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Disability–Linked Annuities

……..under–rated tools for meeting LTC needs?

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Full paper available from
http://www.cass.city.ac.uk/arc/reports/180ARP.pdf

Outline of Talk

- The Product
- Assumptions
- Results
  - Claim probabilities
  - Sample premiums
- Effect of changing health scenarios
- Effect of changing "disability" definitions
- Underwriting considerations
- Last survivor product
- Conclusions

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The Products

- "1/ 1.5/ 2.5" ≡ £10,000 pa whilst healthy/low disability
  £15,000 pa whilst medium disability
  £25,000 pa whilst high disability

- "1/ 1.8/ 3" defined similarly

- "1/1/1" is traditional £10,000 pa whole life annuity

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Key Features

- Mortality and morbidity risks act in opposite directions

    - Disability ↑ ⇒ life expectancy ↓
    - Enhanced annuity payments but shorter term
    - Allows flexibility in underwriting requirements

- Annuity enhancement helps to meet care costs

- Marketing advantage over traditional LTC

    - pays annuity while life is healthy, with top up available should health deteriorate.

- Tax position improved since A-Day

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Tax considerations post A-Day

HM Revenue & Customs suggest either

- **Offer annuity as a pension product:**

    - **Premium paid out of pre-tax income**
    - **Fund is accumulated virtually tax-free**
    - **Annuity payments subject to income tax**

or

- **Treat annuity as a combination of Purchase Life Annuity (PLA) and IP benefit:**

    - **Premium paid out of post-tax income**
    - **Capital element of PLA and whole of IP is paid gross**
    - **Non-capital element of PLA is subject to income tax**

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Practical considerations

- Assume no guarantee period

- Assume no ultimate age when enhancement paid regardless of health status

- Assume paid annually
    - in theory, health status should be verified at every payment date

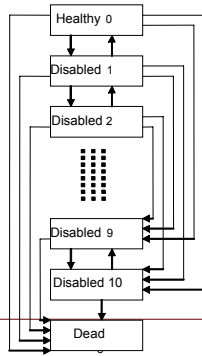The Actuarial Profession
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Morbidity assumptions

- **Use multiple state model described in Rickayzen & Walsh (2002)**

- **Pessimistic – "Model A"**
  - **Expansion of morbidity hypothesis**

- **Central – "Model C"**
  - **Dynamic equilibrium hypothesis**

- **Optimistic – "Model N"**
  - **Compression of morbidity hypothesis**

- **Population rather than insured lives' morbidity assumptions used**

  - **but should not alter results substantially**

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Multi-State Model

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Other assumptions

- Overall mortality : IL92
  - allowing for additional mortality component for states 6-10

- Interest: 7% pa

- Inflation : 3.9% pa   (i.e. net interest = 3% pa for index-linked bfts)

- Expenses
  - 2.5% of basic annuity component
  - 15% of enhancement component

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"Disabled" definitions for central assumptions

- Healthy/low disability – OPCS 0-6

- Medium disability - OPCS 7-8½

- High disability – OPCS 8½ - 10

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Females: Central Assumptions

Age	Expected no. of years spent in each disability category			
	Low	Medium	High	Total
60	23.6	1.6	2.2	**27.4**
65	19.0	1.5	2.2	**22.7**
70	14.8	1.3	2.1	**18.2**
75	11.2	1.1	1.9	**14.2**
80	8.1	0.9	1.7	**10.7**

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Males : Central Assumptions

Age	Expected no. of years spent in each disability category			
	Low	Medium	High	Total
60	21.7	1.1	1.5	**24.3**
65	17.3	1.0	1.4	**19.7**
70	13.4	0.9	1.3	**15.6**
75	9.8	0.8	1.3	**11.9**
80	7.1	0.7	1.2	**9.0**

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Claim probabilities - Central Assumptions

• Females

Age	Prob (remains low)	Prob (reaches medium)	Prob (reaches high)
60	0.49	0.16	0.35
70	0.50	0.15	0.35
80	0.53	0.13	0.34

• Males: (0.63, 0.12, 0.25)

