › The basis risk arises as the put option on mutual fund is hedged by creating a short exposure on a proxy basket of benchmark equity and bond indices (through exchange-traded futures or OTC total return swaps) as opposed to the mutual fund itself
- › However, by definition, the amount of short exposure is always less than the amount of long exposure; it should therefore be possible to **offset the short against the long** by optimising the product and/or fund design
- › As opposed to underlying investments in funds another solution is to create investment options that are indexed based or Etf's. These could be hedgeable and mitigate Basis risk. Thereby being efficient for the manufacturer and low cost for the investor



Exploring a different engine behind Variable Annuities

An Introduction to iCPPI technology

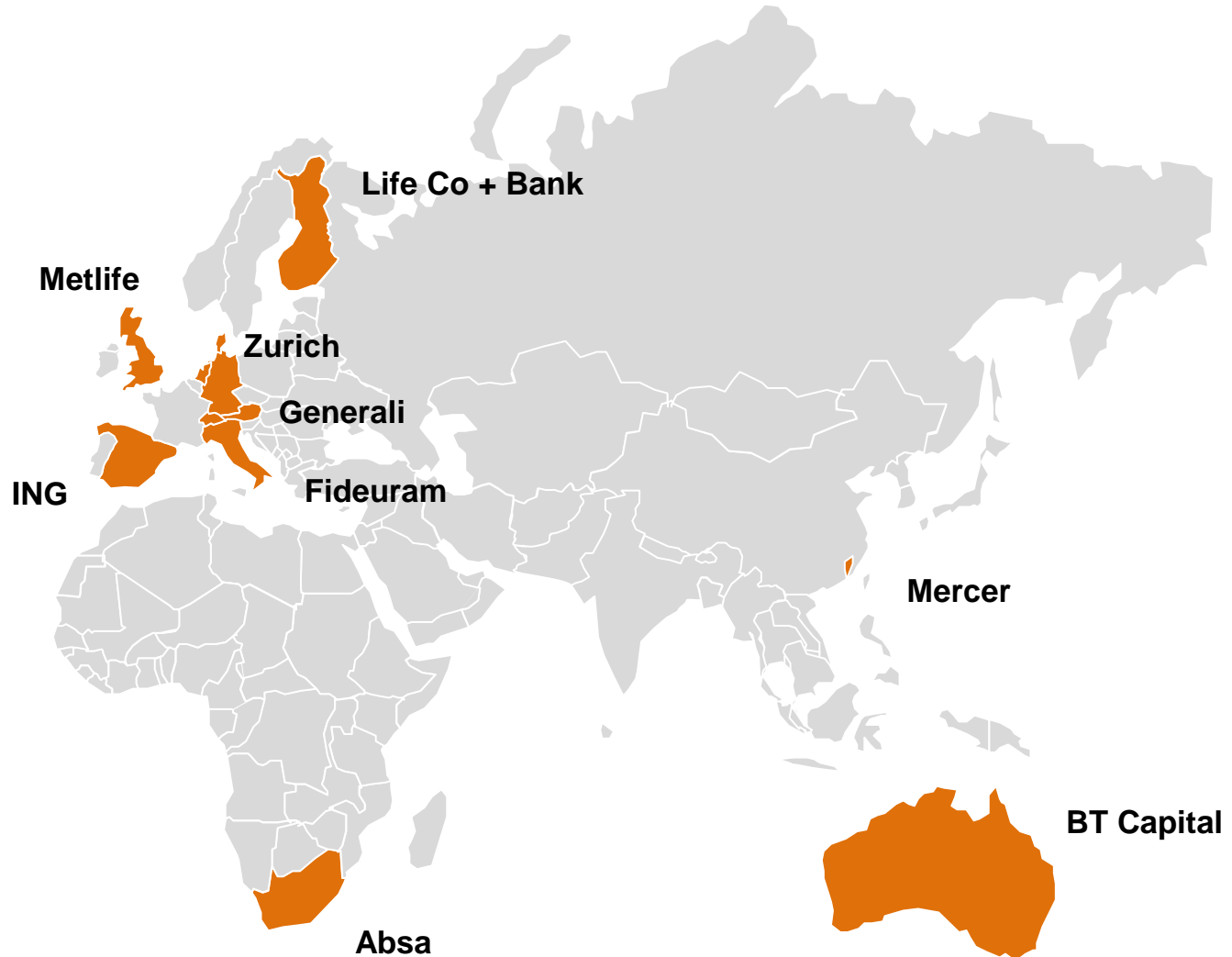
Variable Annuity Hedging



- › Key VA Risks
 - › Capital Market Risks
 - › Actuarial/ Behaviour Risks
 - › Ancillary Risks
- › In short, VA is a complicated derivative !
- › Possible to mitigate some risks through clever product design; hard to substantially simplify through incremental changes
- › Explore an alternative technology to power Variable Annuities: “iCPPI”
- › Pros and cons

Source: Ernst & Young

iCPPI Products in Africa, Asia & Europe

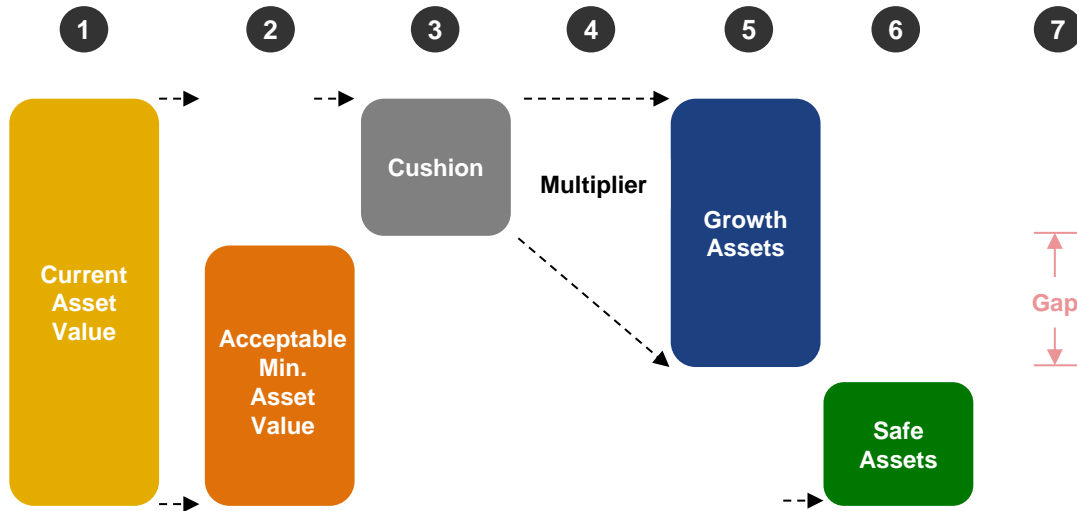


To understand iCPPI, we first need to understand CPPI

The Concept:



The Mechanism Explained in 7-steps:



What is it ?

