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FACULTY OF BUSINESS AND ECONOMICS

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Risk and return of illiquid investments

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Risk and return of illiquid investments

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Introduction

- This research
  - Extent superannuation funds invest in illiquid asset classes
  - Characteristics that influence these decisions
  - Performance impacts

Introduction

- Debate on illiquid allocations
  - Yale endowment investment strategy
- Shift to defined contribution pension funds
  - Emphasis on liquidity
- Greater reliance on asset realisation for meeting obligations
  - Industry-wide outflows projected to increase
  - ‘Baby-boomer’ generation retiring

Trade-off of liquidity and returns

- Diversification benefits of illiquid assets
  - Real estate 10-15% (Ennis et al, 1991), private equity 2-9% (Chen et al, 2002)
- Liquidity drawbacks of illiquid assets
  - Execution delays: market depth, due diligence
- Superannuation funds
  - Payment obligations to members
    - Benefit payments, transfers, switching between options, rebalancing, hedging

Data and sample

- 152 large superannuation funds
  - September 2004 to June 2010
  - Fund flows, earnings, expenses, net assets, age of members, asset allocation from APRA
- Trading volume and market cap. for asset classes
  - Used to measure portfolio liquidity

Data and sample

Data sources for trading volume and market capitalisation

Asset class	Representation	Source
Cash	Bank-accepted bills, certificates of deposit	AFMA
Fixed income	Government and non-government debt securities	AFMA
Australian shares	S&P ASX 200 Index constituent stocks	Bloomberg
International shares	MSCI World ex-Australia Index and MSCI Emerging Markets Index constituent stocks	Bloomberg
Unlisted property	Units in unlisted property trusts	ABS
Other investments	Units in unlisted equity trusts	ABS

Liquidity measures

- Measure 1
  - Illiquid investments

$$LLI = \frac{1}{\sum_{i=1}^{6} w_i}\left(w_5 + w_6\right)$$

    - w_i = dollar value of asset class *i*
      - Unlisted property (*i*=5)
      - Other investments (*i*=6)

- Measure 2
  - Average holding period

$$AHP = \frac{1}{\sum_{i=1}^{6} w_i}\sum_{i=1}^{6} w_i HoldingPeriod_i$$

    - $HoldingPeriod_i$ = average market cap. / average daily dollar trading volume

Role of trustees and members

- Default strategy
  - When the members provide no direction
  - Trustee solely responsible for the allocation
- Whole-of-fund
  - Trustee decides what choice to offer, members permitted to give directions
  - Both trustees and members influence the allocation

Descriptive statistics

Data item	Illiquid investments tertile 1 (low)	2	3 (high)	Total sample
Number of funds	47	47	47	141
Net assets $mil	3,894	2,636	3,223	3,248
Preservation age %	35.2	27.4	23.4	28.2
Internally managed %	1.8	4.6	8.5	4.9
Fund flow %	5.8	5.3	6.7	6.0
Default strategy				
LLI %	6.1	14.5	21.3	13.5
AHP days	356	511	615	486
Whole-of-fund				
LLI %	1.7	9.4	21.6	10.8
AHP days	341	417	543	432

Liquidity and fund characteristics

- Panel regression:

$$LIQHOLDING_{i,t} = \alpha_t + \beta_1 \times LOGSIZE_{i,t} + \beta_2 \times PRSAGE_{i,t} + \beta_3 \times RETAIL_i + \beta_4 \times INTMAN_{i,t} + \beta_5 \times FLOW_{i,t} + \beta_6 \times VFLOW_{i,t} + \varepsilon_{i,t}$$

  - $LIQHOLDING_{i,t}$ = liquidity measure (*LLI* or *AHP*)
  - $LOGSIZE_{i,t}$ = log net assets - log 200 million
  - $PRSAGE_{i,t}$ = proportion of members aged 50 years and over
  - $RETAIL_i$ = dummy variable which equals one for a retail fund
  - $INTMAN_{i,t}$ = percentage of fund assets managed internally
  - $FLOW_{i,t}$ = average percentage new fund flow
  - $VFLOW_{i,t}$ = standard deviation of percentage new fund flow

Liquidity and fund characteristics

	Dependent variable			
	Default strategy		Whole-of-fund	
Independent variables	**LLI_{dis}**	**AHP_{dis}**	**LLI_{wof}**	**AHP_{wof}**
Log size	2.032 **	32.020 **	1.804 **	23.116 **
	(7.81)	(4.89)	(4.02)	(3.79)
Preservation age	-0.135 **	-3.318 **	-0.105 **	-1.599 **
	(-6.11)	(-5.81)	(-3.16)	(-3.47)
Retail	-10.020 **	-227.696 **	-6.041 **	-125.633 **
	(-13.68)	(-12.65)	(-4.50)	(-7.78)
Internally managed	0.118 **	2.328 **	0.076	1.088
	(2.63)	(2.12)	(1.49)	(1.35)
Fund flow	0.537 **	5.419	0.247	4.505
	(3.58)	(1.54)	(0.69)	(1.05)
Volatility of fund flow	-0.168	-0.696	-0.274	-4.619
	(-1.04)	(-0.23)	(-1.05)	(-1.46)
Adj. R^2	0.34	0.45	0.19	0.31
Observations	805	805	280	280

Numbers in parentheses are *t*-statistics. ** indicates significance at the 5% level.

