Intergenerational Altruism, Fertility, and Welfare Across Countries and Time

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Motivation

- A good welfare measure is important for understanding:
  - → Inequality: differences in living standard across countries
  - → Growth: evolution of living standard over time
- GDPPC is an imperfect measure of welfare (Fleurbaey 2009)
- Existing work (Becker et al. 2005; Jones and Klenow 2016) focus on consumption, leisure, life expectancy, and inequality

This Paper

- This paper incorporates intergenerational altruism into welfare analysis
- Why intergenerational altruism?
  1. Crucial in explaining fertility and parents' spending on children
  2. Reveal constraints not shown in traditional measures
  3. Life expectancy and fertility are two pillars of demographic transition
- As the degree of altruism increases in fertility (Barro and Becker 1989), large gaps in fertility $\Longrightarrow$ large variations in utility derived from altruism
- Incorporating altruism, I find that relative to existing metrics,
  1. The welfare of many developed countries is adjusted downward by 40%
  2. Cross-country convergence in the past few decades is much slower

The Model

- Jones and Klenow (2016):

$$\underbrace{U_i}_{\text{country } i\text{'s lifetime utility}} = \underbrace{e_i}_{\text{life expectancy}} \cdot \underbrace{u(\underbrace{C_i}_{\text{consumption}}, \underbrace{l_i}_{\text{leisure}}, \underbrace{\sigma_i}_{\text{inequality}})}_{\text{flow utility}}$$

- Barro and Becker (1989):

$$\underbrace{V_i}_{\text{parents' welfare}} = \underbrace{U_i}_{\text{parents' utility}} + \underbrace{\Psi(\underbrace{n_i}_{\text{fertility}})}_{\text{degree of altruism}} \cdot \underbrace{U_i'}_{\text{child's utility}}$$

- When parents expect $U_i' = U_i$,

$$V_i = \underbrace{\frac{1}{1-\Psi(n_i)} \cdot e_i}_{\textbf{altruism-adjusted life expectancy } (\tilde{e})} \cdot \underbrace{u(C_i, l_i, \sigma_i)}_{\text{flow utility}} \tag{1}$$

Welfare Measure: Consumption Equivalence λ

- Denote factor λ as:

$$V_i(\lambda) = U_i(\lambda) + \Psi(n) \cdot \mathbb{E}U_i'(\lambda)$$

$$\text{where} \qquad U_i(\lambda) = e_i \cdot u(\lambda \cdot C_i, l_i, \sigma_i)$$

- The consumption equivalent λ_i for country i solves:

$$V_i(1) = V_{\text{U.S.}}(\lambda_i)$$

Rawls is indifferent between living in country i and living in the U.S. with consumption scaled by λ_i

Decomposition

- Decomposition of welfare differences across countries / over time:

$$\log(\lambda_i) = \frac{\tilde{e}_t}{\tilde{e}_{\text{U.S.}}} \cdot \left(\overline{u} + \log C_i + v(l_i) - \frac{1}{2}\cdot\sigma_i^2\right) - \left(\overline{u} + \log C_{\text{U.S.}} + v(l_{\text{U.S.}}) - \frac{1}{2}\cdot\sigma_{\text{U.S.}}^2\right)$$

$$\overset{\text{decompose}}{=} \underbrace{\log(Y_i) - \log(Y_{\text{U.S.}})}_{\text{GDP per capita}} + \underbrace{\log(C_i/Y_i) - \log(C_{\text{U.S.}}/Y_{\text{U.S.}})}_{\text{consumption share}}$$

$$+ \underbrace{v(l_i) - v(l_{\text{U.S.}})}_{\text{leisure}} + \underbrace{\frac{1}{2}\cdot\left(\sigma_{\mathbb{U}}^2 - \sigma_{it}^2\right)}_{\text{inequality}} \tag{2}$$

$$+ \underbrace{\frac{\tilde{e}_i - \tilde{e}_{\text{U.S.}}}{\tilde{e}_{\text{U.S.}}} \cdot \left(\overline{u} + \log C_i + v(l_i) - \frac{1}{2}\cdot\sigma_i^2\right)}_{\text{altruism-adjusted life expectancy}}$$

- Key difference from Jones and Klenow (2016): $\tilde{e}_i$ rather than e_i in the life expectancy (LE) term

Calibration

- Flow utility:

$$\overline{u} + \log C - \frac{\theta\epsilon}{1+\epsilon}(1-l)^{\frac{1+\epsilon}{\epsilon}} - \frac{1}{2}\cdot\sigma^2$$

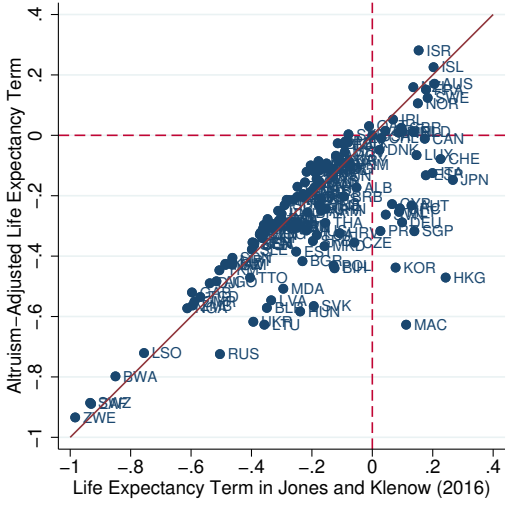
  where $\overline{u} = 5.23$, $\theta = 14.17$, and $\epsilon = 1$ following Jones and Klenow (2016)

