Lectures on Economic Inequality

Warwick, Summer 2017, Slides 3

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- Overview: Convergence and Divergence
- Inequality and Divergence: Economic Factors, Part 1
- Inequality and Divergence: Psychological Factors
- Inequality, Polarization and Conflict
- Uneven Growth and Conflict

Aspirations and Inequality

- Two-way interaction:
- Aspirations $\rightarrow$ inspiration or frustration

$\rightarrow$ economic investment

$\rightarrow$ collective action

- Such actions shape growth and distribution.
- Society $\rightarrow$ aspirations
- Aspirations are shaped by the lives of others around us.

Aspirations Appadurai (2004), Ray (1998, 2006), Genicot-Ray (2015)

- A set of reference points to evaluate personal outcomes.

- Fundamentally social as well as personal:

$$a = \Psi(y, F),$$

where F = social distribution, y = personal characteristics.

- Our Leading Example.

y = personal income or wealth.

F = the ambient distribution of income or wealth

a = expressed in same units as wealth of one's children, or future self.

- More generally, aspirations are multidimensional:

- income, dignity, good health, recognition

- political power, or the urge to dominate others on religious or ethnic grounds.

- So are the social influences on aspirations:

- the influence of peers or near-peers (Lewis 1958, Das Gupta 1994)

- sources of information (Wilson 1987)

- religion, caste, ethnicity (Munshi and Myaux 2001)

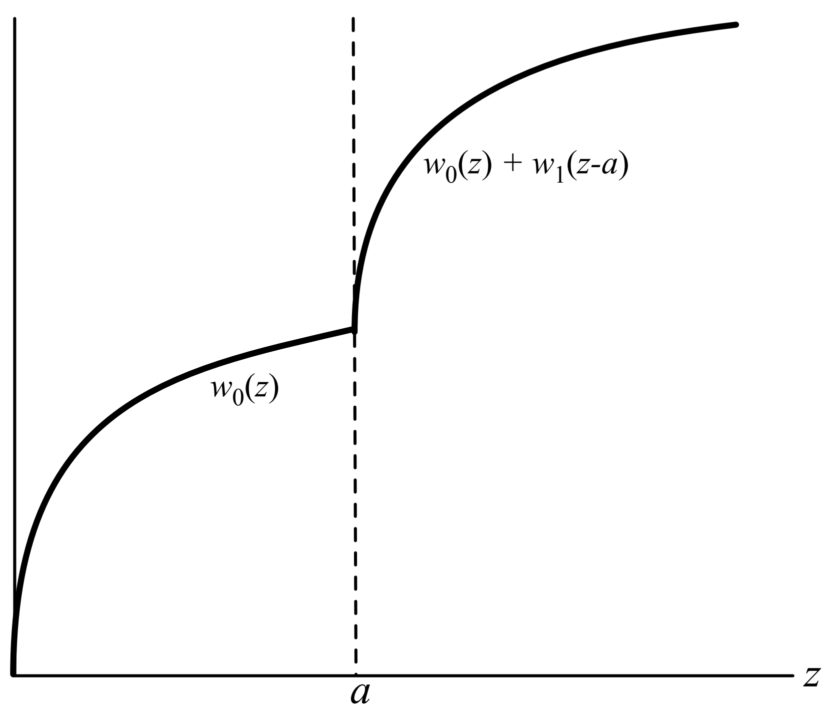
- statistical considerations (Munshi 1999)

How Aspirations Map Into Preferences

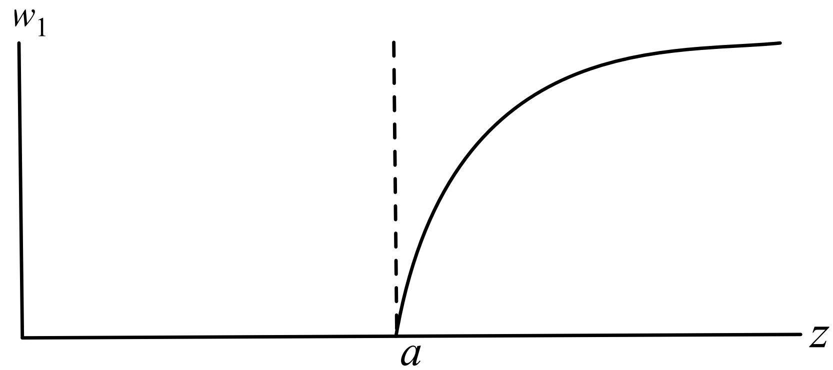
- In our leading example:

$$u(c) + w_0(z) + w_1(e),$$

- where $e = \max\{z - a, 0\}$, and $z =$ child's wealth.
- w_0 intrinsic utility; w_1 aspirational utility.
- Increasing, smooth, strictly concave.



Remark 1. Alternatives for w_1.