- › CPPI = Constant Proportion Portfolio Insurance
- › An asset allocation technique to protect investment capital over time
- › Invest in Growth Assets during market rallies and shift capital to Safe Assets during drawdowns
- › Works for “Liquid” investments only

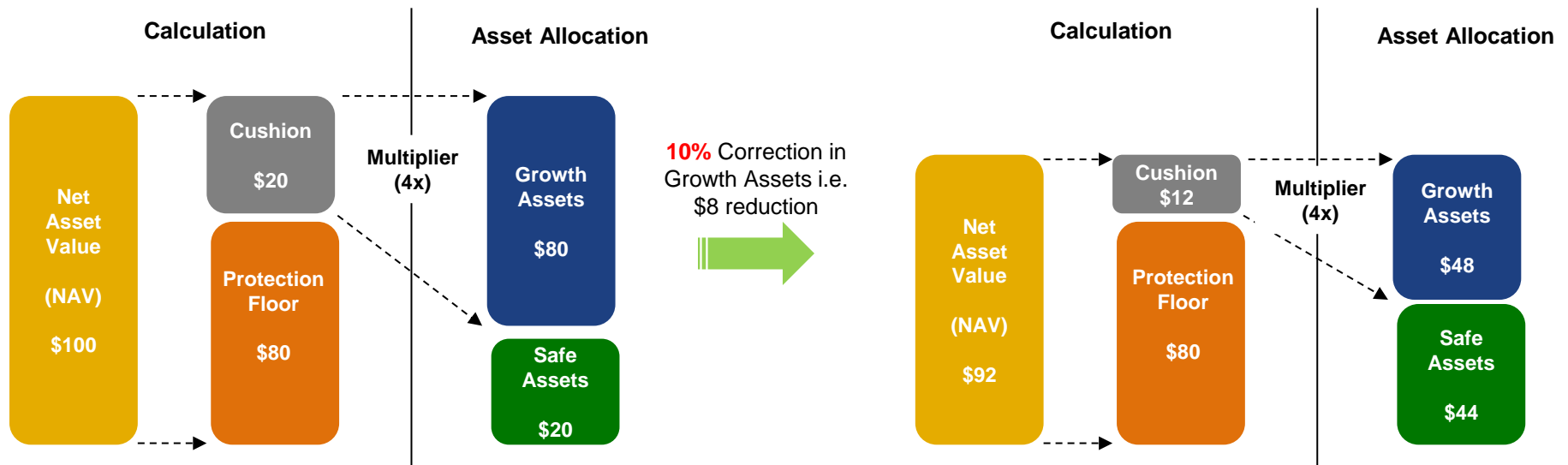
How does it work ?

- › Current Asset Value less acceptable Minimum Asset Value = “Cushion” (i.e. loss absorption capacity)
- › Allocation to Growth Asset = Cushion x Multiplier (pre-determined)
- › Multiplier >1 => Gap Risk

Simple Illustration of CPPI Concept – Day 1 & Day 2 (Example #1 of 3)

Day 1

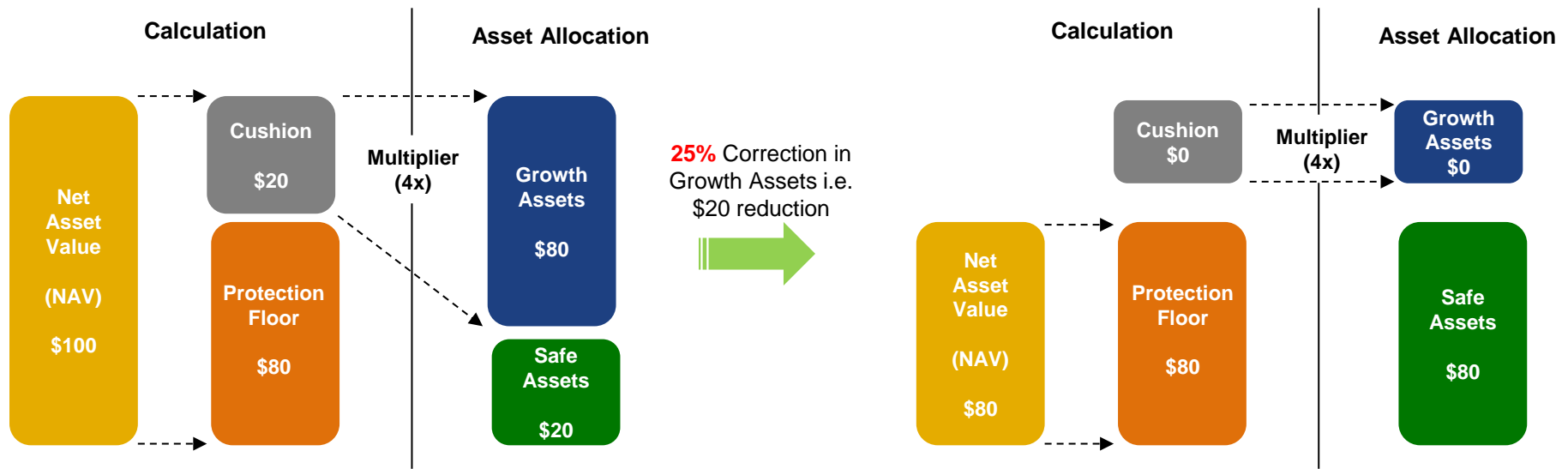
Day 2



Main Issue with CPPI Concept – Cash Lock Risk (Example #2 of 3)

