Valuing Basic Pensions

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Basic Pensions

- Welfare safety net for elderly
- 20% - 40% of average earnings
- Targeted via income and/or asset testing
- Represent increasing fiscal burden as populations age
Basic Pension dependence in Australia

- Targeted basic pension is Age Pension
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- Primary source of income for
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Primary source of income for

- 70% of couples
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  - 70% of couples
  - 80% of singles over 64 years
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  - 70% of couples
  - 80% of singles over 64 years
- Payments currently 2.5% of GDP, rising to 4.4% by mid century
- Superannuation Guarantee accumulations modest (<$100k)
- Stated policy aim of government to encourage private saving and reduce demand for Age Pension
Generating a basic pension from private savings - is it feasible?
Private Savings and Basic Pensions

- Generating a basic pension from private savings - is it feasible?
- How much wealth does a retiree need to reproduce an equivalent income?
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  - investment insurance
Private Savings and Basic Pensions

• Generating a basic pension from private savings - is it feasible?
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  • longevity insurance
  • investment insurance
  • maintain relativity with average earnings
Generating a basic pension from private savings - is it feasible?

How much wealth does a retiree need to reproduce an equivalent income?

Features

- longevity insurance
- investment insurance
- maintain relativity with average earnings

Wealth equivalent of basic pension entitlement is 8.5 times average earnings
1 Features of the Australian basic pension
1. Features of the Australian basic pension
2. Calculating wealth equivalent of basic pension (Stochastic Present Value)
Features of the Australian basic pension

Calculating wealth equivalent of basic pension (Stochastic Present Value)

Investment returns and mortality parameters
1. Features of the Australian basic pension
2. Calculating wealth equivalent of basic pension (Stochastic Present Value)
3. Investment returns and mortality parameters
4. Valuation of basic pension
### Key Features of Age Pension

Single Age Pension payments and related benefits, as at May 2007.

<table>
<thead>
<tr>
<th>Age Pension Benefits</th>
<th>Regular Payment</th>
<th>Annual value</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age pension payment</td>
<td>$525 fortnightly</td>
<td>$13653</td>
<td>CPI, MTAWE</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>$6 fortnightly</td>
<td>$151</td>
<td>CPI</td>
</tr>
<tr>
<td>Rent assistance</td>
<td>$104 fortnightly</td>
<td>$2704</td>
<td>CPI</td>
</tr>
<tr>
<td>Telephone</td>
<td>$21 quarterly</td>
<td>$86</td>
<td>CPI</td>
</tr>
<tr>
<td>Utilities</td>
<td>$53 semi-annually</td>
<td>$106</td>
<td>CPI</td>
</tr>
<tr>
<td>Remote area</td>
<td>$18 fortnightly</td>
<td>$473</td>
<td>by legislation</td>
</tr>
<tr>
<td>Concession Card</td>
<td>Access to PBS plus lower state and local government charges e.g. water, property and vehicle taxes, energy bills, public transport fares</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Centrelink, Department of Human Services, Australian Government

Key Features of Age Pension

Prices and earnings adjustments

Maximum of CPI and MTAWE

- Average CPI 2.9%, Average MTAWE 4.4%, Average of max 4.5%
Key Features of Age Pension

Summary of means tests

Income and assets testing of basic pension
\[ P(W(t)) = \begin{cases} 
  P_0 & \text{if } W(t) \leq Y_1 = 74K \\
  P_0 \left( \frac{Y_2}{Y_2-Y_1} - \frac{1}{Y_2-Y_1} W(t) \right) & \text{if } Y_1 < W(t) \leq A_1 = 162K \\
  P_0 \left( \frac{A_2}{A_2-A_1} - \frac{1}{A_2-A_1} W(t) \right) & \text{if } A_1 < W(t) \leq A_2 = 339K \\
  0 & \text{if } A_2 < W(t) 
\end{cases} \]