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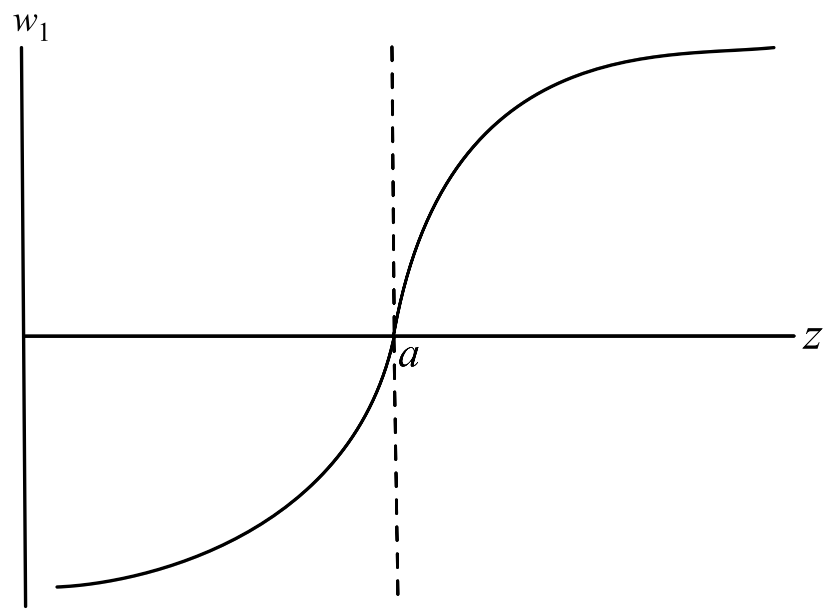

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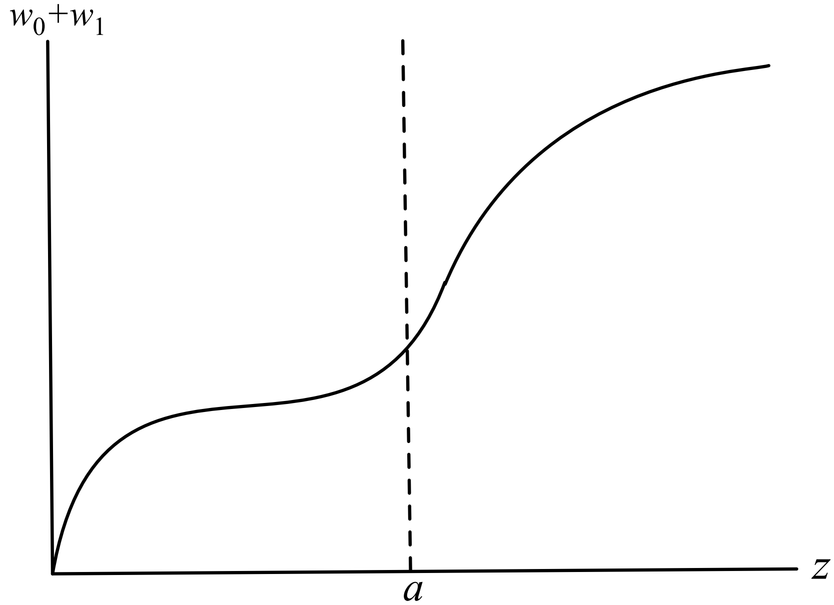
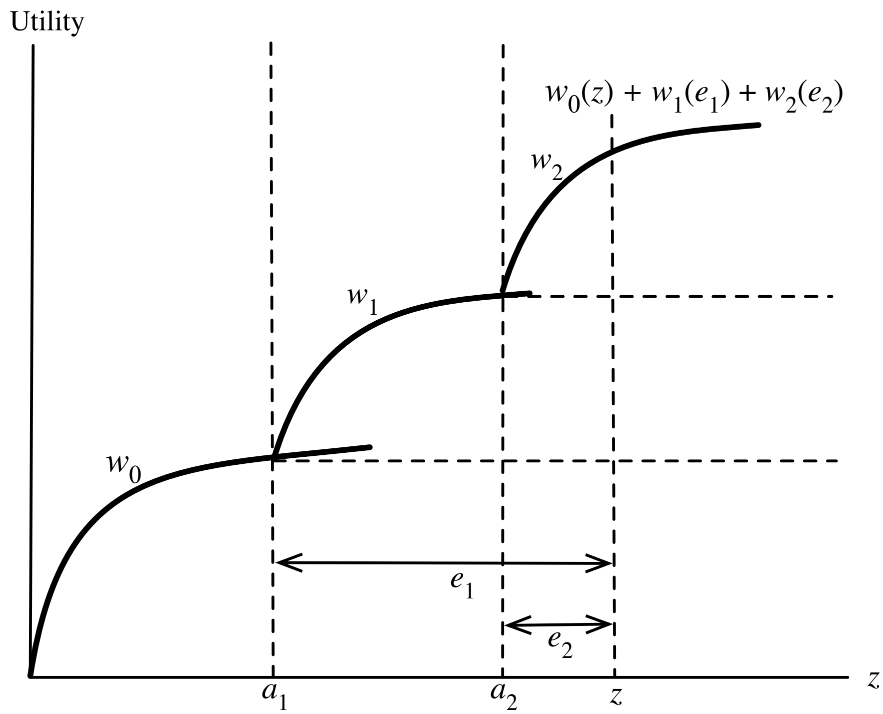
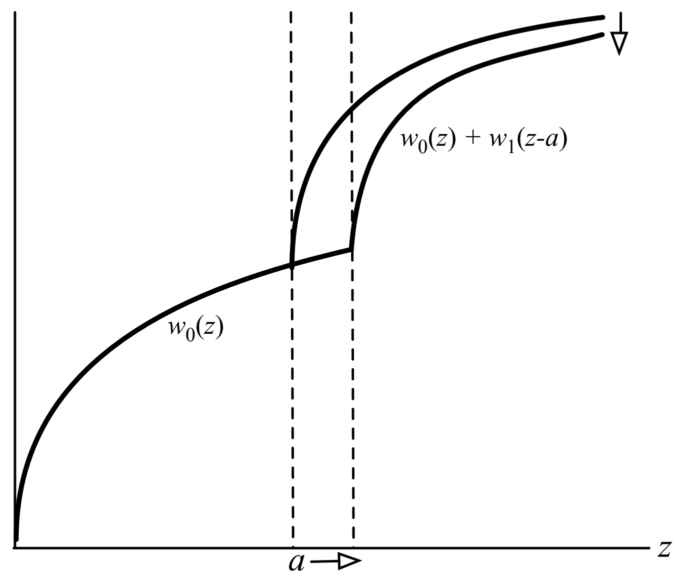


- Remark 2. Extends to aspiration vectors.



