Development Economics

Slides 12

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Inequality and Development: Evolving Together



Endowments

- \Rightarrow Supply and demand for goods
- \Rightarrow Equilibrium
- \Rightarrow Wages, rents, profits \Rightarrow human, physical capital accumulation

\Rightarrow Endowments

A Little Taxonomy For Sources of Inequality

- 1. Savings: How do savings rates change with income?
- 2. **Rates of Return**: Variations in the rate of return to capital across people and across wealth levels.
- 3. Occupational Choice: Can wealth affect selection into occupations?
- 4. **Demand**: Income distribution affects composition of demand, and therefore individual incomes.
- 5. **Politics and Policies**: Income distributions will affect taxes on labor and capital income via political lobbies.

Individual accumulation equations:

$$k_{t+1} = y_t - c_t + k_t,$$
 (1)

and

$$y_t = f(k_t, \theta_t), \tag{2}$$

where θ_t is some macro state:

- Perhaps external to the economy
- More often external to individual but not to the economy.

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- Wage earning + capital income: $f(k_t) = w(\theta_t) + r(\theta_t)k_t$.
- Skill accumulation over occupations:

$$f(k) = w_u(\theta)$$
 for $k < \bar{x}$
= $w_s(\theta)$ for $k > \bar{x}$.

Can also be used for setup costs, or multiple occupations.

The Household's "Production Function"



Investments/Occupations

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Investments/Occupations

Differential Savings Rates

Permanent versus temporary income

Friedman (1957), see discussion in Dynan-Skinner-Zeldes (2004)

Estimates from Survey of Consumer Finances (SCF):

	6-Yr Income Average	Instrumented By
		Vehicle Consumption
Quintile 1	1.4	2.8
Quintile 2	9.0	14.0
Quintile 3	11.1	13.4
Quintile 4	17.3	17.3
Quintile 5	23.6	28.6
Top 5%	37.2	50.5
Top 1%	51.2	35.6

Source: Dynan-Skinner-Zeldes (2004), they provide other estimates

A very rough calibration for pure capital owners:

- Average rate of growth in the economy is g.
- Rate of return on capital is *r*.
- The capitalists save s_R of their income.

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- Average rate of growth in the economy is g.
- Rate of return on capital is *r*.
- The capitalists save s_R of their income.
- So if initial rich share is x(0), then t periods later it will be

$$x(t) = x(0) \left(\frac{1+s_R r}{1+g}\right)^t$$

That is,

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g) - 1}{s_R}$$

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- Some quick calculations for top 10% in the US:
- $x_0 = 1/3$ in 1970, rises to $x_t = 47/100$ in 2000.
- Estimate for g: 2% per year.
- Estimate from Dynan et al for s_R : 35% (optimistic).
- Can back out for r: r = 9.7%.
- Possible, but much higher than the inflation-adjusted rate of return on capital, including dividends (around 6.5%).

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g) - 1}{s_R}$$

Similar calculations for top 1% in the US:

- $x_0 = 8/100$ in 1980, rises to $x_t = 18/100$ in 2005.
- Estimate for g: 2% per year.
- Estimate from Dynan et al for s_R : 51%.
- Can back out for r: r = 10.5%.
- Again, there is more going on than just savings differentials.

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g) - 1}{s_R}$$

Try the top 0.1% for the United States:

- $x_0 = 2.2/100$ in 1980, rises to $x_t = 8/100$ in 2007.
- Estimate for g: 2% per year.
- If these guys also save at 0.5, then r = 14.4%!
- If they save 3/4 of their income, then r = 9.6%.

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g) - 1}{s_R}$$

Slightly better job for Europe, but not much. Top 10%:

- $x_0 = 29/100$ in 1980, rises to $x_t = 35/100$ in 2010.
- Estimate for g: 2% per year.
- Estimate from Dynan et al for s_R : 35%.
- Can back out for r: r = 7.5%.
- Very high relative to *r* in Europe over this period.

$$r = \frac{[x(t)/x(0)]^{1/t}(1+g) - 1}{s_R}$$

Finally, top 1% for the UK:

- $x_0 = 6/100$ in 1980, rises to $x_t = 15/100$ in 2005.
- Estimate for g: 2% per year.
- Estimate from Dynan et al for s_R : 51%.
- Can back out for r: r = 11.4%.

What Explains the High Rates of Return to the Rich?

Two broad groups of answers:

- The rich have access to better information on rates of return
- The rich have physical access to better rates of return.

Information: Investing in Investment

This section is omitted for the course.

- The greater is wealth, the more effort in finding good rates of return on it.
- Simplest model:

and

$$\sum_{t=0}^{\infty} \delta^t c_t^{1-\sigma},$$

where $0<\sigma<1$, $0<\delta<1$, and

$$c_t = \underbrace{(1+r_{t-1})F_{t-1}}_{\text{old wealth + return}} + \underbrace{w(1-e_t)}_{\text{wages on } 1-e \text{ time}} - \underbrace{F_t}_{\text{new wealth}},$$

$$r_t = \beta e_t$$

F: financial wealth, w: wage rate, and e: informational effort.