Trustee and member decisions

Comparison of asset allocations between the default strategy and member-selected strategies

Investment option type	Cash and fixed income %	Australian and int'l shares %	Unlisted property and other investments %
Default strategy (1)	29.8	58.7	11.5
Member-selected strategies (2)	29.6	56.5	13.9
Difference (2-1)	-0.2	-2.2	2.4 **
	(-0.14)	(-1.37)	(2.33)
Observations	279	279	279

Numbers in parentheses are *t*-statistics. ** indicates significance at the 5% level.

Performance impacts

- Loadings of each fund using 3 and 5-factor models:

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,1} \times (FI_t - r_{f,t}) + \beta_{i,2} \times (AS_t - r_{f,t}) + \beta_{i,3} \times (IS_t - r_{f,t}) + \varepsilon_{i,t}$$

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,1} \times (FI_t - r_{f,t}) + \beta_{i,2} \times (AS_t - r_{f,t}) + \beta_{i,3} \times (IS_t - r_{f,t}) + \beta_{i,4} \times (UP_t - r_{f,t}) + \beta_{i,5} \times (OI_t - r_{f,t}) + \varepsilon_{i,t}$$

  - $r_{i,t}$ = net fund return
  - $r_{f,t}$ = 90-day bank bill interest rate
  - FI_t = return on Citigroup Australian Broad Investment-Grade Bond Index
  - AS_t = return on S&P ASX 200 Accumulation Index
  - IS_t = return on MSCI Total Return Net World ex-Australia Index
  - UP_t = return on Mercer/IPD Australian Pooled Property Fund Index
  - OI_t = return on Cambridge Associates Australia Private Equity and Venture Capital Index
- Risk-adjusted return
  - Difference between realised fund return and expected fund return

Performance impacts

- Panel regression:

$$\alpha_{i,t} = \delta_t + \gamma_1 \times LIQHOLDING_{i,t-1} + \gamma_2 \times LOGSIZE_{i,t-1} + \gamma_3 \times RETAIL_i + \gamma_4 \times FNDAGE_{i,t-1} + \gamma_5 \times FLOW_{i,t-1} + \varepsilon_{i,t}$$

  - $\alpha_{i,t}$ = risk-adjusted net fund return
  - $LIQHOLDING_{i,t\text{-}1}$ = liquidity measure (LLI_{wof} or AHP_{wof})
  - $LOGSIZE_{i,t\text{-}1}$ = log net assets - log 200 million
  - $RETAIL_i$ = dummy variable which equals one for a retail fund
  - $FNDAGE_{i,t\text{-}1}$ = log of fund age
  - $FLOW_{i,t\text{-}1}$ = percentage new fund flow in the previous quarter

Performance impacts

	Dependent variable			
	3-factor α		5-factor α	
Independent variables	**(1)**	**(2)**	**(1)**	**(2)**
LLI_{wof}	-0.0013		-0.0068	
	(-0.18)		(-1.70)	
AHP_{wof}		0.0003		-0.0002
		(0.98)		(-0.64)
Log size	0.0321	0.0225	0.0198	0.0130
	(1.91)	(1.05)	(1.10)	(0.69)
Retail	-0.3330 **	-0.2580 **	-0.2967 **	-0.2590 **
	(-3.37)	(-1.97)	(-3.28)	(-2.54)
Log fund age	0.0259	0.0339	0.0168	0.0308
	(0.61)	(0.75)	(0.34)	(0.61)
Lagged fund flow	-0.0080 **	-0.0086 **	-0.0076 **	-0.0078 **
	(-2.55)	(-2.66)	(-3.30)	(-3.36)
Adj. R^2	0.30	0.30	0.17	0.17
Observations	3,328	3,328	3,328	3,328

Numbers in parentheses are *t*-statistics. ** indicates significance at the 5% level.

Conclusion

- Broad cross-section of investment in illiquid assets
  - Fund returns generally commensurate with the non-diversifiable risk contributed by these investments
- Drivers of investment in illiquid assets
  - Fund size, fund flows, internal management, member age
- Retail funds have lower allocations
  - Aggregation of the choices of individual members
  - More comfortable with liquid asset classes

Feedback

- Welcome comments from industry practitioners and academics
- Paper posted on SSRN:
  - http://ssrn.com/abstract=1962971

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