■ Remark 3.

- Higher aspirations always bad for happiness in the short-run:



Restrictions on the Aspiration Formation Function

$$a = \Psi(y, F)$$

■ Assume that Ψ is:

- [regular] $\Psi(y, F)$ is continuous in (y, F), nondecreasing in y.
- [range-bound] $\min\{y, \min F\} \leq \Psi(y, F) \leq \max\{y, \max F\}$.
- [scale-invariant] $\lambda\Psi(y, F) = \Psi(\lambda y, F^\lambda)$ for $\lambda > 0$. [$F^\lambda(\lambda y) = F(y)$.]
- [socially monotone] $\Psi(y, F') > \Psi(y, F)$ when F' strictly FOSD F.

Aspirations and Distribution: Individual Incentives

- Start with F_t.
  - Then $a_t = \Psi(y, F_t)$ for every $y \in$ Supp F_t.
  - At income y, choose $z \in [0, f(y)]$ to max

$$u\left(y - k(z)\right) + w_0\left(z\right) + w_1\left(\max\{z - a_t, 0\}\right)$$

    where $k(z) \equiv f^{-1}(z)$.
  - F_{t+1} new distribution.
- From F_0, recursively generates equilibrium sequence $\{F_t\}$:
- Proposition 0. An equilibrium (trivially) exists.

Tiny Digression: Benchmark Without Aspirations

- Choose $z \in [0, f(y)]$ to max

$$u\left(y - k(z)\right) + w_0\left(z\right)$$

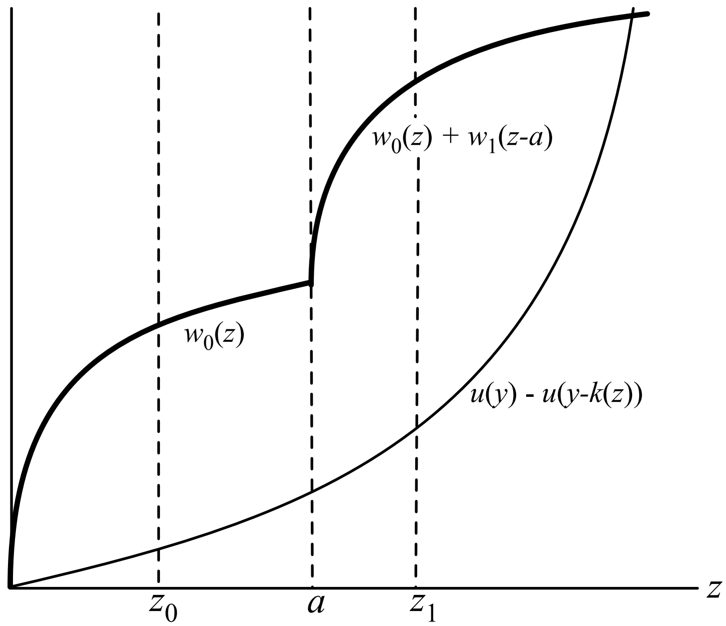
  - Steady state condition:

$$d(y) \equiv -\frac{u'(y - k(y))}{f'(k(y))} + w_0'(y) = 0.$$

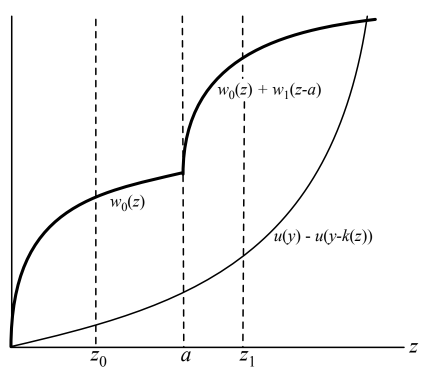
  - Assumption: $d(y) > 0$ for some y and strictly decreasing if $d(y) \leq 0$.

    (at most one, strictly positive steady state y^* in benchmark model)

From Aspirations and Wealth To Investment



- At most one "local" solution on either side of a.



Lower solution z_0 as in benchmark:

$$-\left[u'\left(y-k(z_0)\right)/f'(k(z_0))\right]+w_0'\left(z_0\right)=0,$$

where $k(z) \equiv f^{-1}(z)$.

Upper solution z_1:

$$-\left[u'\left(y-k(z_1)\right)/f'(k(z_1))\right]+w_0'\left(z_1\right)+w_1'(z_1-a)=0.$$

- Compare, and pick the one with the higher payoff.

■ An aspiration a is satisfied if optimum is no less than a.

It is frustrated if optimum strictly smaller than a.

