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How actuaries can drive business strategies in the low interest rate environment

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Agenda

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Conclusions and future plans

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Background

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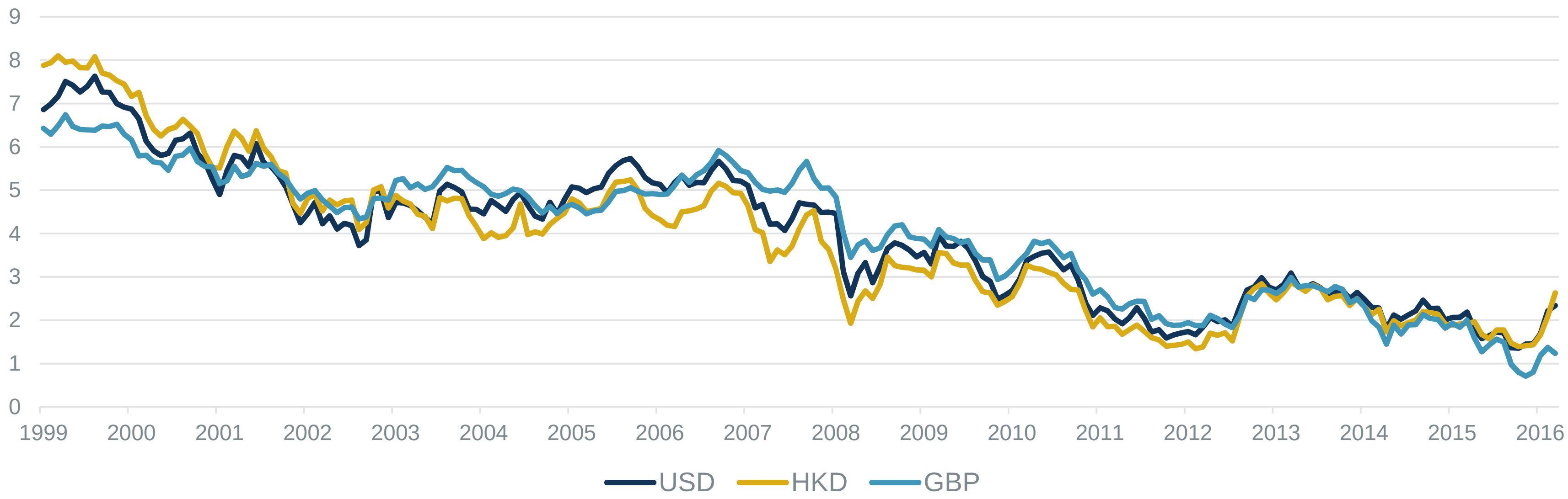
Interest rates have been declining over the last 25 years

10-year swap rates (%)



Source: Bloomberg

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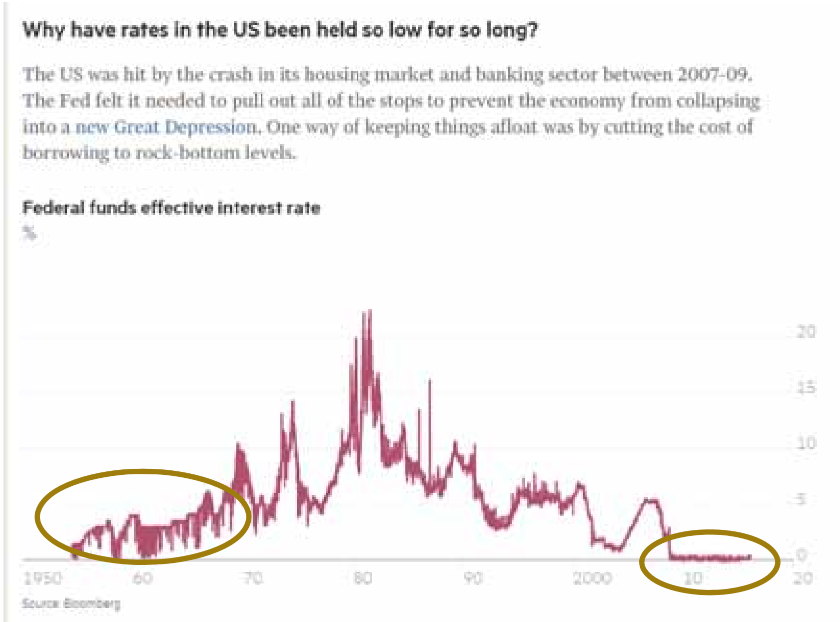
History and forecasts suggest that the long period of very low official interest rates may have some way to run

UK Bank Rate
(per cent)

