Society of Actuaries in Ireland

Life Reinsurance Forum

30 May 2018

Disclaimer

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

Agenda

Topic	Speaker(s)
Current Topics in Reinsurance o EIOPA consultation on SCR changes o US Tax Reform o Brexit	Patrick Meghan (Milliman) Liam Lynch (KPMG) James Maher (EY)
The expanding market for Longevity Risk	Sheila Harney (Canada Life Re)
What if we find a cure for obesity?	Nay Wynn (Hannover Re)

Society of Actuaries in Ireland

SCR Review 2018

Patrick Meghen

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

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

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

Feedback
- ECON Committee of EC
- May 2018

Changes Announced

2016 | 2017 | 2018

What are the proposed changes?

EIOPA-BoS-17/280
30 October 2017

EIOPA's first set of advice to the European Commission on specific items in the Solvency II Delegated Regulation

EIOPA – Westhafen Tower, Westhafenplatz 1 - 60327 Frankfurt – Germany - Tel. + 49 69-951119-20;
Fax. + 49 69-951119-19; email: info@eiopa.europa.eu site: https://eiopa.europa.eu/

Set 1: 137 pages

EIOPA-BoS-18/075
28 February 2018

EIOPA's second set of advice to the European Commission on specific items in the Solvency II Delegated Regulation

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

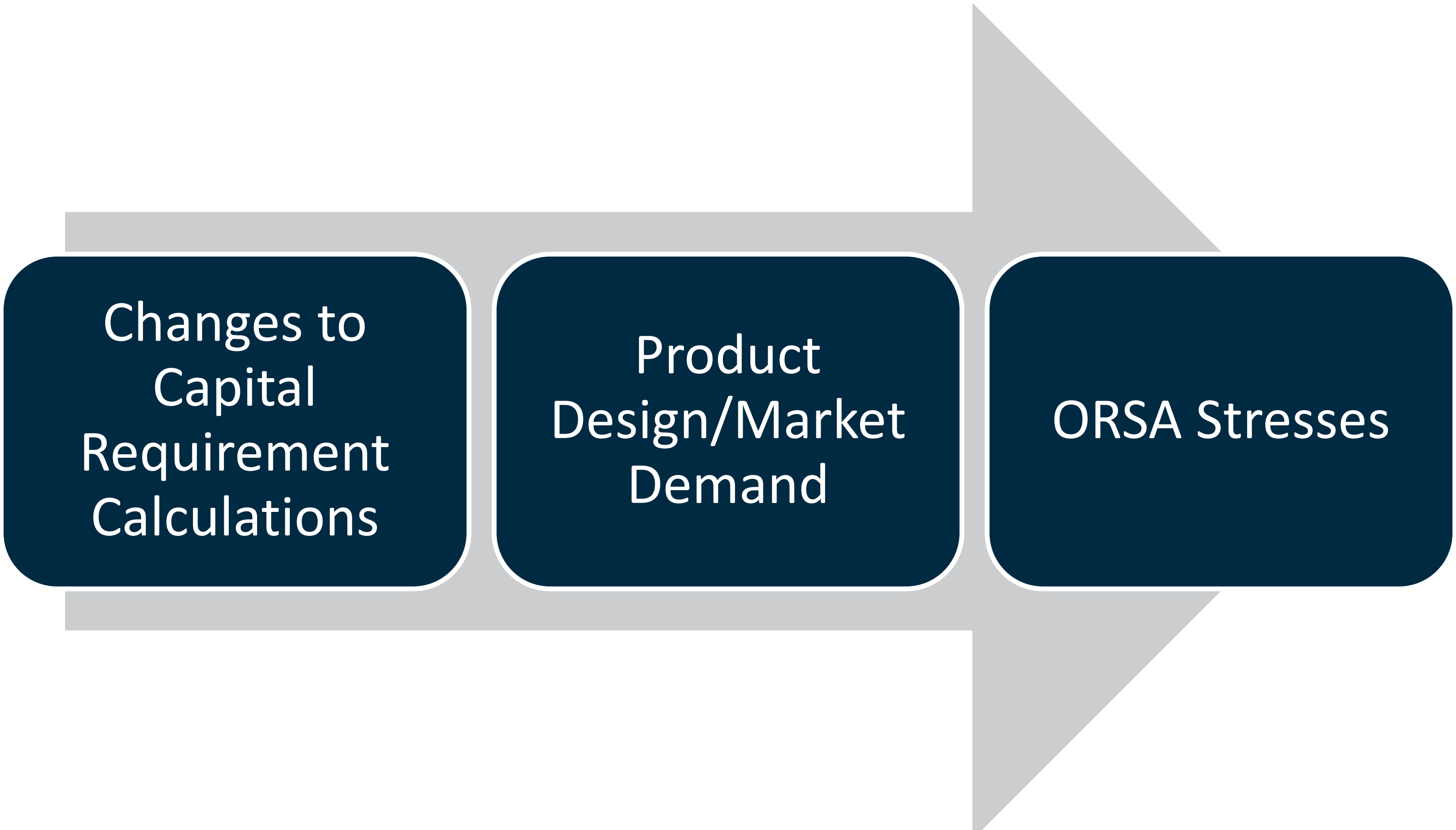
LACDT

What changes are proposed? Set 2

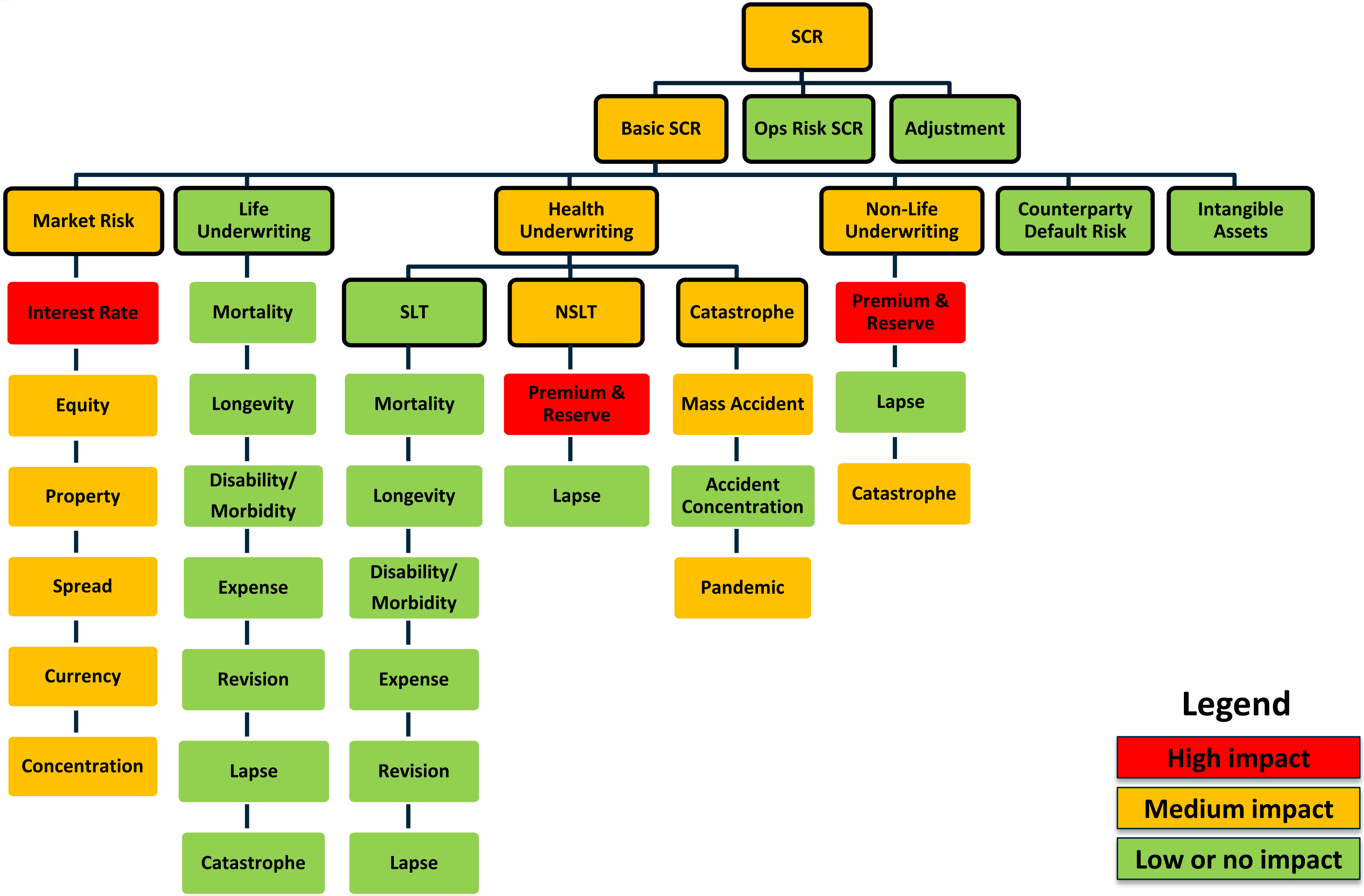
Recalibration of standard parameters for Prem&Reserve risk	Volume measure for premium risk	Recalibration of mortality and longevity	Explore simplifications for non-life cat risk
Interest rate risk	Market Risk Concentration	Currency at Group level	Unrated Debt
Unlisted Equity	Strategic Equity investments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

