Portfolio choices, firm shocks, and uninsurable wage risk

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Research Question

- Research Question: Does income uncertainty matter for individual's portfolio allocations (share of risky financial assets) ?
- Novelty: Use cross-sectional variance in firm value added as instrument for income uncertainty

Econometric framework

$$S_{it} = \mathbf{W}'_{it}\beta + \lambda B_{it} + r_i + \epsilon_{it} \tag{1}$$

- S_{it} is the share of risky assets in individual i's portfolio at time t
- $\mathbf{W}_{it}$ are socio-demographic characteristics
- B_{it} is cross-sectional variance of income, referred to as "uninsurable background risk".
- λ is parameter of interest and theory (Aiyagari 1994, Heaton and Lucas 1996) argues that it should be < 0
- r_i is individual fixed effect

Income Uncertainty

$$\ln y_{ijt} = \mathbf{Z}'_{it}\gamma + v_{it} + \theta_f f_{jt} \tag{2}$$

- y_{ijt} is earnings of worker i, at firm j at time t, $\mathbf{Z}_{it}$ are demographic
- v_{it} and f_{jt} are worker specific and firm specific shock, mutually uncorrelated.

Decompose this residual insurable and uninsurable component

$$\begin{aligned} \ln y_{ijt} - \mathbf{Z}'_{it}\gamma &= \underbrace{(1-\theta_v)\, v_{it}}_{\text{Avoidable}} + \underbrace{\theta_v v_{it} + \theta_f f_{jt}}_{\text{Unavoidable}} \\ B_{it} &= \text{var}\left(\theta_v v_{it} + \theta_f f_{jt}\right) = \rho_v V_{it} + \rho_f F_{it} \end{aligned}$$

Problems with OLS

Simple OLS of S_{it} on cross-sectional variance of income

1. Measurement error in income: $\ln y^*_{ijt} = \ln y_{ijt} + \xi_{ijt}$
2. Interpret all variance in income as unavoidable:

$$\begin{aligned} \sigma^2_{it} = \text{var}\left(\ln y^*_{ijt} - \mathbf{Z}'_{it}\gamma\right) &= V_{it} + \rho_f F_{it} + \text{var}\left(\xi_{ijt}\right) \\ &= B_{it} + \psi_{it} \end{aligned}$$

3. Previous studies find effects close to zero as both of these measurement errors pull estimates close to zero.
4. Solution is to use F_{it} as instrument for σ^2_{it}

Why does that IV work

$$
\begin{aligned}
\operatorname{p\,lim} \lambda_{IV} &= \operatorname{p\,lim} \frac{\operatorname{cov}(S_{it}, F_{it})}{\operatorname{cov}\left(\sigma_{it}^2, F_{it}\right)} \\
&= \operatorname{p\,lim} \frac{\operatorname{cov}(\lambda B_{it} + \epsilon_{it}, F_{it})}{\operatorname{cov}(B_{it} + \xi it, F_{it})} \\
&= \operatorname{p\,lim} \frac{\operatorname{cov}\left(\lambda\left(\rho_v V_{it} + \rho_f F_{it}\right) + \epsilon_{it}, F_{it}\right)}{\operatorname{cov}\left(\rho_v V_{it} + \rho_f F_{it} + \xi it, F_{it}\right)} \\
&= \lambda
\end{aligned}
$$

$$
\begin{aligned}
\operatorname{p\,lim} \lambda_{RF} &= \operatorname{p\,lim} \frac{\operatorname{cov}(S_{it}, F_{it})}{\operatorname{var}(F_{it})} \\
&= \operatorname{p\,lim} \frac{\operatorname{cov}\left(\lambda\left(\rho_v V_{it} + \rho_f F_{it}\right) + \epsilon_{it}, F_{it}\right)}{\operatorname{var}(F_{it})} \\
&= \lambda \rho_f \leq \lambda
\end{aligned}
$$