Source: FT

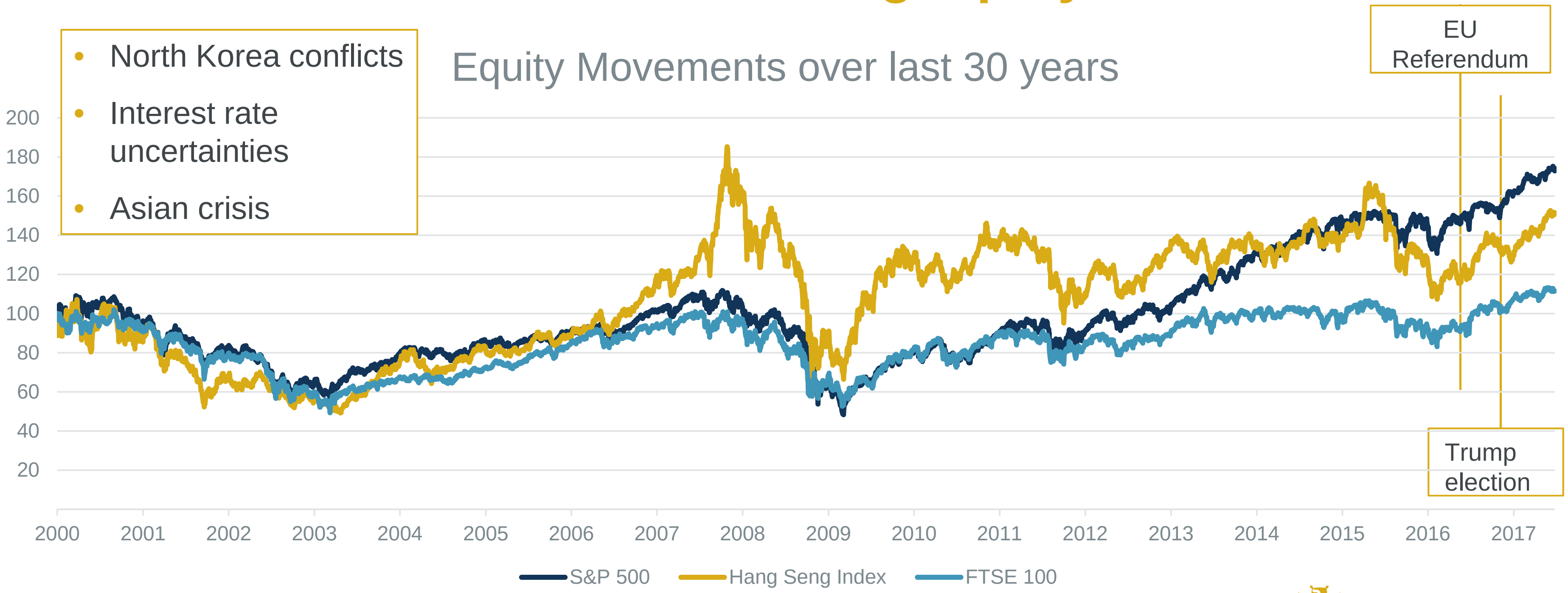
Low rates are now the new norm in developed economies…



Source: FT

Political uncertainties are causing equity volatilities

- North Korea conflicts
- Interest rate uncertainties
- Asian crisis

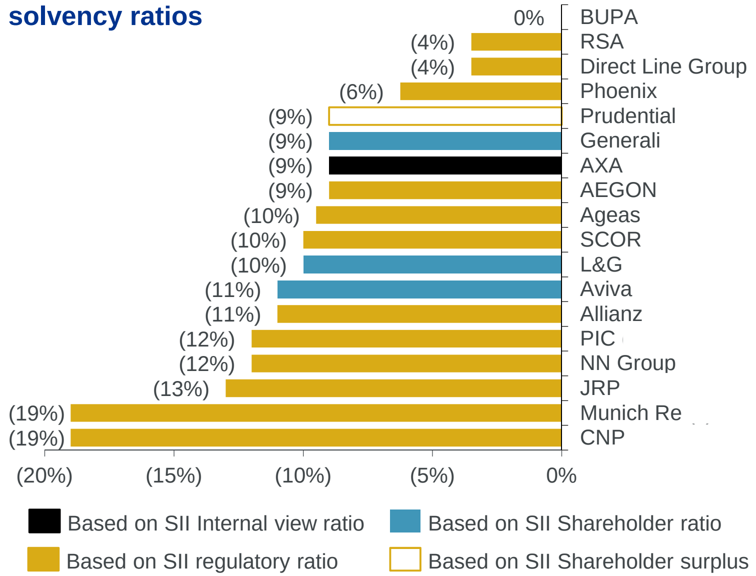


Source: Yahoo! Finance and FT, Sep 2012 values have been rebased to January 2000.

What these mean for the life insurance industry

- Low interest rates have material negative impact to firms' solvency ratios
- Trend in moving away from products with guarantees, e.g. through reduction in minimum guaranteed crediting rates, rate-lock period
- Firms have applied significant management actions to products
- ALM strategy become increasingly important
- Increased investments in growth and alternative assets

