Forced Retirement Risk and Portfolio Choice

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Question

- Background
  - Many discussions on the adequacy of the level of savings of older households.
  - Less on how they should manage their portfolio.
  - Life-cycle funds with monotonically decreasing share of risky assets.
    - Justified by bond-like human capital (Jagannathan and Kocherlakota, 1996)

Question

- Background
  - Many discussions on the adequacy of the level of savings of older households.
  - Less on how they should manage their portfolio.
  - Life-cycle funds with monotonically decreasing share of risky assets.
    - Justified by bond-like human capital (Jagannathan and Kocherlakota, 1996)
- What we do
  - Show that a forced retirement is a significant risk for older Americans.
  - Examine implications of this risk on financial portfolio choice.

Labor income and portfolio choice

- Labor income risk typically modeled as shocks to earnings process...
- ...that you face before your retirement.

$$log(Y_{it}) = f(t, Z_{it}) + \nu_{it} + \epsilon_{it},$$
$$\nu_{it} = \nu_{i,t-1} + u_{it},$$

  where u_{it} can be correlated with stock returns.
- Most of these papers find that human capital is bond-like.
  - Viceira (2001), Cocco, Gomes, and Maenhout (2005)
  - Fagareng, Guiso, and Pistaferri (2016)
  - Hugget and Kaplan (2016)
  - Heaton and Lucas (2000), Benzoni, Collin-Dufresne, and Goldstein (2007), Schmidt (2016) are exceptions.

Labor income and portfolio choice

- Neglected risk in labor income: uncertainty in retirement timing
  - Retirement timing either assumed as fixed or endogenous (hence functions as a buffer)
  - Involuntary (early) retirement is prevalent (25% of total retirement)
  - Small but growing literature focuses on retirement timing uncertainty
    - Chan and Stevens (2001), Dorn and Sousa-Poza (2010)
    - Smith (2006), Caliendo, Casanova, Gorry, and Slavov (2016)
  - We examine the implication of this risk on portfolio choice.

Outline of the talk

1. Empirical evidence on forced retirement risk
    - Average size
    - Correlation with stock returns
2. Impact of forced retirement risk on optimal portfolio choice
    - Human capital becomes stock-like under forced retirement risk.
    - Key mechanism is the correlation between forced retirement risk and stock returns.
    - Optimal life-cycle stock share profile can be very different from conventional suggestions.

Data and sample

Data

Health and Retirement Studies, 1998 - 2012.

Sample

Male household head, age between 55-69.

Forced retirement indicator

Q: Thinking back to the time you [partly/completely] retired, was that something you wanted to do or something you were forced into?

A: 1) Wanted to do; 2) Forced into; 3) Part wanted, part forced

Prevalence of forced retirement

Table: Number of Retirees and Forced Retirees (FR) Ratio

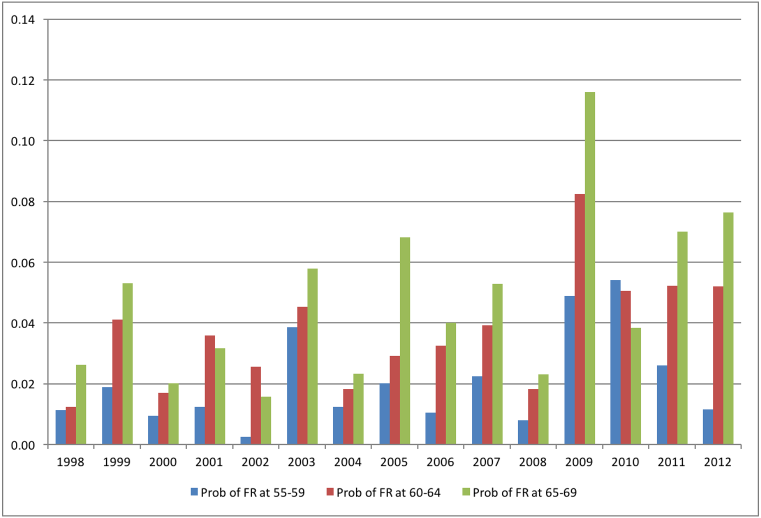
	Retirement Age							
	55-59		60-64		65-69		Total	
Retirement Year	# of Retirees	% of FR	# of Retirees	% of FR	# of Retirees	% of FR	# of Retirees	% of FR
1998	86	37.2%	159	18.9%	85	20.0%	330	23.9%
1999	48	29.2%	162	19.1%	82	17.1%	292	20.2%
2000	56	23.2%	128	28.1%	82	19.5%	266	24.4%
2001	36	22.2%	129	20.2%	54	18.5%	219	20.1%
2002	37	40.5%	148	25.0%	62	14.5%	247	24.7%
2003	45	37.8%	85	21.2%	61	29.5%	191	27.7%
2004	39	23.1%	76	22.4%	64	18.8%	179	21.2%
2005	36	50.0%	77	14.3%	73	20.5%	186	23.7%
2006	33	42.4%	47	34.0%	70	25.7%	150	32.0%
2007	56	42.9%	58	27.6%	62	22.6%	176	30.7%
2008	40	55.0%	54	37.0%	48	33.3%	142	40.8%
2009	42	57.1%	59	47.5%	57	35.1%	158	45.6%
2010	50	60.0%	58	43.1%	42	23.8%	150	43.3%
2011	28	50.0%	55	34.5%	29	24.1%	112	35.7%
2012	19	42.1%	49	46.9%	22	40.9%	90	44.4%
Total	651	40.2%	1,344	26.3%	893	23.0%	2,888	28.4%