Firm's value added process

$$
\begin{aligned}
\ln VA_{jt} &= Q_{jt} + f_{jt}^{T} \\
Q_{jt} &= Q_{jt-1} + f_{jt}^{P} \\
\Delta \ln VA_{jt} = g_{jt} &= f_{jt}^{P} + f_{jt}^{T} - f_{jt-1}^{T} \\
\text{cov}\left(g_{jt}, g_{jt+1}\right) &= -\text{var}\left(f_{jt}^{T}\right) \\
\text{cov}\left(g_{jt}, g_{jt-1} + g_{jt} + g_{jt+1}\right) &= \text{var}\left(f_{jt}^{P}\right)
\end{aligned}
$$

- VA_{jt} is value added of firm j at time t.
- f_{jt}^{P} and f_{jt}^{T} are permanent and transitory shocks resp.
- $\text{cov}\left(g_{jt}, g_{jt-1} + g_{jt} + g_{jt+1}\right) =$
  $-\text{var}\left(f_{jt-1}^{T}\right) + \text{var}\left(f_{jt}^{P} + f_{jt}^{T} - f_{jt-1}^{T}\right) - \text{var}\left(f_{jt}^{T}\right)$

Individual income process

$$
\begin{aligned}
\ln y_{ijt} &= \mathbf{Z}'_{it}\gamma + v_{it} + \theta^P Q^P_{jt} + \theta^T f^T_{jt} \\
\Delta\left(\ln y_{ijt} - \mathbf{Z}'_{it}\gamma\right) = \omega_{ijt} &= v_{it} - v_{it-1} + \theta^P f^P_{jt} + \theta^T\left(f^T_{jt} - f^T_{jt-1}\right) \\
\text{cov}\left(\omega_{ijt}, g_{jt+1}\right) &= -\theta^T \text{var}\left(f^T_{jt}\right) \\
\text{cov}\left(\omega_{ijt}, g_{jt-1} + g_{jt} + g_{jt+1}\right) &= \theta^P \text{var}\left(f^P_{jt}\right)
\end{aligned}
$$

- $\text{cov}\left(\omega_{ijt}, g_{jt-1} + g_{jt} + g_{jt+1}\right) =$
  $-\theta^T \text{var}\left(f^T_{jt-1}\right) + \text{cov}\left(\omega_{ijt}, g_{jt}\right) - \theta^T \text{var}\left(f^T_{jt}\right) +$

Pass-through coefficient

$$\theta^T = \frac{\text{cov}\left(\omega_{ijt}, g_{jt+1}\right)}{\text{cov}\left(g_{jt}, g_{jt+1}\right)} = 2\%$$

$$\theta^P = \frac{\text{cov}\left(\omega_{ijt}, g_{jt-1} + g_{jt} + g_{jt+1}\right)}{\text{cov}\left(g_{jt}, g_{jt-1} + g_{jt} + g_{jt+1}\right)} = 7\%$$

- Identify θ^T by regressing ω_{ijt} on g_{jt} with g_{jt+1} as instrument, i.e. using future growth in value added as instrument to isolate the mean reverting component
- Identify θ^P using long-run growth in value added as instrument which removes the mean-reverting component