- translate income constraint to wealth using deeming regulations
\[ P(W(t)) = \begin{cases} 
P_0 & \text{if } W(t) \leq Y_1 = $74K \\
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- translate income constraint to wealth using deeming regulations
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- from 20th September 2007, \( A_2 = \$512K \)
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- translate income constraint to wealth using deeming regulations
- income constraint binds first but tapers more slowly
- from 20th September 2007, \( A_2 = $512K \)
- trade-off pension benefits against cost of lower wealth
Key Features of Age Pension

- Continues from 65 until end of life
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- Continues from 65 until end of life
- Real value ensured
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- Continues from 65 until end of life
- Real value ensured
- Relative value ensured
Key Features of Age Pension

- Continues from 65 until end of life
- Real value ensured
- Relative value ensured
- Payment around $14,000 p.a.
What amount of wealth do I need to support a fixed real income stream? Answer depends on

- Age, health mortality (random)
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- Age, health mortality (random)
- Investment returns and asset allocation (random)
What amount of wealth do I need to support a fixed real income stream? Answer depends on

- Age, health mortality (random)
- Investment returns and asset allocation (random)
- Planned spending (not random, but chosen)
What is Stochastic Present Value?


- If we knew the investment return $R$ and the time of death $T$ then the present value of a $1$ spending plan is

$$PV = \sum_{i=1}^{T} \frac{1}{(1 + R)^i}$$

When $\tilde{R}$ and $\tilde{T}$ are random, the present value is stochastic

$$SPV = \sum_{i=1}^{\tilde{T}} \prod_{j=1}^{\tilde{i}} \frac{1}{1 + \tilde{R}}$$

If we assume that

Only return and volatility of investment returns matter (lognormal)
Mortality is close to average (Gompertz)
SPV approximately reciprocal gamma distributed
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- If we assume that
  - Only return and volatility of investment returns matter (lognormal)
  - Mortality is close to average (Gompertz)
  - SPV approximately reciprocal gamma distributed
SPV and likelihood of ruin


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PDF

0.12

0.10

0.08

0.06

0.04

0.02

0

0

5

10

15

20

25

30

35

Sustainable

Ruin

SPV: Woman, Age 65

SPV: Woman, Age 50

Current Dollars (nest egg)
Perspective is a self-funded retiree trying to replicate Age Pension payment stream
Matching the problem to Australian Retirement Incomes

- Perspective is a self-funded retiree trying to replicate Age Pension payment stream
  - Confine investment to typical managed portfolios
Perspective is a self-funded retiree trying to replicate Age Pension payment stream

- Confine investment to typical managed portfolios
- Compute risk and returns using asset class indexes
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- Perspective is a self-funded retiree trying to replicate Age Pension payment stream
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Perspective is a self-funded retiree trying to replicate Age Pension payment stream

- Confine investment to typical managed portfolios
- Compute risk and returns using asset class indexes
- Deflate by maximum of CPI and change in MTAWE
- Deduct management fees
- Fit Gompertz parameters to improved population life expectancy (Life Tables)
<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Nominal Return</th>
<th>CPI-adj Return</th>
<th>CPI/AWE adj Return</th>
<th>-fees</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Growth</td>
<td>10.4%</td>
<td>7.6%</td>
<td>6.0%</td>
<td>4.1%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Growth</td>
<td>10.0%</td>
<td>7.2%</td>
<td>5.6%</td>
<td>3.8%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Balanced</td>
<td>9.2%</td>
<td>6.4%</td>
<td>4.8%</td>
<td>3.1%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Conservative</td>
<td>8.5%</td>
<td>5.7%</td>
<td>4.1%</td>
<td>2.4%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Cap. Stable</td>
<td>7.5%</td>
<td>4.7%</td>
<td>3.1%</td>
<td>1.5%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>
## Probability of retirement ruin (female)