Controversy

Impact for Reinsurers



SCR – Standard Formula



Internal Model Companies

- 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

ORSA

- 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
  - Set 1: https://eiopa.europa.eu/Publications/Consultations/EIOPA-BoS-17-280_First_set_of_Advice_on_SII_DR_Review.pdf
  - Set 2: https://eiopa.europa.eu/Publications/Consultations/EIOPA-18-075-EIOPA_Second_set_of_Advice_on_SII_DR_Review.pdf
- Milliman Briefing Notes (shorter summary)
  - Set 1: http://ie.milliman.com/uploadedFiles/insight/2017/EIOPA-Solvency-II-Review.pdf
  - Set 2: http://ie.milliman.com/uploadedFiles/insight/2018/EIOPA-Second-Set-Advice.pdf
- Latest ECON Committee Meeting
  - European Parliament's Committee on Economic and Monetary Affairs (Econ) on 16 May

Questions

US TAX REFORM

Liam Lynch
Tax Partner KPMG
Head of Insurance Tax, Ireland

30 May 2018

The cost and how its paid for

Revenue impact[1] US$'bn	Final bill provisions
$1,349	Reduce Corporate rate to 21% KEY
$415	Pass-throughs
$212	Territoriality
$86	Temporary, limited expensing
$64	Domestic IP incentive (foreign-derived intangible income ("FDII") deduction)
$98	Repeal section 199 (relates to US manufacturing)
$113	Super Subpart F (incl. global intangible low-taxed income ("GILTI") inclusion) KEY
$150	Base erosion and anti-abuse tax ("BEAT") KEY
$201	NOL reform
$253	Interest expense reforms
$339	Mandatory repatriation

1. *Based on scores provided by the Joint Committee on Taxation, US Congress*

KEY ***Of major relevance for Insurance Industry***

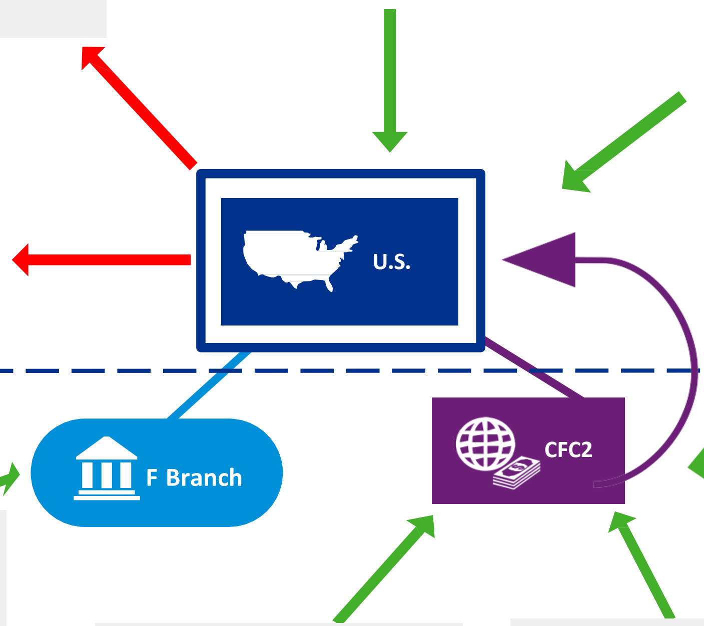
Key measures – one page summary

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

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



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

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

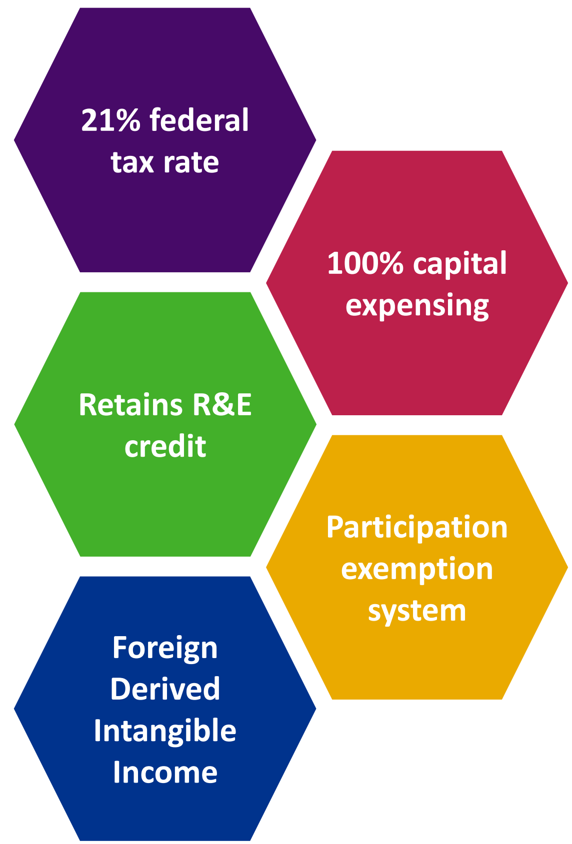
Branch Income – 21%
- Current inclusion
- Separate basket
- 10 year carryforward
- Cannot get FDII

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)

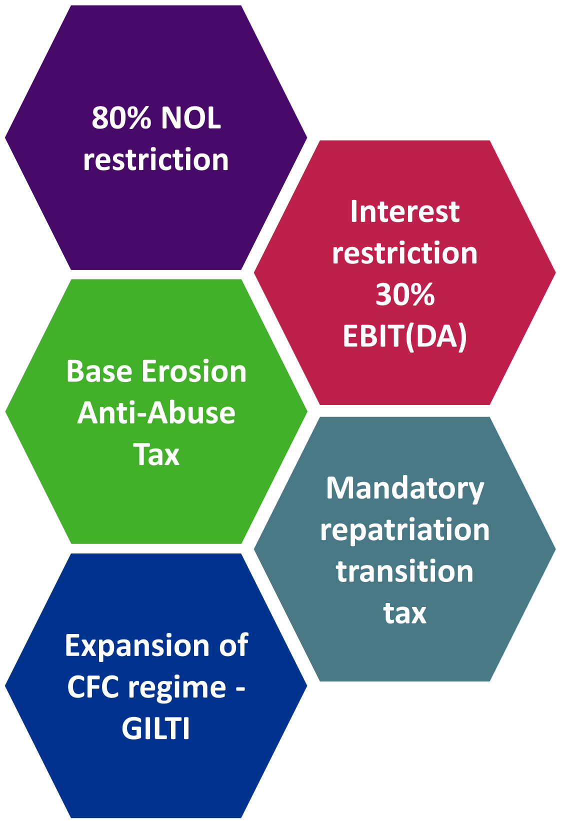
Measures boosting US competiveness

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	
Total gross income in US	US$1bn
Reinsurance premium to related companies	US$300m
Total US taxable profits	US$50m
US tax at 21%	US$10.5m
Base for BEAT calculation (US taxable profits & payments to related parties)	US$350m
Apply BEAT minimum tax rate for 2019 of 10% (would be 5% for 2018)	US$35m
BEAT charge (BEAT minimum tax less US tax at 21%)	US$24.5m
Effective tax rate in US	70%

Irish considerations

Ireland as a home for US investment

Pros:

1. Low, stable corporation tax on trading income
2. Long track record of business-friendly approach
3. Existing management may provide required substance
4. Good treaty network
5. EU membership
6. Hedge against future U.S. tax changes
7. Small or no GILTI change given 12.5% rate

Cons:

1. High capital gains tax rate
2. May need additional personnel for required substance – income tax considerations

Irish inbounds – key takeaways

1. Beat the BEAT
2. Optimize U.S. and global debt levels
3. Take advantage of 100% expensing
4. Minimize unanticipated CFC consequences

