Lifecycle Impacts of the Financial & Economic Crisis on Household Optimal Consumption, Portfolio Choice, and Labor Supply

©Jingjing Chai, Raimond Maurer, Olivia S. Mitchell, Ralph Rogalla

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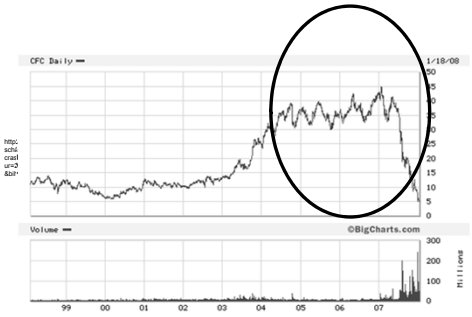
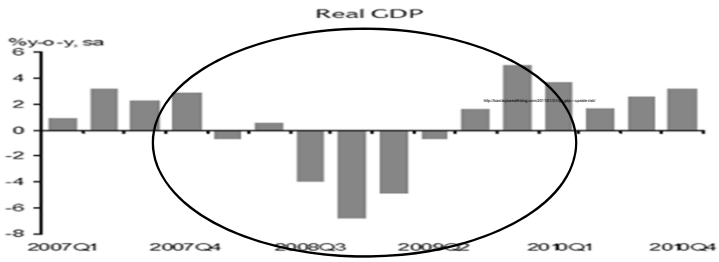
Financial/Economic Crisis





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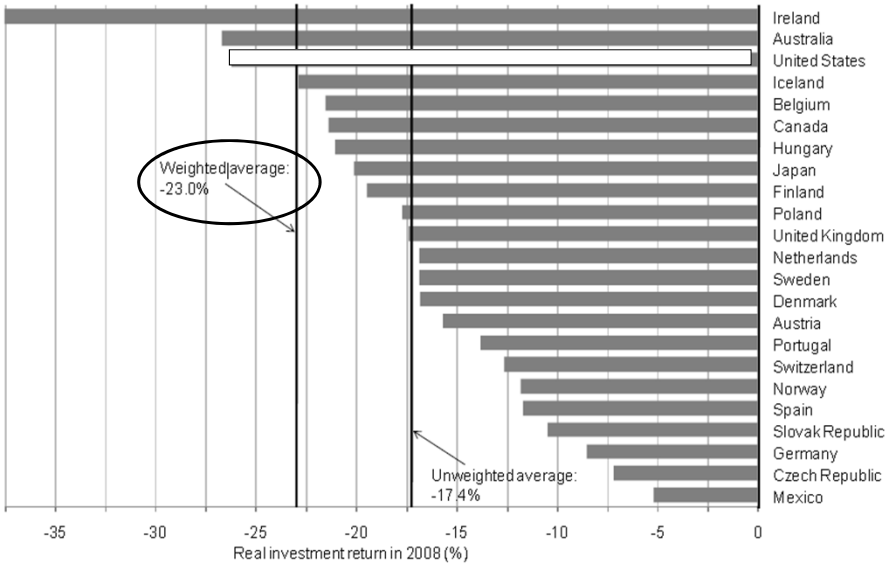
Pension Fund Returns 2008



OECD (2009), "Private Pensions Outlook, Paris"; E. Whitehouse (2010) "Pension during the Crisis"

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Motivation & Research Questions

- Financial crisis (capital market): workers lost substantial portion of their retirement saving.
- Economic crisis (labor market): high unemployment and pay cuts; Social Security and private pension contributions down.

We ask:

✓ How might people react (optimally) to combination of financial & economic crisis?

✓ Diff's by age group?

✓ Short vs long term consequences?

Literature & Contributions

- Recent LC-portfolio choice studies:
  - ✓ Stock returns: i.i.d. normally distributed
  - ✓ Labor income: Permanent & transitory shocks i.i.d.
  - ✓ Relation: Correlation (Cocco et al. 2005 RFS) Cointegration (Benzoni et al. 2007 JF)
- Empirical models of regime changes:
  - ✓ Finance Lit.: Time-varying investment opportunity set: bull/bear market → low/high volatility & high/low mean returns (Guidolin/Timmermann 2008 RFS)
  - ✓ Macro Lit: Countercyclical dynamics of labor income risk (Storesletten et al. 2004 JPE)
- Our Contribution
  - ✓ Extend LC-portfolio model using joint process for stock/labor market risk with business cycle (Ferri/Greenberg 1990 JEBO)
  - ✓ Incorporate endogenous work effort, retirement,& annuitization.