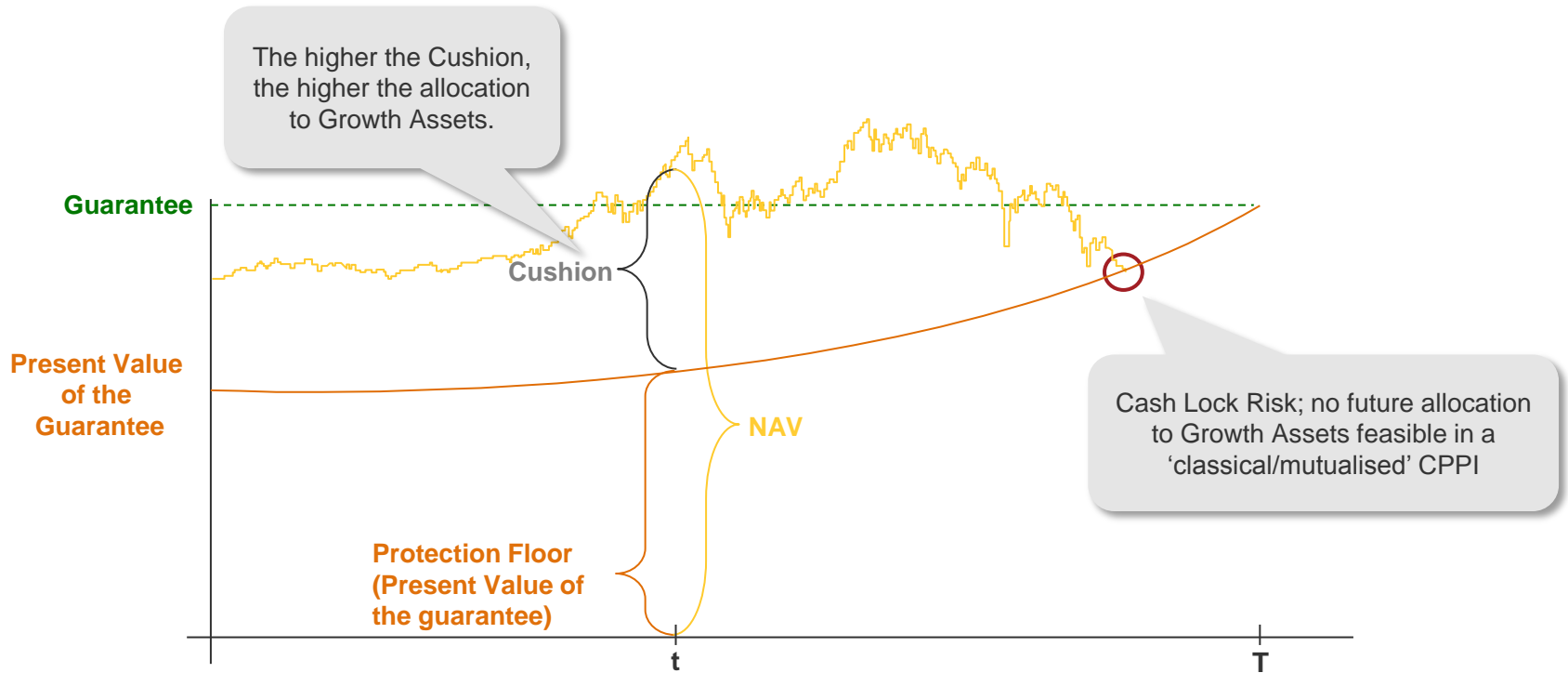
Day 1

Day 2



No further participation in Growth Assets

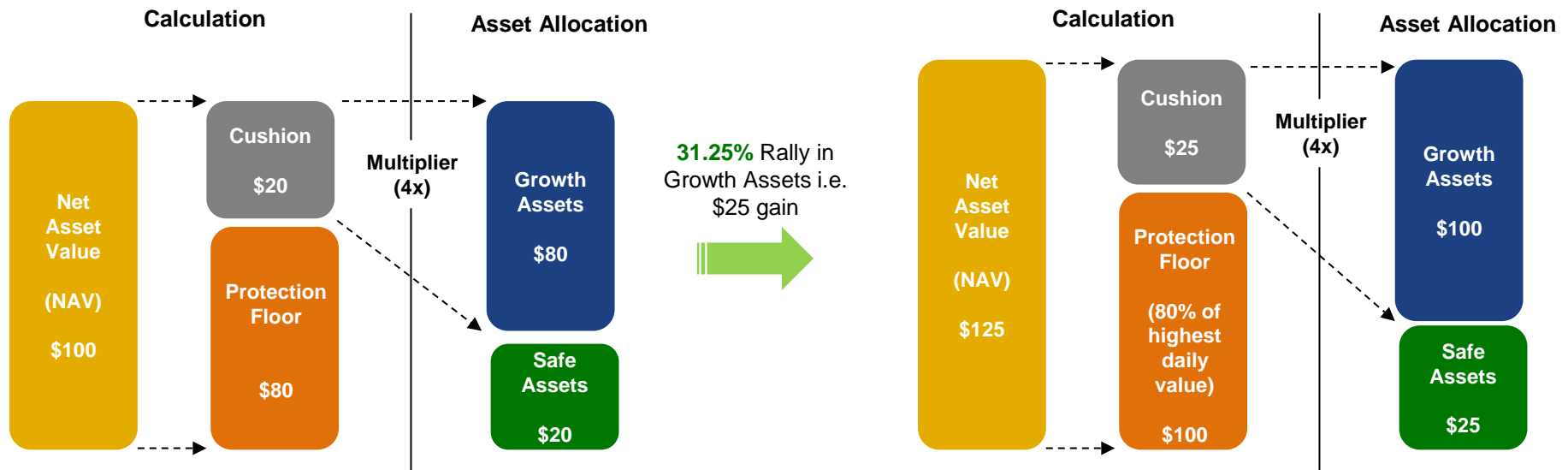
CPPI Illustration Through Time



CPPI Advantage – Open-ended Protection & Profit Lock In (Example #3 of 3)