Brexit update

James Maher

Life Reinsurance Forum

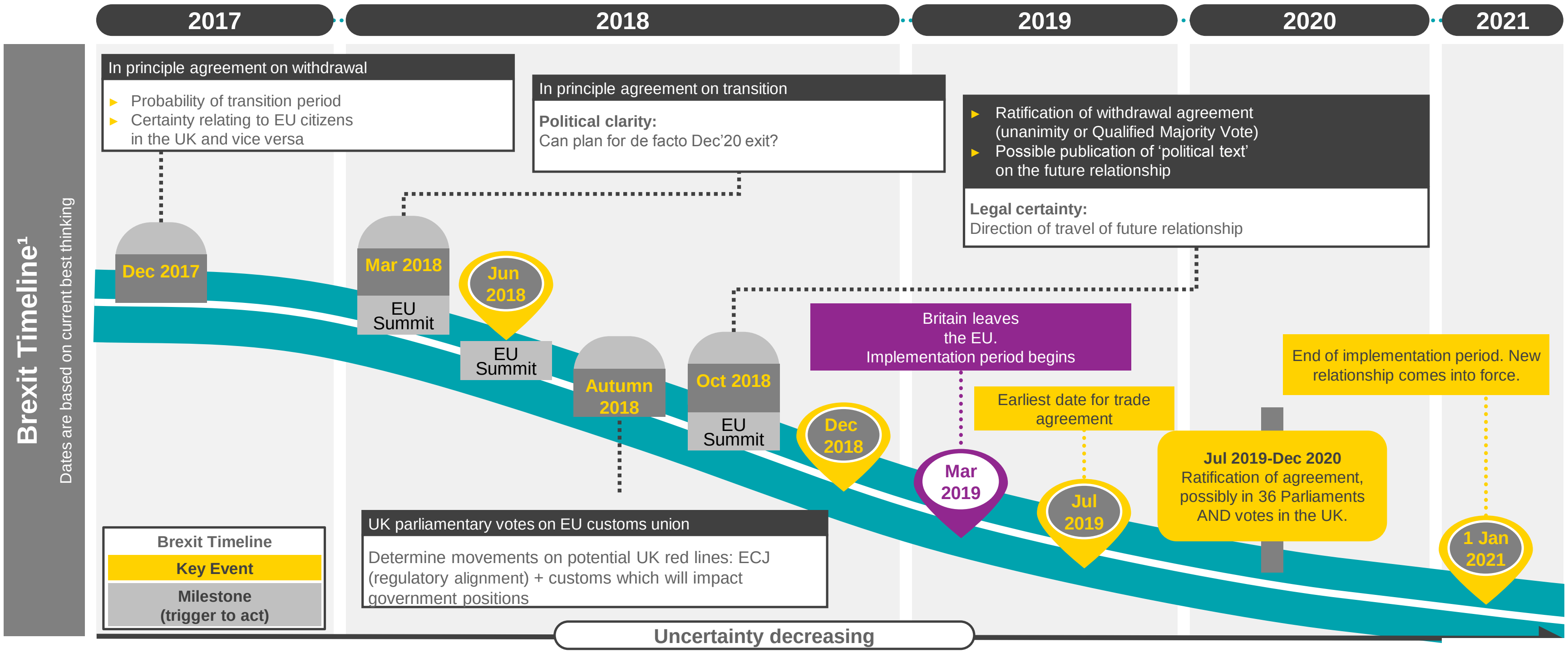
Society of Actuaries in Ireland

30 May 2018

Building a better working world

Brexit – Navigating Uncertainty

Timeline: Important dates to look out for



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

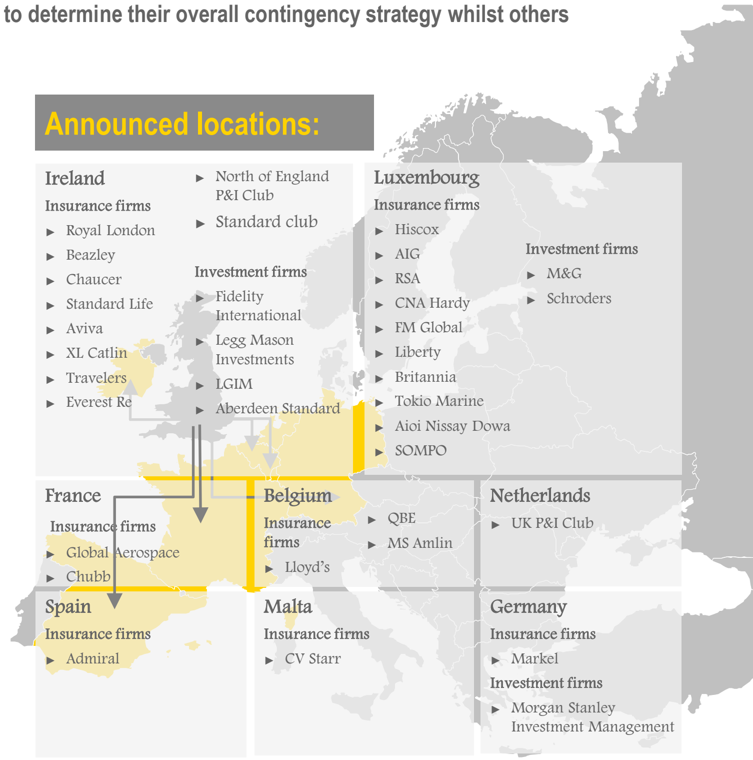
- Many insurance contracts will "cross over" the date of Brexit. There are several ways that life, pensions and investments contracts could create cross-border issues post Brexit.
- Life insurance, due to the long-term nature of the business and the mobility of people, poses particular challenges when 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

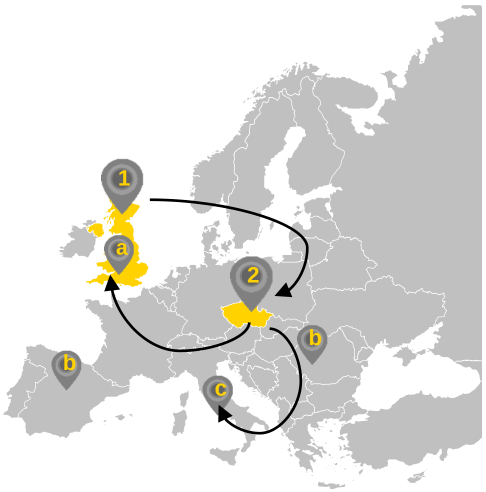
1 Policies originally written by a UK insurer in an EU27 territory

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)

EIOPA Opinion

- 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
  - https://eiopa.europa.eu/Publications/Opinions/EIOPA-BoS-18-2018_opinion_on_solvency_and_Brexit.pdf

Other considerations

- Capital considerations (also see EIOPA note)
- Regulatory considerations
- Financial reporting considerations
- Tax considerations

EY | Assurance | Tax | Transactions | Advisory

About EY
EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. For more information about our organization, please visit ey.com.

EYG/OC/FEA no.

ED None

EY-000055539-01 (UK) 02/18. CSG London.

ey.com/

Society of Actuaries in Ireland

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

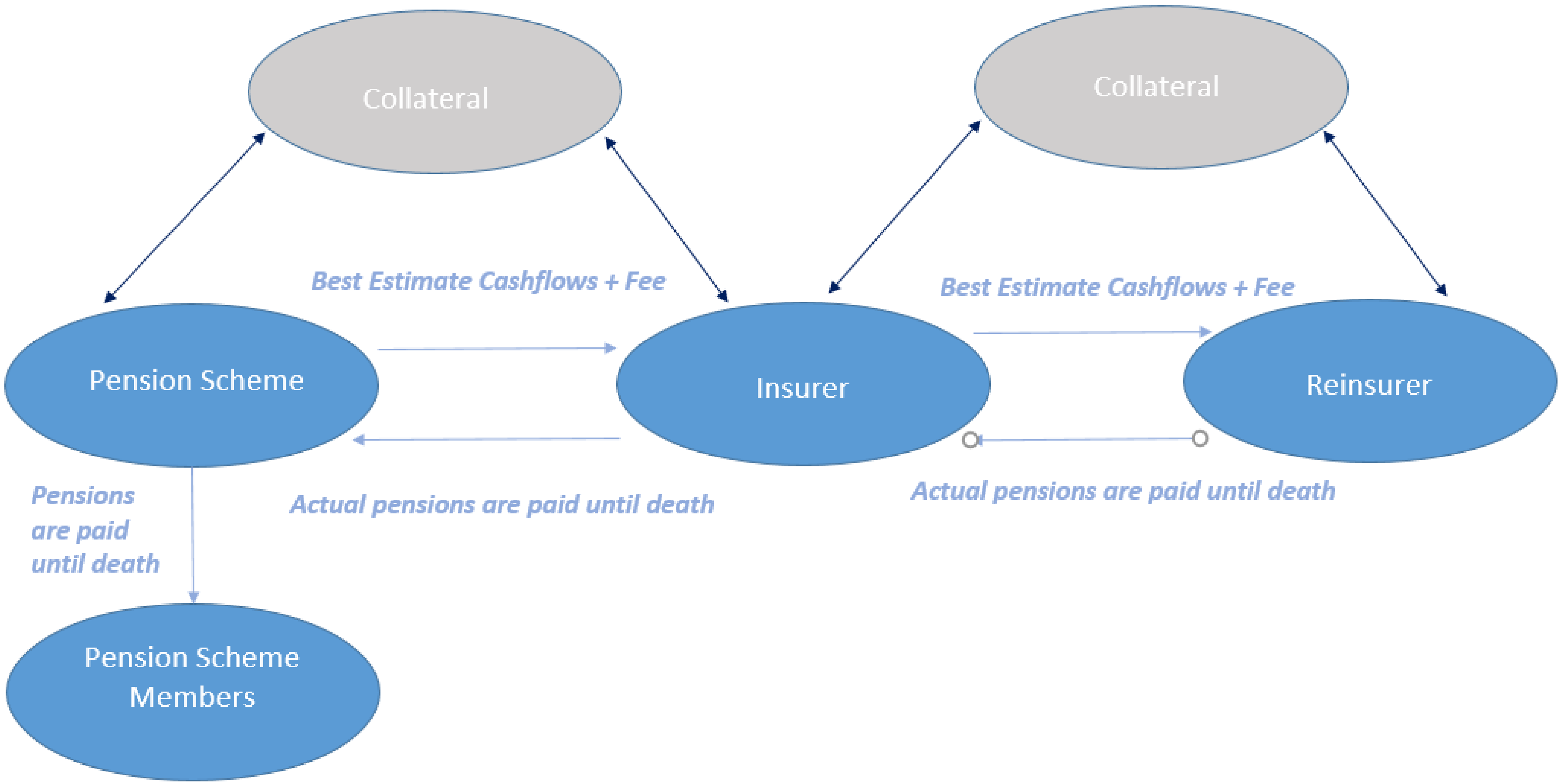
A) Pension Buy-in: longevity risks are transferred to insurer

