The views expressed in this presentation are those of the presenter(s) and not necessarily of the Society of Actuaries in Ireland
Life Reinsurance Committee

- Gavin Maguire (Chair)
- Sarah Lynch (Secretary)
- Steven Hardy
- Michael Culligan
- Ciara Fitzpatrick
- Thomas Moran
- Brian Morrissey
- Viviana Pascoletti
- Jason Wiebe
- Aisling Bradfield
- John Fitzgerald
- Philip Shier
Life Re Committee

• EIOPA review of SCR
  – Contribution from Life Reinsurance perspective to SAI feedback on Consultation on EIOPA second set of advice to EC on SII.

• Work with other committees

• Life Reinsurance focused CPD
<table>
<thead>
<tr>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Topics in Reinsurance</td>
<td>Patrick Meghan (Milliman)</td>
</tr>
<tr>
<td>o EIOPA consultation on SCR changes</td>
<td>Liam Lynch (KPMG)</td>
</tr>
<tr>
<td>o US Tax Reform</td>
<td>James Maher (EY)</td>
</tr>
<tr>
<td>o Brexit</td>
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</tr>
<tr>
<td>The expanding market for Longevity Risk</td>
<td>Sheila Harney (Canada Life Re)</td>
</tr>
<tr>
<td>What if we find a cure for obesity?</td>
<td>Nay Wynn (Hannover Re)</td>
</tr>
</tbody>
</table>
Agenda

Why?

What changes are proposed? (or not)?

Impact for Reinsurers
Why?

• The European Commission is required to
  “review the methods, assumptions and standard parameters used when calculating the Solvency Capital Requirement (SCR) with the standard formula”

• Must be reviewed before December 2018
  – Recital 150 of the Delegated Regulations

• Further Assessment planned before end December 2020
  – as per article 111 of the Solvency II Directive
So what’s happened to date?

Discussion Paper
- December 2016

Call for Advice
- Set 1
- European Commission to EIOPA
- July 2017

Provide Advice
- Set 1
- EIOPA to European Commission
- October 2017

Feedback
- ECON Committee of EC
- May 2018

Call for Advice
- Set 2
- European Commission to EIOPA
- November 2017

Provide Advice
- Set 2
- EIOPA to European Commission
- February 2018

Changes Announced
What are the proposed changes?

Set 1: 137 pages

Set 2: 612 pages
What changes are proposed? Set 1

- Simplified Calculations
- External Credit Ratings
- Treatment of Guarantees and exposure to RGLAs
- Risk Mitigation Techniques
- Asset Look through
- USPs
- LACDT
What changes are proposed? Set 2

- Recalibration of standard parameters for Prem&Reserve risk
- Volume measure for premium risk
- Recalibration of mortality and longevity
- Explore simplifications for non-life cat risk
- Interest rate risk
- Market Risk Concentration
- Currency at Group level
- Unrated Debt
- Unlisted Equity
- Strategic Equity investments
- Counterparty Default simplified
- Look through
- LACDT
- Risk Margin
- USPs for Lapse Risk
- Recognition of adverse development covers
Controversy

Donald J. Trump @realDonaldTrump · May 26

EIOPA proposed changes to Interest Rate Stresses in SCR Calculations
BAD IDEA!
Impact for Reinsurers

- Changes to Capital Requirement Calculations
- Product Design/Market Demand
- ORSA Stresses
Many reinsurers are using internal models...

EIOPA comparative study on market and credit risk modelling

- All model instantaneous shocks except for two that model the evolution over 1 year.
- All are now assuming negative interest rates can occur
Product Design/Demand (1)

• Risk Mitigation Techniques
  – Changes to how these are recognised (rolling hedge)
  – More competition for reinsurance?
  – Recognition of reinsurance where in breach of SCR/MCR

• Risk Margin Calculation
  – Arguments that the current calculation incentivises longevity risk reinsurance outside the EU
  – CoC was the focus of the current review
  – Allow for diversification within RM calc – composite undertakings
Product Design/Demand (2)

- Lapse Risk USP/Shocks
  - No changes yet. Invited submissions for a lapse risk USP

- Adverse Development Covers
  - Complex item: depends on attachment points, % of reserves covered, mix of business
  - Works for mono-line but proposals rejected overall

- Non-Life Prem & Reserve risk module
• More relevant for standard formula companies

• Base case – what SCR calculation is assumed in 2019 and beyond?

• New interest rate stress tested?