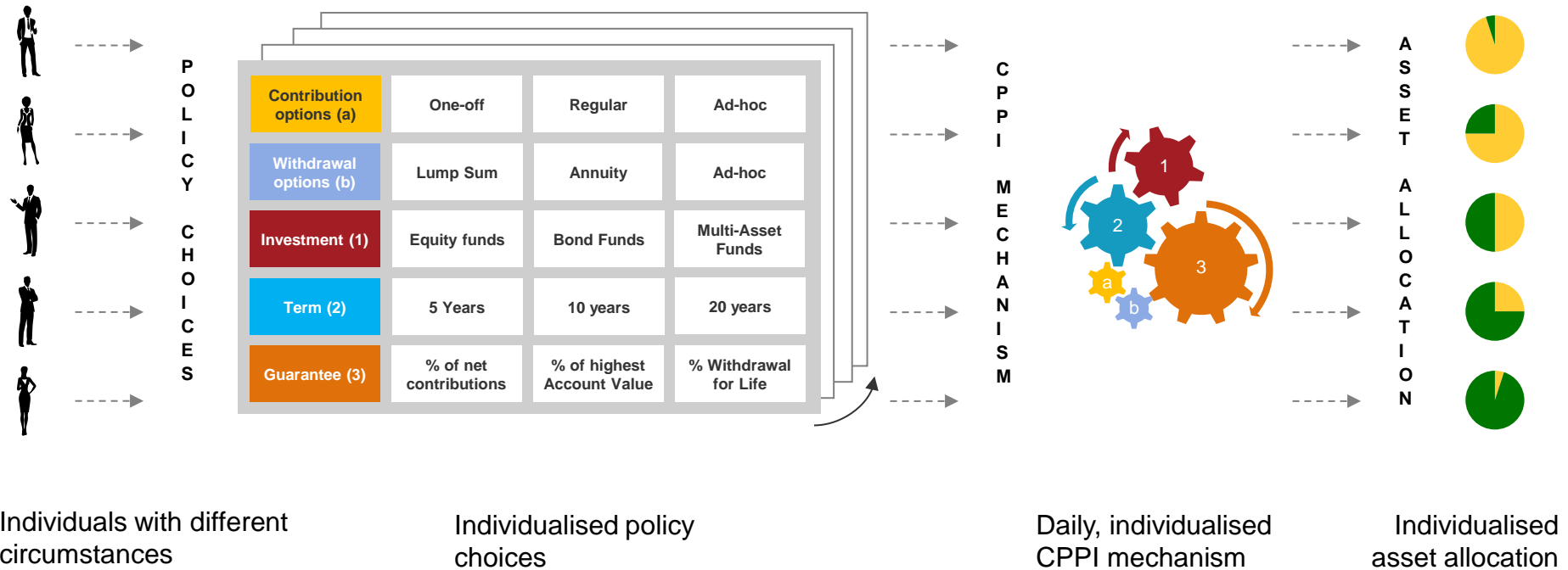
Day 1

Day 2



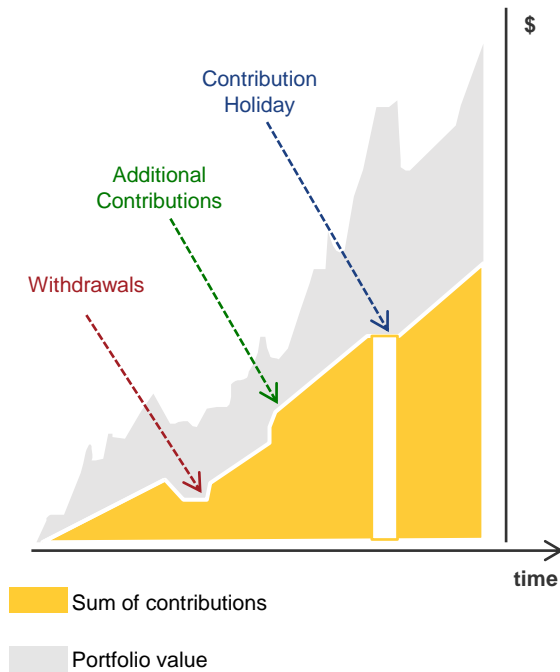
One can 'choose' to lock-in \$20 of profit !

Introduction to iCPPI (i = individualised)

