Discussion Parallel session 3: " Longevity and Generation Effect"

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- **Asset-liability management in life insurance: Evidence from France**
  Victor Lyonnet

- **Valuing Life as an Asset, as a Statistic, and at Gunpoint**
  Julien Hugonnier, Florian Pelgrin and Pascal St-Amour

Study of the asset-liability management of life insurers

- life insurance investors problem of the optimal contract liquidation date, as a function of taxes and rates of return.
- test whether life insurers portfolio choice is responsive to liquidation risk.

Data

- sample period (2011 – 2015).
- two different data sources:
  - regulatory data from the national insurance supervisor (Autorité de Contrôle Prudentiel et de Résolution)
  - confidential data from the French Insurance Federation (Fédération Française de l'Assurance)

Methodology

Model : considering insurer i in year t

- cross-sectional model:

$$Y_{i,t} = \gamma_t + \beta X_{i,t} + \varepsilon_{i,t}$$

  $X_{i,t}$ is a measure of liquidation exposure,
  $Y_{i,t}$ average maturity of the bond acquisition (resp. stocks acquisition) portfolio

- three different measures for liquidation risk $X_{i,t}$
  - estimated liquidation rate of insurer

$$X_{i,t} = \frac{\sum_j h(j) prov_t(i,j)}{\sum_j prov_t(i,j)}$$

    j=contract age, $h(j)$=market hazard rate, $prov_t(i,j)$ amount of provisions
  - Or $X_{i,t} = X_i$ is the average liquidation rate for each insurer i across the sample
  - Or $X_{i,t}$ is the liquidation rate for each insurer i at date t

Results

- Since investors return taxation is decreasing (and assuming contract returns known and increasing over time)
  - investors whose contract is relatively older should favor liquidating their contract later compared to investors whose contract is younger.
  - life insurers whose investor base is relatively young should be more exposed to liquidation risks
- One standard deviation increase in liquidation risk
  - increases the maturity of insurers bond acquisition by 1.2 years on average, or one-third of its standard deviation,
  - decreases insurers share of stocks in asset acquisitions by 25 basis points, or one-half of its standard deviation

Results are very exciting, and opening up interesting developments

- implementation on a larger data set to achieve better statistically significant results
- estimation of liquidation risk
  - computation and accuracy of the market hazard rate h?
  - How to handle the different causes of liquidation risk, such as exogeneous behavioral causes ?

Planning

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Theory and measurement of life values

- Give an unified framework to formally define and relate the different empirical life valuations
  - Human Capital (HK) : the present value of the dividend stream associated with human capital
  - Statistical Life Values (VSL): relies on a stated, or inferred, willingness to pay (WTP) to avert (resp. attain) small increases (resp. reductions) in exposure to death risks.
- introduce a benchmark life value calculated at Gunpoint (GPV), that is the maximal WTP to avoid certain, instantaneous death.
- characterize the WTP and the three life valuations in closed-form, in a parametrized human capital model.

METHODOLOGY

- Underlying Human Capital Problem

$$V(W,H,\mathcal{P}) = sup_{I,X} U \quad \text{with} \quad H = H(I),\ W = W(Y(H), I, X)$$

  - $\mathcal{P}$ instantaneous death probability
  - H human capital and $Y(H)$ the associated increasing income function
  - W the wealth
  - I investment in the human capital
  - X other controls
- Human capital value of life

$$v_t^{hk} = E_t \int_0^{\tau_m} m_{t,s}(Y(H_s) - I_s)ds$$

- Willingness to pay to avoid a permanent change Δ in death risk exposure $\mathcal{P}$ is implicitly given

$$V(W - v, H, \mathcal{P}) = V(W, H, \mathcal{P} + \Delta)$$

- Value of Statistical Life

$$v^{VSL} = \frac{\partial v(W,H,,\Delta)}{\partial \Delta}|_{\Delta=0}$$

- Gunpoint Value of Life v^g: $V(W - v^g, H, \mathcal{P}) = V^m =$ the utility at death.

- Benchmark model with dynamics for
  - human capital H with a Poisson depreciation shock
  - jump/diffusive dynamic budget constraint for the financial wealth W
- Data : 8,378 individuals taken from the 2013 wave of the Institute for Social Research's Panel Study of Income Dynamics (PSID)

Results

- closed-form expressions for the life valuations
- analytical calculations: life values of 8.35 M $ (VSL), 421 K $ (HK) and 447 K $ (GPV).
- strong curvature of the WTP explains why the VSL is much higher than other values.
- the three life pricing are valuable tools that should remain specialized in their respective applications.

Comments

Results are of particular interest

- in public health and safety debates, such as for cost/benefit analyses of life-saving measures in transportation, environmental, or medical settings.

Possible future studies

- Impact in the life valuation of
  - the heterogeneity of the population
  - the change in the composition of the population