Impact interest rate sensitivity -50bps to solvency ratios



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HSBC context

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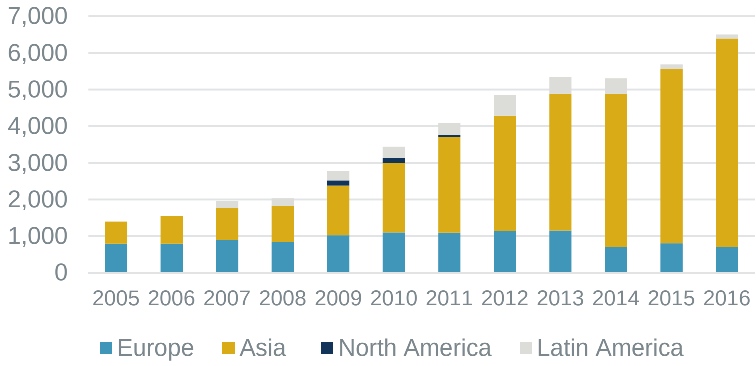
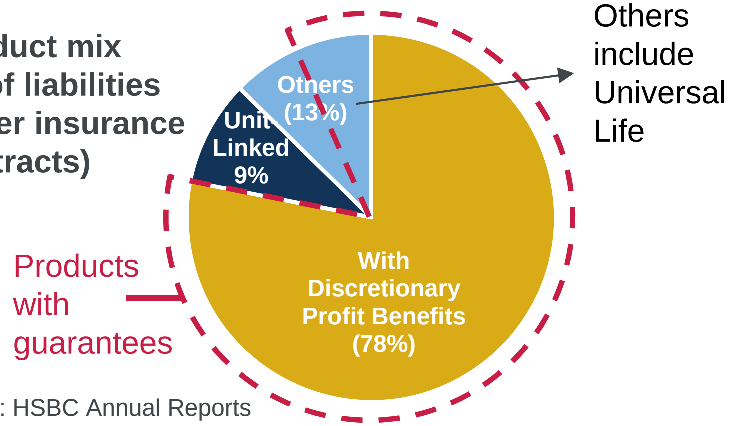
HSBC context and structure

- Insurance entities are owned by bank parents in each location. HSBC Insurance generates strong profits, but its capital is constrained to paying dividends to its bank parents.
- A large proportion of HSBC Insurance's profits come from Asian businesses, with a contribution of 87% of its total present value of in-force long term insurance business (PVIF) in 2016.
- In Asia, customers expect products with guaranteed smooth returns. In Hong Kong specifically, regulators have put up significant barriers on the sale of unit-linked products. As a result, HSBC's product mix is skewed towards products with guarantees.
- In Europe, the extensive competition and low interest rates have also resulted in lower margins and potentially slower growths. The bar chart to the top right shows that the Asian businesses have dominated the insurance group since 2009.

PVIF by region (USD m)



Product mix (% of liabilities under insurance contracts)



Source: HSBC Annual Reports

Key challenges faced by HSBC's products in low rates environment

Participating business in Asia

- High guarantees in deferred annuity products
- Mismatching between USD-denominated assets and HKD-denominated liabilities as Hong Kong assets are typically shorter in duration
- De-pegging risk between HKD and USD
- Existing customer expectations of stable bonus rates

Universal Life business in Asia

- Minimum guaranteed crediting rate increases exposure to low interest rates
- Reinvestment risk after the initial "rate-lock" period
- Policyholder expectations deterring management actions
- Trends in the industry to increase growth assets
- High competition in Singapore significantly challenges margins

Participating business in France

- High competition leading to low margins
- Low rates and hence investment returns
- Upside is more risk sharing with policyholders

Above all, increased regulatory focus on treating customers fairly and value for money.

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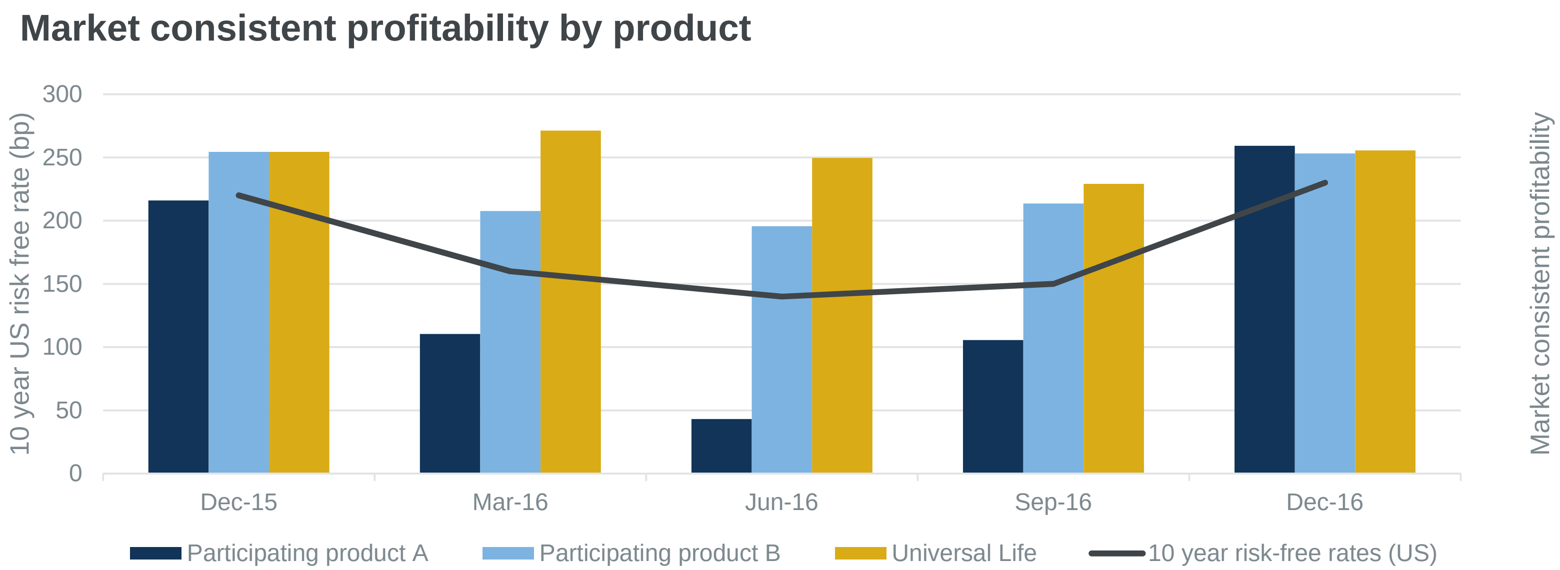
Interest rate crunch point

- In July / August last year, interest rates in HSBC’s key insurance markets hit long term lows.
- As a bancassurer, HSBC’s product set is heavily geared towards savings products, and the key products were highly sensitive to interest rates and backed by vanilla corporate bond investments.
- As a result, returns, profits and capital positions were badly hit at the time.
- In particular risk limits on capital were breached / close to breach in the largest insurance entities, in Asia and continental Europe, and these breaches were sufficiently significant to be escalated by the CEO of HSBC’s Retail Bank to the Group’s Holdings Board.