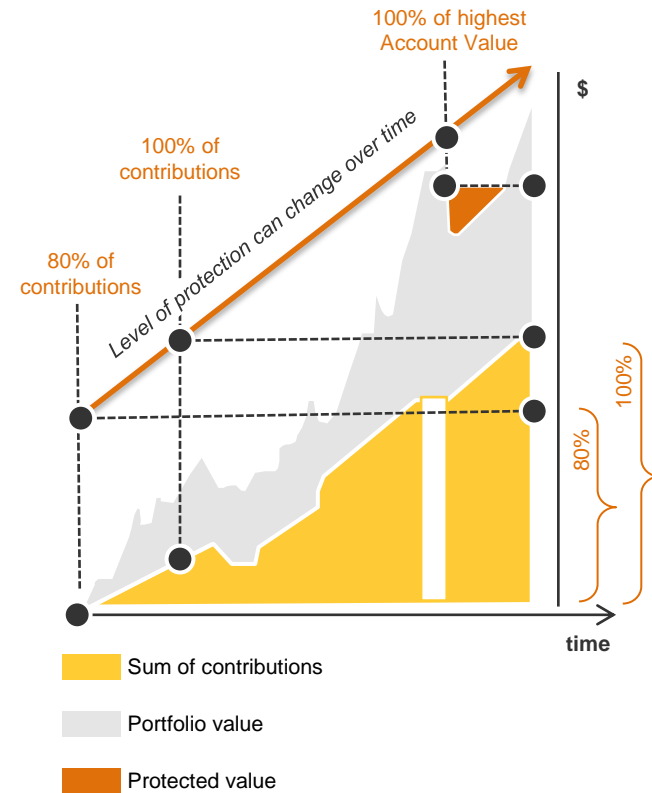


How iCPPI can provide flexibility through time

Payment Flexibility

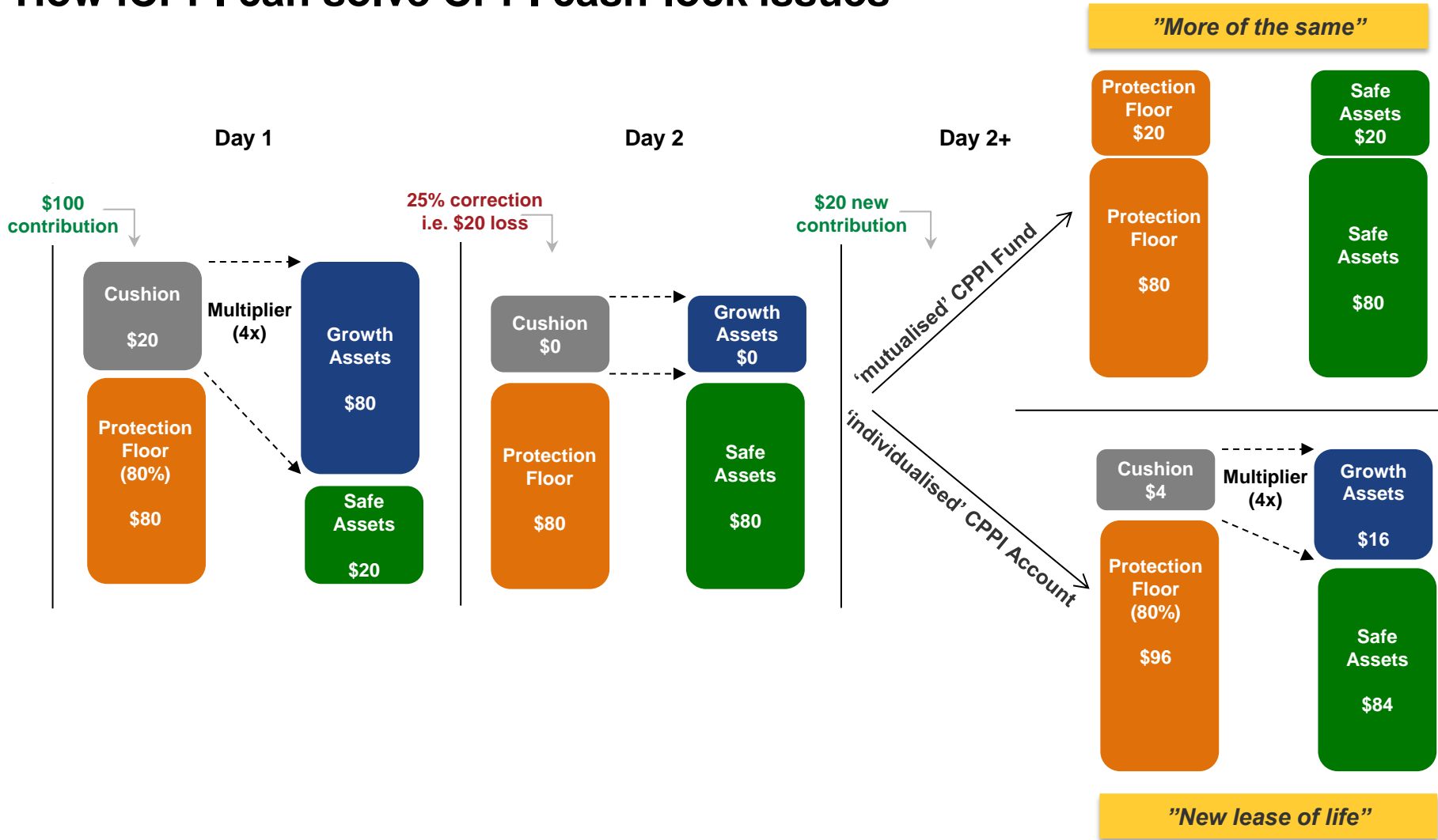


Protection Flexibility

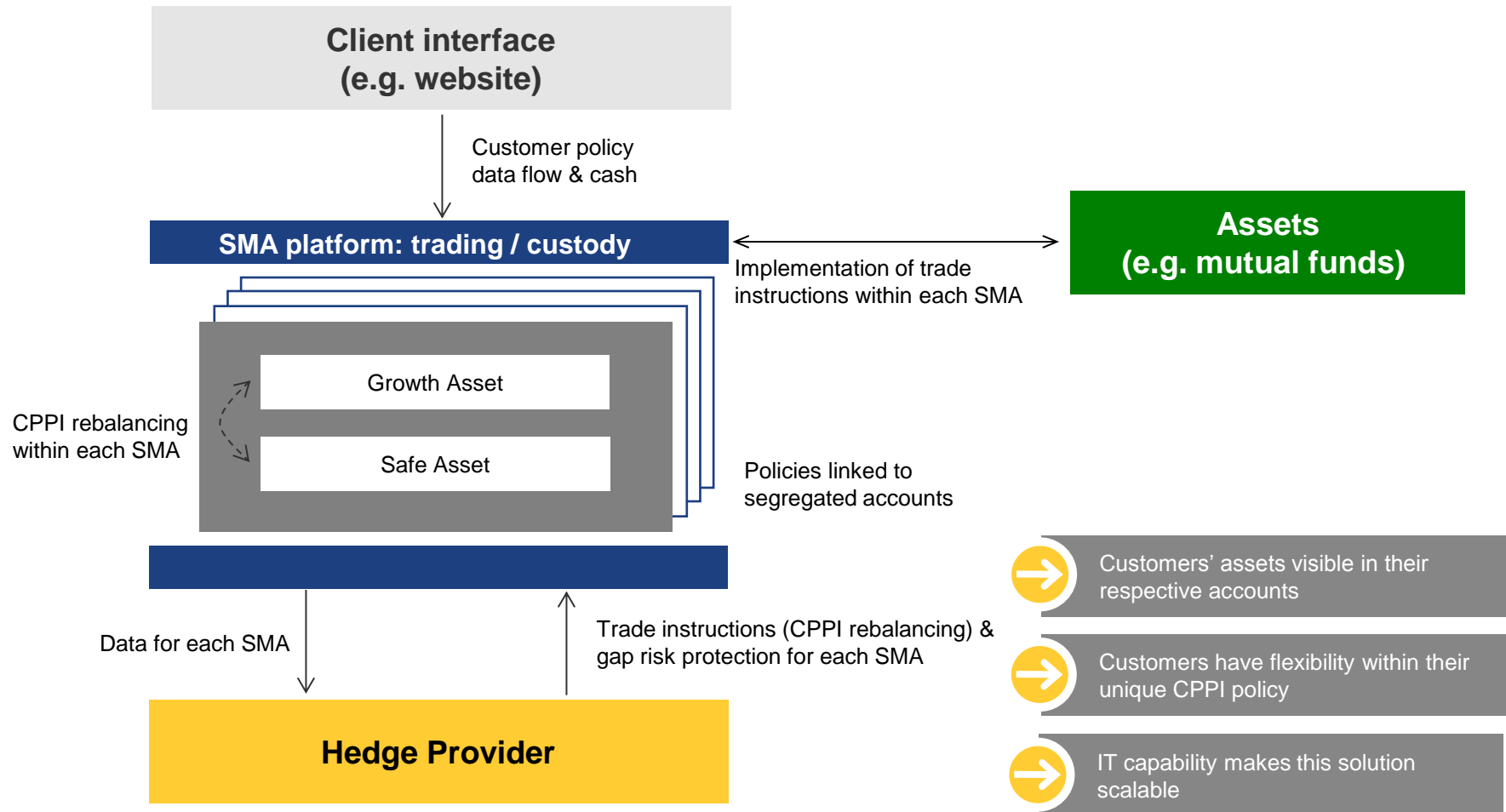


Source: FNZ

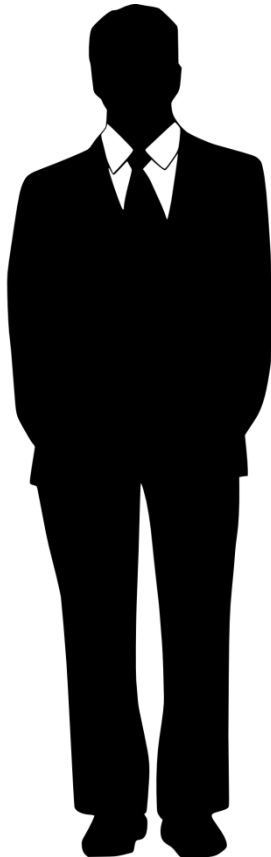
How iCPPI can solve CPPI cash-lock issues