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Life Cycle Building Blocks

Utility of consumption & leisure

$$V_t = \frac{\left(C_t L_t^{\alpha}\right)^{1-\rho}}{1-\rho} + \beta E_t\left(p_t^s V_{t+1}\right)$$

Labor market: Wage rate stochastic; econ. state dependent

Capital market: Deferred annuity, bond, econ. state dep. risky stock

Housing: Age dependent (det.) costs

Regulation: US SocSec-rules, tax rates

Household: US female; mid-income; RRA=5; α=1.3

Business Cycle

Numerical dynamic optimization; simulation of 100,000 life cycles

Consumption

Leisure / labor supply

Asset allocation, annuitization

Retirement

Model & Calibration

- Business Cycle: NBER classification
  - Markov Chain $M = \begin{bmatrix} p_{0,0} & p_{1,0} \\ p_{0,1} & p_{1,1} \end{bmatrix} = \begin{bmatrix} 0.68 & 0.32 \\ 0.32 & 0.68 \end{bmatrix}$
  - Regime change for macroeconomy.

  Two states: s = *expansion* or *contraction*
  - Annual US GNP growth rate from BEA for 1929-2008

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Model & Calibration

Labor market:

- Data: PSID panel

$$\text{Prob(unemployment)} = \begin{cases} p_0 & \text{if expansion at date t} \\ p_1 & \text{if contraction at date t} \end{cases}, \quad p_0 < p_1$$

$$\text{WR}_t = \begin{cases} \text{w(t,...,)E}_t u_t & \text{if employed} \\ \text{x\%w(t,...,)E}_t u_t & \text{if unemployed} \end{cases}, \quad \text{x} \in (0,100)$$

→When working: wage rate * hours

$$E_t = E_{t-1} n_{t,s_t}$$

$$(S = \text{expansion or contraction})$$

$$\text{Permanent income shock } n_{t,s_t} \sim \log \text{Niid}\left(0, \sigma_{n,s_t}^2\right)$$

$$\sigma_{n,s_t} = \begin{cases} \sigma_{n,0} & \text{if expansion at date t} \\ \sigma_{n,1} & \text{if contraction at date t} \end{cases}, \quad \sigma_{N,0} < \sigma_{N,1}$$

$$\text{Transitory income shock } u_t \sim \log \text{Niid}\left(0, \sigma_u^2\right)$$

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Model & Calibration

- Labor market:
  - →Social Security benefits depend on retirement age relative to NRA, & earnings:
    - If retire < NRA: benefit permanently reduced
    - If retire ≥ NRA: benefit permanently increased
- Annuities:
  - Deferred annuity: before NRA, payout at NRA;
  - Immediate annuity: after NRA;
  - Loading factor: 2.38%.

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Model & Calibration

- Capital market:
  - ❖Risk-free asset: Bonds 2% p.a.
  - ❖Risky stocks:

    Data: Annual real value-weighted market index portfolio returns on the NYSE, AMEX, and NASDAQ (retrieved from CRSP) from 1950 to 2008

$$y_t = \mu_{s_t} + \sigma_{s_t}\varepsilon_t \qquad \varepsilon_t \sim N(0,1)$$

s_t : (Observed) states/regimes at time t;

Markov chain-- > Business Cycle

state 1: $y_t \sim N(\mu_1 = 6.84\%, \sigma_1 = 11.21\%)$

state 2: $y_t \sim N(\mu_2 = 2.12\%, \sigma_2 = 20.77\%)$

transition matrix: $\begin{bmatrix} 0.68 & 0.32 \\ 0.32 & 0.68 \end{bmatrix}$

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How to Define a Crisis?

- Macro: Financial/Economic
  - 1st year: -30% downturn in the stock market
  - First 4 years contraction (business cycle)
  - Exogenous into the model (i.e. for all 100,000 simulated LC with optimal feedback controls)

- Individual crisis:
  - 2+ years unemployed in first 4 years;
  - Average yearly stock return < age 62 in 1st quintile;
  - Methodology: Select from 100,000 simulated LC-Profiles (with optimal feedback controls).