### Probability of retirement ruin (%), $W = \$1$ million

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Real Spending rate, $000$ p.a.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td>High Growth</td>
<td>0.03</td>
</tr>
<tr>
<td>Growth</td>
<td>0.008</td>
</tr>
<tr>
<td>Balanced</td>
<td>0.004*</td>
</tr>
<tr>
<td>Conservative</td>
<td>0.004</td>
</tr>
<tr>
<td>Capital Stable</td>
<td>0.01</td>
</tr>
<tr>
<td>Portfolio</td>
<td>Real Spending rate, $000 p.a.</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td>High Growth</td>
<td>0.04</td>
</tr>
<tr>
<td>Growth</td>
<td>0.02</td>
</tr>
<tr>
<td>Balanced</td>
<td>0.01*</td>
</tr>
<tr>
<td>Conservative</td>
<td>0.02</td>
</tr>
<tr>
<td>Capital Stable</td>
<td>0.03</td>
</tr>
</tbody>
</table>
Valuing pension stream

- Fix the probability of ruin (regulatory risk of say 1%)
- Fix the income stream at real $14,000
- Compute required wealth as function of age, gender, investment allocation
Valuing pension stream (females age 65)
As multiple of average earnings and to maintain real value

<table>
<thead>
<tr>
<th></th>
<th>Ruin probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5%</td>
</tr>
<tr>
<td>High Growth</td>
<td>8.24</td>
</tr>
<tr>
<td>Growth</td>
<td>7.54</td>
</tr>
<tr>
<td>Balanced</td>
<td>7.43*</td>
</tr>
<tr>
<td>Conservative</td>
<td>7.59</td>
</tr>
<tr>
<td>Capital Stable</td>
<td>8.24</td>
</tr>
<tr>
<td>Life annuity</td>
<td></td>
</tr>
</tbody>
</table>

- at 1%, required wealth is $379K
Valuing pension stream (females age 65)
As multiple of average earnings and to maintain real value

<table>
<thead>
<tr>
<th>Initial wealth level for $14000 income</th>
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</thead>
<tbody>
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<td><strong>Female 65 yrs</strong></td>
</tr>
<tr>
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<tr>
<td>High Growth</td>
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- at 1%, required wealth is $379K
- about 8 times current average female super balances
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- Life annuity: 6.06

- at 1%, required wealth is $379K
- about 8 times current average female super balances
- about 7 times current average earnings ($56,000 p.a.)
Valuing pension stream (females age 65)  
As multiple of average earnings and to maintain real value

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- about 8 times current average female super balances
- about 7 times current average earnings ($56,000 p.a.)
- at age 70, about $20K less required
Valuing pension stream (females age 65)
As multiple of average earnings and to maintain real value and wage relativity

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| Life annuity | 7.56 |

- at 1%, required wealth is $477K
Valuing pension stream (females age 65)
As multiple of average earnings and to maintain real value and wage relativity

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<th>Ruin probability</th>
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<tbody>
<tr>
<td></td>
<td>0.5%</td>
</tr>
<tr>
<td>High Growth</td>
<td>10.48</td>
</tr>
<tr>
<td>Growth</td>
<td>9.60</td>
</tr>
<tr>
<td>Balanced</td>
<td>9.46*</td>
</tr>
<tr>
<td>Conservative</td>
<td>9.74</td>
</tr>
<tr>
<td>Capital Stable</td>
<td>10.83</td>
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<td>Life annuity</td>
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- at 1%, required wealth is $477K
- about 8.6 times current average earnings ($56,000 p.a.)
Valuing pension stream (females age 65)
As multiple of average earnings and to maintain real value and wage relativity

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| Life annuity | 7.56 |

- at 1%, required wealth is $477K
- about 8.6 times current average earnings ($56,000 p.a.)
- at age 70, about $35K less required
Valuing pension stream (males age 65)
As multiple of average earnings and to maintain real value and wage relativity

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<thead>
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<th>Male 65 yrs</th>
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- at 1%, required wealth is $473K
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- at 1%, required wealth is $473K
- about 8.4 times current average earnings ($56,000 p.a.)
Valuing pension stream (males age 65)
As multiple of average earnings and to maintain real value and wage relativity

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<tr>
<td>Life annuity</td>
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</tr>
</tbody>
</table>

- at 1%, required wealth is $473K
- about 8.4 times current average earnings ($56,000 p.a.)
- at age 70, about $45K less required
Conclusions

- wealth required to match basic pension stream is large (> $400K and more than 8 time average earnings)
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- high implicit value of pension creates ‘wealth-reduction’ incentives