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Single Premium: Central Assumptions - Females

Initial Age	Level Benefits		
	1/1/1	1/1.5/2.5	1/1.8/3.0
60	127,943	138,167 **(8.0%)**	142,162 **(11.1%)**
70	105,993	120,441 **(13.6%)**	126,006 **(18.9%)**
80	77,655	94,421 **(17.4%)**	100,762 **(24.0%)**

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Premiums: Central Assumptions - Females

| Initial Age	Index-linked increases		
	1/1/1	1/1.5/2.5	1/1.8/3.0
60	192,238	215,462 **(12.1%)**	224,449 **(16.8%)**
70	144,139	170,095 **(18.0%)**	180,020 **(24.9%)**
80	95,687	120,384 **(25.8%)**	129,677 **(35.5%)**

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Observations on results

- % uplift in premium required for disability enhancements seems modest

    - Little time spent disabled
    - Disability occurs at end of life

- % uplift rises with age

    - Proportionately more time spent disabled
    - Disability occurs earlier

- % uplift is greater for females than males

    - Females spend longer periods disabled, and more severely disabled

- % uplift is greater for index–linked than level benefit

   - Effective rate of interest lower for index-linked benefit.

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Expected Time Spent in Each Disability State – Optimistic to Pessimistic Health Scenarios

Females

Low   Medium   High

years

30
25
20
15
10
5
0

N C A 60   N C A 65   N C A 70   N C A 75   N C A 80

Expected Time Spent in Each Disability State – Optimistic to Pessimistic Health Scenarios

Males

Low   Medium   High

years

30
25
20
15
10
5
0

N C A 60   N C A 65   N C A 70   N C A 75   N C A 80
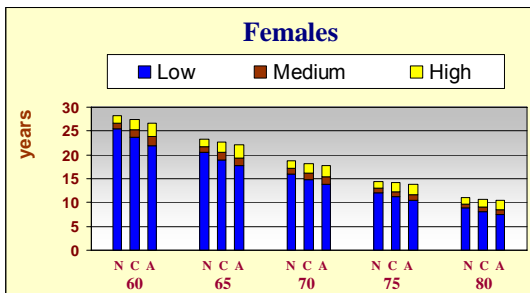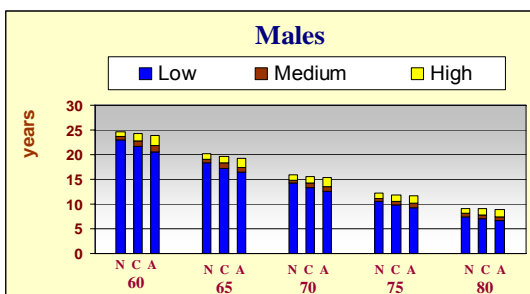
Changing Health Scenarios: Claim Probabilities

- Pessimistic
  - Females: (0.42, 0.16, 0.42)
  - Males: (0.56, 0.13, 0.31)

- Optimistic
  - Females: (0.61, 0.14, 0.25)
  - Males: (0.72, 0.10, 0.18).

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Changing Health Scenarios: Premiums

- Pessimistic
    - Premiums increase by at most 3.2%

- Optimistic
    - Premiums decrease by at most 4.2%

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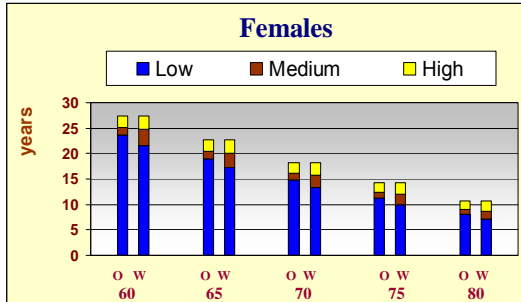making financial sense of the future

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Adopting wider definitions of disability