Defining forced retirement risk

- What fraction of households are forced to retire...
- ...conditional on willing to keep working.
- $ForcedRetirementRisk_{i,j} = \frac{N(ForcedRetirees_{i,j})}{N(ForcedRetirees_{i,j}) + N(Working_{i,j})}$

Estimated forced retirement risk

Figure: Forced retirement risk



Effective size of risk

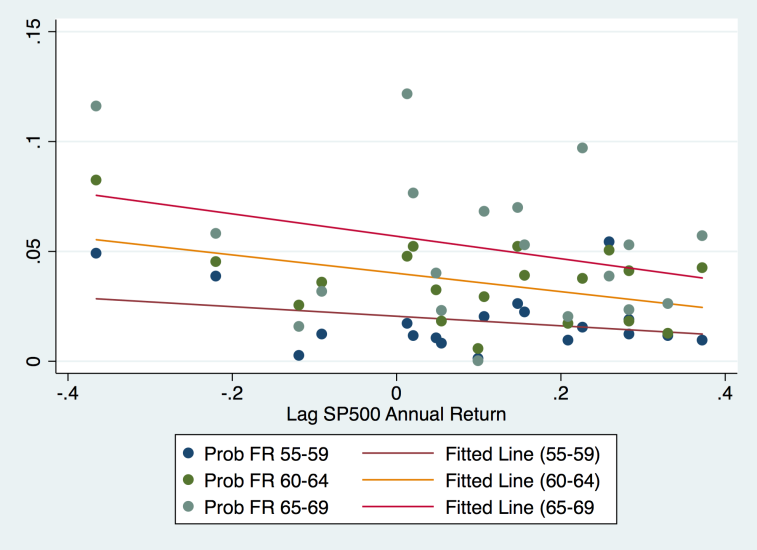
Table: Expected - actual retirement age

	Percentile			N
	25	50	75	
55-59	2	5	7	198
60-64	0	2	4	322

- Only 8 percent come back to the labor market.
- Almost none of them receive unemployment insurance.

Correlation with stock return

Figure: Forced retirement risk and S&P returns



Lifecycle portfolio choice model

- Based on standard lifecycle portfolio choice model
  - Households face idiosyncratic income and mortality risk and aggregate stock return risk
  - Households choose how much to consume/save and how to allocate savings between a risky and a safe assets.
- Forced retirement risk
  - Households plan to retire at a certain age, but need to retire earlier when hit by this shock.
  - Forced retirees have no labor earnings. Start to receive retirement income.
  - Calibrated based on the HRS data

Lifecycle portfolio choice model

Retirement timing:

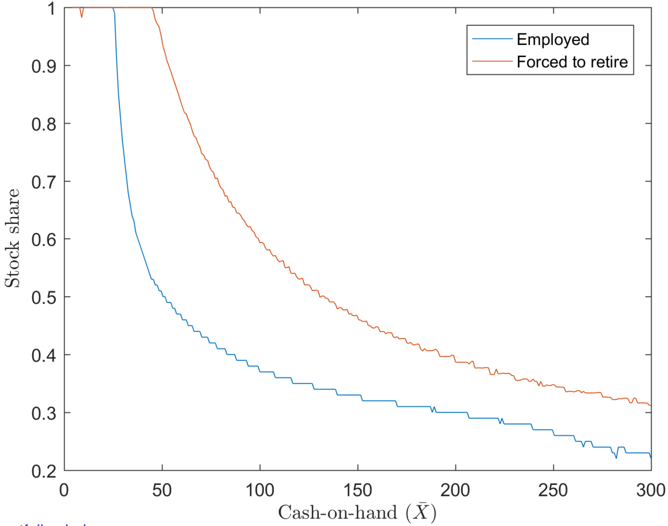
- If not hit by a forced retirement shock, households work up to K.
- Ω_t: probability of being forced to retire, at age t.