Data

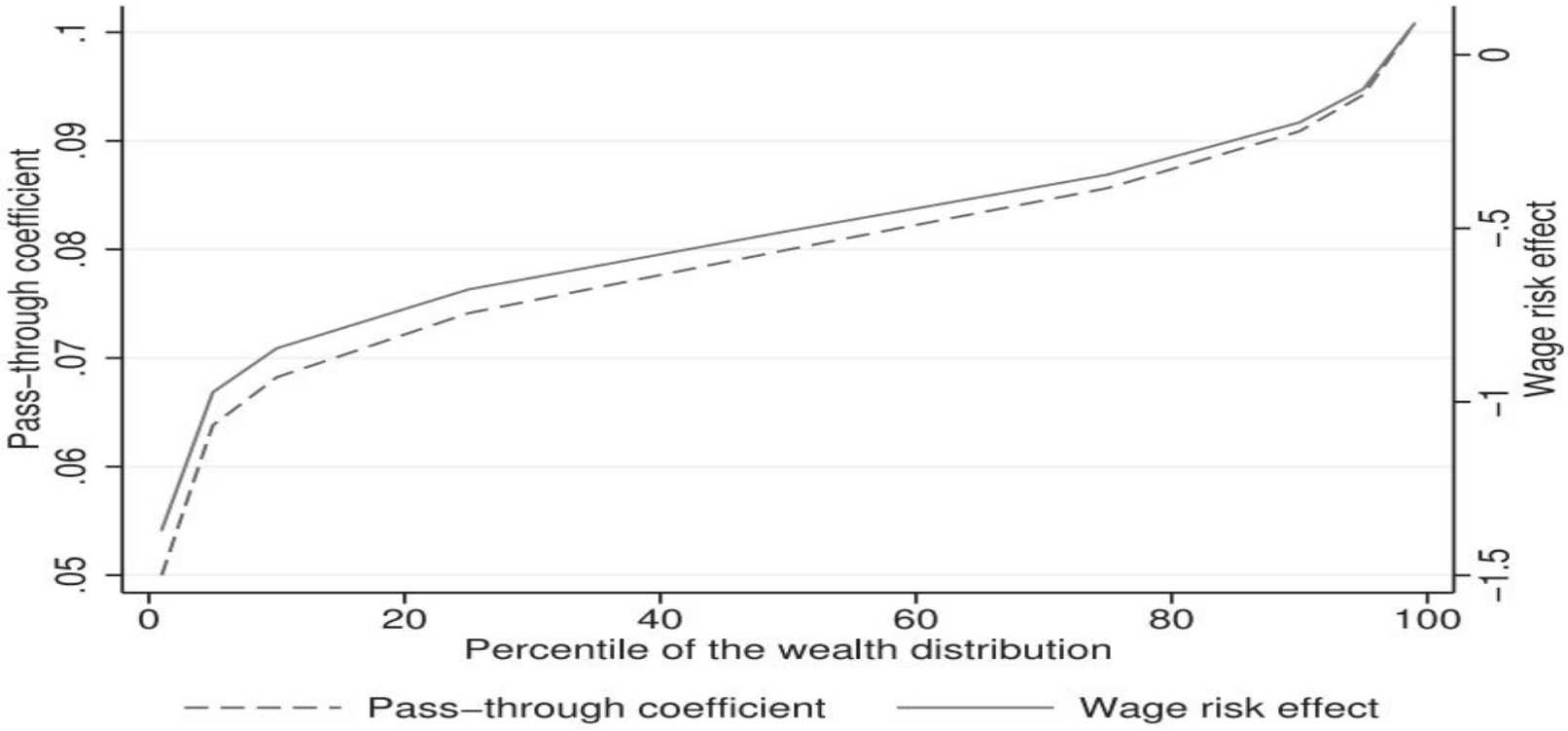
- Information on end-of-year financial asset from tax records (*Administrative Tax and Income Register*)
- Income of individuals and firm information comes from *Employer–Employee Register* and *Balance Sheet Register*
- Other administrative datasets used to gather information on individual demographics, industry classification of firm, information about firm bankruptcy

Main result

	(1)	(2)	(3)
	Fixed effect	Reduced form fixed effect	Fixed effect IV (*Baseline*)
σ_{it}^2	−0.0202***		−0.4986***
	(0.0029)		(0.1827)
F_{it}^P		−0.0033***	
		(0.0012)	
F_{it}^T		−0.0028***	
		(0.0007)	

- OLS and reduced form estimates are 25 times smaller than IV estimate

Heterogeneous effects over wealth distribution



- Large marginal effect of wage risk for individuals below median wealth but low effect for those above
- The reverse is true for pass-though coefficient (CEO's hurt more than factory workers)

Conclusion and Discussion

- Wage uncertainty has large marginal effect on portfolio allocation
- But, evaluated at the sample means, the effect of uncertainty is small: individuals with the average amount of wage uncertainty have a share of risky assets in portfolio that is 0.14% lower than that of those facing no uncertainty whatsoever.
- Partly due to the pass-through coefficients being small and partly due to that those who hold most of the risky assets have very small marginal effects.
- Uncertainty in business income and in price of housing not considered
- Might be due to high Local average treatment effect (LATE) - change in uncertainty might be affecting the extensive margin of stock market participation, and so many going from 0 to positive asset holding and back.