• Appropriateness of the standard formula?
Further Reading

• **EIOPA Advice**
  
  

• **Milliman Briefing Notes (shorter summary)**
  
  

• **Latest ECON Committee Meeting**
  
  – European Parliament's Committee on Economic and Monetary Affairs (Econ) on 16 May
Questions
The cost and how its paid for

<table>
<thead>
<tr>
<th>Revenue impact¹ (US$’bn)</th>
<th>Final bill provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,349</td>
<td>Reduce Corporate rate to 21%</td>
</tr>
<tr>
<td>$415</td>
<td>Pass-throughs</td>
</tr>
<tr>
<td>$212</td>
<td>Territoriality</td>
</tr>
<tr>
<td>$86</td>
<td>Temporary, limited expensing</td>
</tr>
<tr>
<td>$64</td>
<td>Domestic IP incentive (foreign-derived intangible income (“FDII”) deduction)</td>
</tr>
<tr>
<td>$98</td>
<td>Repeal section 199 (relates to US manufacturing)</td>
</tr>
<tr>
<td>$113</td>
<td>Super Subpart F (incl. global intangible low-taxed income (“GILTI”) inclusion)</td>
</tr>
<tr>
<td>$150</td>
<td>Base erosion and anti-abuse tax (“BEAT”)</td>
</tr>
<tr>
<td>$201</td>
<td>NOL reform</td>
</tr>
<tr>
<td>$253</td>
<td>Interest expense reforms</td>
</tr>
<tr>
<td>$339</td>
<td>Mandatory repatriation</td>
</tr>
</tbody>
</table>

1. Based on scores provided by the Joint Committee on Taxation, US Congress
   Of major relevance for Insurance Industry
Key measures – one page summary

**BEAT**
- Imposes minimum tax
- Imposes 10% tax on certain payments to foreign related persons (5% in 2018)

**Other Income – 21%**
- U.S. and Foreign source income that is not FDII or GILTI or eligible for DRDs

**FDII – 13.125%**
- Income from sale, leases, licenses, and dispositions of property to foreign person for foreign use
- Income from services to person outside the US

**GILTI – 10.5% (13.125%)**
- CFC income that is not exempt or sub F
- Current inclusion with 50% deduction
- 80% FTC
- Separate basket
- No FTC carryforward

**Distributions**
- Mandatory Repatriation
- Participation Exemption
- 0% on Previously Taxed Income

**163(j) Limit on interest deduction**
- Related and unrelated party debt
- 30% of EBITDA (EBIT in 2026)

**Branch Income – 21%**
- Current inclusion
- Separate basket
- 10 year carryforward
- Cannot get FDII

**Sub F – 21%**
- Current inclusion at 21%
- General and passive baskets
- 10 year FTC carryforward

**Exempt Income – 0%**
- 10% QBAI
- High Tax sub F income (elective)

**Branch Income – 21%**
- Current inclusion
- Separate basket
- 10 year carryforward
- Cannot get FDII
Measures boosting US competitiveness

1. Reduces corporate rate to 21% and repeals the corporate AMT

2. Provides preferential treatment for certain foreign-derived intangible income (FDII) – reduced 13.125% (16.406% from 2026) effective federal tax rate on certain qualifying income

3. Creates a new, but limited to dividends, participation exemption system

4. Allows expensing of qualified capital investment (temporary)
   - 100% expensing for certain qualified, new and used capital expenditures for five years
   - Election to ‘opt out’ for first year only
   - Not applicable to goodwill, intangibles, or real property

5. Retains research and experimental (R&E) credit
   - must capitalize R&E expenditure after 31/12/2021 (5 year amortization period)
Measures protecting US fiscal interests

1. Imposes a minimum (BEAT) tax on groups making significant deductible payments to related foreign persons (particular impact for reinsurance out of the US)

2. Expands the breadth and impact of controlled foreign corporation status – introduction of effective 10.5% tax on Global Intangible Low-Taxed Income (GILTI)

3. NOL restriction to 80% of profits, indefinite carryforward (though no carryback)

4. Limits net interest deductions to 30% of EBITDA (reduced to EBIT in 2022)
   - Applies to ALL debt (unrelated and related)
   - Indefinite carry forward of disallowed expense
   - No grandfathering of existing debt

5. Mandatory repatriation - tax on overseas earnings from 1986 to 2017: 15.5% on cash or liquid assets and 8% for non-cash assets. Payable over 8 years
Base erosion anti-abuse tax (BEAT) – it’s a REALLY big deal

- Applies to groups with annual average global U.S. gross receipts > $500M over 3 years and base erosion deductions as % of total allowable deductions) > 3%
- Imposes a minimum 10% tax on U.S. companies having excessive deductible ‘base erosion payments’ (transitional 5% rate for 2018; 12.5% after 2025)
- Base erosion payments (payments to 25% related party) wide drafted, includes reinsurance premiums, certain depreciable/amortizable amounts, allowable interest expense. Generally excludes COGS payments
- Difficult to beat the BEAT, appears will be successful in denying tax deductions for reinsurance out of US (will impact both Ireland and Bermuda)
- Impacts on reinsurance operations and capital required to be held by US
- Potential solution may involve reinsurers electing into US tax system (subject to tax at 21% US rate). However, this is complicated and gives rise to a number of issues to consider (e.g. impact of additional Irish tax, need to separate US and non-US business)