iCPPI Typical Set-Up – Separately Managed Accounts (SMA)



iCPPI Example for a pre-retirement investor : problem

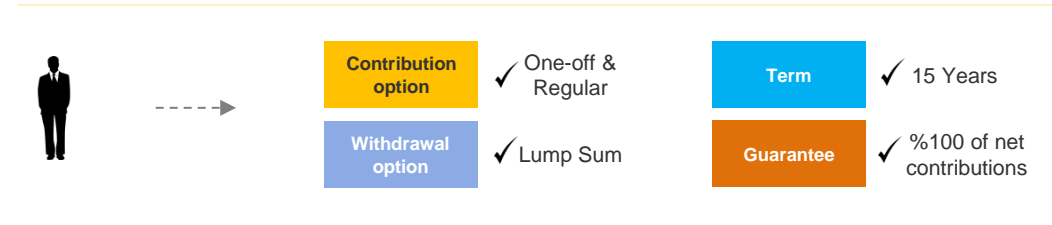


Key Facts

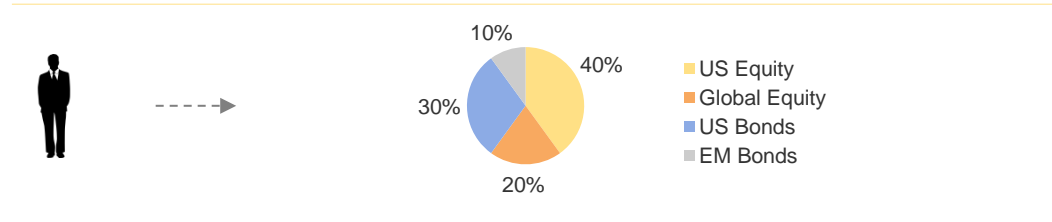
Age	50 years
Planned Retirement Age	65 years
Savings	\$200,000
Additional yearly contributions (possibly)	\$20,000
Investment Decisions	Self
Risk Appetite	Medium
Capital Protection	Desirable
Current Annuity Rates	Finds them low so does not want to lock-it now
Preferred De-accumulation Option	Lump Sum Payment

Solution

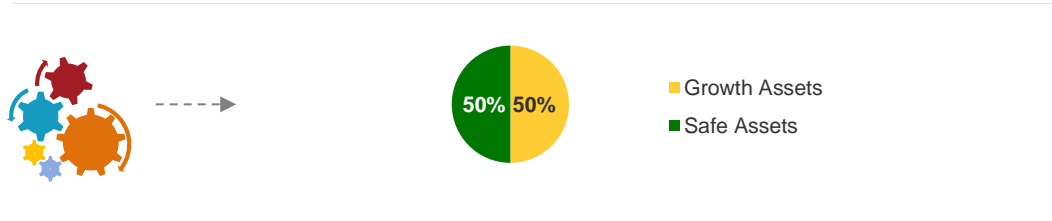
1. The investor makes appropriate policy choices



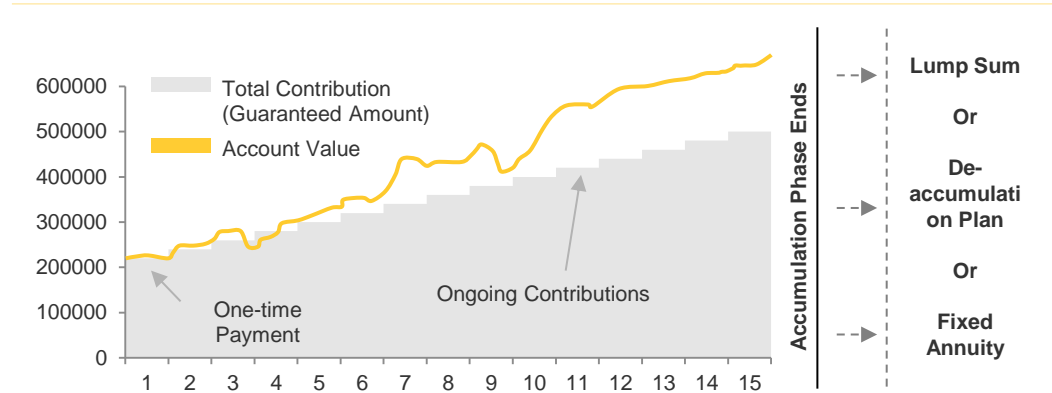
2. The investor decides the composition of Growth Assets (can change over time)



3. iCPPI Mechanism determines the ongoing allocation between Growth & Safe Assets



4. The investor makes ongoing contribution, can make ad-hoc additions (e.g. due to inheritance) and is guaranteed to get back 100% of all contributions when he turns 65



iCPPI Example for a post-retirement investor : problem

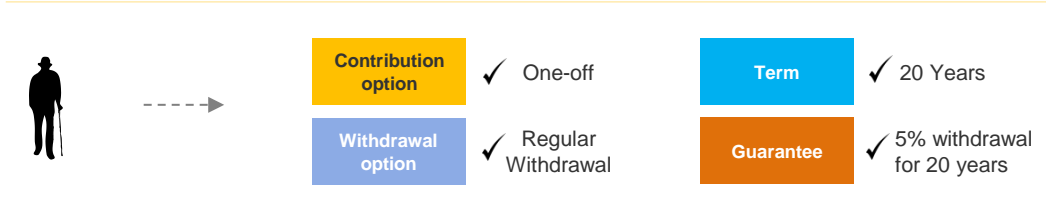


Key Facts

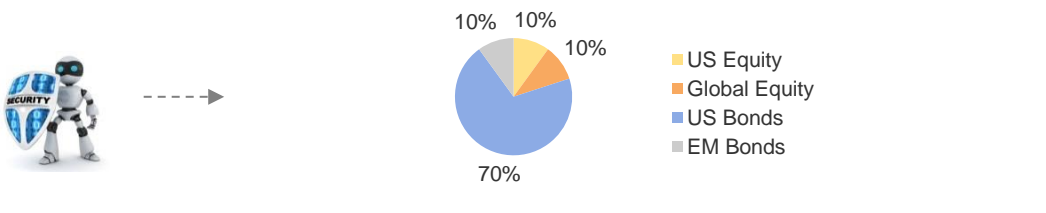
Age	65 years
Planned Retirement Age	Retired
Savings	\$500,000
Yearly Withdrawals	\$25,000
Investment Decisions	Needs Advise
Risk Appetite	Very Low
Capital Protection	Necessary
Current Annuity Rates	Finds them low
Preferred De-accumulation Option	Annual minimum withdrawal for 20 years