- 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

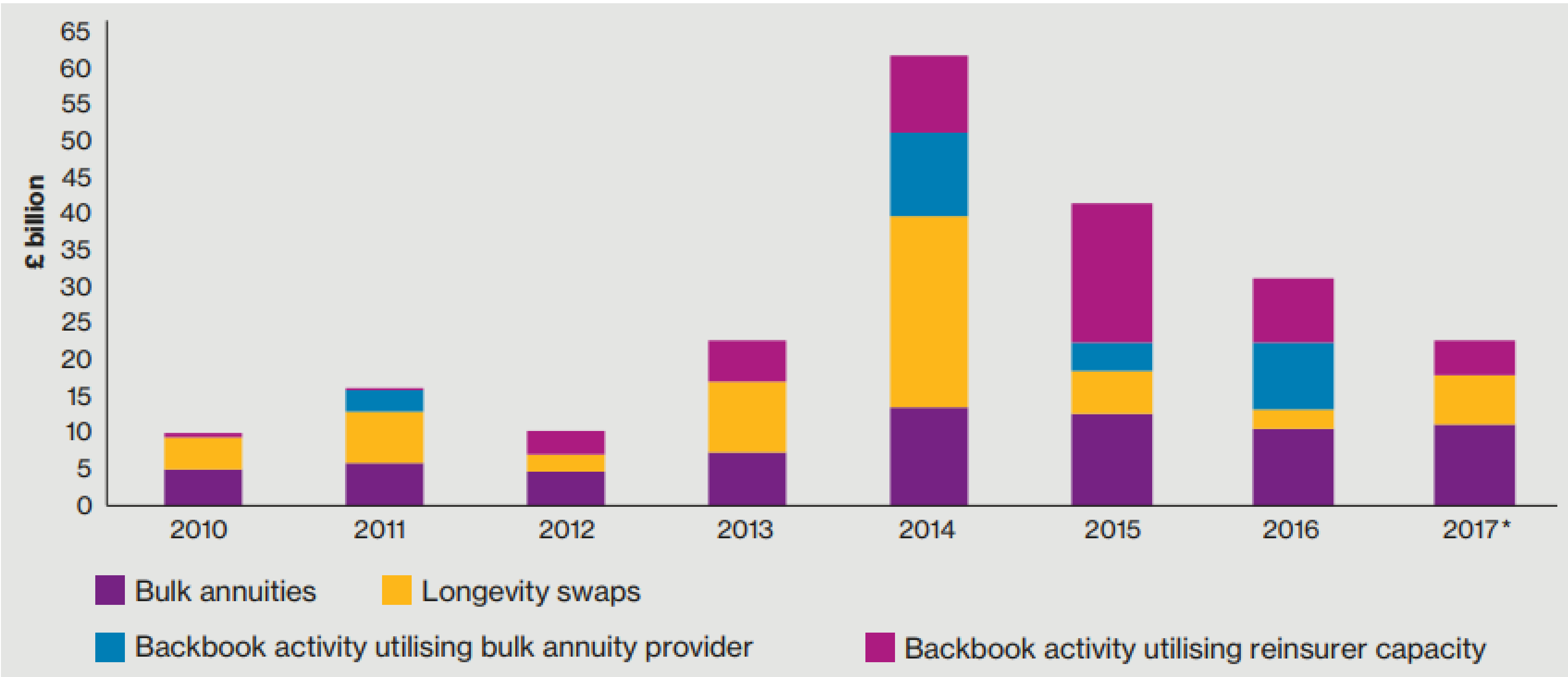
B) Longevity swap: longevity risks are transferred to (re)insurer

- 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



Historical Risk Transfers



*Transactions announced at time of publication
Source: WTW risk transfer report 2017

UK Insurers and Reinsurers

Estimated buy-in and buyout new business 2017*	
PIC	3,704
Legal & General	3,405
Aviva	2,045
Just	998
Rothesay Life	960
Scottish Widows	645
Canada Life	544
TOTAL	**12,301**

*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

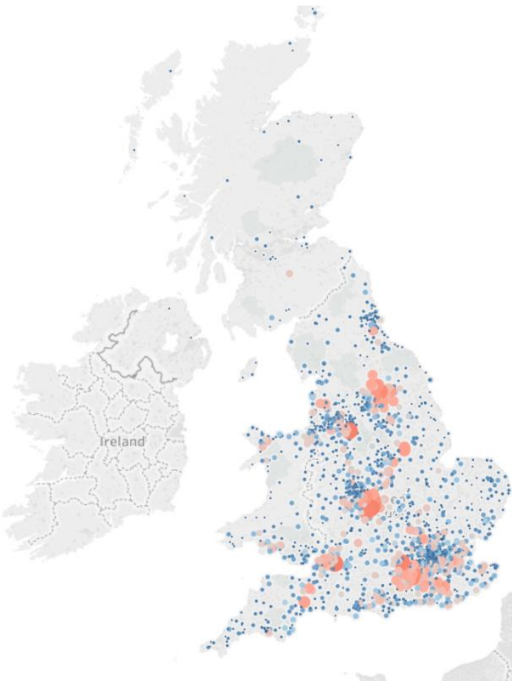
5. Increased market activity outside of the UK

1. Contracts and collateral structures

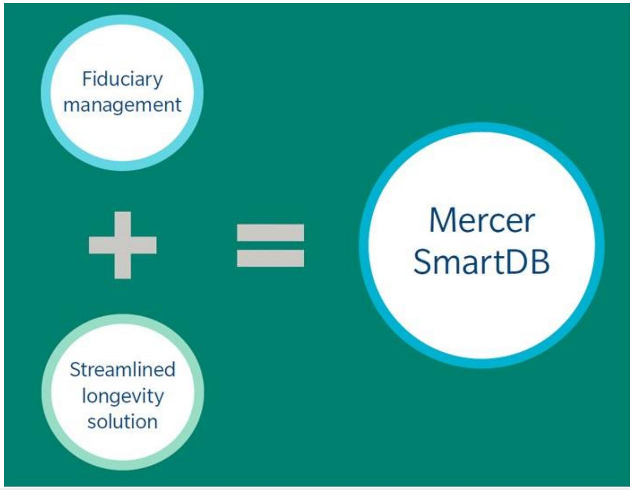
- Data errors & Reprice rights
- Future novation and termination rights – **flexibility to move to buy-out in future**
- Experience collateral and mortality basis reviews

  PV (Fixed Leg) 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

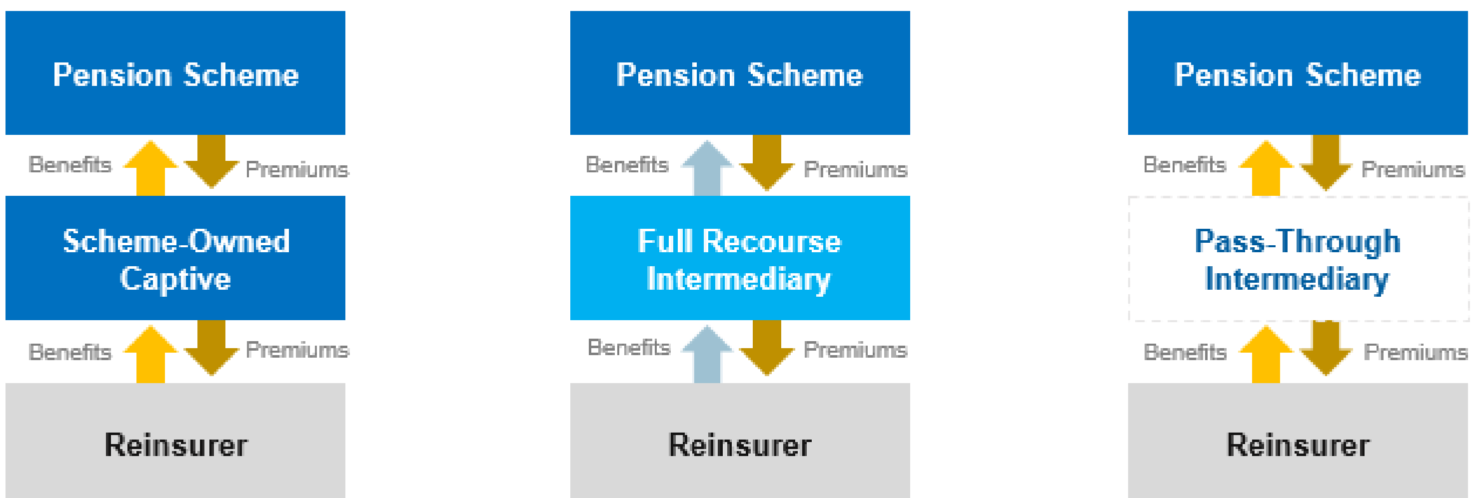
- Captive acts as intermediary and provides access to reinsurers
- Pension scheme retains reinsurer credit risk
- Typically collateralised

