

An experimental survey of investment decisions for retirement savings

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A cross-disciplinary team:

Choice modeling
Marketing
Economics
Finance
Econometrics



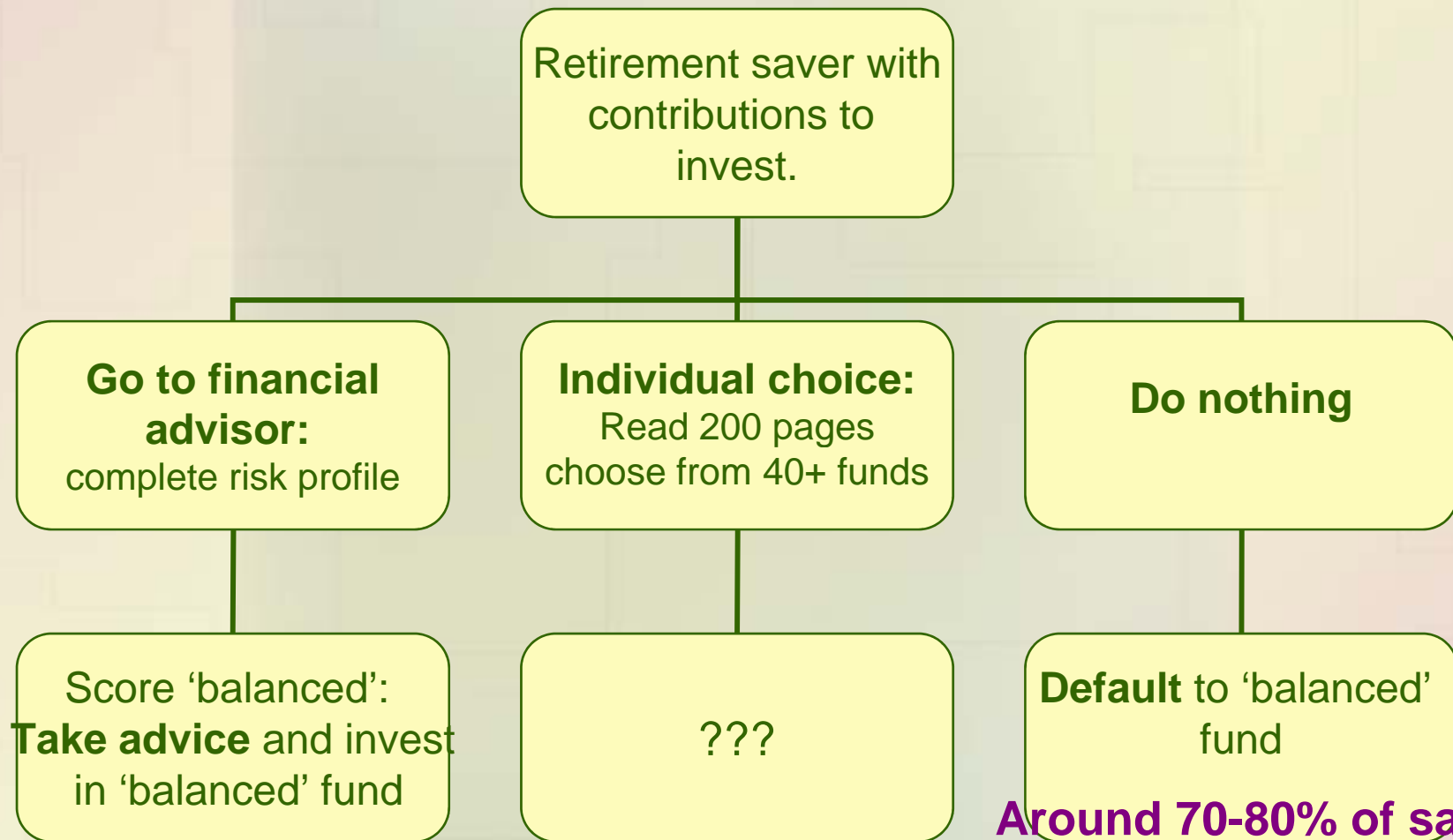
Photo: Tourism Australia

What does
standard theory
predict about
investment
choice?