Information: Investing in Investment

Use F_t to equate marginal benefits over time:

$$\left(\frac{c_{t+1}}{c_t}\right)^{\sigma} = \delta(1+r_t)$$

Use e_t to equate marginal benefits over time:

$$\left(\frac{c_{t+1}}{c_t}\right)^{\sigma} = \delta \frac{F_t}{w}\beta.$$

- Proposition. Individuals with a higher ratio of F to w earn a higher rate of return, and grow faster.
- Proof. Combine the two equations above to see that for all t,

$$1 + r_t = \frac{F_t}{w}\beta.$$

Or you can have your cake and eat it too. Consider

$$c_t = (1 + r_{t-1})F_{t-1} + w - z_t - F_t,$$

where $r_t = \gamma z_t$ (e.g., paying an expert to do your research).

• The *z* that equates marginal benefits is given by

$$\left(\frac{c_{t+1}}{c_t}\right)^{\sigma} = \delta F_t \gamma$$

- Proposition. Those with higher *F* earn higher rates of return.
- PS: Contrast the two propositions.

Back to course material

Why might wealth affect access to high rates of return?

- Risk-taking
- Stock markets
- Politics (Sokoloff-Engerman on Latin America)
- Imperfect capital markets:

Inability to seize opportunities with startup costs

This last item will be our focus here.

- People indexed on [0, 1]: all identical except for their initial wealth.
- Choose to become workers or entrepreneurs.
- Startup cost *S* for entrepreneurship.

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- Choose to become workers or entrepreneurs.
- Startup cost *S* for entrepreneurship.
- Entrepreneurs have a production function $f(\ell) = A\ell^{\alpha}$.
- They hire workers at wage w to maximize profit:

$$A\ell^{\alpha} - w\ell$$

w adjusts to equate supply and demand.

Output net of setup costs: Choose n to maximize

$$\max_{n} nA\left(\frac{1-n}{n}\right)^{\alpha} - nS(1+r)$$

where r is rate of return on alternative use of funds invested in startup.

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First order condition for maximization of net output:

$$A\left(\frac{1-n^{*}}{n^{*}}\right)^{\alpha} - \frac{\alpha}{n^{*}}A\left(\frac{1-n^{*}}{n^{*}}\right)^{\alpha-1} = S(1+r).$$
(3)



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 (3)

Can this solution be decentralized? Yes, if credit markets are perfect.

Decentralized First-Best Under Perfect Credit Markets

- Market equilibrium with *n* entrepreneurs and wage *w*:
- Because credit markets are perfect, profits equal wages:

$$A\left(\frac{1-n}{n}\right)^{\alpha} - w\frac{1-n}{n} - S(1+r) = w,$$
(4)

Wages equal marginal product:

$$w = \alpha A \left(\frac{1-n}{n}\right)^{\alpha-1} \tag{5}$$

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Substitute (5) into (4):

$$A\left(\frac{1-n}{n}\right)^{\alpha} - \frac{\alpha}{n}A\left(\frac{1-n}{n}\right)^{\alpha-1} = S(1+r).$$
(6)

Compare (6) with (3) to see that *n* equals *n**.

The problem of collateral and repayment:

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- Example:
- My assets = 100,000; startup costs = 200,000.
- Business hires 50 workers, pays them 5,000 each
- Revenue = 500,000.
- After one period, repay. Interest rate = 10%.
- If default, then:
- Half profits seized plus expected jailtime worth 60,000.

To pay or not to pay?

Items	Repay	Default
Principal & Interest	220,000	0
Collateral Credit	110,000	0
Jail	0	60,000
Seizure of Profits	0	125,000
Total	110,000	185,000

Repay if wealth/collateral is 100,000.

To pay or not to pay?

Items	Repay	Default
Principal & Interest	220,000	0
Collateral Credit	22,000	0
Jail	0	60,000
Seizure of Profits	0	125,000
Total	198,000	185,000

- Default if wealth/collateral is 20,000.
- Note: It is the same person in both cases!

More generally:

$$W \geq S - \frac{F + \lambda \left\{f(\ell) - w\ell\right\}}{1 + r}$$

- where W = wealth
- S = setup cost
- F = jail/fines
- w = wage rate
- $\ell = labor$
- r =interest rate
- $f(\ell) =$ produced output.

Entrepreneurship with Imperfect Capital Markets

Credit access determined by wage rate and wealth:

Threshold defined by
$$W(w) = S - \frac{F + \lambda \{f(\ell) - w\ell\}}{1 + r}$$
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Demand curve is "product" of access and firm demand for labor.





- Supply curve mirrors the "lack of access" diagram.
- Demand curve is "product" of access and firm demand for labor.

Three regimes:



- Inefficiency in Panels A and B compared to the social planner's outcome.
- Efficiency in Panel C.

Inequality and Inefficiency

Does inequality hinder efficiency or move the system towards it?

It depends on how poor the economy is to begin with.

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Inequality helps when average wealth levels are relatively low.

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Inequality hurts when average wealth levels are relatively high.

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- Differential savings rates
- Differential access to occupations via imperfect capital markets

- We studied a small set of topics on inequality and development
- Differential savings rates
- Differential access to occupations via imperfect capital markets
- When markets are imperfect, inequality matters!
- In very poor societies, can create partial efficiency gains
- In richer societies, causes efficiency losses
- Traced to the imperfection of credit markets (our next topic).