

One size fits all? Drawdown structures in Australia and The Netherlands

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Mandatory pre-funded retirement income schemes: Best policy and practice

Forthcoming output:

- *Sustainable retirement income policies in aging society: Lessons from the UK, Australia and the Netherlands*: UNSW
- *Saving Preferences In Retirement: The Impact Of Mandatory Annuitisation, Flexibility And Health Status*: UNSW + Tilburg University
- *A cross country analysis of retirement income product decisions: the case of The Netherlands and Australia*: UNSW + APG Asset Management
- *Optimal consumption and portfolio choice for retirees with housing, health risk and idiosyncratic longevity risk*: UNSW



Network for Studies on Pensions, Aging and Retirement

Structure

- 1 Introduction
 - Motivation
 - Lit. review
- 2 Model description and calibration
 - Individual preferences
 - Life table
 - Accumulation
 - Decumulation
- 3 Portfolio comparison
 - Standardized comparison
 - Means-testing pensions
 - Sensitivities

Motivation

- Retirement income solutions are often analyzed from the perspective of representative individuals
- However, preferences for certain arrangements may be influenced by their heterogeneous attitude towards risk, income category and mortality (Bateman et al. 2001)
- Furthermore, the role of the (means-tested) first pillar during retirement may differ across income levels
- Finally, heterogeneous mortality (Kaplan et al. 1996; Deaton and Paxson 2001; Brown and McDaid 2003) may distort the preference for products offering longevity protection

Institutional settings

Common features:

- Non contributory public pension + mandatory privately managed private pensions/superannuation.
- Total replacement rate of around 70%.

Differences :

- **Australia:** DC system with *choice* of benefits. No requirement to annuitize, retirees mostly take account-based pensions (phased-withdrawal products)
- **The Netherlands:** DB system where the legislation only *mandates* the annual maximal accrual of pension rights, following a defined benefit philosophy. Retirement income can only be paid out as a *lifetime* pension.

(García-Huitrón and Ponds 2015; Bateman et al. 2016)

Literature review

- The literature in this area commonly studies the welfare implications of introducing an innovating income product compared to the classical lifetime annuity (CLA) payout
- Stevens (2009); De Waegenare et al. (2010); Horneff et al. (2010a) and Post (2012) study the portfolio choice between a CLA and a deferred annuity
- Doyle et al. (2004); Milevsky and Kyrychenko (2008) and Horneff et al. (2010b) compare variable annuities arrangements with CLA
- Hanewald et al. (2013) and Boon et al. (2017) compare GSA arrangements with CLA

Limited choice in NL

- In the Netherlands, choice flexibility has not been a part of the pension discussion until very recently (Dellaert and Ponds 2014)
- Few innovations introductions, such as flexible payouts such as the 'high-low' and 'low-high' arrangements have been introduced
- van Ewijk et al. (2017) study the welfare impact of these new arrangements and compare it to the classical lifetime annuity and lumpsum payout

Our contribution

We extend the literature on financial planning at retirement as follows:

- Study of all drawdown choices in Australia and The Netherlands
- Consider realistic payments based on wages for three income categories
- Mortality differentials considered (actual mortality \neq actuarial annuity table)
- Effect of an (australian-like) means-test in the individual's preferences
- Assess how individual's characteristics such as risk attitude and desire to bequeath affect the retirement outcomes
- Analyze the influence of pricing assumptions on the ranking of preferences

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Individuals exhibit Constant Relative Risk Aversion (CRRA) preferences:

$$V(k_s, y) = \sum_{t=s}^{\omega-s} \beta^{t-s} \left(\underbrace{t-s p_s(y)}_{\text{survival}} \underbrace{u(c_{t,y+t-s})}_{\text{consumption}} + \underbrace{t-1-s p_s(y) q_{t-1}(y+t-1-s)}_{\text{death}} \underbrace{b(k_{t,y+t-s})}_{\text{bequest}} \right),$$

with u and b represented as follows for the CRRA preferences:

$$u(c) = \frac{c^{1-\gamma}}{1-\gamma}, \quad b(k) = \alpha \frac{k^{1-\gamma}}{1-\gamma},$$

where

γ is the risk aversion coefficient and
 α is the strength of the bequest motive.