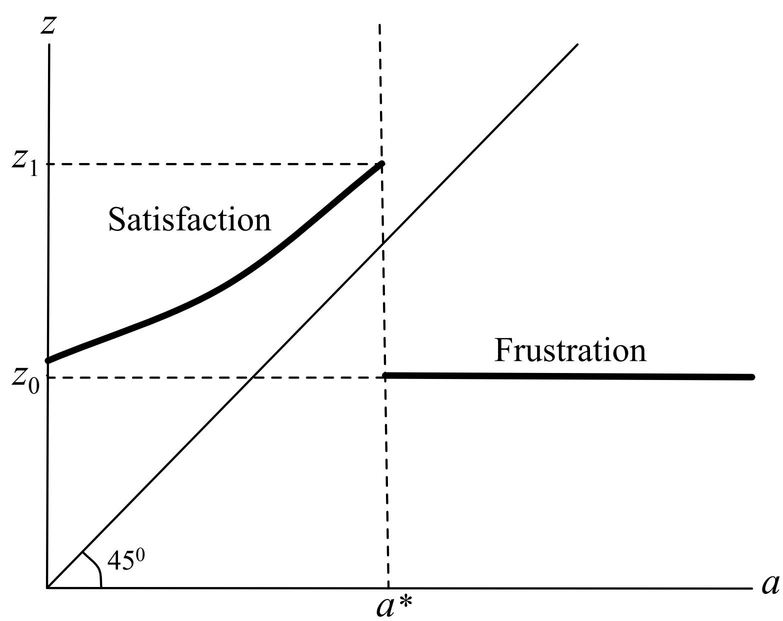
■ When is an aspiration satisfied, and when is it frustrated?

- useful partial equilibrium exercise, aspirations "exogenous."
- rise of television, advertising or the internet
- change in the income distribution

■ Proposition 1. Fix current wealth.

- There is a unique threshold value of aspirations below which aspirations are satisfied, and above which they are frustrated.

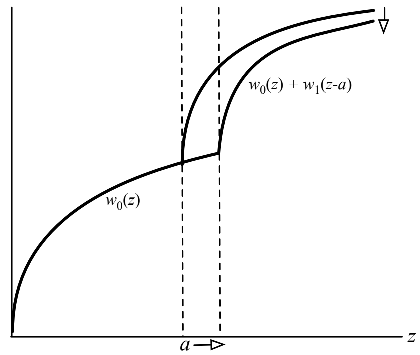
- As long as aspirations are satisfied, chosen wealth grows with aspirations. Once aspirations are frustrated, chosen wealth becomes insensitive to aspirations.



■ Note the discontinuous jump-down.

On Frustration

- Recall that aspirational growth always lowers direct utility:



- If aspirations are frustrated, no inspirational role either:

- "The French found their position all the more intolerable as it became better." de Tocqueville, 1856

- Lowered aspirations of low income students reduces school dropout Kearney-Levine, 2014, for the US; Goux-Gurgand-Maurin, 2014, for France

A Variant: Aspirations-Wealth *Ratios* and Investment

- Introducing the canonical linear model:

- Linear production: $f(k) = \rho k$.

- Constant-elasticity utility:

$$u(c) = c^{1-\sigma}, w_0(z) = \delta z^{1-\sigma}, \text{ and } w_1(e) = \delta \pi e^{1-\sigma}$$

- Investment choice: Given (y, a), pick z to maximize

$$\left(y - \frac{z}{\rho}\right)^{1-\sigma} + \delta \left[z^{1-\sigma} + \pi \left(\max\{z - a, 0\}\right)^{1-\sigma}\right].$$

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$$u(c) = c^{1-\sigma}, w_0(z) = \delta z^{1-\sigma}, \text{ and } w_1(e) = \delta \pi e^{1-\sigma}$$

- Investment choice: Given a/y, pick z/y to maximize

$$\left(1 - \frac{z/y}{\rho}\right)^{1-\sigma} + \delta \left[(z/y)^{1-\sigma} + \pi \left(\max\left\{ \frac{z}{y} - \frac{a}{y}, 0 \right\} \right)^{1-\sigma} \right].$$

(dividing through by y)

- Investment choice:
  - Aspirations ratio: $r \equiv a/y$. Choose growth $g \equiv z/y$ to max

$$\left(1 - \frac{g}{\rho}\right)^{1-\sigma} + \delta \left[g^{1-\sigma} + \pi \left(\max\{g - r, 0\} \right)^{1-\sigma} \right].$$

  - Failed aspiration; solution $\underline{g}$ independent of r:

$$\left(1 - \frac{\underline{g}}{\rho}\right)^{-\sigma} = \delta \rho \underline{g}^{-\sigma}$$

  - Satisfied aspiration; solution $g(r)$ depends on r:

$$\left(1 - \frac{g(r)}{\rho}\right)^{-\sigma} = \delta \rho \left[g(r)^{-\sigma} + \pi \left(g(r) - r \right)^{-\sigma} \right].$$

■ Proposition 2.

- There is a unique ratio r^* such that for $r \equiv a/y > r^*$, wealth grows at rate $\underline{g}$, and for all $r \equiv a/y < r^*$, wealth grows at rate $g(r)$.

- $g(r) \uparrow$ in r, but larger and bounded away from $\underline{g}$ in r.