### Worked example for offshore reinsurance

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total gross income in US</td>
<td>US$1bn</td>
</tr>
<tr>
<td>Reinsurance premium to related companies</td>
<td>US$300m</td>
</tr>
<tr>
<td>Total US taxable profits</td>
<td>US$50m</td>
</tr>
<tr>
<td>US tax at 21%</td>
<td>US$10.5m</td>
</tr>
<tr>
<td>Base for BEAT calculation (US taxable profits &amp; payments to related parties)</td>
<td>US$350m</td>
</tr>
<tr>
<td>Apply BEAT minimum tax rate for 2019 of 10% (would be 5% for 2018)</td>
<td>US$35m</td>
</tr>
<tr>
<td>BEAT charge (BEAT minimum tax less US tax at 21%)</td>
<td>US$24.5m</td>
</tr>
<tr>
<td>Effective tax rate in US</td>
<td>70%</td>
</tr>
</tbody>
</table>
## Irish considerations

<table>
<thead>
<tr>
<th>Ireland as a home for US investment</th>
<th>Irish inbounds – key takeaways</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros:</strong></td>
<td>1. Beat the BEAT</td>
</tr>
<tr>
<td>1. Low, stable corporation tax on trading income</td>
<td>2. Optimize U.S. and global debt levels</td>
</tr>
<tr>
<td>2. Long track record of business-friendly approach</td>
<td>3. Take advantage of 100% expensing</td>
</tr>
<tr>
<td>3. Existing management may provide required substance</td>
<td>4. Minimize unanticipated CFC consequences</td>
</tr>
<tr>
<td>4. Good treaty network</td>
<td></td>
</tr>
<tr>
<td>5. EU membership</td>
<td></td>
</tr>
<tr>
<td>6. Hedge against future U.S. tax changes</td>
<td></td>
</tr>
<tr>
<td>7. Small or no GILTI change given 12.5% rate</td>
<td></td>
</tr>
</tbody>
</table>

### Cons:

1. High capital gains tax rate
2. May need additional personnel for required substance – income tax considerations
Brexit update
James Maher
Life Reinsurance Forum
Society of Actuaries in Ireland
30 May 2018
Brexit – Navigating Uncertainty
Timeline: Important dates to look out for

Brexit Timeline¹

2017
- Dec 2017
  - In principle agreement on withdrawal
    - Probability of transition period
    - Certainty relating to EU citizens in the UK and vice versa

2018
- Mar 2018
  - EU Summit
- Jun 2018
  - EU Summit
- Autumn 2018
- Oct 2018
  - EU Summit
- Dec 2018
  - In principle agreement on transition
  - Political clarity:
    Can plan for de facto Dec’20 exit?

2019
- Britain leaves the EU.
  - Implementation period begins
- Mar 2019
  - UK parliamentary votes on EU customs union
  - Determine movements on potential UK red lines: ECJ (regulatory alignment) + customs which will impact government positions
- Jul 2019
  - First elections or referendum
- Jul 2019-Dec 2020
  - Ratification of agreement, possibly in 36 Parliaments AND votes in the UK.

2020
- End of implementation period. New relationship comes into force.
- 1 Jan 2021

¹Timings post the October 2018 EU summit are based on best assessment of the timetable based on intelligence as at March 2018. They should therefore be treated with caution.
Insurance Brexit update

Brexit uncertainty

Even with agreement of a transition period, insurance firms still face significant uncertainty. This drives ongoing contingency planning across four key scenarios.

1. **Nature of any Free Trade Agreement (FTA)**
   - The UK government have indicated their acceptance that Financial Services “passporting” in its current form will no longer exist after Brexit.
   - At the direction of UK regulators, the insurance industry has been planning for some time on this basis.
   - In parallel, the industry has been focused on providing input to help shape an FTA that addresses the specific needs of insurance, life and pensions and asset management.

2. **Transition Period**
   - The EU Council has agreed a transition period on March 29th 2019 for 21 months. This will be incorporated in the Withdrawal Agreement which is expected to be agreed in October 2018.
   - UK regulators have told firms they can assume they will not need new PRA/FCA authorisation until the end of the transition period.
   - There is still uncertainty as to how EU27 regulators will ask firms to interpret the transition agreement.