Profitability challenged by low interest rates



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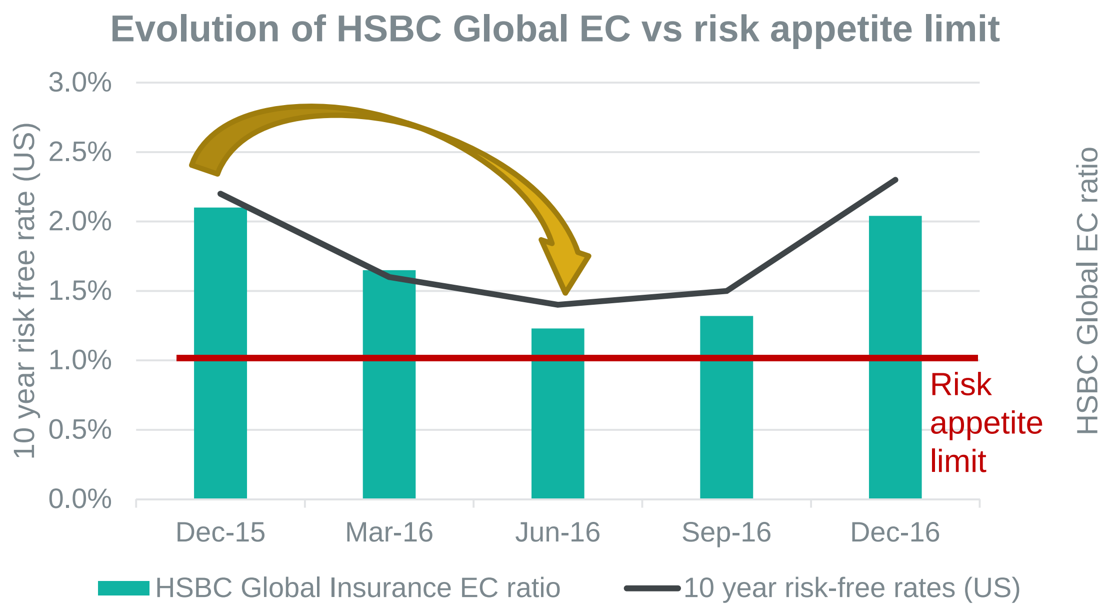
HSBC Global Insurance almost falls below risk appetite limit as a result of the interest rate fall



EC ratio dropped by 30% in absolute terms when 10-year rates dropped by 80 bps from Dec 15 to June 16

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How actuaries can drive business strategy in this environment

- New CEO for HSBC Insurance was appointed in August.
- His Number One objective was to future-proof the insurance business if interest rates remain low in key markets for a long time, as seen in Europe.
- Solution: Hire consultants!
- Kicked off major project to develop the tools to enable HSBC to determine changes to strategy required to improve the sustainability of the Insurance business through a long-term low interest rate environment.
- Key areas of strategy where changes were needed were product design, sales mix, investment management and asset liability management. All areas of actuarial expertise!
- Two tools that were developed to help drive these major changes to business strategy:
  - Capital Projection Tool, to allow Senior Management to see, in minutes, what the business will look like in 3 or 5 years, under a suite of different product and investment strategies.
  - Asset Liability Management Tool, to optimise returns to customers and shareholders.

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EC Projection Tool

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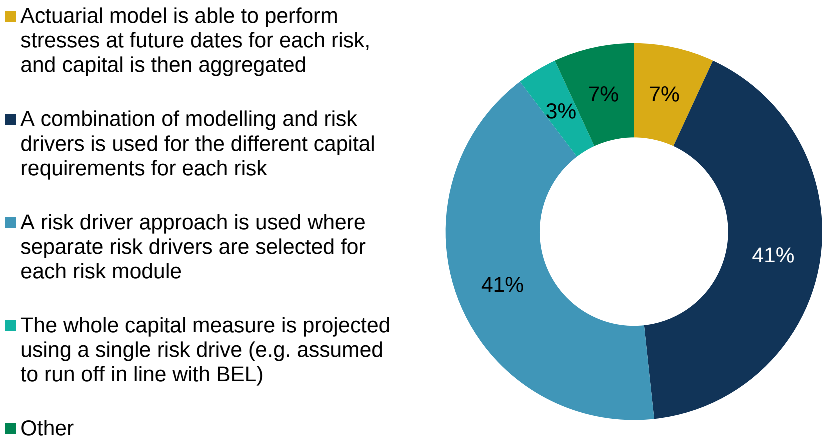
HSBC ambitions on EC projection tool

