

Mobility and Welfare in Developing Countries

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Two Strands of Literature on Mobility

- Quantitative/empirical- nature of change individual income-e.g. transition matrices
 - Lillard and Willis (1978) Shorrocks (1978) Geweke, Marshall and Zarkin (1986), Fields and Ok (1996)
 - Poverty mobility- Dang et. al (2011), Cruces et. al. (2011). Also Cuesta et. al. (2010) for LAC using cross sections.
- Welfare theoretic approaches- How much particular dynamic income patterns are valued by society
 - Atkinson (1983), Markandya (1982, 1984), Conlisk (1989), Atkinson, Bourguignon and Morrison (1992), Dardononi (1992), Gottschalk and Spolaore (2002)

Two Methodological Issues

- Difficult to map parametric formulations (transition matrices) to welfare theoretic analysis
 - Fields and Ok (1996) review several approaches
 - Gottschalk and Spolaore (2002)
- Measurement of income dynamics
 - Income data subject to measurement error
 - Much of observed income changes temporary in nature
 - Lead to overestimation of welfare-relevant mobility in income
 - Lillard and Willis(1978), Solon(2001), Luttmer(2002), Fields et al.(2003), Glewwe(2004), McKenzie(2004)
 - Consumption enters utility, but income data more available- would like a framework to translate income to welfare.

This Paper

- Attempts to bridge welfare theoretic and empirical literatures.
- Standard income process that distinguishes transitory from permanent shocks to income.
- Standard Utility function.
- DSGE model with imperfect markets (Krebs 2004).
 - Allows us to isolate (and sign) the welfare relevant elements of a standard mobility measure
 - Tractable, allows direct links between econometric framework and welfare-theoretic model.

This Paper

- Empirical approach that
 - Allows separation of permanent from transitory shocks and noise.
 - Allows estimation of key elements of income process which feed into mobility and welfare calculations.
- Suggests some additional indicators to go in the back of the WDR

A Standard Income Process

Income

$$\log y_{it} = \mu_t(x_{it}) + \omega_{it} + \eta_{it}$$

- $\mu_t(x_{it})$ = observable human capital, etc.

Permanent Component, AR(1)

$$\omega_{i,t+1} = \rho\omega_{it} + \epsilon_{i,t+1}$$

- η_{it} = Transitory component + noise
- $\epsilon_{it} \sim N(0, \sigma_\epsilon^2), \eta_{it} \sim N(0, \sigma_\eta^2)$
- These generate the distribution AND income dynamics we observe

Which elements of income are interesting to us? η

Income

$$\log y_{it} = \mu_t(x_{it}) + \omega_{it} + \eta_{it}.$$

- Measurement error- no
- Transitory shocks?
 - Can be largely smoothed. (Self employment)
 - NB “Poverty Mobility” literature (Cruces 2011, Dang 2011) If @ subsistence, even temporary shocks can be fatal.

What elements are interesting to us? ρ

Permanent Component, AR(1)

$$\omega_{i,t+1} = \rho\omega_{it} + \epsilon_{i,t+1}$$

- $(1-\rho)$ is convergence
 - $\rho = 1$, random walk- shock permanently affects income.
 - Convergence=0
 - NB: income distribution worsens with age: variance= $t\sigma_\epsilon^2$
 - $\rho < 1$, there is convergence
- Our argument: this is the critical concept and measure of “good” mobility
- BUT: Convergence to what?

Which elements of income are interesting to us? x

- How about observable elements of income, x_{it} ?
 - As workers age, they make more income and move through distribution. Interesting?
 - Choice affects the interpretation of convergence
 - no controls: convergence to unconditional average, regardless of level of education.
 - control for x_{it} : convergence to income level given your human capital
 - individual fixed effects (all individual characteristics observed and unobserved): your own personal convergence to your personal mean.
 - 2 makes the most sense in an intra generational context. Implies a first stage mincer equation, and then work with residuals

Which elements of income are interesting to us? II

- How about observable elements of income, x_{it} ?
 - Do we care that as workers age, they make more income and move through the income spectrum, or out of poverty?
Probably not.
 - However, the interpretation of convergence is key
 - no controls- convergence to unconditional average, regardless of level of education.
 - control for x_{it} convergence to income level given your human capital
 - individual fixed effects (all individual characteristics observed and unobserved)- your own personal convergence to your personal mean.
 - 2 makes the most sense in an intra generational context. But makes some approaches to controlling for measurement error fail (e.g. Glewwe 2001).

A Common Measure of Mobility as Origin Independence

Hart Index (Shorrocks 1993)

$$m = 1 - \text{corr}(\ln y_{i0}, \ln y_{it})$$

$$m = 1 - \frac{\rho^t \sigma_{\omega_0}^2}{\sqrt{\sigma_{\omega_0}^2 + \sigma_{\eta}^2} \sqrt{\rho^{2t} \sigma_{\omega_0}^2 + \sigma_{\eta}^2 + \frac{1 - \rho^{2t}}{1 - \rho^2} \sigma_{\epsilon}^2}}$$

- Increases in transitory shocks σ_{η}^2
- Increases in permanent shocks σ_{ϵ}^2
- Decreases in persistence ρ (for our parameter values)

Does Mobility Imply Welfare Improvements?