3. **Continuity of Service**
   - Many insurance contracts will “cross over” the date of Brexit. There are several ways that life, pensions and investments contracts could create cross-border issues post Brexit.
   - Life insurance, due to the long-term nature of the business and the mobility of people, poses particular challenges when the geographical perimeter of the market changes. Passporting has conveniently obscured local legal frameworks, which must now be taken into account.
   - There may be an agreement between the UK and the EU27, whereby firms can continue to uphold the rights and obligations of insurance contracts until the end of the contract, without the need for authorisation.
   - Firms have nevertheless been asked by regulators to plan on the basis that authorisation will be required. However the UK has taken unilateral action with a commitment to a temporary permissions regime.
UK domiciled insurers – outbound carriers
30 insurers and 7 investment firms have publicly announced their Brexit contingency plans

The majority of insurers with EU exposures are well advanced in their contingency planning. A few insurers are yet to determine their overall contingency strategy whilst others are actively engaging regulators in dialogue and submitting documentation in support of their contingency plans.

- Life insurance firms which have overseas policyholders in the EU face a risk of losing the right to continue to service customers in the EU post March 2019 / post the transition period if they do not have appropriate contingency plans in place.
- Life firms and investment firms will have different approaches towards contingency planning
  - Life businesses generally have several subsidiaries within the EU and are planning to organise a sensible structure around a European hub.
  - Non-life firms tend to operate under the Freedom of Services and are therefore require setting up a new EU company to access the market
  - Whilst some are setting up new entities, Investment firms tend to be building out existing infrastructure and resources to meet April 2019 requirements
- Many insurers are still proceeding with their contingency plans on the basis that the UK will leave the EU without a Transition Agreement on 29 March 2019.
- A number of firms (mainly non-life) are at an advanced stage of their contingency planning and have now commenced implementation – e.g. company registration and key hires.
- A Part VII transfer process will be used in many cases to transfer policies to EU company or alternative structure.
EU domiciled insurers – inbound carriers

There are c450 insurers operating into the UK under Freedom of Establishment/Freedom of Services

► The scale of the authorisation task facing the PRA and FCA is very significant (i.e. high volume of requests/applications). This means that the schedule for a Part VII process should be considered in the context the full volume of applications going to the PRA and FCA, leaving sufficient time for delays.

► On 28 March, the PRA announced that for inbound carriers:
  ► Firms will not need to be authorised in the UK until the end of the transition period
  ► They should consider how to best make use of the additional time in their planning
  ► The Government will use the proposed temporary permissions regime as a back-stop in case the Withdrawal Agreement is not ratified

► EU27 headquartered firms are now applying for status as Third Country Branches or Authorised Subsidiaries in the UK – 12 month application window opened on 31 March.
Life insurance specific considerations
The three key issues affecting life insurers

1. Policies originally written by a UK insurer in an EU27 territory
   These could fall into the following categories, with different solutions for each:
   - Core business with a strategy for growth
   - Core business and no growth strategy
   - Non-core business

2. Migrating policyholders
   1. UK citizen buys a life policy within the UK
   2. UK citizen then moves abroad to an EU27 country
      a. Participant may return to UK
      b. Require authorisation in every EU country where policies exist
      c. Policy holder moves again
   3. Operationally this will be difficult to maintain as policyholders often do not notify insurers when they move

3. Reinsurance
   - Structure to demonstrate substance (EIOPA’s minimum retention of 10%) vs commercial needs
   - Profit sharing funds with policyholders in both the UK and EU27 countries: Potential operational issues in splitting these policyholders and potential prejudice to policyholders for smaller overseas blocks. A desire/need to reinsure 100% of the risk back to the original fund (but consider EIOPA minimum retention)
On 18th of May EIOPA issues “opinion on the solvency position of insurance and reinsurance undertakings in light of the withdrawal of the UK from the EU#

Impact of UK becoming a 3rd country on solvency position

Impacting the following areas in determination of technical provisions, own funds and capital requirements

- Risk mitigating effects of derivatives from UK banks and investment firms
- UK credit rating agencies will be “deregistered” at the withdrawal date with consequence effect
- Access of UK reinsurers to some markets without presence, impact on risk mitigation due to challenge on qualitative conditions
- Changing recognition of spreads for UK bonds for matching adjustments and standard formulas
- Loss of group approved internal models without reapproval

Other considerations

► Capital considerations (also see EIOPA note)
► Regulatory considerations
► Financial reporting considerations
► Tax considerations
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The expanding market for longevity risk

Sheila Harney
Agenda

• Overview of UK longevity risk transfer market
• Risk Profile
• Areas of innovation
• Challenges
• Future outlook
UK Pension Schemes

- Over 5,000 DB schemes in the UK with estimated liabilities ~ £2 trillion
- Majority closed to new members and to future accrual
- Typically ~40% Pensioners, 45% Deferred Pensioners, 15% Actives
- **Most DB Schemes are on an ultimate path to winding up**
- As Schemes mature, advice is reduce equity risk and move to a matched asset strategy using long dated bonds
- **This leaves longevity risk as the key remaining risk**, along with second order interest/inflation rate risks
- A low interest rate environment and increased debate around future mortality improvements has increased the focus on longevity risk derisking in the UK in recent years
- Funding levels have improved in recent years due to higher pension contributions/strong investment growth and lower life expectancy/inflation assumptions
Methods of Risk Transfer