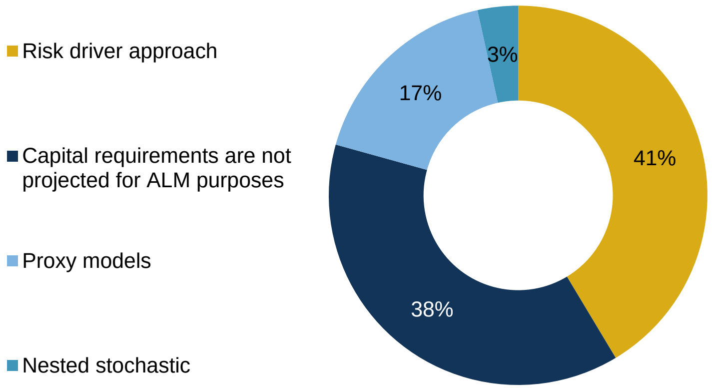
	Area	Business benefit	HSBC's ambitions
1	New business volume/mix	Optimise new business strategy and pricing decisions based on projected EC	Capability to allow for different new business volume and mix
2	Asset mix and other mgmt. actions	Enable ALM optimisation on EC positions and flexibility for management to see the impact of strategic actions	Capability to assess asset mix changes and management actions.
3	Robustness	Increased accuracy of projection to provide confidence in business plans and dividend sustainability	Improved robustness of projection through additional product and risk granularity
4	Group-wide model	Consistent group-wide model that is cost effective and easily understandable and provides a single version of the truth to facilitate EC decision making	A holistic model that can be used across all HSBC entities and for other business uses (e.g. ALM)

Types of EC projection model considered

How does your company project its future capital requirement in the ORSA?



How do you project future capital requirements for ALM purposes?



Source: KPMG Technical Practices Survey 2017

Benchmarking of the details of EC projection practice

	Basic practice	Intermediate practice	Best practice
Methodology	Factor based projection model based on sensitivities and exposure carriers	More advanced factor based projection leveraging proxy models used for internal capital calculation	Advanced proxy modelling techniques fitting to risk factors, asset mix, management actions and time
Business segmentation	Entity level New business not split by product	In-force split into broad categories (i.e. UL, WP, NP) New business not split by product	Product level
Risk granularity	Run off using total Assets and Liabilities No allowance for risk segmentation	Run off profiles developed for high-level risk splits (i.e. market, underwriting etc.)	Run off for individual risk drivers allow for risk interactions
Sensitivity	Circa three sensitivities (i.e. central and up/down scenarios)	Capability to include ad-hoc sensitivities and use model within stress and scenario testing and daily solvency monitoring	Capability for management to dynamically flex new business mix, asset mix and scenarios
Platform	Manual excel spreadsheet and reporting framework	Standardised dashboards linked to manual production process and excel spreadsheet	Interactive dashboard that allow management to flex parameters and customise reports

HSBC previous model

Short term solution

Tactical solution

Strategic solution

EC projection tool - model structure overview

Model input

- Time 0 assets, liabilities and sensitivities
- Cashflows
- New business volumes (next 5 years)
- Economic assumptions (asset mix, investment return, yield curves)
- Capital requirements by risk, correlations and exposure carriers

Calculations

- Premiums, outgo and investment returns are used to project assets and liabilities
- Cashflows also used as exposure carriers to project capital requirements for each risk
- Sensitivities used to project movements

Output

- Assets and liabilities broken down into asset classes and liability components over projection period
- Capital requirement split into risk categories over projection period

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Dividend capacity and planning

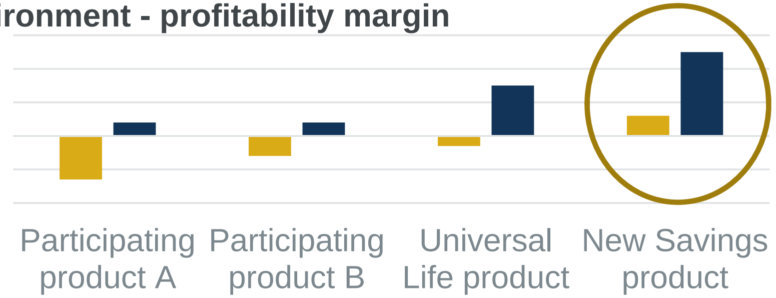
- Better understanding of risk drivers
- More robust dividend plans due to ability to project EC, increased confidence in ability to pay dividends
- Stronger confidence in projection and more robust analysis

EC Projection*	2017	2018	2019	2020	2021	2022
Planned dividends	50	50	50	50	50	50
EC cover ratio	x%	x%	x%	x%	x%	x%
EC surplus before dividends	10	30	40	40	40	90
EC additional distributable surplus (above risk appetite)	-40	-20	-10	-10	-10	40

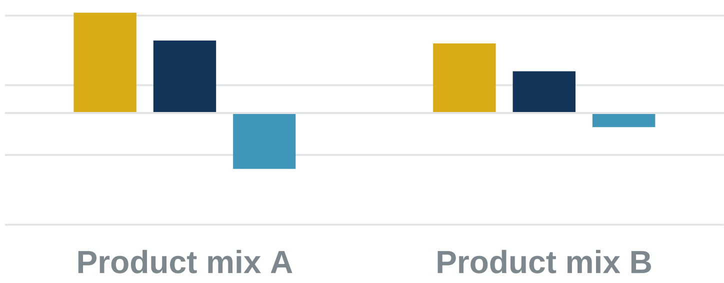
**Illustrative only*

Understanding the importance of diversifying product portfolios

Low interest rate vs high interest rate market environment - profitability margin