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

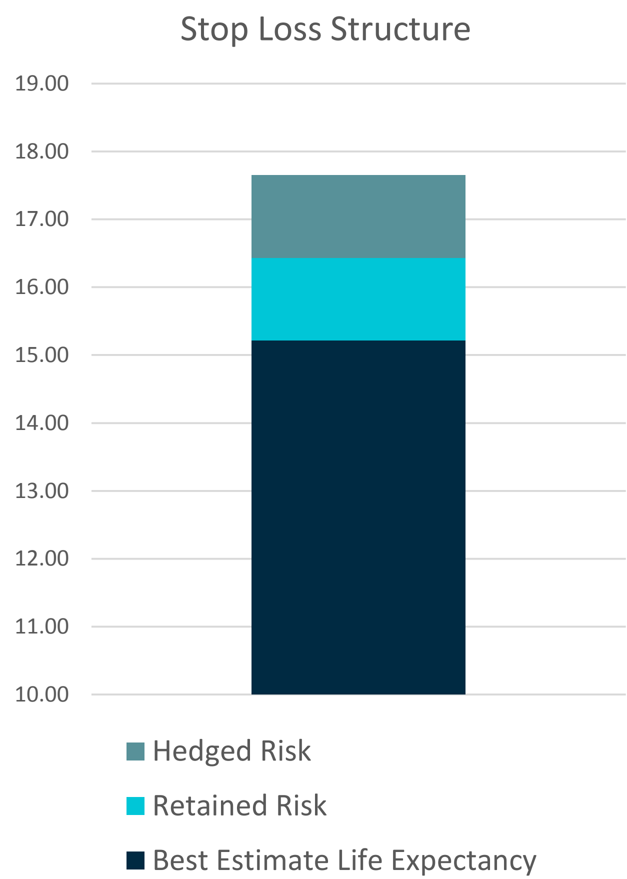
Pass-Through

- 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

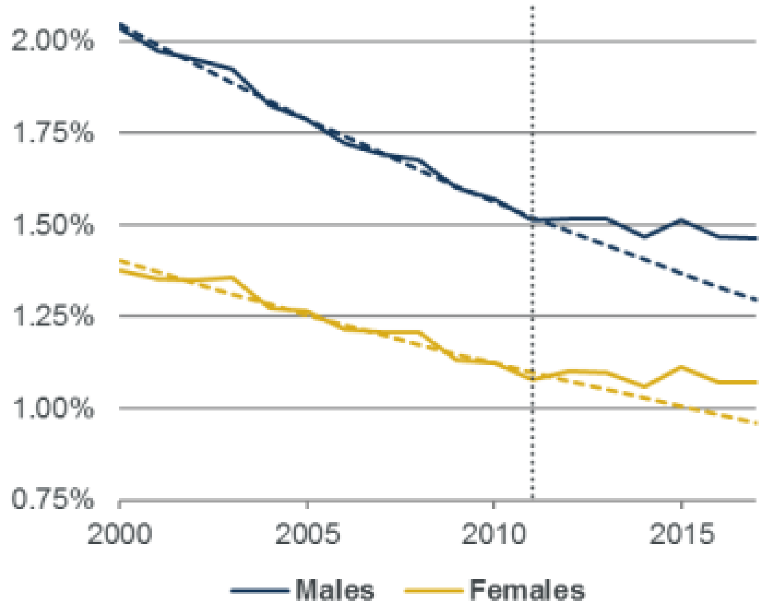
- Canada: Bell Canada Pension Plan CA$5bn swap with Sun Life, small scheme initiative with Canada Life
- USA: Slow but steady growth since the mega-deals announced in 2012 (General Motors, Verizon). Buy-outs of $23bn in 2017.

Challenges

- Increasing competition (new entrants), Winner's Curse
- Complexity increasing
- Operational capacity constraints
- Mortality improvement debate

Mortality improvement debate (1)

Chart 1: Standardised mortality rates, 2000-2017, males and females



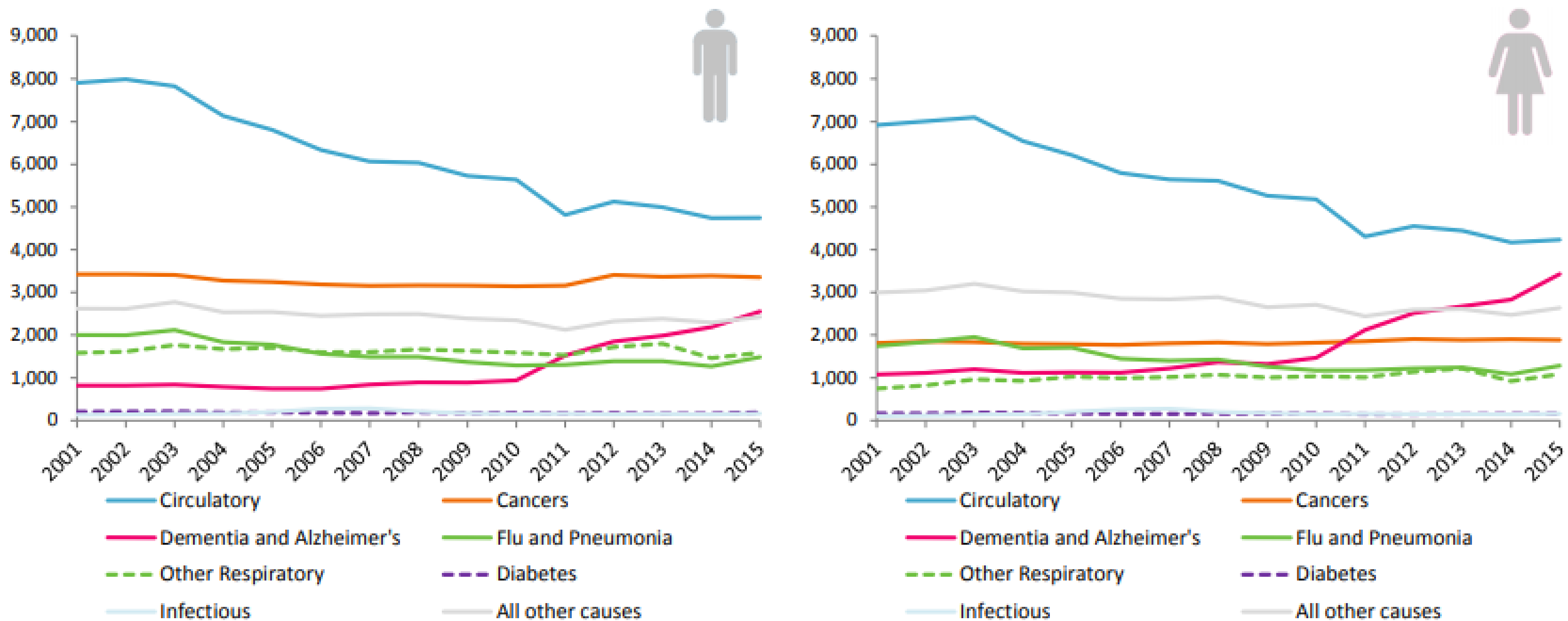
"…SMRs for males and females in 2017 are 13% and 11% higher than would have been expected from extrapolating the trends in 2000-2011…"

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)

Mortality amongst 85+ (England & Wales, deaths per 100,000 lives)



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

Future Outlook

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)

Society of Actuaries in Ireland

What if there was a cure for obesity?

Nay Whynn

Intro/Contents

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?

