Human Capital Risk, Contract Enforcement, and the Macroeconomy

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General Issue:

- For many households (the young), human capital is the most important part of total wealth.

- Human capital is an asset with three characteristics:
  i) risky (health risk, labor market risk)
  ii) heterogeneous ex-ante returns (young vs old)
  iii) non-pledgeable (bad collateral)

- Properties i)-iii) imply:

  high risk-exposure (young) $\implies$ little insurance
Intuition

- Households with high expected human capital returns (young) choose to invest a lot in human capital

- These households therefore have high risk exposure and large need for insurance

- With complete markets and perfect contract enforcement, these households will borrow and be perfectly insured

- With limited enforcement of credit contracts (US bankruptcy law), these households are borrowing constrained and under-insured
This Paper – Contributions

• We show analytically that this risk-insurance relationship holds in equilibrium

• We establish this risk-insurance pattern in the data on life-insurance

• We show that a calibrated macro model can quantitatively match this and other important life-cycle facts

• We show that welfare cost of under-insurance of young households is substantial (4% of lifetime consumption)
This Paper – Additional Contribution

- Tractable macro model with convex household decision problem

- Policy experiment: US reform of consumer bankruptcy regulation
Literature

  i) Exogenous human capital
  ii) Too much consumption insurance

Production

\[ Y_t = F(K_t, H_t) \]

\( Y_t \): aggregate output
\( K_t \): aggregate stock of physical capital
\( H_t \): aggregate stock of human capital

Profit maximization:

\[ r_{kt} = r_k(\tilde{K}_t) \]
\[ r_{ht} = r_h(\tilde{K}_t) \]

\( r_k \): rental rate of physical capital
\( r_h \): rental rate of human capital
\( \tilde{K}_t = K_t/H_t \): aggregate "capital-to-labor ratio"
Uncertainty

Large number of households of "age" $j$ with $j = 23, \ldots, 60$, pre-retirement, retirement

$s_j = (s_{1j}, s_{2j})$: household-specific shock at age $j$

$s_{1j}$: death of an adult household member (widowhood)

$s_{2j}$: all other human capital risk (labor market risk)

Assumption:

$\{s_{2j}\}$ is i.i.d. and $\{s_{1j}\}$ is i.d.
Preferences

Expected lifetime utility of individual household at age 23:

\[
\sum_{j=23}^{60} \beta^{j-23} \sum_{s^j} \ln c_j(s^j) \pi_j(s^j|s_{23}) + \sum_{s_{61}} V_{61}(a_{61}, h_{61}, s_{61}) \pi_{61}(s_{61})
\]

\(V_{61}\): value function of households ”age” \(j = 61\) (pre-retirement stage of life)

\(s^j = (s_{23}, \ldots, s_j)\): history of shocks up to age \(j\)
Budget Constraint

\[ c_j + x_{hj} + \sum_{s_{j+1}} q_j(s_{j+1})a_{j+1}(s_{j+1}) = r_h h_j + a_j(s_j) \]

\[ h_{j+1} = (1 - \delta_h + \eta_1(s_{1j}) + \eta_2(s_{2j})) h_j + \phi_j x_{hj} \]

\( \eta_1, \eta_2 \): mortality risk and labor market risk

\( x_{hj} \): human capital investment

\( \phi_j \): productivity of human capital investment

\( a_{j+1}(s_{j+1}) \): quantity of Arrow-security purchased/sold
Remarks

- We assume complete markets because we want to focus on one financial friction (limited contract enforcement)

- We can add general time-cost of human capital investment (Ben-Porath), but for tractability result we need linearity in $x_h$ and $h$
Participation Constraint (Default)

\[
\sum_{j=n}^{60} \beta^{j-n} \sum_{s_j|s_n} \ln c_j(s^j) \pi(s^j|s_n) + \sum_{s_{61}} V_{61}(a_{61}, h_{61}, s_{61}) \pi_{61}(s_{61}) \\
\geq V_d(h_n, s_n)
\]

\(V_d(.)\): value function in case of default

Consequences of default (along the lines of Chapter 7):

i) all debt is cancelled: \(a_n = 0\)

ii) exclusion from financial markets in the future, \(a_j = 0\), until stochastically determined future date

iii) no garnishment of labor income
Remarks

• The household problem separates into a "consumption-saving" problem and a portfolio problem

• I.i.d. human capital shocks imply that labor income follows a log random walk
Financial Intermediaries

- no default in equilibrium

- perfect competition: insurance companies and credit companies (banks) make zero profit:

\[ q_j(s_{j+1}) = \frac{\pi_j(s_{j+1})}{1 + r_f} \]
Calibration

- Choose age-dependent expected human capital returns to match the life-cycle profile of median earnings (growth)

- Choose human capital risk $s_1$ to be consistent with empirical evidence on human capital (labor income) loss in the cases of death of an adult family member – consequences of widowhood

- Choose human capital risk $s_2$ so that implied labor income process is consistent with estimates of the empirical literature on labor income risk
Data: Survey of Consumer Finance

- Repeated cross-section; every three years
- Household-level data
- We use data on labor income, net worth (financial wealth), and life insurance
- We use surveys 1992-2007
- We always compute median value from the data (conditional on age)
Figure 1: Life-cycle profile of log labor income
The calibrated model provides a good quantitative account of the “observed” human capital choice over the life-cycle

\[
\text{human capital choice} = \frac{\text{net worth}}{\text{labor income}}
\]
Figure 3: Life-cycle profile of portfolio choice
Insurance Measure

- Model-based insurance measure
  \[ I = \frac{\text{insurance payout}}{\eta(\text{bad}) \times h} \]

- Empirical insurance measure
  \[ \tilde{I} = \frac{\text{insurance payout}}{\eta(\text{bad}) \times (\text{current earnings}) \times \text{PVF}} \]

- \( \eta(\text{bad}) \): fraction of household human capital lost when bad shock (death of an adult family member) occurs
Result 2

- Both model-based and empirical insurance measure increase with age

- The match between basic version of the model and data is good for intensive margin

- An extended version of the model with heterogeneity in size of $\eta(\text{bad})$ and cost of life-insurance purchase also matches the extensive margin well
Figure 10: Life-cycle profile of life insurance (extended model)
Result 5

Calibrated model implies substantial welfare costs of under-insurance for the young – equivalent to almost 4 percent of lifetime consumption for 23-old household
Figure 5: Life-cycle profile of welfare cost of under-insurance
Policy Implications

What type of policy reform would lead to a welfare-improving increase in insurance and human capital investment?

- subsidize credit – but ensure that households in default do not have access to the subsidy (not in paper)

- more stringent bankruptcy code – garnish labor income (in paper)