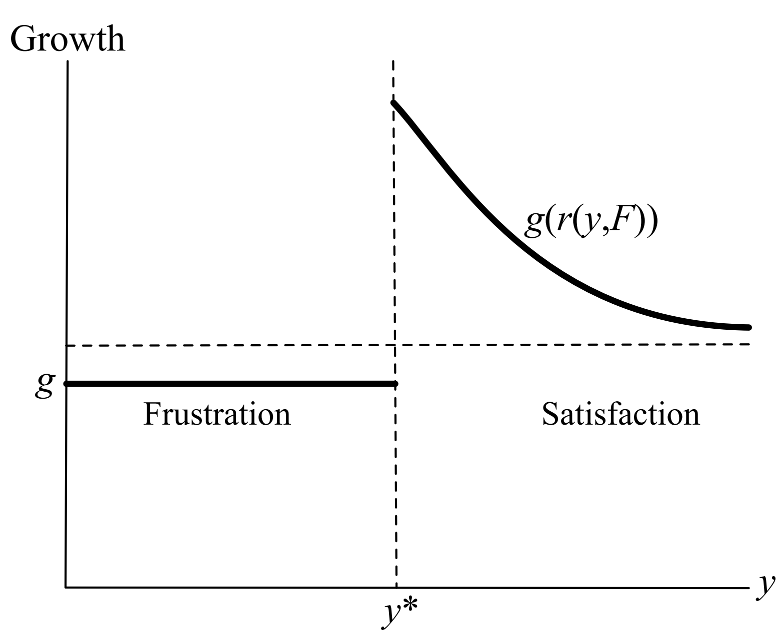
- Moreover, we can link y to a/y:

■ Proposition 3.

- Assume scale invariance and social monotonicity. Then for each F:

- The aspirations ratio $r(y, F) \equiv \Psi(y, F)/y$ is decreasing in y.

■ Combining Propositions 2 and 3:



Society-Wide Evolution of Aspirations and Incomes

- Recall our recursive equilibrium notion:
  - Wealth distribution F_t at date t; $a_t = \Psi(y, F_t)$.
- Each person with wealth y chooses continuation z.
  - z is tomorrow's wealth, and F_{t+1} is new distribution.
  - From F_0, recursively generate F_t and $a_t = \Psi(y, F_t)$ for all y and t.
- Questions:
  - Persistent or growing inequality, or convergence?
  - Connections between initial distribution and subsequent growth.

Steady States

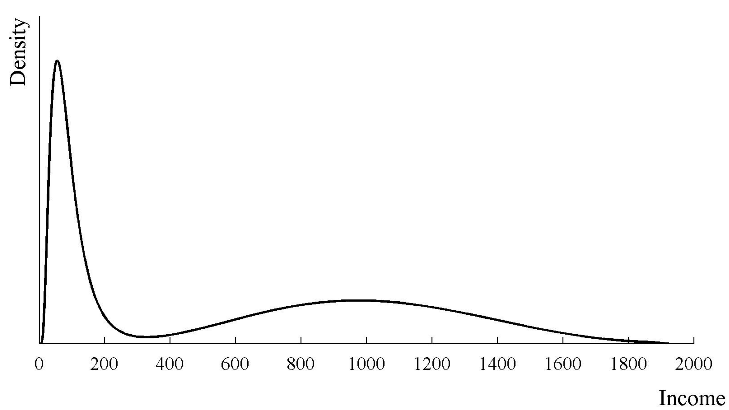
- Distribution F^* concentrated on strictly positive incomes:
  - $\{F^*, F^*, F^*, \ldots\}$ equilibrium from F^*.
  - Natural setting: incomes in compact support, as in Solow model.
- Proposition 4.
  - There is no steady state with perfect equality.
- Argument.
  - Perfect equality implies concentration of y and $\mathbf{a}$ at same point.
  - Contradiction: everyone wants to move away from $y = a$.
  - Related to symmetry-breaking.

Clustering in Steady State

- Proposition 5.
  - Assume range-bound, scale-invariant and socially monotone aspirations.
  - Then steady states must all be bimodal.
- Two-point distribution F^*. (y_ℓ, y_h, p):
  - $y_\ell < y_h$, and p is population weight on y_ℓ.
  - Aspirations satisfy $a_i = \Psi(y_i, F^*)$ for $i = \ell, h$.
  - a_ℓ is a failed aspiration, so $d(y_\ell) = 0$.
  - And a_h is a satisfied aspiration, so $d(y_h) + w_1'(y_h - a_h) = 0$.

Remarks on Clustering

- Of course, convergence to degenerate poles is an artifact (akin to single steady-state income in Solow model.)
  - With stochastic shocks (e.g., Brock-Mirman 1972): smoothly dispersed.



Const-elasticity u: $\sigma = 0.8$, $\delta = 0.8$ and $\pi = 1$; $f(k, \theta) = \theta(A/\beta)k^\beta$, where $\beta = 0.8$, $A = 4$ and θ lognormal mean 1. a = average of own y and mean y.

Multimodality in the Literature

- [US] Pittau-Zelli 2004, Sala-i-Martin 2006, Zhu 2005
- [world] convergence clubs

  Durlauf-Johnson 1995, Quah 1993, 1996, Durlauf-Quah, 1999
- Quah uses the term “twin peaks.”
- Bimodality also a feature of polarized distributions

  Esteban-Ray 1994, Wolfson 1994.

Aspirations, Inequality and Endogenous Growth

- Return to canonical linear model:
- constant-elasticity utility, linear production.
- Recall aspirations ratio $r = a/y$.
- And recall Proposition 3: there is r^* such that:
- if aspirations too high ($r > r^*$), grow at $\underline{g}$
- otherwise (if $r \leq r^*$), grow at $g(r)$.

Ultimate Equality | Perpetually Widening Inequality

- Proposition 6. Assume aspirations are range-bound, scale-invariant and socially monotone. Let F_0 be initial distribution of with compact support. Then there are just two possibilities:

I. Convergence to Perfect Equality. There is $g^* > 1$ such that $y_t/{g^*}^t$ converges to a single point independent of $y_0 \in \text{Supp } F_0$; or

II. Persistent Divergence. F_t "separates" into two components defined by threshold $y^* \in \text{int Range } F_0$:

- If $y < y^*$, income grows forever after at $\underline{g}$.