Solution

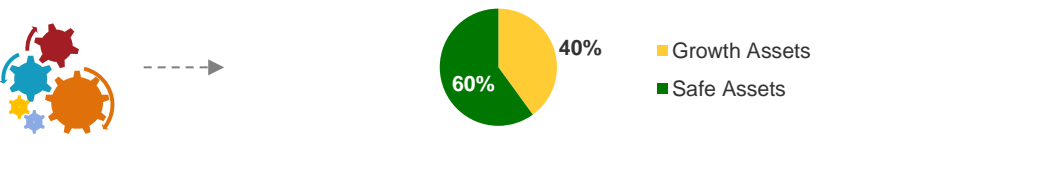
1. The investor makes appropriate policy choices



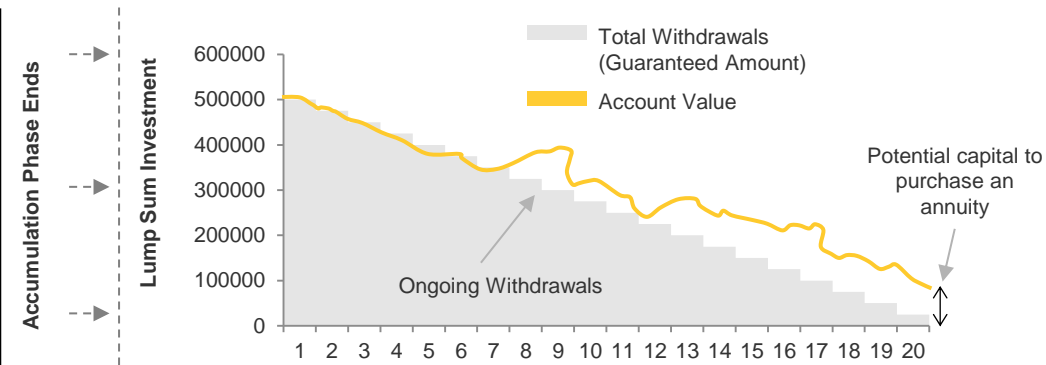
2. The insurer provides a default Growth Asset allocation depending on investor's risk profile



3. iCPPI Mechanism determines the ongoing allocation between Growth & Safe Assets



4. The investor makes ongoing withdrawals and is guaranteed to receive at least 5% for the next 20 years



Advantages & Disadvantages of iCPPI (insurer's perspective)

Insurer is primarily exposed to large market gap events (typically $\geq 10\%$ in 1-day) when hedging a CPPI; this risk can be syndicated and more easily passed to the wider market (investment banks, hedge funds, etc.) unlike the substantially more dynamic and complicated VA risks

Easily manageable lapse/surrender risks as the insurer is effectively selling a 'daily crash put' as opposed to a long-term put option

Limited or no basis risk



iCPPI implementation is technologically challenging requiring both time and capital investment

Significant operational risk due to daily rebalancing of each individual account

Management of Safe Asset

Policyholders will have to be educated about how a CPPI mechanism works

Advantages & Disadvantages of iCPPI (investor's perspective)

▶ Payment flexibility over time - increases/withdrawals possible as financial circumstances evolve

▶ Protection flexibility over time – can increase/decrease protection levels as risk appetite changes

▶ Protection flexibility over time – can increase/decrease protection levels as risk appetite changes

▶ More asset allocation flexibility (within Growth Assets) compared to traditional Variable Annuities

▶ Potentially less severe penalties for surrendering policy early

▶ Cheaper and more transparent pricing



▶ The allocation between Growth & Safe Assets (i.e. the CPPI mechanism) can be difficult to understand

▶ The account can be largely made of Safe Assets during market drawdowns thus limiting participation when the market eventually rebounds

▶ Safe Asset may carry overnight or longer term credit risk

▶ The final outcome is path dependent

Appendix – iCPPI Front-End

SMA platform providers are able to integrate education tools

MANAGEMENT INFORMATION **EDUCATION** CREATE STRATEGY ADMIN HEDGING LOGOUT

HERE'S HOW IT WORKS

We've picked a few different market scenarios from the last few years to show how this product works in different conditions. The graphs you're going to see will help explain how the product works by responding to market rises and falls. You can view our animated guide below by entering some details, or you can skip and go directly to a live demo. Please note these figures are based on a number of assumptions you can read [here](#) and are for illustrative purposes only.

ENTER SOME DETAILS

Choose currency: Market: Default market index

STEP 1 - How much might you invest?

Single amount: € 400000 Regular amounts: € 0 Monthly

STEP 2 - Pick a market scenario to see how it might perform

RISING MARKET

See how a protected investment might perform in a rising market. Take note of the opportunities to capture growth along the way.

FALLING MARKET

You can see the impact of protection on a client investment both during the protection term as well as the end.

VOLATILE MARKET

View the impact of tailoring protection in a volatile market. See the impact of capturing growth along the way and extending the term.