- Healthy/Low disability – OPCS 0-4

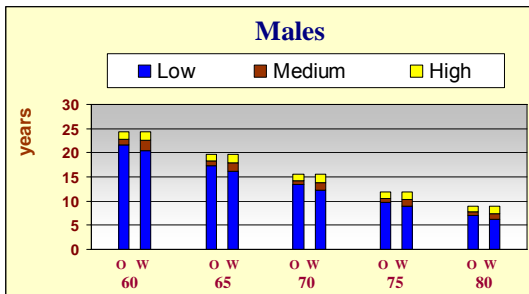- Medium disability – OPCS 5-7

- High disability – OPCS 8-10

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Original vs Wider Disability Definitions

Females

Original vs Wider Disability Definitions

Males

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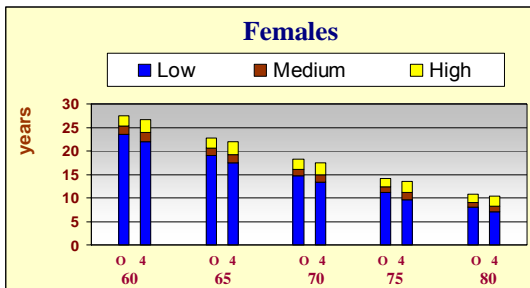

Premiums: Wider disability definitions - Females

Initial Age	Indexed–linked increases		
	1/1/1	1/1.5/2.5	1/1.8/3.0
60	192,238	224,581 **(4.2%)**	238,028 **(6.0%)**
70	144,139	178,809 **(5.1%)**	192,893 **(7.2%)**
80	95,687	127,120 **(5.6%)**	139,529 **(7.6%)**

Note: Parenthesis show % change in premiums compared with original definitions

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Initial State 4 vs Initial State 0

Females

Legend: ■ Low ■ Medium □ High

Y-axis: years (0, 5, 10, 15, 20, 25, 30)

X-axis: O 4 (60), O 4 (65), O 4 (70), O 4 (75), O 4 (80)

Premium increases by at most 6.1% compared to initial state 0

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Last survivor disability–linked annuity product

Health statuses of the two lives	Total amount payable
Both lives in OPCS 0-7	£10,000 p.a.
One life in OPCS 0-7, One life in OPCS 8-10	£25,000 p.a.
Both lives in OPCS 8-10	£40,000 p.a.
One life in OPCS 0-7, one dead	£10,000 p.a.
One life in OPCS 8-10, one dead	£25,000 p.a.

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Expected time (in years) spent by two lives in different states of disability: central assumptions

Initial age of both lives	Health statuses of the two lives					
	Both 0-7	One 0-7 One 8-10	Both 8-10	One 0-7 One dead	One 8-10 One dead	Total
60	18.437	1.991	0.154	8.365	2.240	31.187
70	10.626	1.577	0.156	6.893	2.198	21.450
80	5.217	1.154	0.151	4.707	1.964	13.193

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Single premium: last survivor annuity

Initial Age	Level Benefits		
	Standard	Disability-linked	% increase in premium
60	136,107	153,194	12.6
70	117,731	141,526	20.2
80	90,828	120,361	32.5

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Single premiums: last survivor annuity

Initial Age	Index-linked Benefits		
	Standard	Disability-linked	% increase in premium
60	211,064	249,393	18.2
70	164,724	207,389	25.9
80	114,417	157,399	37.6

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Potential market for products

Estimated UK population over age 65 who have no ADL impairments in different wealth brackets

Assets (£000's)	Excluding housing			
	Single	Married	Total	% of pop. with no ADL impairment
< 50	2,071	2,209	4,280	70
51 - 200	442	861	1,303	81
201 – 400	87	233	320	78
>401	35	169	204	85

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Potential market for products

Estimated UK population over age 65 who have no ADL impairments in different wealth brackets

Assets (£000's)	Including housing			
	Single	Married	Total	% of pop. with no ADL impairment
< 50	1,084	673	1,757	66
51 - 200	1,026	1,411	2,437	74
201 – 400	392	883	1,275	79
>401	133	505	638	78

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Conclusions

Disability–linked annuities have several positive features:

- Morbidity and mortality risks act in opposite directions

- Reasonable value for money

- good marketability prospects..….particularly for females

- Tax position has improved since A–Day

- Potential market exists…..amongst more affluent population

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