- If $y > y^*$, income has asymptotic growth $\bar{g} > \underline{g}$, with $\bar{g} - 1 > 0$, and $y_t/\bar{g}^t$ has the same limit independent of y_0, as long as y_0 exceeds y^*.

- $\underline{g} < \bar{g} \leq g^*$: equality exhibits faster growth.

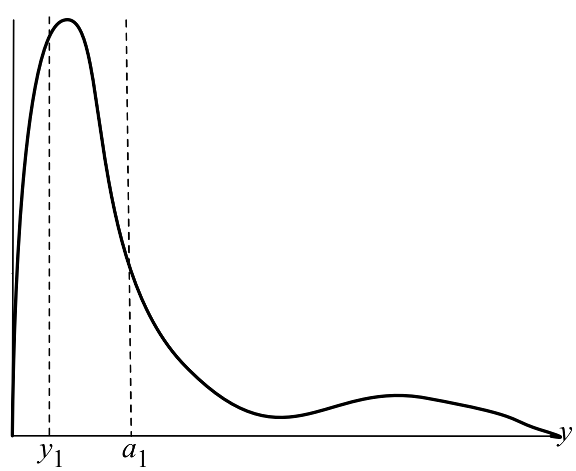
- In Case II, relative inequality never settles, it perpetually widens.

Social Monotonicity and the Inequality Proposition

- Social monotonicity $\Rightarrow$ If $y_1 < y_2$, then $r(y_1, F) > r(y_2, F)$.

- The argument for the equality-inequality proposition hinges on this.

- Example. Aspirations = conditional mean above income.



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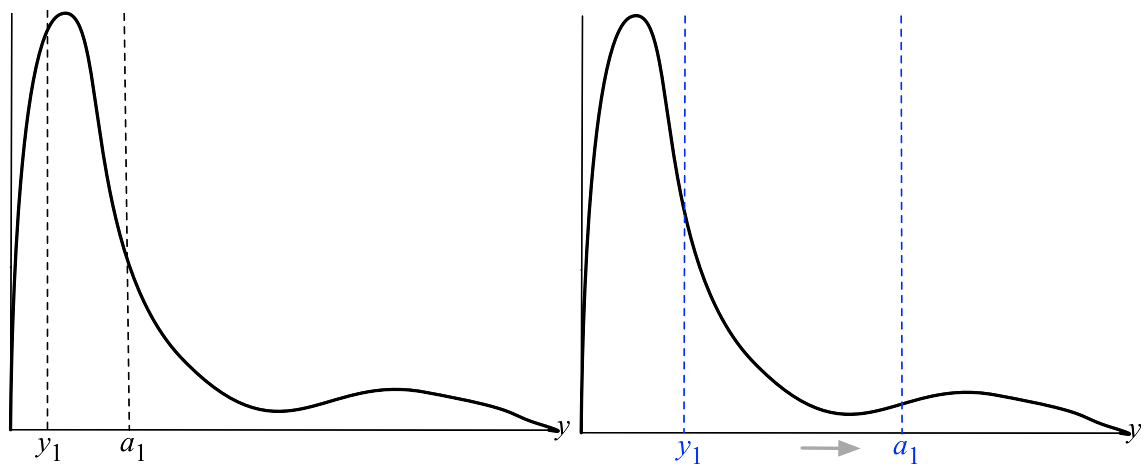


The Proposition Without Social Monotonicity

- Example 1. Balanced Growth with Unbounded Distribution.
  - Aspirations = conditional mean above income.
  - Observation. There are balanced growth paths with all incomes satisfied and non-degenerate inequality. The accompanying income distribution must be Pareto.

$$F\left(\frac{y}{[1+g]^t}\right) \equiv F(w) = 1 - (A/w)^{r/(r-1)}$$

for all $w \geq A$ and (A, r) such that $r \in (1, r^*]$.

- Everyone has the same aspirations ratios.

The Proposition Without Social Monotonicity

- Example 2. Balanced Growth with Compact Distribution.
- Aspirations determined by incomes in some range around own incomes:
  - For some $\beta > 0$, $\Psi(y, F)$ is insensitive to $y' \notin [y(1-\beta), y(1+\beta)]$.
- Observation. Beginning with any distribution with compact support, the income distribution converges to a set of isolated income clusters, each growing at a factor strictly larger than $\underline{g}$.
- Balanced growth even under distributions with bounded support ...
  - ... but at the expense of assuming the possibility of *total* isolation.

The Proposition Without Social Monotonicity

- Example 3. Infinite Crossings.
  - Distribution with just three mass points $y^1 > y^2 > y^3$.
  - The poorest at y^3 don't "see" the rich, but are inspired by y^2, grow at $\bar{g}$
  - The middle class "see" only the rich, but are frustrated by them, grow at $\underline{g}$
  - The rich just "see" themselves, grow at g
- Assume $y^2\underline{g} = y^3 g$ and $y^3\bar{g} = y^2 g$:
  - Then balanced growth with 2 and 3 perennially crossing.

Extension of Equality-Inequality Proposition

- Minimally monotone aspirations:

- Distribution F and $y \in$ Supp F,
- F' weakly FOSD F, but $F'(y) = F(y)$ (no crossings over y "from below.")
- $\Rightarrow \Psi(y, F') \geq \Psi(y, F)$.