**Full risk transfer:**
**Pension Buy-out:** *investment, inflation, longevity risks are removed*
- Pension Scheme pays an **upfront** premium to an insurer
- Insurer pays all future pensions **directly** to the insured members
- Full risk transfer – enables Scheme to wind up
- Not affordable for all schemes

**Partial risk transfer**
**A) Pension Buy-in:** *longevity risks are transferred to insurer*
- Pension Scheme pays an **upfront** premium to an insurer
- Insurer pays the pensions for the insured members **to the Scheme**
- Policy is an asset to the Scheme who continues to pay members

**B) Longevity swap:** *longevity risks are transferred to (re)insurer*
- Pension Scheme agrees to pay **regular premiums** to an insurer (comprising of pre-agreed “Fixed Leg” plus Fee)
- Insurer pays the actual future pensions **to the Scheme** (“Floating Leg”)
- Policy is an asset to the Scheme who continues to pay members
Longevity Swap Illustration

Pension Scheme

Collateral

Best Estimate Cashflows + Fee

Insurer

Reinsurer

Pensions are paid until death

Actual pensions are paid until death

Pension Scheme Members
*Transactions announced at time of publication
Source: WTW risk transfer report 2017
# UK Insurers and Reinsurers

## Estimated buy-in and buyout new business 2017*

<table>
<thead>
<tr>
<th>Company</th>
<th>Buy-in</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIC</td>
<td>3,704</td>
</tr>
<tr>
<td>Legal &amp; General</td>
<td>3,405</td>
</tr>
<tr>
<td>Aviva</td>
<td>2,045</td>
</tr>
<tr>
<td>Just</td>
<td>998</td>
</tr>
<tr>
<td>Rothesay Life</td>
<td>960</td>
</tr>
<tr>
<td>Scottish Widows</td>
<td>645</td>
</tr>
<tr>
<td>Canada Life</td>
<td>544</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12,301</strong></td>
</tr>
</tbody>
</table>

*Source: Aon Risk Settlement: UK market update, March 2018
Features of the inforce swap portfolios

• Long duration (usually 10-15 years discounted mean term)
• In practice, fixed and floating legs are offset. The resulting net cashflows can be volatile
  – Very sensitive to changes in mortality improvements
  – Also sensitive to changes in base mortality and interest rates
  – Another risk relates to the contingent life pensions – marital rates and age differences
• Some swaps feature unusual benefit profiles e.g. guarantee periods, temporary pensions, many escalation tranches
Areas of innovation

1. Future-proofing of contracts and collateral structures
2. Small scheme initiatives
3. Alternative intermediaries
4. Tail risk protection
5. Increased market activity outside of the UK
1. Contracts and collateral structures

- Data errors & Reprice rights

- Future novation and termination rights – **flexibility to move to buy-out in future**

- Experience collateral and mortality basis reviews
  
  \[ PV (Fixed\ Leg) \text{ vs } PV(Floating\ Leg) \]

- Fee collateral
2. Small scheme initiatives

Scheme membership by postcode

OVERVIEW OF DEALS

- February 2017: £130m buy-in for the Smiths Group’s TI Group Pension Scheme
- January 2017: £100m buy-in for the Alcatel-Lucent Pension Scheme
- January 2017: £300m longevity swap for an undisclosed pension scheme
- January 2017: £90m buy-in for the Civil Aviation Authority Pension Scheme
- December 2016: £110m buy-in for the Pension and Assurance Scheme of the Land Securities Group of Companies

PIC, Prudential aim to expand de-risking market to small schemes
3. Alternative intermediaries

**Captive**
- Captive acts as intermediary and provides access to reinsurers
- Pension scheme retains reinsurer credit risk
- Typically collateralised

**Fully Intermediated (Traditional or Streamlined)**
- UK regulated insurer acts as counterparty
- Protects pension scheme from reinsurer credit risk
- Can be uncollateralised under the Streamlined/SmartDB variant

**Pass-Through**
- As per fully intermediated, but pension scheme retains reinsurer credit risk
- Typically collateralised

Source: Mercer
4. Tail risk protection

- Designed to transfer extreme longevity risk only
- Can be structured as a stop loss reinsurance or as an out of the money longevity swap
- Very bespoke transaction calibrated to meet a particular clients need
5. Growth outside of the UK