EC surplus of new business product mix after 5 years



- Empirical evidence to support actuaries' views in product strategy (e.g. high guarantees result in high interest rate sensitivity, protection businesses have lower capital requirements)
- Supported HSBC in launching a new more capital efficient savings product: longer terms, lower guarantees with special bonus at maturity / death / surrender throughout the period of policy

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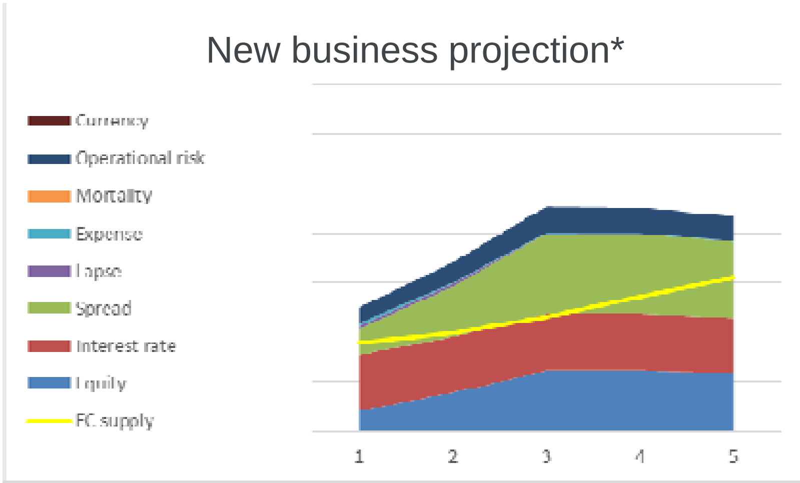
Analysing individual new business products

- Provide more robust challenge to product teams
- Ability to perform quick analysis when assessing feasibility of new products
- Understand new business capital payback period
- Helped improve Universal Life product proposition in Singapore (better pricing strategy, assess product features) - Universal Life product has high profitability but also high capital requirement – redeveloping products to provide lower guarantees to reduce capital requirements



*Illustrative only

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Asset Liability Management Tool

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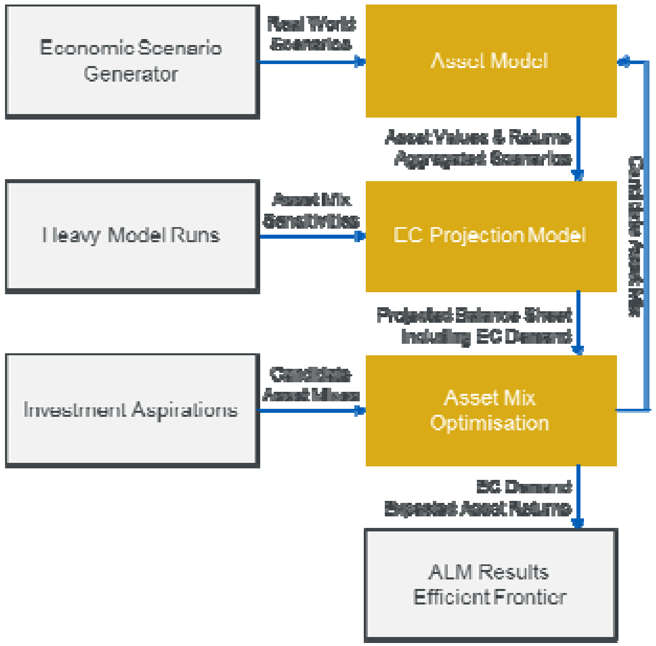
ALM tool – overview and approach

- Standardisation of ALM approach and optimisation metric across all regions
- EC metric used as a common methodology
- Leveraging enhanced EC projection capabilities – both model development and calibration effort shared
- Increased asset granularity
  - asset classes
  - credit rating
  - derivatives and hedges
- Approach facilitates integration of more sophisticated approaches to asset and liability projection in the future



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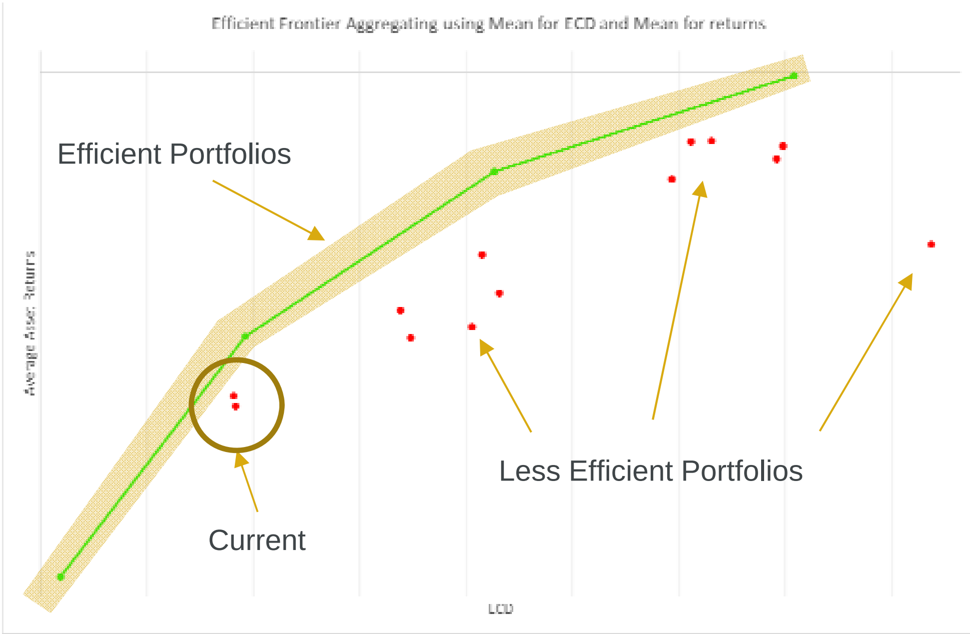
ALM tool – analysis and illustrative outputs