Welfare

$$\begin{aligned}
 W &= E \left[E \left[\sum_{t=0}^{\infty} \beta^t \ln c_{it} | \omega_{i0} \right] \right] \\
 &= \frac{\ln Y}{1 - \beta} - \frac{1}{2(1 - \beta\rho^2)} \sigma_{\omega_0}^2 - \frac{1}{1 - \rho^2} \left(\frac{1}{1 - \beta} - \frac{1}{1 - \beta\rho^2} \right) \frac{\sigma_{\epsilon}^2}{2}
 \end{aligned}$$

- Increases in average income (Y); Decreases in initial variance $\sigma_{\omega_0}^2$
- Decreases in risk σ_{ϵ}^2
- Insensitive to transitory shocks σ_{η}^2
- Decreases with ρ : Convergence $(1 - \rho)$ is the only good mobility

Summary

Component		Mobility	Welfare
Transitory Shocks	σ_{η}^2	Increase	None
Permanent Shocks	σ_{ϵ}^2	Increase	Decrease
Convergence	$(1 - \rho)$	Increase	Increase

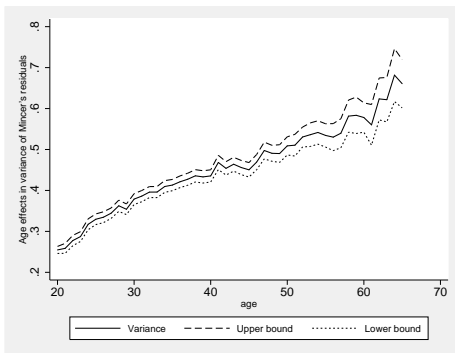
- Which parameters are most important to mobility and welfare?
- Requires estimating σ_{ϵ}^2 , $(1 - \rho)$, σ_{η}^2 , and $\sigma_{\omega_0}^2$

Data

- Mexican National Urban Employment Survey (ENEU)
1987-2004
- Labor market participants 16 -65: schooling, age, gender
- Repeated cross section: 18 years capture long run effects
- Rotating panel: 4 quarters X 18 = 72 yearly panels
- Use both cross sectional and panel dimensions to estimate.

Estimating Income Processes when only Short Panels are Available

Figure: Variance of Unpredicted Part of Earnings vs. Age, Mexico 1987-2003



Shocks drive increasing variance. See Deaton and Paxson (1994).

Estimation

Non-linear seemingly unrelated regression NLSUR

The cross sectional variance of the (the unpredictable portion of) log incomes of cohort c :

$$\text{Var}(\ln y_{cj}) = \sigma_{\eta}^2 + \rho^{2t} \sigma_{\omega_0}^2 + \frac{1 - \rho^{2t}}{1 - \rho^2} \sigma_{\epsilon}^2$$

One year covariance:

$$\text{Cov}(\ln y_{ij}, \ln y_{ij+1}) = \rho^{2t+1} \sigma_{\omega_0}^2 + \frac{1 - \rho^{2t}}{1 - \rho^2} \rho \sigma_{\epsilon}^2$$

- Cannot separately identify $\sigma_{\omega_0}^2$ and σ_{ϵ}^2 (as both evolve at the same rate with t) so need both.

Results: NLSUR Estimation

	<i>Full Sample</i>
ρ	0.9770*** (0.0019)
σ_{ω}^2	0.1040*** (0.0038)
σ_{ϵ}^2	0.0153*** (0.0008)
σ_{η}^2	0.2028*** (0.0039)
<i>Time Dummies</i>	Yes
<i>N</i>	387460

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Results: Mobility Δ

	Span of measurement (t , in years)		
	1	10	25
Actual mobility	0.674	0.763	0.846
if:			
$\rho=0$	-0.77%	-5.2%	-8.6%
$\sigma_{\epsilon}^2=0$	-1.2%	-6.6%	-7.4%
$\sigma_{\eta}^2=0$	-89.7%	-45.7%	-23.3%

Results: Welfare Effects: $\% \Delta$ measured in lifetime consumption

if:	$\sigma_{\epsilon}^2 = 0$	$\rho = 1$	$\sigma_{\epsilon}^2 = 0$ and $\rho = 1$
$\beta = 0.96$	12.56	-8.04	10.5
$\beta = 0.95$	10.64	-5.82	8.91
$\beta = 0.94$	9.21	-4.45	7.72
$\beta = 0.90$	5.87	-2.05	4.93

So What? Conceptual

- Common measure of Mobility tells us little about Welfare
- Many measures conflate permanent, transitory and measurement error and are suspect.
- Mobility is not always a good thing when it's risk.
- Mobility depends a LOT on span across which measured.
- Convergence $(1 - \rho)$ is the only "good" mobility.
- Need to think about what convergence we expect (x_i)

So What? Welfare

- Welfare analysis suggests that WDR should include
 - Average Income (Y): GDP/Capita
 - Conditional income distribution: (σ_{ω_0})
 - Risk (σ_{ϵ})
 - Convergence (ρ)
- In practice, Y ok, Gini can be fixed (standardized on one age group).
- Could get ρ and σ_{ϵ} for a few countries with panels and repeated x-sections
- Could get σ_{ϵ} for the world if assume $\rho=1$ or if don't, ρ