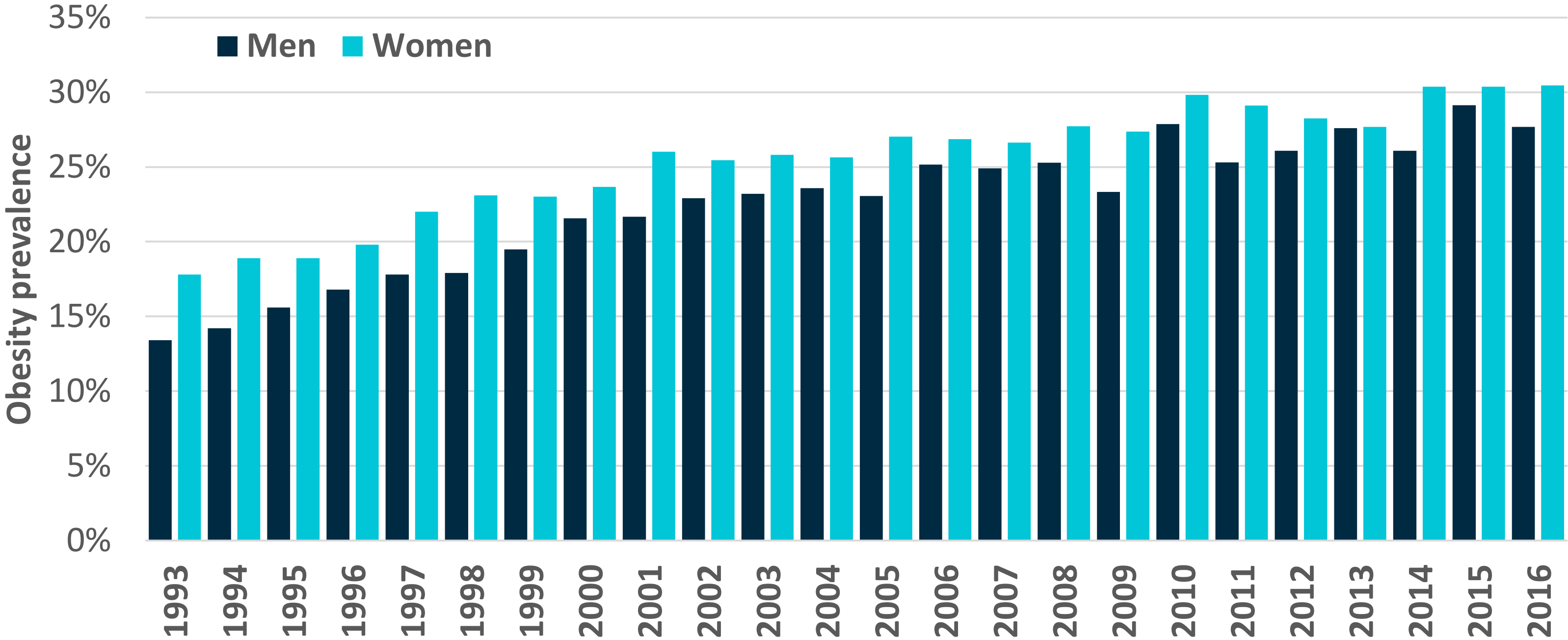
- **BMI = weight(kg) / height(m)^2**

WHO Classification	BMI	Risk of Comorbidity
Underweight	Below 18.5	Low (but risk of other clinical problems increased)
Healthy weight	18.5-24.9	Average
Overweight	25.0-29.9	Mild increase
Obese	**>30.0**	
Grade 1 obesity	30.0-34.9	Moderate increase
Grade 2 obesity	35.0-39.9	Severe increase
Grade 3 obesity (morbid obesity)	>40.0	Very severe

Alternatives exist, e.g. waist circumference

Obesity statistics

- **Prevalence of obesity among adults aged 16+ years**

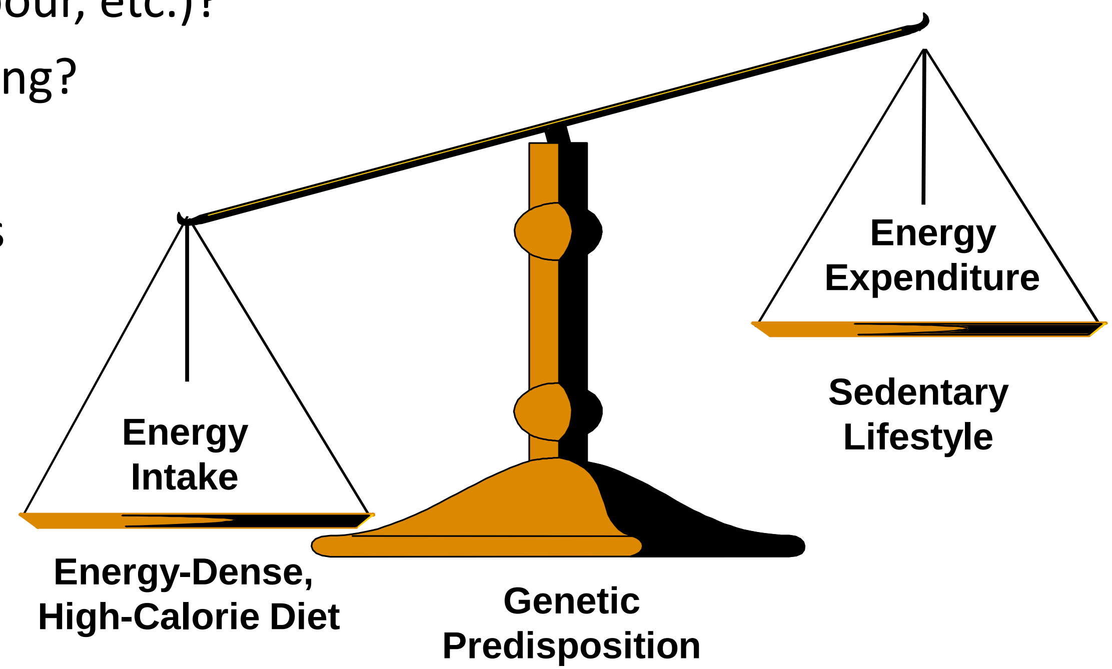


Health Survey for England 2016; Adult health trends; Obesity defined as BMI ≥ 30kg/m^2

- **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

Obesity: the revised picture

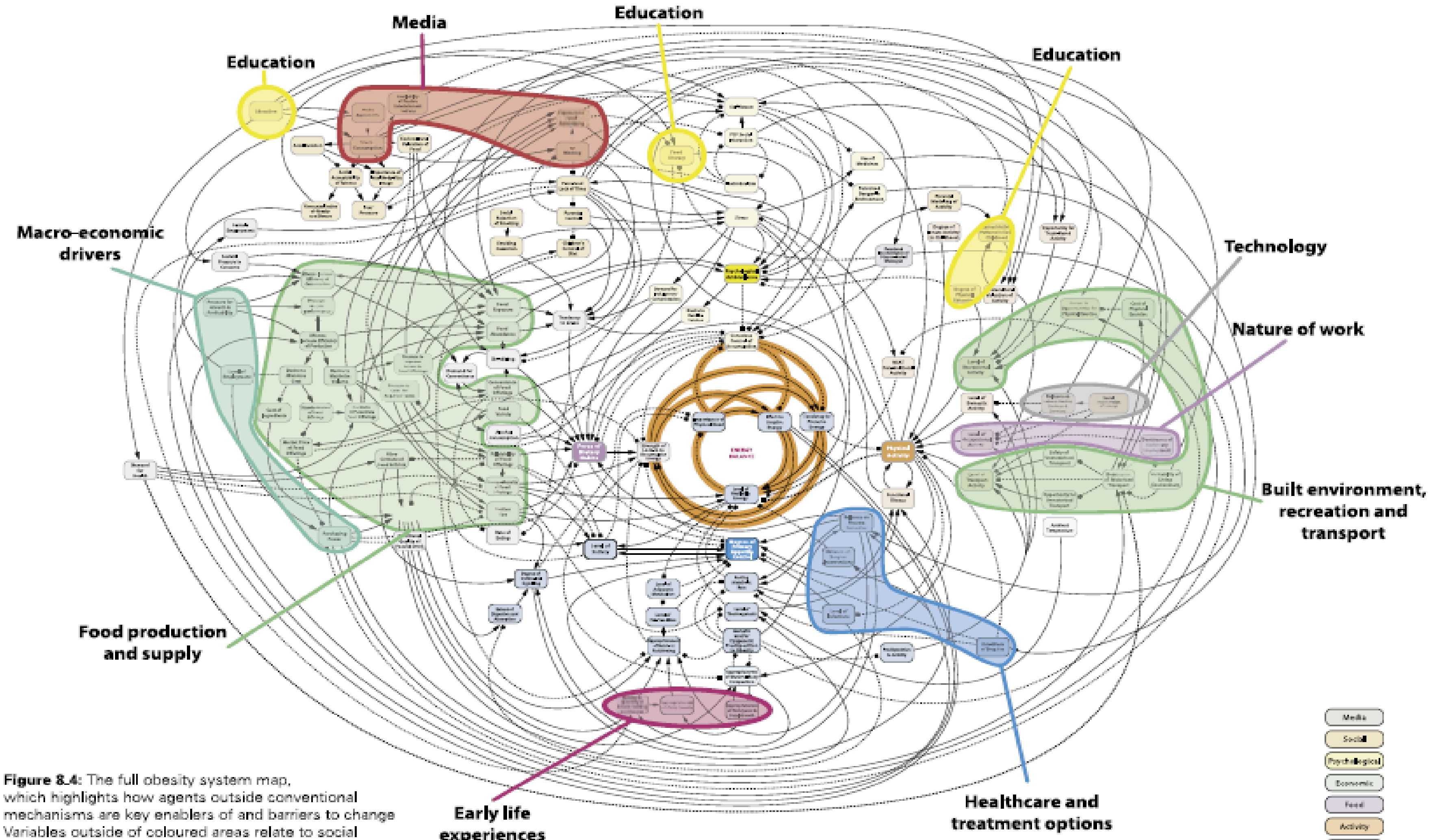
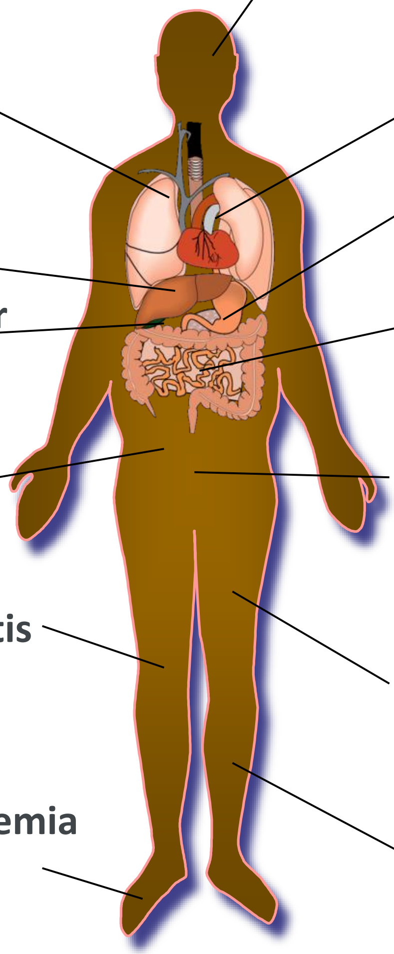


Figure 8.4: The full obesity system map, which highlights how agents outside conventional mechanisms are key enablers of and barriers to change Variables outside of coloured areas relate to social trends and interaction or human biology. Variables are represented by boxes, positive causal relationships are represented by solid arrows and negative relationships by dotted lines. The central engine is highlighted in orange at the centre of the map.