- Stochastic projection of assets, liabilities and economic capital over a 1 year horizon
- Results summarised on efficient frontier graphs showing risk/return trade-off.
- Identifying ALM strategies that bring diversification benefits
- Agile analysis of a wide range of investment choices with fewer heavy model runs



ALM pilot study

- A pilot study was performed on two products in the Hong Kong business
  - Both have a connection between asset returns and policyholder payments
  - One fully invested in bonds; one in bonds and equity.
- Economic scenarios were generated to match current investment prices
- Leverage existing calibration of EC projection tool
- Individual conclusions for each product

Candidate Asset Mixes Considered
Mix of bond durations
Mix of bond ratings
Government vs corporate bond mix
Repos on long dated bonds
Emerging market equity
Securitised products
Private equity
Equity index puts

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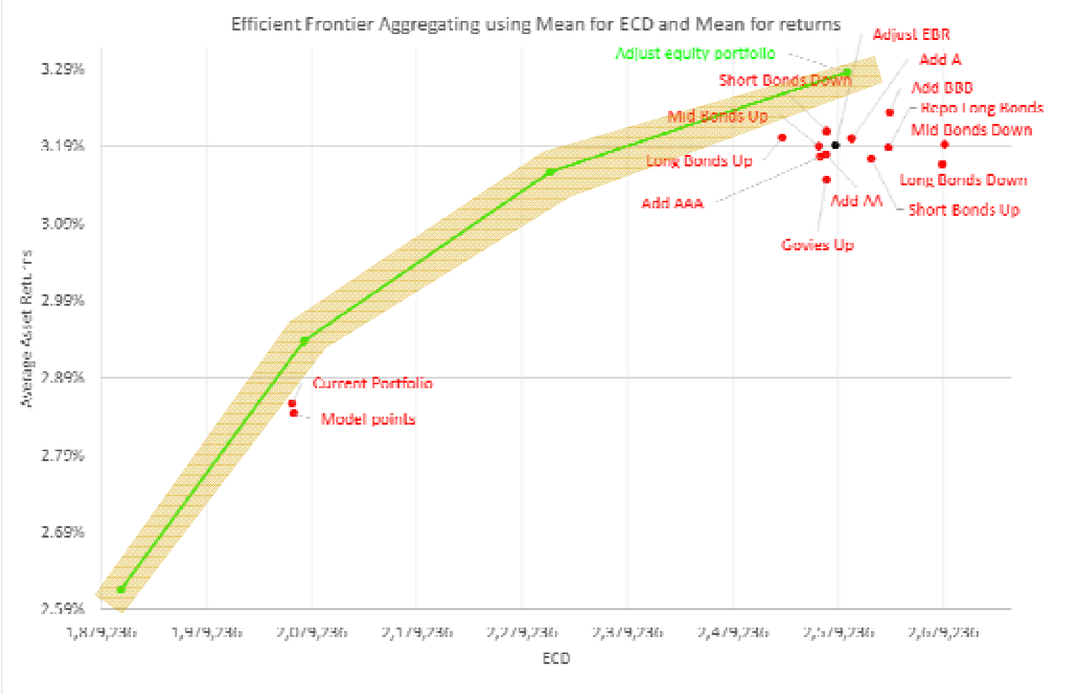
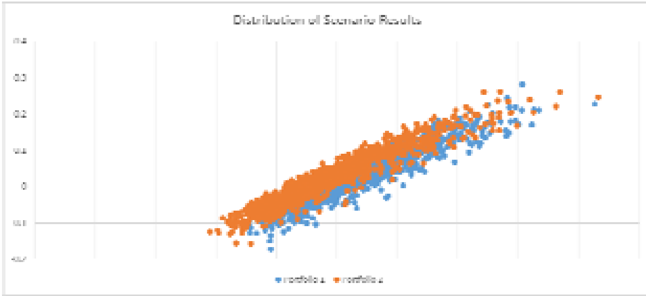
ALM tool – investigating adjustment to SAA

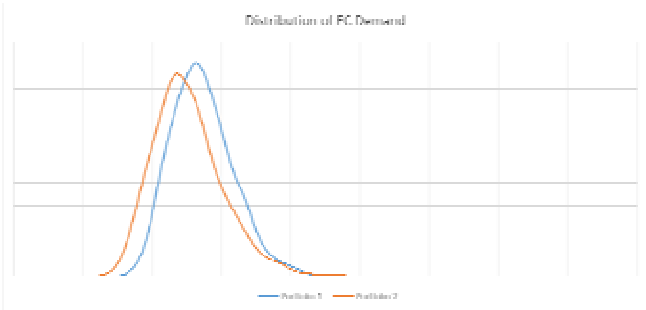
- An adjustment to the SAA was investigated
- Current bond scaled down and equity scaled up
- Then investigate changes to bond portfolio
- Opportunities:
  - Rating mix of bond portfolio
  - Optimising bond duration mix by product
  - Introduction of specific growth asset classes
- It wouldn't be feasible to investigate this many options in heavy model