Testing some
predictions:
Discrete choice
experiment and
results

Discussion and
future work

Do we have investment allocation by word association?



77% score 'balanced' in the risk profile

Around 70-80% of savings are in default funds

How do people choose investments?

Choices influenced by 'architecture' and demographics.

- Number of options matters
 - when naïve diversification is used
 - to participation rates
 - to asset allocation
 - to exposure to employer stock
- Information presentation matters
 - irrelevant information
- Demographics matter
 - Age, gender, family structure
 - Financial literacy (correlated with participation)

How do people choose investments?
Theory predicts that investors prefer higher returns and lower risk.

Take a mean-variance investor i with expected utility function V_i

$$V_i = \mu_i - \lambda_i \sigma_i^2$$

μ_i = expected rate of return of i 's investment

σ_i^2 = investment portfolio variance

λ_i = risk parameter- expected to be positive for risk aversion

Utility depends on proportions of cash and shares: experimental investment menu.

Utility for each cash/stock portfolio (j) depends on net return and variance.

6 Options: Bank Act., 100% cash 75:25, 50:50, 25:75, 100% shares.

$$V_j = V(\theta_j) = \mu_s \theta_j + \mu_c (1 - \theta_j) - \varphi_j - \lambda [\theta_j^2 \sigma_s^2 + 2\theta_j(1 - \theta_j)\sigma_{sc} + (1 - \theta_j)^2 \sigma_c^2]$$

θ_j = proportion allocated to shares

φ_j = fees deducted

μ_s = return to stocks

μ_c = return to cash

μ_r = return to bank account

σ_s^2 = variance of stock returns

σ_c^2 = variance of cash returns

σ_{sc} = covariance of stocks and cash

NET RETURN: $\mu_s \theta_j + \mu_c (1 - \theta_j) - \varphi_j - \mu_r$

RISK: $\theta_j^2 \sigma_s^2 + 2\theta_j(1 - \theta_j)\sigma_{sc} + (1 - \theta_j)^2 \sigma_c^2$

We investigate the determinants of choice of investment option.

- Do returns and risk explain investment choices as theory predicts?
- Which demographics are relevant here?
- How do default options and risk-profiling-based allocations compare with observed choices?
- Does the financial crisis change outcomes?

We conduct a 'pilot' discrete choice experiment in
March 2007
and repeat this experiment in the financial crisis in
October 2008

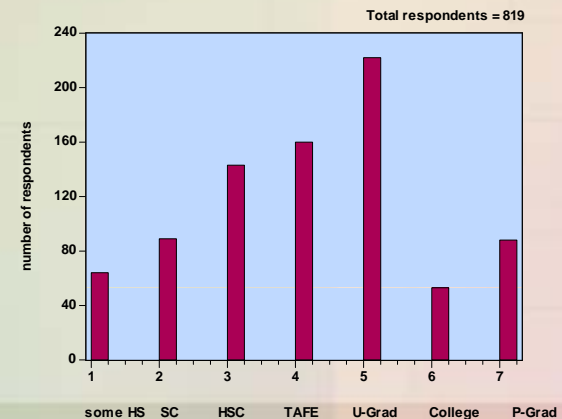
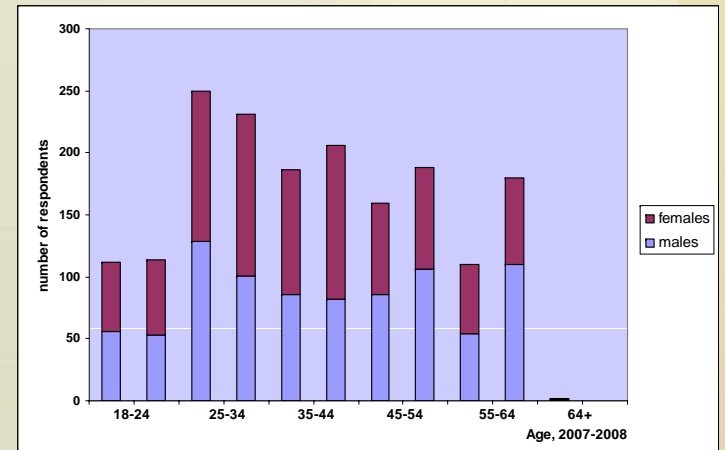
Standard theory predicts that investors like returns and dislike risk.