Foresight. Tackling Obesities: Future Choices. Gov.UK. 2007

Consequences of obesity

- **Pulmonary disease**
  - obstructive sleep apnea
  - Asthma/COPD
- **Nonalcoholic fatty liver disease**
  - steatohepatitis
  - cirrhosis
- **Gall bladder disease**
- **Gynaecologic abnormalities**
  - abnormal menses
  - infertility
  - polycystic ovarian syndrome
- **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

Disease	Women	Men
Type II Diabetes	12.7	5.2
Hypertension	4.2	2.6
Myocardial infarction	3.2	1.5
Colon cancer	2.7	3.0
Angina	1.8	1.8
Gall bladder disease	1.8	1.8
Ovarian cancer	1.7	-
Osteoarthritis	1.4	1.9
Stroke	1.3	1.3

National Audit Office Report. Tackling Obesity in England. London, 2001

How can we tackle obesity?

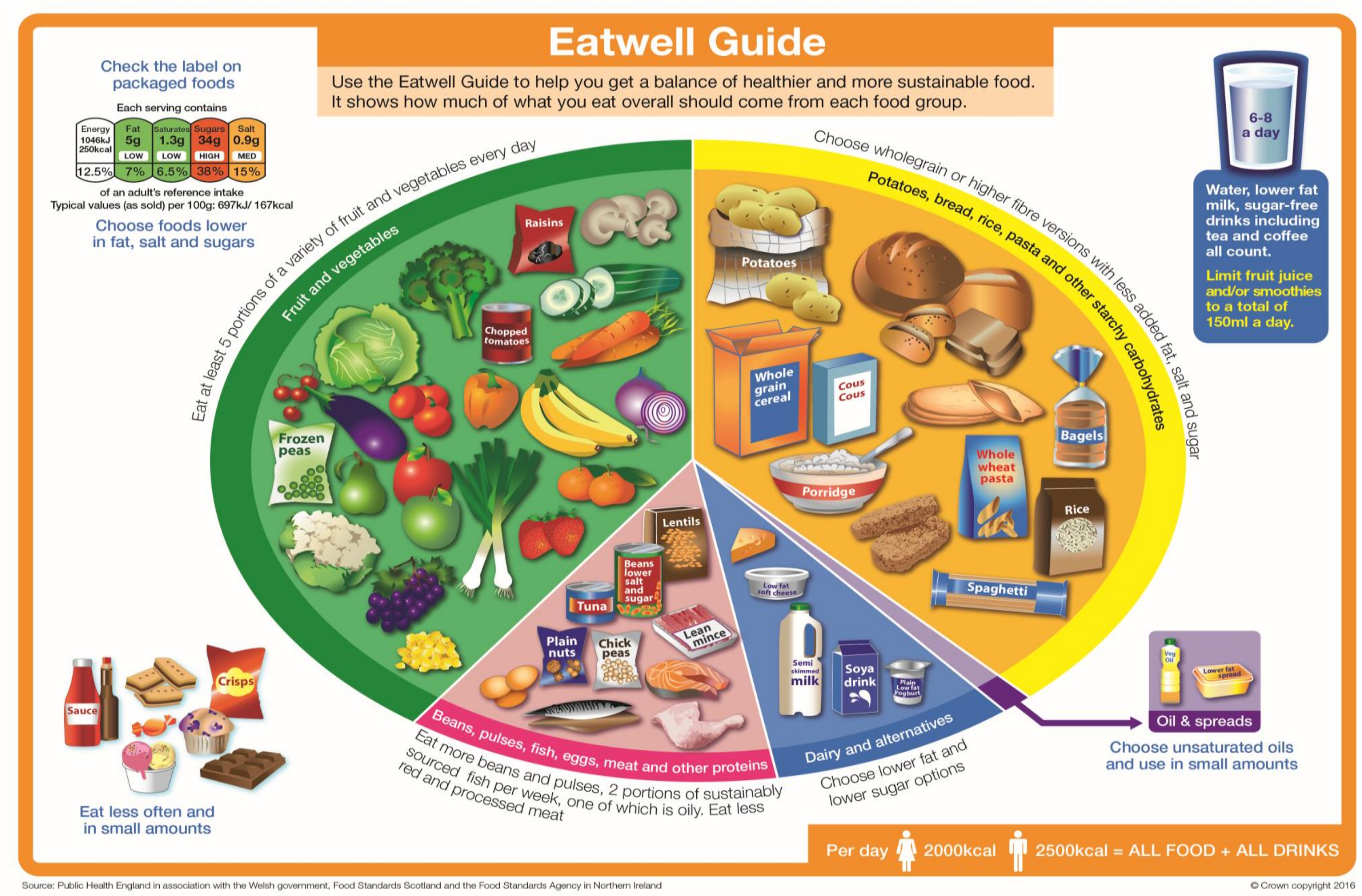
1) Tackle all 100+ causes

- 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)

Tacking obesity - diet

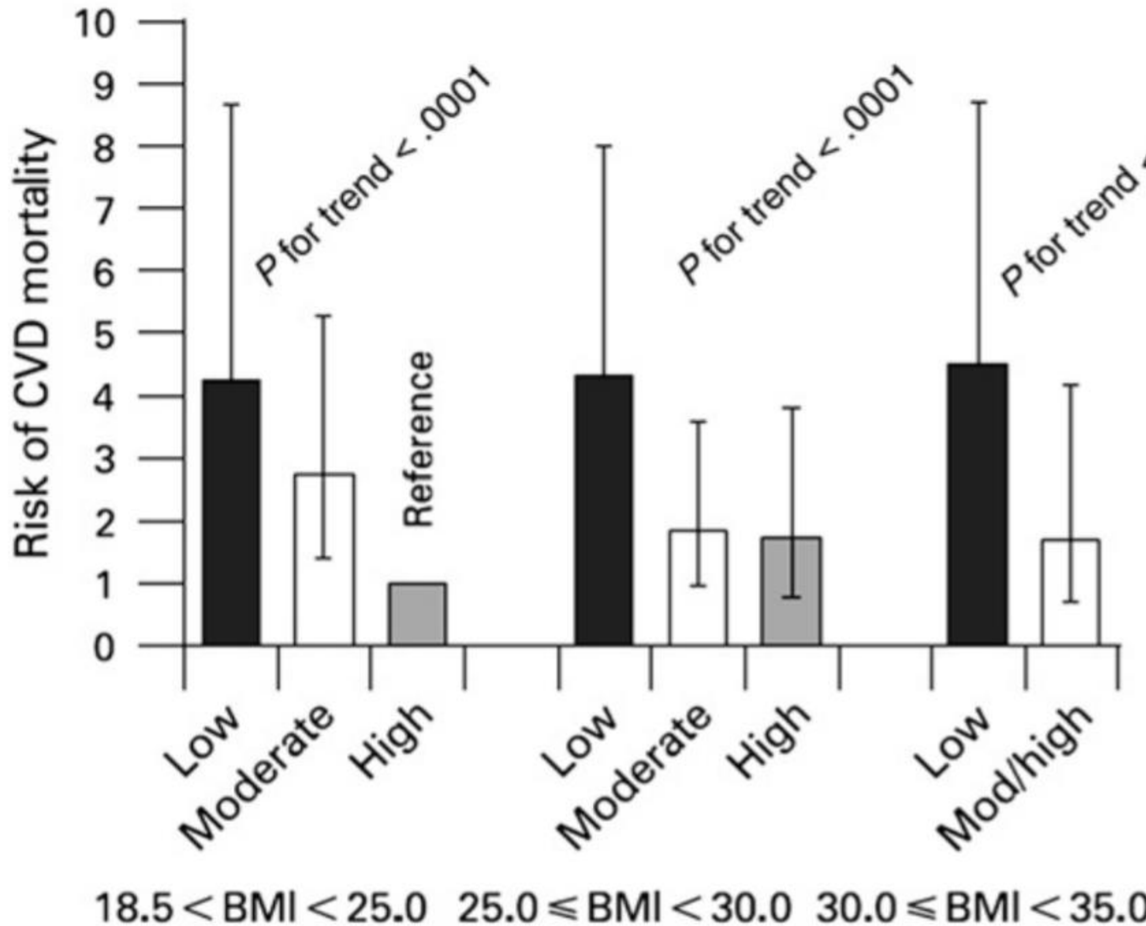


Eatwell guide, March 2016

Diet – common pitfalls

- **All** sugars are the same **(4kcal/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 **(9kcal/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