Rich outputs produce new insights

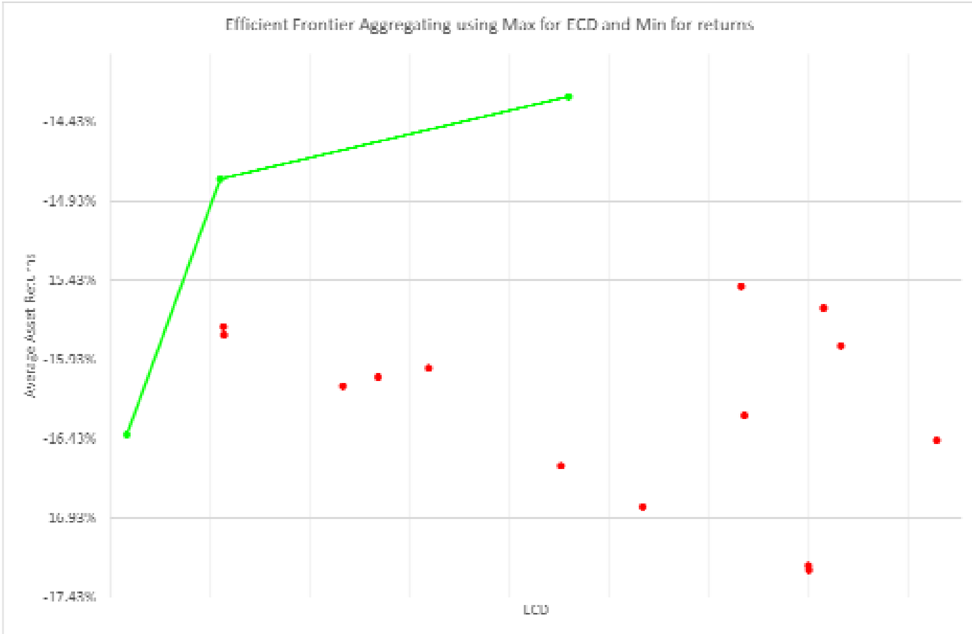
- Asset and liability valuations are projected forwards over a selection of economic scenarios
- The rich outputs provide opportunities for a detailed analysis of how the risk profile might develop over time
- Comparison of portfolios using different measures gives a different perspective
- Here we see that Portfolio 2 improves on ECD by improving the better (lower) end of the distribution





Own view vs. regulatory view of risk

- The efficient frontier here considers the 99.9% VaR of the portfolio return and ECD
- The return volatility is high and all portfolios make a significant loss
- This presentation strongly favours low volatility assets (even if they are unfairly penalised in SF)



Technical Challenges in projecting ALM positions

- Asset projection assumptions
- Bringing separate business units together
  - Differences in reporting, data, product design…
- Balancing agility and accuracy
  - How complex should projection be?
  - Are heavy model results available? Project aimed to relieve pressure on team.
- Accuracy of EC and liability projections
  - Tied to improvements in EC projection mentioned earlier
  - ALM specific adjustments to be included in wider process going forward

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Next steps

- Enhanced Liability projection
- Bringing ALM tool into production
  - Combine with regular calibrations of EC Lite tool
  - Bring analysis into ALCO inputs
- Enhanced ALM Analysis
  - More automation in choice of asset mixes to consider
  - More granular risks - Credit risk; FX
  - More asset classes - Derivatives: IR hedging; credit default swaps; FX swaps.

- Other uses for the model:
  - Hedging
  - SAA
  - TAA
  - New business

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Conclusions and future plans

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Not just prototypes

- Used these tools to launch two new flagship products already:
  - New savings product in Hong Kong more capital efficient and resilient to low interest rates
  - Redeveloped Universal Life product in Singapore to provide lower guarantees and reduce capital requirements but more attractive expected returns and rider benefits
- Used the capital projections tool to produce our 2018 capital plans:
  - Increased confidence in capital projections has resulted in quite a different distribution and overall higher projected dividends in aggregate globally across the business, crucial for meeting challenging ROE targets
- Diversified into broader investment classes, focusing on going down the ‘liquidity curve’ e.g. emerging market debt, private equity, real estate funds, infrastructure debt, short duration high yield bond funds, etc

Key challenges

Reliable and relevant data

Global consistency

Timing

Constraints by BAU activities

Conflicts and constraints from company structure (e.g. dividends)

Overall profitability to HSBC bank

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Conclusions and Future Plans

These tools are proving vital in helping HSBC make major strategic decisions in an agile manner in this economic climate.

- Can now assess the impact of business decisions such as asset allocation and product strategy to capital and profitability under various market conditions, to feed into product design / strategy and dividend planning.
- Can also make more robust informed decisions around ALM, hedging and investment strategies.

Good clear communication with wider stakeholders (explaining complex actuarial concepts to non-technical stakeholders) from the start has been crucial to ensuring buy-in from the different teams across the business. Going forward now much more likely to gain buy-in from sponsors to support investment in enhancing sophistication of tools.

Actuaries can be key to driving business and investment strategies in this challenging economic environment.

Questions

Comments

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