Testing some predictions:
Discrete choice experiment and results

Discussion and future work

We collect stated preferences plus demographics from 800 respondents.

- Genders about equal
- Ages 18-65
- Majority partnered, employed
- Majority home-owners
- 60% reported income at \leq AWE
- 20% investment properties, 43% stocks/shares
- Risk profiles
 - 2% conservative
 - 17% moderately conservative
 - 77% balanced
 - 4% moderately aggressive
 - Unchanged in 2008



Risk and net return vary over four levels for each option.

- Returns vary as investment fees change
 - Expected accumulation stays constant
 - Fee levels taken from current prospectuses
- Risk is represented as changes in range
 - ‘Best case’ and ‘Worst case’ scenarios
 - Ranges are quantiles from empirical returns distributions (e.g. 95-5%, 80-20%)
 - NOT typical of ‘risk’ in current prospectuses
 - Ranges capture ‘upside’ and ‘downside’

Observed choices show a strong preference for risk, slightly weaker in the crisis.

	Investment option					
	100% cash	75:25	50:50	25:75	100% shares	RSA
2007						
best	0.05	0.11	0.19	0.30	0.33	0.02
worst	0.15	0.04	0.04	0.06	0.12	0.59
2008						
best	0.08	0.13	0.24	0.27	0.25	0.03
worst	0.13	0.04	0.04	0.06	0.17	0.57

Estimate choices using a finite mixture (latent class) model.

- Use 'best' choices in 2007 and 2008 in estimation
- Model latent (discrete) preference classes and scale classes (subsets of surveyed population)
- General form:

log odds of choosing one option over the constant option

= f (net returns, portfolio volatility, personal characteristics)

- ❑ **scale classes** → types of people who showed more or less overall variation in their responses
- ❑ **preference classes** → types of people with similar tastes
- Both scale and preference classes are functions of demographics

Variability is a function of age and risk profile score.

- Two variability classes
- **Younger** ages (18-24) significantly **more variable**
- **Older** ages (45-64) significantly **less variable**
- **Higher risk** profile score **more variable** in 2007
- Risk profile score **irrelevant** in 2008