Global longevity exposure around US$30trillion

- France: AXA €750m and €1.3bn longevity swap
- Ireland: €335m Danske Bank buy-in with Irish Life
- Netherlands: Index-based hedges AEGON, Delta Lloyd, NN
- Canada: Bell Canada Pension Plan CA$5bn swap with Sun Life, small scheme initiative with Canada Life
- USA: Slow but steady growth since the mega-deals announced in 2012 (General Motors, Verizon). Buy-outs of $23bn in 2017.
Challenges

- Increasing competition (new entrants), Winner’s Curse
- Complexity increasing
- Operational capacity constraints
- Mortality improvement debate
There is considerable debate about the causes of this slowdown, whether low improvements will persist and for how long. The latest data provides increasing evidence that the low level of recent mortality improvements may be due to medium- or long-term influences, rather than just short-term events such as influenza in early 2015. However almost all users of the CMI Model expect that mortality will continue to improve, even if this is at a slower rate than in the first decade of this century.

Source: CMI briefing note March 2018
Mortality improvement debate (2)

Source: Club Vita analysis of ONS and WHO data

- Levelling off of circulatory disease mortality
- Material rise in Alzheimers and Dementia mortality
Future Outlook

Short-term

• UK bulk annuity market could exceed £30bn in 2018

• Insurer and Reinsurer pricing for de-risking options continues to be very attractive relative to gilt yields

• Will it last? Availability of alternative assets for insurers, debate about future improvements by socio-economic class

• Continued investment in process efficiencies
Medium and Long-term

- PRA reducing risk margin requirements could reduce demand in the UK in time while increase in overseas markets could shift reinsurer focus
- Actual mortality improvements vs expected will continue to affect perception of longevity risk
- Increase in deferred pensioner de-risking
- Eventual reinsurer appetite constraints (limit to US mortality diversification)
What if there was a cure for obesity?

Nay Whynn
Nay Wynn, Research Actuary at Hannover Re

• What is obesity?
• Current statistics
• What causes obesity and what are the consequences?
• How can we tackle obesity?
• What are the impacts on Protection business?
• Q&A

With thanks to Dr Matthew S Capehorn, GPwSI and Bariatric Physician, Clinical Manager for Rotherham Institute for Obesity and Board member for the Association for the Study of Obesity (ASO)
What is obesity?

- $\text{BMI} = \frac{\text{weight(kg)}}{\text{height(m)}^2}$

<table>
<thead>
<tr>
<th>WHO Classification</th>
<th>BMI</th>
<th>Risk of Comorbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Below 18.5</td>
<td>Low (but risk of other clinical problems increased)</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>18.5-24.9</td>
<td>Average</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
<td>Mild increase</td>
</tr>
<tr>
<td><strong>Obese</strong></td>
<td><strong>&gt;30.0</strong></td>
<td></td>
</tr>
<tr>
<td>Grade 1 obesity</td>
<td>30.0-34.9</td>
<td>Moderate increase</td>
</tr>
<tr>
<td>Grade 2 obesity</td>
<td>35.0-39.9</td>
<td>Severe increase</td>
</tr>
<tr>
<td>Grade 3 obesity (morbid obesity)</td>
<td>&gt;40.0</td>
<td>Very severe</td>
</tr>
</tbody>
</table>

Alternatives exist, e.g. waist circumference
Obesity statistics

- Prevalence of obesity among adults aged 16+ years

Health Survey for England 2016; Adult health trends; Obesity defined as BMI $\geq 30$kg/m$^2$

- Prevalence projected to rise to $>50\%$ by 2050
- Total direct and indirect cost of obesity may increase to £50bn
What causes obesity?

- Gluttony (eating too much)?
- Laziness (not enough physical activity)?
- Food Industry?
- Technology (less manual labour, etc.)?
- Comfort eating or habit eating?
- Lack of cooking skills?
- Genetics and/or epigenetics
- Microbiota

The traditional view: energy-in / energy-out

![Balance Scale Diagram]

- Energy Intake
  - Energy-Dense, High-Calorie Diet
  - Genetic Predisposition
- Energy Expenditure
  - Sedentary Lifestyle
Obesity: the revised picture

Consequences of obesity

- **Pulmonary disease**
  - obstructive sleep apnea
  - Asthma/COPD

- **Nonalcoholic fatty liver disease**
  - steatohepatitis
  - cirrhosis

- **Gynaecologic abnormalities**
  - abnormal menses
  - infertility
  - polycystic ovarian syndrome

- **Gall bladder disease**

- **Osteoarthritis**

- **Hyperuricaemia and Gout**

- **Stroke**

- **Coronary heart disease**
  - Dyslipidemia
  - Hypertension

- **Diabetes**

- **Cancer**
  - breast, uterus, cervix
  - colon, esophagus, pancreas
  - kidney, prostate

- **Stress incontinence**

- **Phlebitis**
  - venous stasis

- **Leg ulcers**
  - pressure sores

*Speakers own opinion*
Relative risks of obesity related diseases

<table>
<thead>
<tr>
<th>Disease</th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type II Diabetes</td>
<td>12.7</td>
<td>5.2</td>
</tr>
<tr>
<td>Hypertension</td>
<td>4.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>3.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>2.7</td>
<td>3.0</td>
</tr>
<tr>
<td>Angina</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Gall bladder disease</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>1.7</td>
<td>-</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>1.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.3</td>
<td>1.3</td>
</tr>
</tbody>
</table>

How can we tackle obesity?