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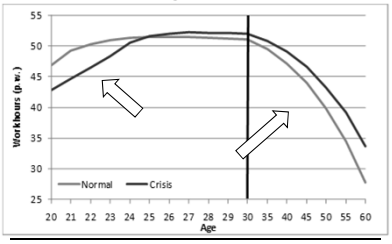
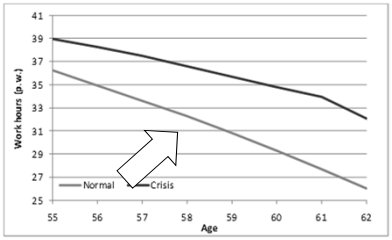
Results: Work Hours & Retirement Age

Age 20



	Retirement Ratio (%)	
Age	Normal	Crisis
62	27.4	8.0
63	6.3	3.6
64	6.6	5.5
65	8.2	8.8
66	24.6	36.3
67	22.3	32.7
68	4.7	5.1
69	0.0	0.1
70	0.0	0.0
Avg. Ret. Age	64.82	65.80

Age 55



	Retirement Ratio (%)	
Age	Normal	Crisis
62	20.6	4.4
63	7.0	3.3
64	7.0	3.2
65	9.0	10.2
66	26.8	38.2
67	24.4	33.2
68	5.1	7.5
69	0.0	0.0
70	0.0	0.0
Avg. Ret. Age	65.08	66.04

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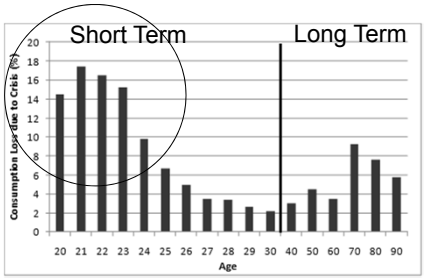
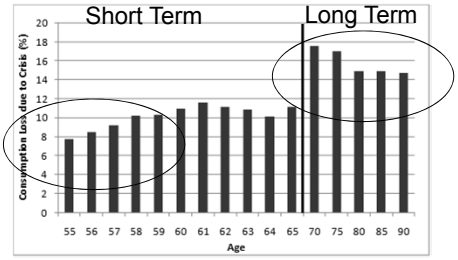
Results: Consumption Loss Crisis *vs* Normal

Age 20



Age 55



- Substantial and persistent for both age groups
  - Young: Large SR consumption loss partly offset by more leisure; smaller LR loss.
  - Older: SR consumption loss smalller despite more work effort; LR consumption loss large

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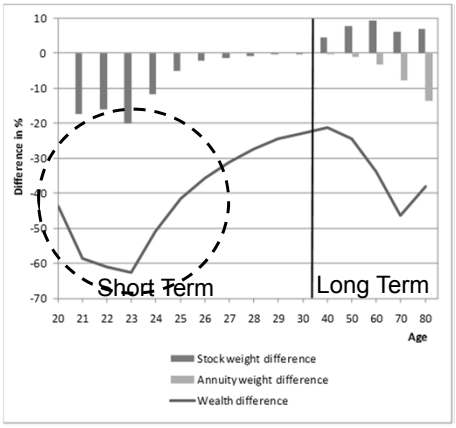
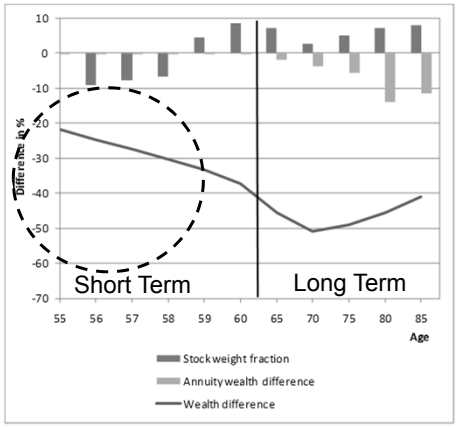
Results: Asset Allocation Crisis *vs* Normal

Age 20



Age 55



Young: SR: 40% wealth drop (low wage & low hours); less equity; LR wealth recovers somewhat; more equity in second half of life
Older: SR 20% wealth drop, less equity now, more later

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Conclusions

- LC model to explore SR & LR impacts of financial/economic crisis on:
  - Optimal portfolio choice,
  - Consumption and saving,
  - Work hours and retirement.
    - Double-barreled crisis Regime change B-cycle model driving stochastic dynamics of stock & labor market risk.
- Results:
  - Young: Work - early but + later; retire later; consumption drop; hold less (more) equity early (late) in life.
  - Older group: Work + and retire later; consume less; hold - (+) equity early (late); buy less longevity risk insurance.

→ Corresponds to recent evidence on short-term effects.

Thank you!

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