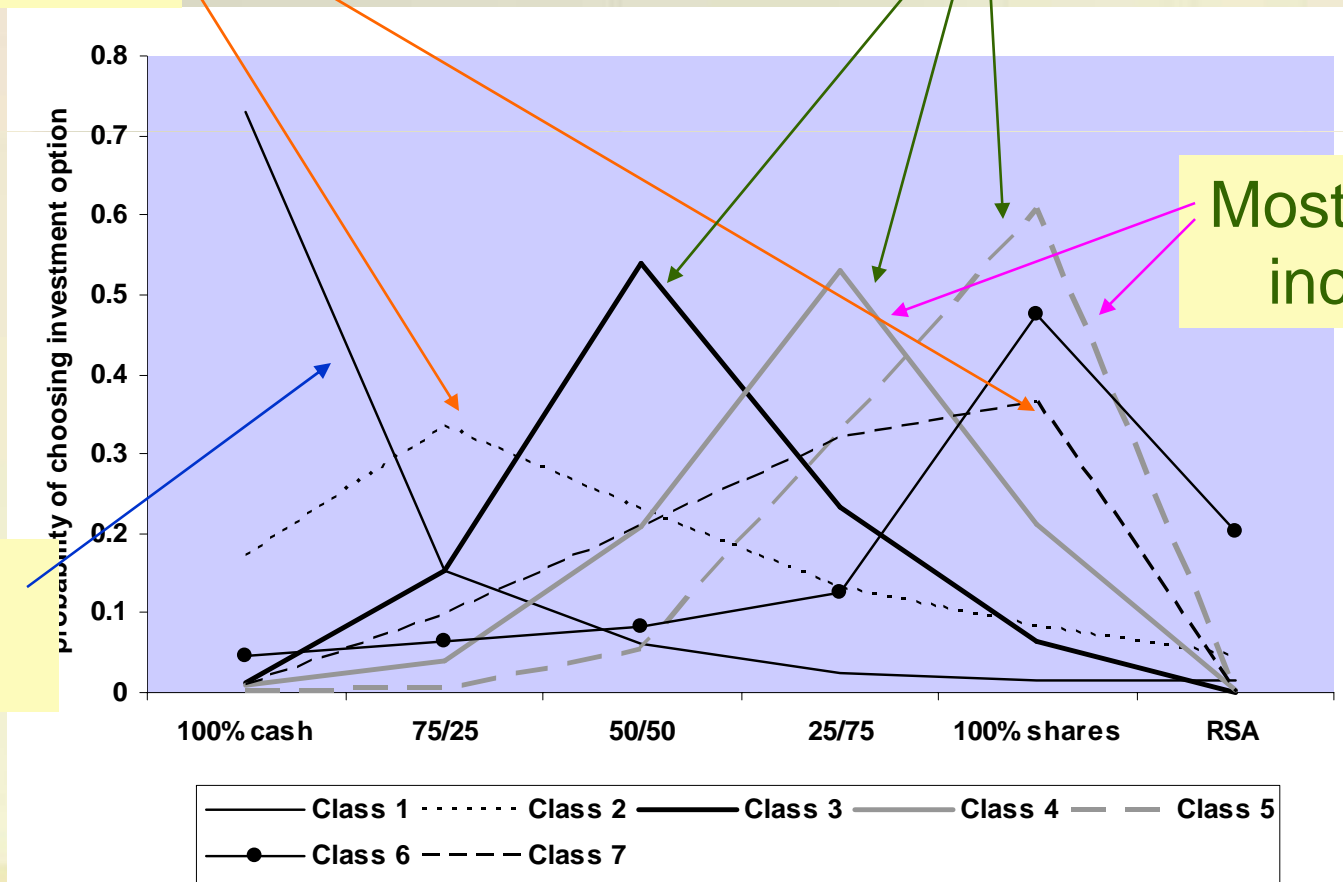
Seven preference classes are a function of age and income.

Class 2, 7
mostly younger

Class 3,4,5
mostly older

Mostly high income

Mostly low income



Estimated marginal effects of return and risk show some unexpected responses.

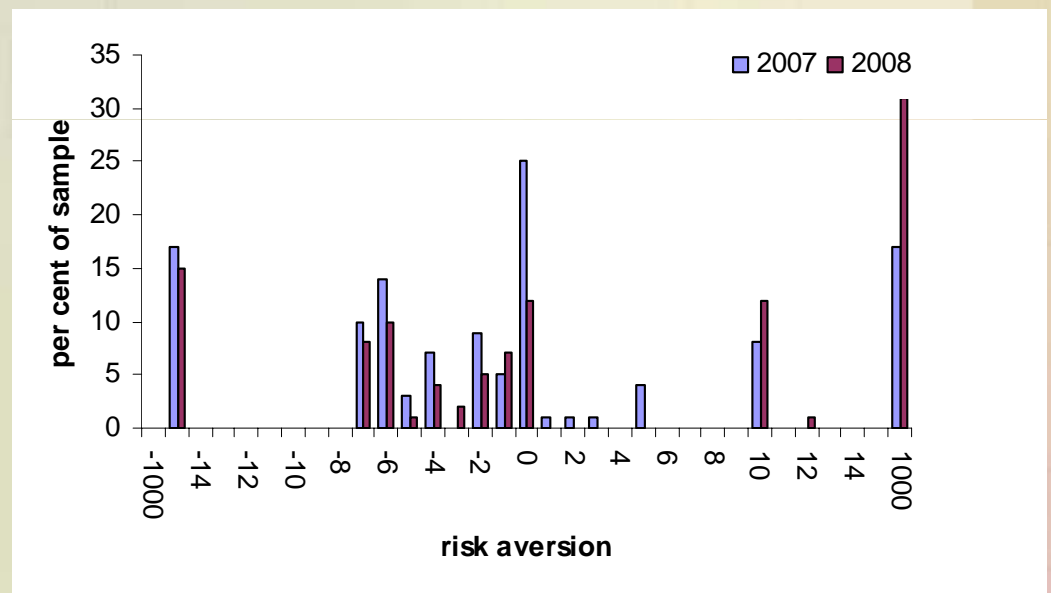
2007	$\lambda = 1$						
Attribute	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
net return							
100% cash	-0.56	0.10				-0.36	0.04
75:25 c/s		0.11	0.31	-0.12			
50:50 c/s		0.08	0.12	0.09	0.10		
25:75 c/s					0.55	0.44	0.34
100% shares			0.19				
variance							
100% cash							
75:25 c/s		-0.08	0.14	0.11			
50:50 c/s				0.19	0.10		-0.22
25:75 c/s		-0.05		0.09	0.47		-0.27
100% shares		-0.02		0.09	0.21		-0.29