- We fit a Cairns, Blake and Dowd (CBD) model (Cairns et al. 2006, 2009) to the Australian and Dutch historical mortality experience from Human Mortality Database (2014, 2015):

$$\begin{aligned}
 \text{logit}(q_x(y)) &= \log\left(\frac{q_x(y)}{1 - q_x(y)}\right) \\
 &= \overbrace{\kappa_y^{(1)}}^{\text{period effect}} + (x - \underbrace{\bar{x}}_{\text{average age}}) \overbrace{\kappa_y^{(2)}}^{\text{period effect}},
 \end{aligned}$$

- We forecast the future mortality rate following Cairns et al. (2006) by assuming that the period indexes $\kappa_y^{(i)}$, $i=1,2$ evolve under a multivariate random walk with drift

(Villegas et al. 2016)

Mortality differentials

- The multi-year survival probability used in the **annuity** calculation for an individual who survives to age t in year $y + t - s$ conditional on being alive at age s in year y is:

$${}_{t-s}p_s(y) = \prod_{j=0}^{t-s-1} (1 - q_{s+j}(y + j)) = \prod_{j=0}^{t-s-1} p_{s+j}(y + j).$$

- However, in practice the survival probability will **differ** across income categories:

$$p_x^{ic}(y) = \eta^{ic} \cdot p_x(y),$$

$$\eta^{ic} = \frac{\dot{e}_{x:\overline{n}|}^{ic}}{\dot{e}_{x:\overline{n}|}},$$

where $\eta^{10} = 0.93$ and $\eta^{90} = 1.13$ (Madrigal et al. 2011).

Wealth dynamics

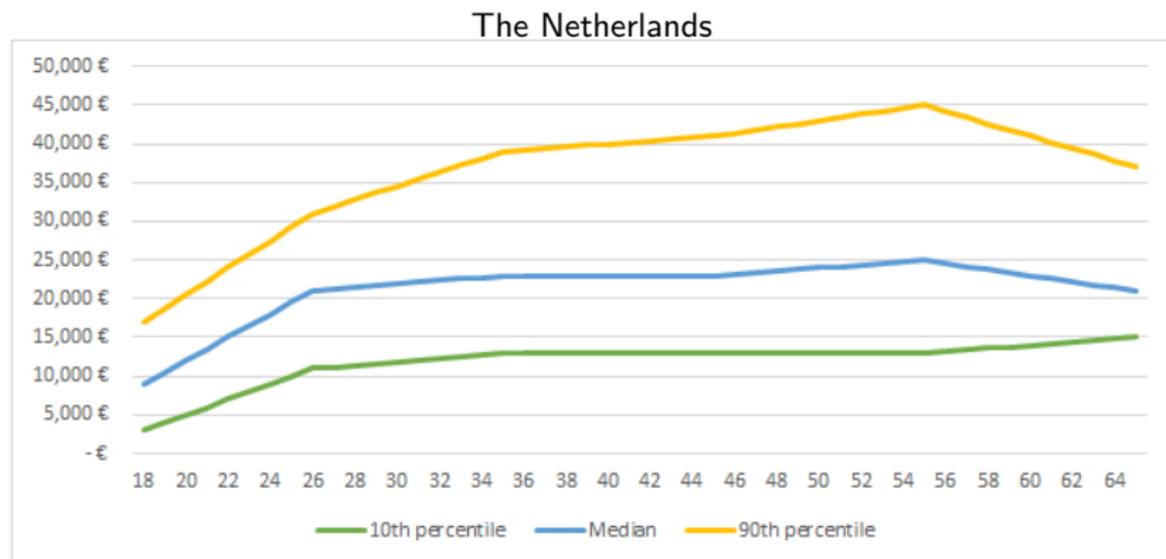
- In Australia participants pay contributions on their wages w from x_0 at the start of their working career until x_r (DC setting) when they retire as follows:

$$k_{x_r, y} = \sum_{x=x_0}^{x_r-1} \underbrace{\pi \cdot w_{x, y-x_r+x}}_{\text{contributions}} \underbrace{\prod_{j=x+1}^{x_r} (1 + i_{y-x_r+x})}_{\text{lognormal (stoch) return}}$$

- In The Netherlands, participants pay contributions but these do not match their entitlements at retirement (DB setting)

Wages

- Historical wages are obtained by adjusting to historical CPI.
- Age-dependent wages as of 2014:



Source: Australian Bureau of Statistics (2016) and Centraal Bureau Statistiek (2014).

