Wage Risk and Employment Risk over the Life Cycle

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Past literature of precautionary responses to income risk under incomplete markes has focused on:

- **Theoretical**: has clarified under which circumstances precautionary behavior arises.
- **Empirical**: has concentrated on assessing the levels of income risk and persistence of shocks, on showing that insurance markets are in fact incomplete and measuring the effects of uninsurable idiosyncratic risk on life cycle and wealth accumulation.
From this literature we obtained a better understanding of individual responses to risk and carry out policy analysis but,

- it is necessary to go deeper and understand the sources of risk.
- Recognize that many of the observed fluctuations are result of endogenous choices.

This paper procures advance in this two points, that is: identify different sources of risk and distinguish exogenous shocks from the response to this shocks.
Motivation and objective of the paper II

With this objective, the paper specify a life cycle model of consumption, labor supply and job mobility in an economy with search frictions. They distinguish three sources of risk:

- **Productivity risk**
- **Employment risk (job arrival, job destruction)**
- **wage risk (heterogeneous firms)**
The model (overview)

- Life cycle model of males with exogenous retirement at 62.
- Model period is a quarter
- Two education groups: some college and the rest
- Each period individuals decide whether to work or not, whether to accept a new job (if currently employed or unemployed) and depending on the state whether apply for disability insurance or not.
The model (structure of wage and shocks)

\[ \ln w_{it} = d_t + x_{it} \Psi + u_{it} + e_{it} + a_{ij}(t_0) \]

- \( w_{it} \) real hourly wage
- \( d_t \) log price of labor at time \( t \)
- \( u_{it} = u_{it-1} + \zeta \) permanent component of wages. Each quarter there is a new realization of \( \zeta \) with prob. 0.25
- \( e_{it} \) transitory error
- \( a_{ij}(t_0) \) firm worker match specific component, \( j(t_0) \) indexes the firm joined by the worker in period \( t_0 \)
The model (frictions in labor market)

- Each quarter, workers receive an alternative job offer with prob $\lambda_e$
- Each quarter, unemployed receive a job offer with prob $\lambda_u$
- Each quarter, jobs are destroyed with prob $\delta$
- No depreciation of skills upon job loss (but destroyed the match history).
- All labor market parameters vary across education groups.
- Endogenous mobility decisions, then job-matches realizations are correlated.
The model consider four ways of partial insurance:

- Unemployment insurance (partial insurance against employed risk). Benefits are paid only for the quarter following job destruction.
- Disability benefits (partial insurance against productivity shock). They need to face a negative productivity shock. Is a proxy for health shock. Only for people above 50 years old.
- Social security. Individuals retire at age of 62 and receive benefits.
- Food stamps. Is a transfer for people under the poverty line.
The model (individual optimization)

Individuals maximizes his life utility function

\[
\sum \beta \left( c \ast \exp \{ \eta P \} \right)^{1-\gamma} \frac{1}{1 - \gamma}
\]

subject to \( A_{it+1} = R[A_{it} + (w_{it} h(1 - \tau_w) - F_{it})P_{it} + (B_{it} E_{it}^{UL} (1 - E_{it}^{DI}) + D_{it} E_{it}^{DI}) (1 - P_{it}) + T_{it} E_{it}^{T} - c_{it}] \)

\( A_{it+1} \geq 0 \)
Estimation of the model (wage process)

- They estimate the model in differences

\[ \Delta \ln w_{it} = \Delta d_t + \Delta x_{it} + \zeta_{it} + \Delta e_{it} + \xi_{ij} M_{ij} \]

- wages are only observed for those who worked
- between wage growth is only observed for those who switch jobs
  ⇒ Use Heckman correction (two step procedure) to deal with selection
Estimation of the model (calibration)

- Coefficient of relative risk aversion $\gamma$ set to 1,5
- Interest rate $r=0,015$.
- Set $(\lambda^e, \lambda^u, \delta, \eta, F)$ to match the life-cycle employment profile and unemployment duration profile

<table>
<thead>
<tr>
<th>Parameter</th>
<th>High education</th>
<th>Low education</th>
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<tbody>
<tr>
<td>Job destruction rate $\delta$</td>
<td>0.028</td>
<td>0.049</td>
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<tr>
<td>Job arrival rate - unemployed $\lambda^u$</td>
<td>0.82</td>
<td>0.76</td>
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<tr>
<td>Job arrival rate - employed $\lambda^e$</td>
<td>0.72</td>
<td>0.67</td>
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<tr>
<td>Fixed cost of work $F$</td>
<td>$1213$</td>
<td>$1088$</td>
</tr>
<tr>
<td>Disutility of working $\eta$</td>
<td>$-0.62$</td>
<td>$-0.55$</td>
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The stochastic process estimated for income (sum of a random walk, an iid process, and a firm worker matched effect) provides a good fit to the data.

If mobility is ignored the estimated variance of the permanent innovation to wages doubles, leading to an impression of much greater risk in the earning process.
Employment over the life cycle

High Education

Employed + Rejected offers

Employed

Data

Low Education

Employed + Rejected offers

Employed

Data
Contrafactual exercises (raise in productivity risk)

- Greater variability in productivity leads to wage offers being more likely to fall below an individual reservation’s wage. Therefore, employment and output declines.
- Individuals are willing to pay more than the output loss to compensate for the increased risk.
Contrafactual excercises (raise in productivity risk) II
Contrafactual exercises (greater job destruction)

- Output declines and unemployment increases as expected.
- Although welfare falls, this risk are mitigated by the utility value of leisure (in the model leisure is a substitute of consumption).
- Output declines and unemployment increases as expected.
They consider first, changing in the productivity shock, and second, changing the rate of job destruction so as to achieve a decline of 5% in the variance of income growth. Then compute the willingness to pay for each of these two changes.

Individuals value more the decline in productivity risk than the decline in the rate of job destruction, both of which achieve the same decline in the variance of income growth.
Goverment programs

- They measure the value that people assign to an increase in the insurance programs provided for the government and compare this to the value of a revenue equivalent cut in proportional taxes.
- The welfare value of programs such as Food Stamps, which partially insure productivity risk is greater than the value of unemployment insurance which provides partial insurance against employment risk.
The nature and sources of risk are particularly important in understanding how to design public insurance programs.

Part of the variability in incomes is explained by endogenous choices.

The income process has a permanent component, even controlling by job mobility.