Not all stated preferences match finance theory: there are a variety of investors.

- **Mean-variance investors:** younger & risk averse
- **Risk loving:** Older & higher income
- **Cash investors :** Low income (probably younger) group choose the **cash** option even at low returns
- **Regret minimizers** or **1/n**: older group who choose the 50:50 option
- **Compare nearby options:** cross-effects show that nearby options are compared; substitution effects are significant.

Preliminary work on risk parameters suggest large group are risk-loving.

- Properties of choice sets allow inference on λ_i for 12-15% of sample
- Median $2\lambda_i$ is -1 in 2007 and -0.5 in 2008
- Very **wide range** of parameters
- **Negatively** correlated with **risk profile** prediction
- Some **increase** in risk aversion between 07 & 08



Standard theory predicts that investors like returns and dislike risk.

Older and higher income respondents prefer more risk.
Some low income respondents prefer less return.

Discussion and future work

Discussion

1. Do returns and risk explain investment choices as theory predicts?
2. Which demographics are relevant here?
3. How do default options and risk-profiling-based allocations compare with observed choices?
4. Does the financial crisis change outcomes?

1 & 2. Some groups respond to risk and return as predicted; others don't.

Why a preference for high risk among the older & better-off ?

- Consistent with **survey evidence** for risky asset shares rising with age and wealth
- Consistent with **non-homothetic utility** (Wachter and Yogo 2009) so that rising wealth outweighs effect of decreasing human capital
- Maybe looking for more leverage than is offered in choice set because **background risk very low**; home owners, secure incomes, low uncertainty
- **Means-tested** public Age Pension hedges investment risk

4. Risk aversion is slightly higher in October 2008 than in March 2007.

- Observed choices shift towards less risk.
- Model constancy is rejected.
- Mean of inferred risk parameter is higher in the crisis than in 2007.
- Possible causes?
 - Lower wealth raises absolute risk aversion
 - Environmental factors

3. Risk profiling and stated choice mismatch: defaults/risk presentation need more research.

- Profiling puts 75% of sample into 'balanced'.
- Default options are typically also 'balanced'.
- Stated preferences from survey show:
 - High risk tolerance
 - Wide range of risk preferences
 - Negative correlation between profile score and stated choices
- Presentation of 'upside' risk seems important.

Proposed panel project

1. Study **information presentation on investment option choice**: risk, returns and fees; labels for options; explanatory detail; size of amounts
2. Study **factors influencing choice of retirement benefit(s)**: including 'frames', information presentation and product features.

Method: 4 year panel survey, quarterly frequency

Personnel:

current team + **Prof John Geweke** (University of Iowa)
Dr Christine Ebling (UTS and CenSoc)