State Pension

- Australia and The Netherlands pay a flat-rate income throughout retirement to all residents regardless of their wages during their career
- In The Netherlands:
 - the payment is **proportional** to the years they live in the country,
 - and it is paid irrespective of wealth and income.
- In Australia:
 - all residents who have lived in Australia for at least 10 years have the *right* to receive the **full** payment,
 - but in practice the payment is determined by an income and asset means test.

State Pension (C'td)

- The state pension in Australia is means-tested and is calculated as the minimum of the state pension after doing the asset test, $SP_{x,t}^{AT}$, and the state pension after doing the income test, $SP_{x,t}^{IT}$:

$$SP_{x,t} = \min (SP_{x,t}^{AT}, SP_{x,t}^{IT})$$

- For instance, the asset test is calculated as follows:

$$SP_{x,t}^{AT} = \max \left(0, \underbrace{SP_{x,t}}_{\text{State pension}} - \max \left(0, \overbrace{k_{x,t}^{AT}}^{\text{Capital}} - \underbrace{\$250,000}_{\text{Threshold}} \right) \cdot \underbrace{0.078}_{\text{Taper rate}} \right)$$

where k^{AT} is the capital of the individual for asset test purposes (\neq liquid account).

Australia

- Upon retirement, individuals **decide** whether they purchase a product (or a portfolio of products) in order to finance their spending at retirement.
- The individual can choose to create a portfolio of products in order to obtain both longevity insurance and flexibility.
- A *nominal* annuity gives a lifetime nominal fixed payment while the *indexed* annuity provides a lower initial payment against a promise of future indexation.
- The *phased withdrawal* product allows the policyholder to withdraw regularly a certain amount from their superannuation fund until it is depleted. The withdrawal rates may depend on the age and statutory regulations on minimum withdrawals.

Australia (C'td)

Table: Minimum withdrawal percentages as a percentage of the remaining balance.

Age (x)	Minimum ψ_x
55-64	4%
65-74	5%
75-79	6%
80-84	7%
85-89	9%
90-94	11%
95+	14%

Source: Australian Taxation Office (2017).

The Netherlands

- Most individuals in the Netherlands are in defined benefit plans that provide around 75% of their average lifetime salary with 40 years of employment.
- The pensionable salary is based on the wages earned on top of a franchise (commonly equal to the state pension).
- Few choices in practice and in all instances involve full annuitization since it is compulsory by law:
 - Indexed annuity,
 - 'High-low' (higher payments during the first 5 years),
 - 'Low-high' (lower payments during the first 5 years).

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Working hypotheses

- We assume a subjective discount factor of 2%, that is a $\beta = 0.98$.
- *Risk attitude*: three levels of risk aversion coefficients which should represent low risk aversion, $\gamma = 2$, moderate risk aversion $\gamma = 5$ and high risk aversion, $\gamma = 8$.
- The *bequest* coefficient α is set equal to 0.15, indicating a low bequest motive (0 indicates no bequest motive and 1 indicates full bequest motive).
- The different portfolios considered, are compared by means of the 'Certainty Equivalent Consumption' (*CEC*) both in presence and absence of bequest.

Standardized comparison

What is the most welfare enhancing institutional setting?

Table: Retirement income portfolios for Australia and The Netherlands.

	Australia				The Netherlands		
	Nominal Annuity	Indexed Annuity	Phased Withdrawal		Indexed Annuity	High/Low	Low/High
1	100%	0%	0%	8	100%	0%	0%
2	0%	100%	0%	9	0%	100%	0%
3	0%	0%	100%	10	0%	0%	100%
4	50%	50%	0%				
5	50%	0%	50%				
6	0%	50%	50%				
7	33%	33%	33%				

Table: Flexibility versus prescription: Ranking of the retirement income portfolios for different income categories and bequest considerations.