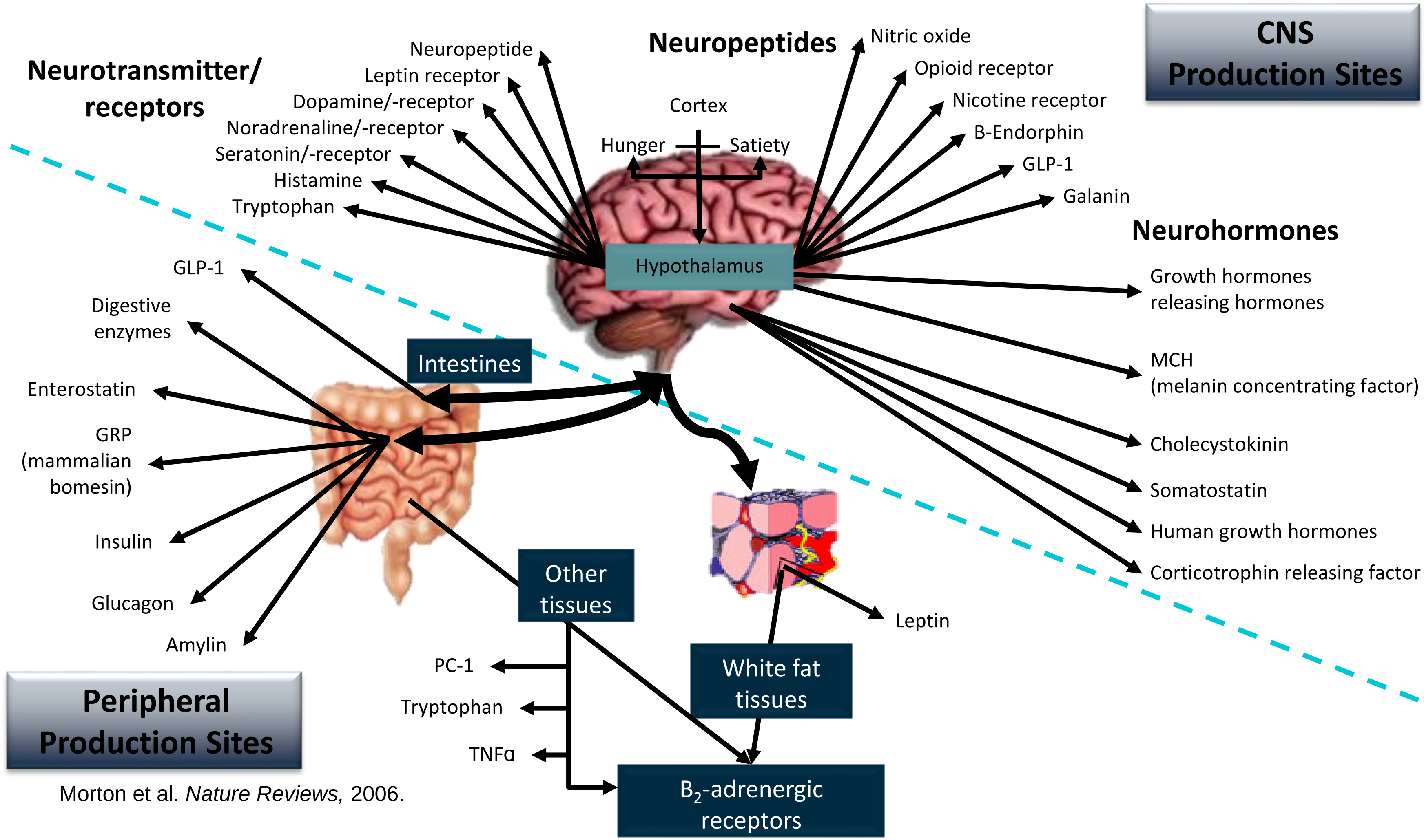
Healthy weight **Overweight** **Obese**

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

Behavioural therapy

- Talking Therapies examples include:
  - Life coaching
  - Cognitive Behavioural Therapy (CBT)
  - Neurolinguistic Programming (NLP)
  - Emotional Freedom Techniques (EFT)
  - Hypotherapy
  - Hypnobanding.

Can we ever control appetite?



Morton et al. *Nature Reviews*, 2006.

Drug therapy

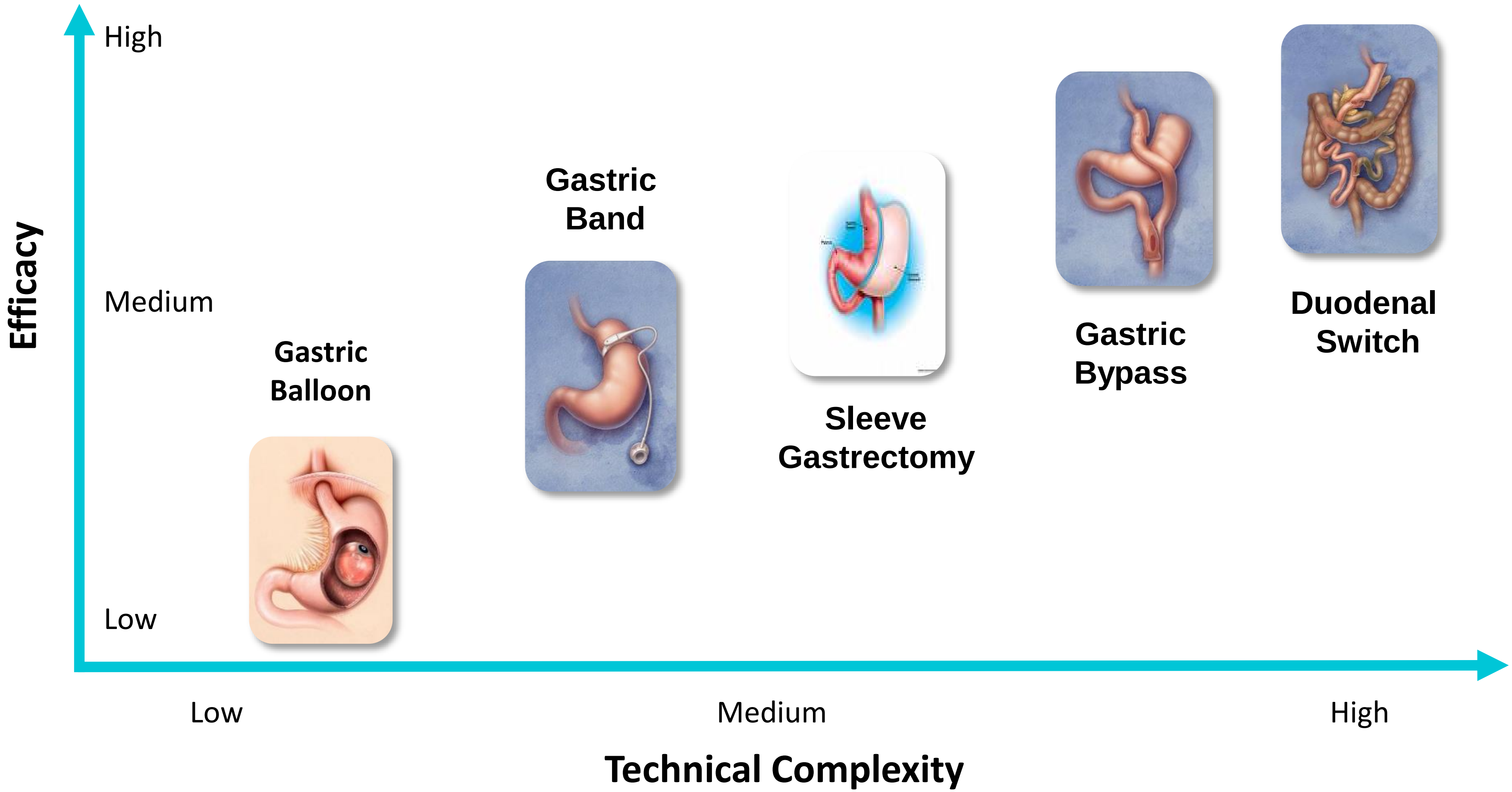
Association of Pharmacological Treatments for Obesity with Weight Loss & Adverse Events:
A systematic review and meta-analysis - Khera R et al. *JAMA,* 2016

- 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:

Disease	Male	Female
Heart attack	+0.7%	+2.5%
Stroke	+0.5%	+0.5%
Other digestive cancers	+0.5%	+0.5%
Breast cancer	N/A	+0.2%
Upper aerodigestive cancers	+1.4%	+1.4%

Derived from multiple sources

- Overall impact:

Run 1	MN	MS	FN	FS	Overall
Impact	2%	2%	3%	3%	**2%**

Run 2: assumptions and impact

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

Disease	Male	Female
Heart attack	+1.1%	+3.8%
Stroke	+0.7%	+0.7%
Other digestive cancers	+0.7%	+0.7%
Breast cancer	N/A	+0.4%
Upper aerodigestive cancers	+2.0%	+120%

Derived from multiple sources

- Overall impact:

Run 2	MN	MS	FN	FS	Overall
Impact	3%	4%	5%	5%	**4%**

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?