$$\Omega_t = \bar{\Omega}_t + \kappa_t \iota_t.$$

Model details

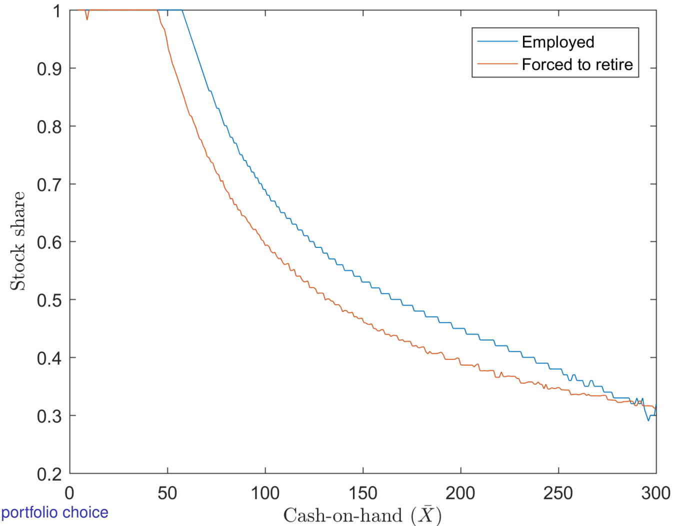
Stock-like human capital

Figure: Optimal stock share for workers and retirees (age 60)



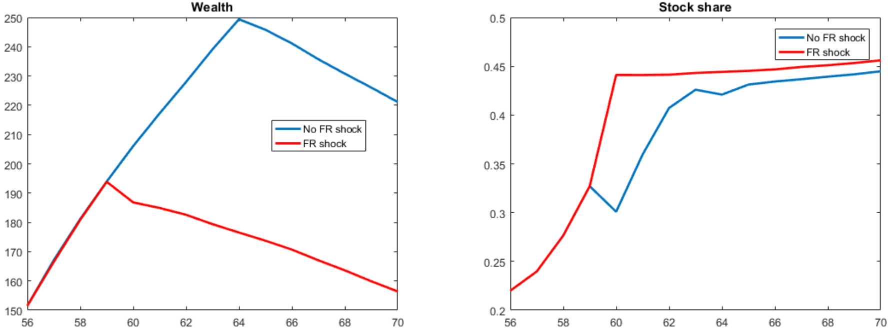
What makes human capital stock-like?

Figure: No correlation between stock returns and forced retirement risk (age 60)



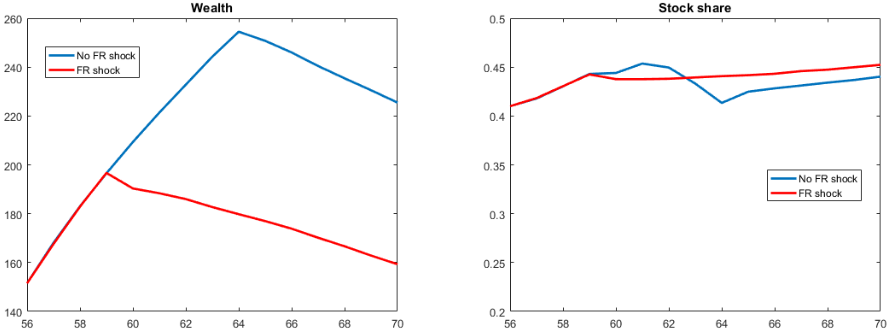
Lifecycle profile

Not forced to retire vs. forced to retire at 60



Lifecycle profile (no correlation)

Not forced to retire vs. forced to retire at 60



Discussion

- Do households actually adjust their portfolio in this way?
  - According to Chen and Nam (2014), they do.
  - Retirement on average increases stock share by 4 pp.
- Conventional portfolio choice advice assumes human capital = safe asset.
  - This formula needs to be reconsidered.
- One possible explanation for the risk premium puzzle.