		Australian							Dutch		
Income category	Bequest	1	2	3	4	5	6	7	8	9	10
Q10	No	1	3	7	2	5	6	4	9	8	10
Q50	No	1	3	10	2	5	7	4	8	6	9
Q90	No	1	3	10	2	5	8	4	7	6	9
Q10	Yes	5	7	3	6	1	2	4	9	8	10
Q50	Yes	5	7	4	6	1	2	3	9	8	10
Q90	Yes	5	7	4	6	2	3	1	9	8	10

Notes: The ranking is shown from 1 to 10 where 1 indicates the most preferred and 10 the least preferred.

Figure: Flexibility versus prescription: Certainty Equivalent Consumption with (blue) and without a bequest (orange) for the median wage, risk aversion coefficient of 5 and with state pension.



- **No bequest** motive, the portfolios based on products with longevity protection are preferred (Yaari 1965).
- **With bequest** motive, portfolios with longevity protection go from the top 3 (portfolios 1, 3 and 4) without a bequest motive to the bottom 3 in presence of bequest.
- Partial annuitization is welfare enhancing, even in presence of the means-tested state pension.
- In all scenarios individuals would prefer a nominal annuity compared to an indexed annuity.
- The inclusion of the bequest motive mimics the observed purchase of phased withdrawal products in Australia more closely.

- In the Netherlands the effect of the state pension is nominally equal for all income categories.
- On a relative scale, the lowest income category draws their retirement income almost solely from the state pension while for the highest quantile it accounts for less than half of its regular income.
- Note, however, that innovations such as the 'high-low' or 'low-high' constructions increase marginally their welfare, especially for the lowest income categories.
- Dutch would not see their preferences change with their current options since none of them offer liquidity and the possibility to bequeath.

Means-testing pensions

Does means-tested pension affect demand equally across cohorts?

Means-testing pensions

Table: Ranking of retirement income portfolios for different income categories, bequest motive and means tested pension for Australian.

			Australia						
Income	Bequest	State Pension	1	2	3	4	5	6	7
All wages	No	No & Yes	1	3	7	2	5	6	4
Q10	Yes	No	5	7	4	6	2	3	1
Q10	Yes	Yes	5	7	4	6	1	2	3
Q50	Yes	No & Yes	5	7	3	6	1	2	4
Q90	Yes	No & Yes	5	7	4	6	2	3	1

Means-testing pensions

- We observe that the state pension affects the ranking for the lowest income category.
- For this income category the state pension, which is indexed, replaces the demand for an indexed annuity in the private market
- The median individual, who receives a partial public pension (indexed), would be best off with a half in a nominal annuity and a half on a phased withdrawal product
- The highest quantile, on the other hand, is best off with a third allocation in the three products (indexed, nominal, phased withdrawal)
- All in all, from an individual perspective, the golden rule of a third in each product holds (coming from either the state pension or the private market) [with a bequest motive]

Sensitivities

- The *CEC* increases with risk aversion for portfolios with phased withdrawal
- Higher γ implies that I am less willing to reduce consumption in the 'death' state relative to the healthy state (\uparrow *CEC* with phased-withdrawal exposure)
- The ranking for Q10 is the most sensitive to γ
- The higher the bequest motive, for the same risk aversion coefficient, the higher the percentage invested in phased withdrawals
- Mortality differentials have little effect on the rankings
- *No bequest*: Despite the presence of loadings the individual is best off with a nominal annuity and worst off with a pure phased withdrawal product. However, the indexed annuity becomes less favorable for increasing loadings.

Discussion

- In **absence** of bequest, a highly prescribed DB setting such as the Dutch one would be welfare enhancing.
- We observe that the state pension fits its purpose by increasing the welfare of lower socio-economic categories.
- Furthermore, we observe that for all income categories the state pension reduces the demand of indexed annuities since it is an inflation linked payment.
- The choices at retirement are mostly affected by their bequest motive and presence of loadings in the pricing of annuities.
- All in all, from an individual perspective, the golden rule of a third in each product holds (coming from either the state pension or the private market) [with a bequest motive]

Next steps

- A shortcoming of our approach is that we consider that the individuals consume the full payout associated with their retirement income choice contrary to empirical evidence.
- Recent findings from our grant research, Alonso-García et al. (2017), find that bequest is not a popular saving motive whereas intra-household, precautionary for health and self-gratification score higher. Need for a couple approach?
- Our results will be sensitive to the inflation risk.

Thank you for your attention



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