Extension of Equality-Inequality Proposition

- Proposition 7. Assume aspirations are range-bound, scale-invariant and minimally monotone. Let F_0 be initial distribution with compact support. Then just three possibilities:

I. Convergence to Perfect Equality. There is $g^* > 1$ such that $y_t/{g^*}^t$ converges to a single point independent of $y_0 \in$ Supp F_0; or

II. Persistent Divergence. Over time, F_t "separates" into two components:

- Frustrated individuals converging to a positive limit measure. Their incomes grow at rate $\underline{g} - 1$.

- Satisfied individuals with common asymptotic growth factor $\bar{g} > \underline{g}$, with $\bar{g} - 1 > 0$. $y_t/\bar{g}^t$ converges to the same limit irrespective of y_0.

III. Infinite Crossings. Income ranks cross and re-cross ad infinitum:

- Compatible with constant or increasing inequality (but not convergence).

Summary So Far

- A theory of aspirations formation.
  - Emphasizes the social foundations of individual aspirations
  - Relates those aspirations to investment and growth.
  - Such behavior can be aggregated, thus closing the model.
- Central feature: aspirations can both incentivize and frustrate.
  - This approach is tractable and may be useful in other contexts.

Aspirations and Distribution: Collective Action

- Two reactions to social change:
  - Individual investment (or disinvestment)
  - Collective action
- Collective action of two kinds:
  - For promoting the self-interest of "my group"
  - For attacking "other groups."
- Groups?
  - Based on class, religion, ethnicity, immigrant status . . .

Aspirations and Groups

- Consider two groups, h and m. For any person i in group h (say):

$$a_h(i) = \Psi_h(y(i), \mu_h, \mu_m).$$

  - where $y(i)$ is own characteristic, and μ_j is mean for group j.
- Example [conformity]: only μ_j matters for person in j.
  - Munshi and Myaux (2006) on fertility norms in Bangladesh.
- Example [rivalry]: only μ_{-j} matters for person in j.
  - Mitra and Ray (2014) on religious violence in India.

Rivalry and Collective Action

$$a_j(i) = \Psi_h(y(i), \mu_{-j}).$$

- A fundamental asymmetry:
  - Individual action to improve own lot . . .
  - Collective action to reduce aspirations and envy.
  - And only possible with cross-group aspirations (targeting).

Rivalry and Collective Action

$$a_j(i) = \Psi_h(y(i), \mu_{-j}).$$

- Budget constraint: $y = k + ty + c$
  - t: fraction time spent in violence, collectively chosen, reduces μ_{-j}.
  - k investment, privately chosen by individual, $z = f(k)$ as before.
- Proposition 8.
  - An increase in rival income increases violence directed against rival group.
  - An increase in own income reduces violence directed against rival group.
  - In both cases, the effect on individual investments is ambiguous.

Distribution and Conflict: Hindu-Muslim Violence

- Recurrent episodes of religious violence
  - Partition era of the 1940s, and earlier
  - Continuing through the second half of the twentieth century.
- $\sim$ 1,200 riots, 7,000 deaths, 30,000 injuries over 1950–2000.

Some Ethnographic Literature

- Thakore (1993) on Bombay riots [land]
- Das (2000) on Calcutta riots [land]
- Rajgopal (1987), Khan (1992) on Bhiwandi and Meerut riots [textiles]
- Engineer (1994), Khan (1991) on Jabbalpur, Kanpur, Moradabad [*bidis*, brass-ware]
- Upadhyaya (1992) on Varanasi riots [sari dealers]
- Wilkinson (2004) on Varanasi [wholesale silk]
- Field et al (2009) on Ahmedabad [housing]

- Example: Engineer (1987) on Meerut riots:

"If [religious zeal] is coupled with economic prosperity, as has happened in Meerut, it has a multiplying effect on the Hindu psyche. The ferocity with which business establishments have been destroyed in Meerut bears testimony to this observation. Entire rows of shops belonging to Muslims . . . were reduced to ashes."

- And yet. . .

- Wilkinson (2004):

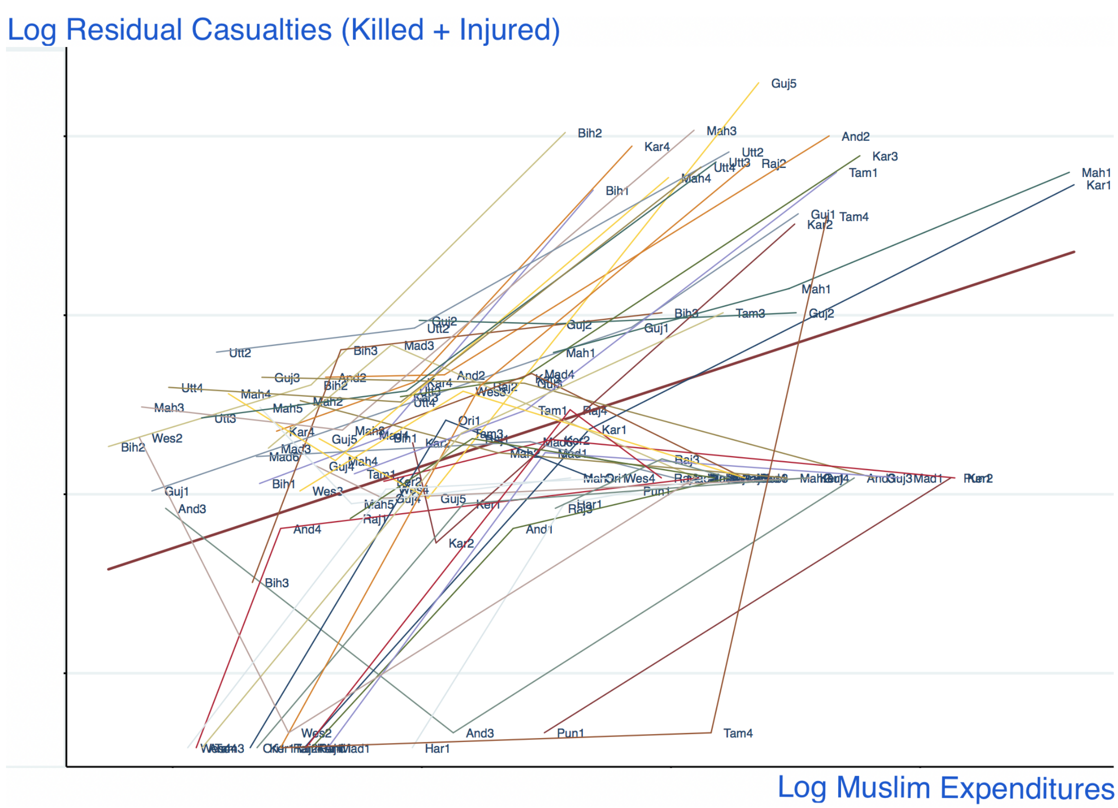
"Despite the disparate impact of riots on Hindus and Muslims, however, little hard evidence suggests that Hindu merchants and financial interests are fomenting anti-Muslim riots for economic gain. . . "