Discussion

- Possible extensions
  - Examine the effect of transition from DB to DC, by lowering λ while increasing labor earnings while working?
  - Treating two main sources–economic condition and health-related reasons–of forced retirement risk separately, while modeling the effect of the latter on life expectancy.
  - Consider joint survival rate for couples.
  - Not allowing (actuarially fair) early retirement benefit before a certain age.

Conclusion

- Using the HRS, we show that older workers face a significant forced retirement risk that is amplified after the stock market downturn.
- Life-cycle portfolio choice model with the estimated forced retirement risk shows that such a risk makes (a part of) human capital stock-like, reducing demand for risky assets in financial portfolio.
- It is the correlation between the forced retirement risk and the stock returns, not the risk per se, which makes human capital stock-like.

Lifecycle portfolio choice model

Preference:

$$E_1 \sum_{t=1}^{T} \delta^{t-1} (\prod_{j=0}^{t-2} P_j \{ P_{t-1} \frac{C_{it}^{1-\gamma}}{1-\gamma} + b(1-P_{t-1}) \frac{D_{it}^{1-\gamma}}{1-\gamma} \}),$$

Labor income before retirement:

$$\begin{aligned} log(Y_{it}) &= f(t, Z_{it}) + \nu_{it} + \varepsilon_{it} \\ \nu_{it} &= \nu_{i,t-1} + u_{it} \\ \varepsilon_{it} &\sim N(0, \sigma_{\varepsilon}^2) \\ u_{it} &\sim N(0, \sigma_u^2). \end{aligned}$$

Lifecycle portfolio choice model

Retirement income:

- Ψ: average labor income the household had until the normal retirement age (K).

$$\Psi_{it} = \frac{(t-1)\Psi_{i,t-1} + Y_{it}}{t}.$$

- If retired at the normal retirement age (K):

$$log(Y_{it}) = log\lambda + log(\Psi_{it}), \forall t \geq K.$$

- If retired before the normal retirement age (K):
  - It reduces Ψ, by having zero incomes in calculation.
  - Conditional on Ψ, the present value sum is not affected (actuarially fair early retirement benefits).

Lifecycle portfolio choice model

Financial assets:

- One safe asset and one risky asset.
- $\bar{R}_f$: Return to the safe asset.
- R_t: Return to the risky asset.

$$R_t - \bar{R}_f = \mu + \eta_t$$
$$\eta_t \sim N(0, \sigma_\eta^2)$$
$$Corr(\eta_t, u_t) = \rho,$$

- No short-selling allowed in either assets.
- We assume $\iota_t = -\eta_t$ to capture the estimated regression line.

Lifecycle portfolio choice model

Optimization problem:

$$
\begin{aligned}
V_{it}(\tilde{X}_{it}, \tilde{\Psi}_{it}, Ret_t, RA_t) =& Max_{\tilde{C}_{it}\geq 0, 0\leq \alpha_{it}\leq 1}[U(\tilde{C}_{it}) + ... \\
& \delta P_t E_t exp(\nu_{i,t+1})^{1-\sigma} V_{i,t+1}(\tilde{X}_{i,t+1}, \tilde{\Psi}_{i,t+1}, Ret_{t+1}, RA_{t+1})], \\
s.t.\ \ X_{it} =& W_{it} + Y_{it} \\
W_{i,t+1} =& R^P_{i,t+1}(W_{it} + Y_{it} - C_{it}) \\
R^P_{i,t+1} \equiv& \alpha_{it} R_{t+1} + (1-\alpha_{it})\bar{R}_f
\end{aligned}
$$

Lifecycle portfolio choice model

Table: Calibration of parameters

Parameter	Value
Own calibration	
Mean of forced retirement risk ($\bar{\Omega}$) for age 55-59	0.02
Mean of forced retirement risk ($\bar{\Omega}$) for age 60-63	0.035
Variance of forced retirement risk (κ) for age 55-59	0.025
Variance of forced retirement risk (κ) for age 60-63	0.05
From Cocco et al. (2005)	
Normal retirement age (K)	65
Discount factor (δ)	0.96
Risk aversion (γ)	10
Bequest motive (b)	0
Average labor income ($f(t, Z_{it})$)*	
Variance of transitory income shocks (σ_{ε}^2)	0.0738
Variance of permanent income shocks (σ_u^2)	0.0106
Correlation between (permanent) labor income shocks and stock returns (ρ)	0
Riskless rate ($R_f - 1$)	0.02
Risk premium ($\mu - 1$)	0.04
Std. of stock return (σ_η)	0.157
Replacement rate at K (λ)	0.68

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