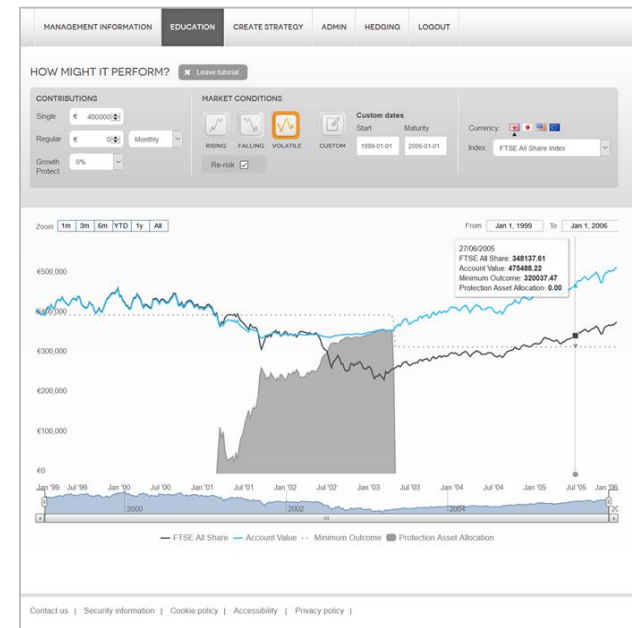
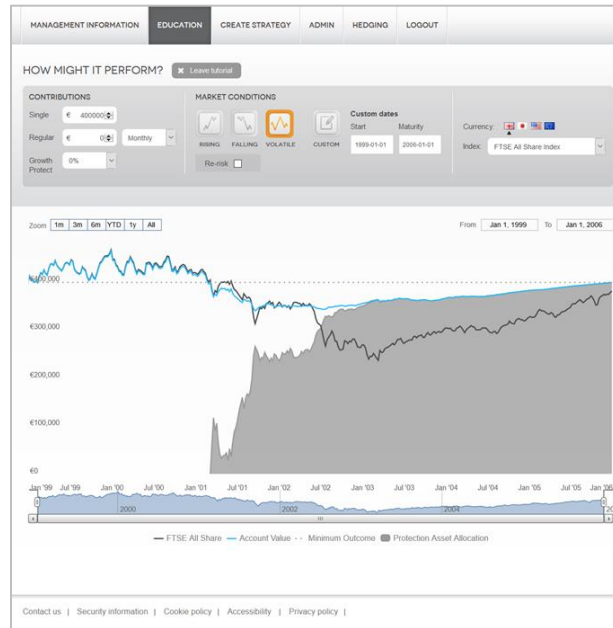
CUSTOM

Pick your own two dates from the FTSE All Share Index to see how varying.....

Contact us | Security information | Cookie policy | Accessibility | Privacy policy |

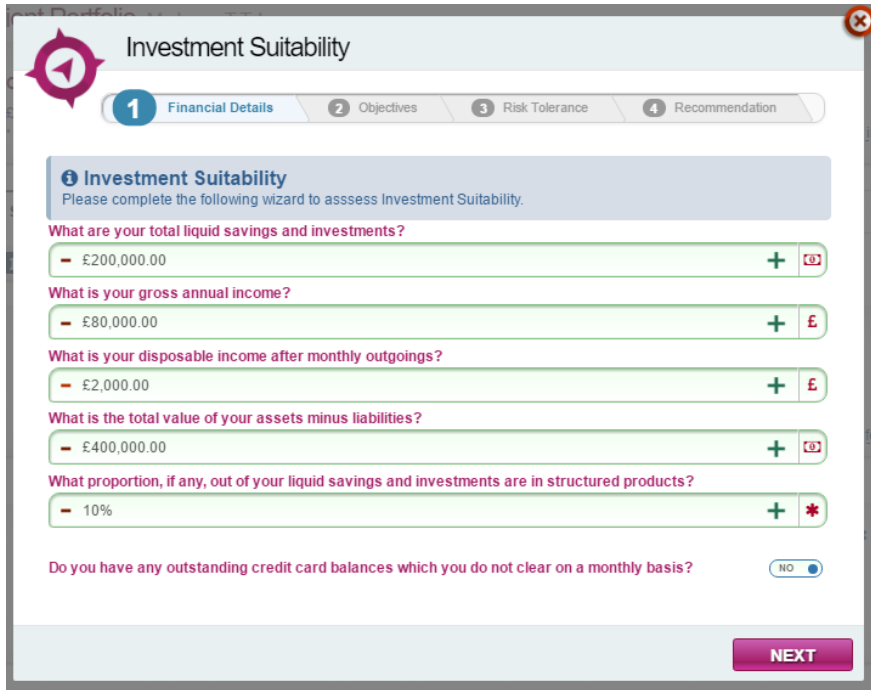


- › The necessary education tools can be provided as either **step-through demonstrations** or **online videos** for the available products describing their associated features and risks
- › **Back-testing** can be made available with **interactive graphs** with predefined market scenarios, and the ability to create custom scenarios



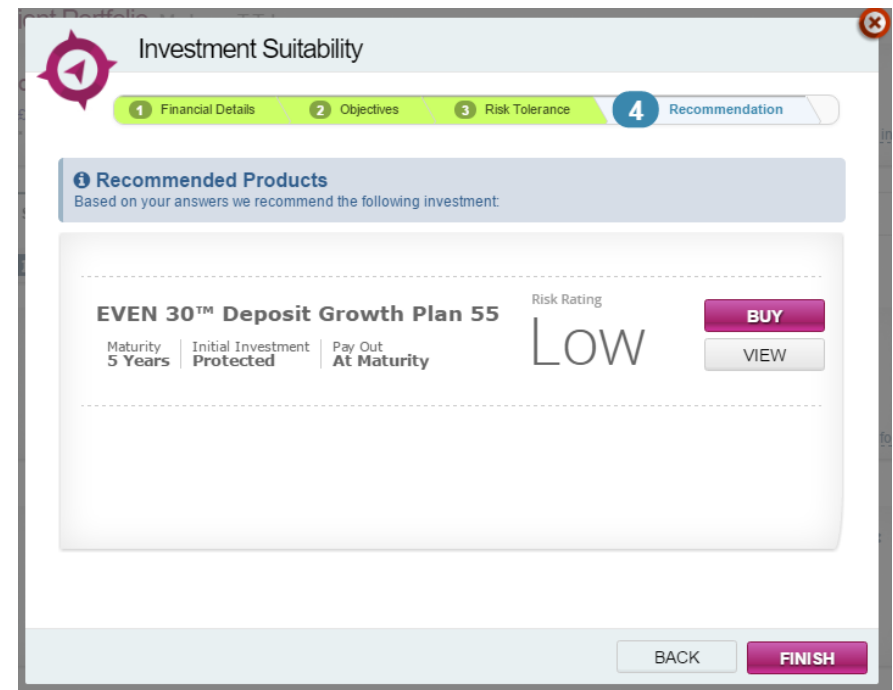
Source: Socius

iCPPI product can also be integrated with Digital Advice



Online Suitability Tests to assess financial goals and risk appetite

Source: Socius



Product Recommendations through a Financial Advisor

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