1) Tackle all 100+ causes
   - Nanny state or “nudge”
   - Increase physical activity
   - Decrease food consumption
   - Food tax/subsidy
   - Where is the evidence that we can “prevent” obesity?

2) Treat the overweight/obese
   - “Treating” the overweight “prevents” more obesity.
   - NICE Recommends (for adults):
     - Diet
     - Exercise
     - Behavioural therapy
     - Drug treatment
     - Surgery (if BMI >40, or >35 with co-morbidities)
Tackling obesity - diet

Eatwell Guide

Use the Eatwell Guide to help you get a balance of healthier and more sustainable food. It shows how much of what you eat overall should come from each food group.

- Check the label on packaged foods
  - Each serving contains
    - Calories
      - Typical values (as sold) per 100g: 80kl/167kcal
    - Of an adult’s reference intake
      - 12.5%

- Choose foods lower in fat, salt and sugars
  - Eat at least 5 portions of a variety of fruit and vegetables every day

- Choose wholegrain or higher fibre versions with less added fat, salt and sugar
  - Potatoes, bread, rice, pasta and other starchy carbohydrates
    - Choose unsaturated oils and use in small amounts

- Eat more beans and pulses, 2 portions of sustainably sourced fish per week, one of which is oily. Eat less
  - Meat and alternatives
    - Dairy and alternatives

- Eat less often and in small amounts
  - Fats, sugars, and sugars

Per day 2000kcal 2500kcal = ALL FOOD + ALL DRINKS

Eatwell guide, March 2016

Source: Public Health England in association with the Welsh government, Food Standards Scotland and the Food Standards Agency in Northern Ireland

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Diet – common pitfalls

- **All sugars are the same** (4 kcal/g) i.e. sucrose = fructose, etc.
  - Coco pop straws 34g/100g = 2 finger KitKat
  - Fruit juice approximately 9g/100mls

- **All fats (satd/polyunsatd/monounsatd) are the same** (9 kcal/g)
  - Jordan’s Country Crisp Cereal: 28.5g/100g = McDonalds McBacon Roll
  - Thick pork sausages: 20.3g/100g

- **Alcohol** (think of each drink as a chocolate bar!)

- **High fat foods vs Low fat foods**

- **Premium vs Economy ranges vs Home cooked food**
  - Premium - likely to have high fat and high sugar (high calories)
  - Economy - likely to have high salt
  - Home cooked - likely to have high fat (depends on how it is cooked) – better?
Physical activity and health

Risk of CVD mortality by cardiovascular fitness and BMI, 2,316 men with Type 2 diabetes

Risk of CVD mortality by

- Healthy weight
- Overweight
- Obese
Behavioural therapy

• Talking Therapies examples include:
  – Life coaching
  – Cognitive Behavioural Therapy (CBT)
  – Neurolinguistic Programming (NLP)
  – Emotional Freedom Techniques (EFT)
  – Hypnotherapy
  – Hypnobodying.
Can we ever control appetite?

**Neurotransmitter/receptors**
- Leptin receptor
- Dopamine/-receptor
- Noradrenaline/-receptor
- Serotonin/-receptor
- Histamine
- Tryptophan

**Neuropeptides**
- Leptin
- B2-adrenergic receptors
- Nitric oxide
- Opioid receptor
- Nicotine receptor
- B-Endorphin
- GLP-1
- Galanin

**Neurohormones**
- Growth hormones releasing hormones
- MCH (melanin concentrating factor)
- Cholecystokinin
- Somatostatin
- Human growth hormones
- Corticotrophin releasing factor

**Intestines**
- Enterostatin
- GRP (mammalian bomesin)
- Insulin
- Glucagon
- Amylin

**Peripheral Production Sites**
- Digestive enzymes
- PC-1
- Tryptophan
- TNFα

**CNS Production Sites**
- Hypothalamus
- Cortex

**Other tissues**
- Leptin

Drug therapy

Association of Pharmacological Treatments for Obesity with Weight Loss & Adverse Events: A systematic review and meta-analysis - Khera R et al. JAMA, 2016

- 28 RCTs (29,018 patients), Mean age 46 (74% women), weight 100.5kg, BMI 36.1

- Those reaching 5% weight loss:
  - Placebo 23%
  - Phentermine/topiramate 75% 8.8kg (7.42 – 10.20)
  - Liraglutide 63% 5.3kg (4.52 – 6.06)
  - Naltrexone/bupropion 55% 5.0kg (3.96 – 5.94)
  - Lorcaserin 49% 3.2kg (2.46 – 3.97)
  - Orlistat 44% 2.6kg (2.16 – 3.04)

- Liraglutide (OR 2.95) and Naltrexone/bupropion (OR 2.64) were associated with the highest odds of adverse event-related treatment discontinuation
Obesity – surgical interventions

Adapted from http://www.nbsr.co.uk/. The United Kingdom National Bariatric Surgical Register.
Impact on insurance: what is the issue?