- Intergenerational altruism, :

$$\Psi(n) = \psi \cdot \exp(-\rho \cdot n)$$

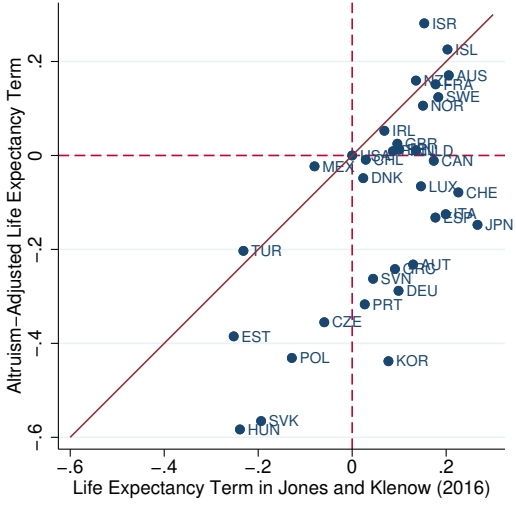
  where $\psi = 0.62, \rho = 1.85$ following Cordoba, Ripoll and Liu (2016)

Result 1: Welfare Across Countries in 2007



- Upward (downward) adjustment when total fertility rate is high (lower) than the U.S.
- Welfare of many countries is adjusted downward, and such adjustments are usually sizable because $\Psi(n)$ is concave

Result 1: Welfare of OECD Countries in 2007

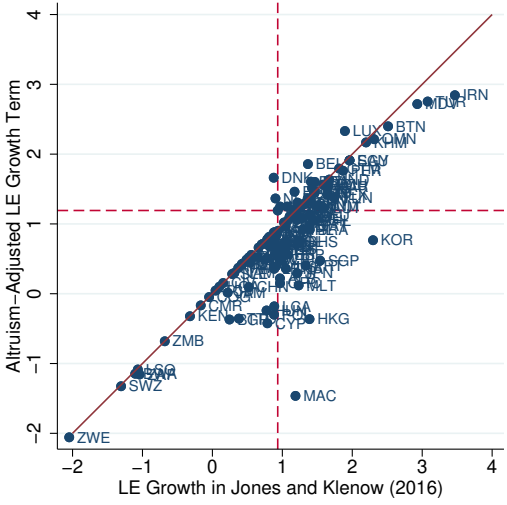


- Welfare of 19 countries is adjusted upward in Jones and Klenow (2016) due to higher life expectancy, but are adjusted downward with intergenerational altruism
- Example: Japan vs United States:

$$e_{\text{Japan}} = 82.5 > e_{\text{U.S.}} = 77.8$$
$$n_{\text{Japan}} = 1.34 < n_{\text{U.S.}} = 2.05$$

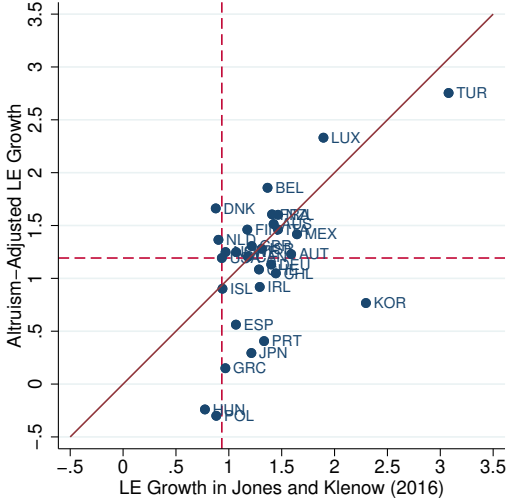
$$\text{LE}_{\text{Japan}} = 0.24 \gg -0.16 = \widetilde{\text{LE}}_{\text{Japan}}$$

Result 2: Welfare Growth from 1980-2007



- 112 out of 125 countries have $\tilde{g} < g$ due to lower fertility in demographic transition ($e \uparrow$ and $n \downarrow$)
- 69 countries have $g > g_{\text{U.S.}}$ in Jones and Klenow, but only 38 countries have $\tilde{g} > \tilde{g}_{\text{U.S.}}$

Result 2: Welfare Growth of OECD Countries from 1980-2007



- 29 (out of 34) countries have $g > g_{\text{U.S.}}$, but only 20 countries have $\tilde{g} > \tilde{g}_{\text{U.S.}}$ after considering fertility and intergenerational altruism
- Cross-country convergence of welfare might have been much slower than previously thought

In Progress

- Robustness w.r.t. $\Psi(n)$
- Incorporate intergenerational mobility
- A full-fledged optimization model?