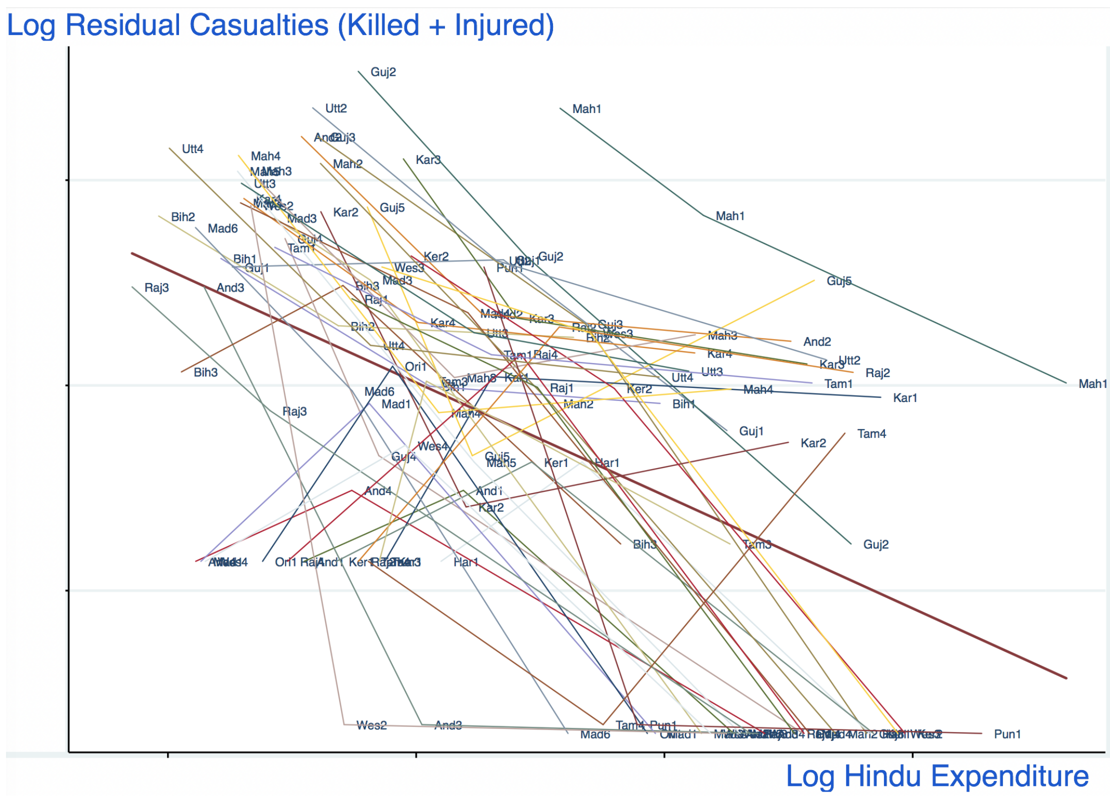
- Horowitz (2001, p. 211):

"The role that commercial competition is said to play is said to be a covert, behind-the-scenes role, which makes proof or disproof very difficult."

Data

- Three-period panel at the regional level; 55 regions.
- Conflict data. Varshney-Wilkinson (TOI 1950-1995)
  - our extension (TOI 1996-2000).
- Income data. National Sample Survey Organization (NSSO) consumer expenditure data.
  - Rounds 38 (1983), 43 (1987-8) and 50 (1993-94).
- Controls. Various sources, in particular Reports of the Election Commission of India.
- For more details, see later Supplement on Conflict, and Mitra-Ray (2014, JPE)





Summary

- Preferences are fundamentally social constructions.
  - (A truism, but economists are often blind to truisms)
- Core idea: interactive model of aspirations and development.
  - The same direction of change can be inspiring, then frustrating.
- Two applications:
  - The evolution of economic inequality
  - Uneven growth and conflict
- Ongoing work with Joan Esteban, Eugenio Rojas, Raimundo Undurraga:
  - Aspirations and mobility in polarized societies.