• Policies underwritten at the outset
  – what is their health status in 10, 20, 30 years time?
  – it is still an issue for policies that keep in touch with the policyholders
  – the current direction of obesity trends means experience is likely to deteriorate

• Anti-selective lapsing

• Obesity is particularly an issue for:
  – policies with long term
  – policies on guaranteed rates
  – when policyholders can increase cover without further underwriting
Modelling the impact on CI

- Hannover Re trends for CI vary by condition, however to simplify:
  - Base scenario: zero trends
  - Starting point: 100% of lives with normal BMI
  - End point: 50% of lives with normal BMI and 50% obese
- Run 1: allow for increase in rates over 30 years (~2050)
- Run 2: allow for increase in rates over 20 years (~2040)
- The impact is determined by calculating levelised rates by age and term for various sex/smoker splits
- Summarise using a typical business mix to get a single percentage
Run 1: assumptions and impact

- Run 1 (obesity impact over 30 years) assumes the trends:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart attack</td>
<td>+0.7%</td>
<td>+2.5%</td>
</tr>
<tr>
<td>Stroke</td>
<td>+0.5%</td>
<td>+0.5%</td>
</tr>
<tr>
<td>Other digestive cancers</td>
<td>+0.5%</td>
<td>+0.5%</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>N/A</td>
<td>+0.2%</td>
</tr>
<tr>
<td>Upper aerodigestive cancers</td>
<td>+1.4%</td>
<td>+1.4%</td>
</tr>
</tbody>
</table>

Overall impact:

<table>
<thead>
<tr>
<th>Run 1</th>
<th>MN</th>
<th>MS</th>
<th>FN</th>
<th>FS</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact</td>
<td>2%</td>
<td>2%</td>
<td>3%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Derived from multiple sources
Run 2: assumptions and impact

- Run 2 (obesity impact over 20 years) assumes the trends:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart attack</td>
<td>+1.1%</td>
<td>+3.8%</td>
</tr>
<tr>
<td>Stroke</td>
<td>+0.7%</td>
<td>+0.7%</td>
</tr>
<tr>
<td>Other digestive cancers</td>
<td>+0.7%</td>
<td>+0.7%</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>N/A</td>
<td>+0.4%</td>
</tr>
<tr>
<td>Upper aerodigestive cancers</td>
<td>+2.0%</td>
<td>+120%</td>
</tr>
</tbody>
</table>

- Overall impact:

<table>
<thead>
<tr>
<th>Run 2</th>
<th>MN</th>
<th>MS</th>
<th>FN</th>
<th>FS</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact</td>
<td>3%</td>
<td>4%</td>
<td>5%</td>
<td>5%</td>
<td>4%</td>
</tr>
</tbody>
</table>
Improving the model

• You can improve the model by allowing for:
  – Obesity prevalence differences by age, socioeconomic status, ethnicity
  – anti-selective lapse risk
  – severity based pay-outs

• Your own results be different if you:
  – place difference weights on the CI condition
  – a different starting point for trends
  – a different methodology for setting trends and evaluating the impact
  – different CI conditions covered in your ‘standard CI’ product
Impact on Term Assurance

- Historic reductions in smoker prevalence led to reducing mortality from cardiovascular diseases, stroke and cancers
  - would the rise of obesity prevalence reverse this?
  - could see start projecting mortality deteriorations in the future?
- NHS (June 2016) estimates that:
  - obesity reduces life expectancy by an average of 3 to 10 years, depending on severity
  - obesity and being overweight contribute to at least 1 in every 13 deaths in Europe
- Impact on TA may be less than CI?
  - you could be diagnosed with a heart attack/stroke as a result of your obesity (get a pay-out under CI) but still take preventative measures to delay death
Summary

• Obesity is a social problem
• Very cost-effective to treat obesity and it makes a huge difference physically and psychologically
• **Obesity is a chronic relapsing condition** – we cannot expect to cure it; instead we need a lifelong management plan
• Rising obesity prevalence is a concern for insurance products that underwrite at the outset
• Impact on CI of around 2% to 4% but could be higher
• Have you allowed for obesity prevalence for setting future trends?