Development Economics

Slides 15

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Inequality and Development: Evolving Together

- **Distribution of Endowments**

$\Rightarrow$ Supply and demand for goods

$\Rightarrow$ Equilibrium

$\Rightarrow$ Market prices, including wages, rents, profits

$\Rightarrow$ Human and physical capital accumulation

$\Rightarrow$ **New Distribution of 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?

[Not for course]

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.

Microeconomic Concepts

Individual accumulation equations:

$$\underbrace{k_t}_{\text{Today's Investments}} = \underbrace{W_t}_{\text{Today's Wealth}} + \underbrace{y_t}_{\text{Fresh Income}} - \underbrace{c_t}_{\text{Consumption}}, \tag{1}$$

- where k_t can be a financial or human capital investment.
- Financial: $k_t \to W_{t+1}$ plus fresh capital income.
- Human: education costs or setup costs $\to$ fresh human income or profits.
- These are exogenous mappings for the individual but often endogenously determined within the economy.

Microeconomic Concepts

Examples:

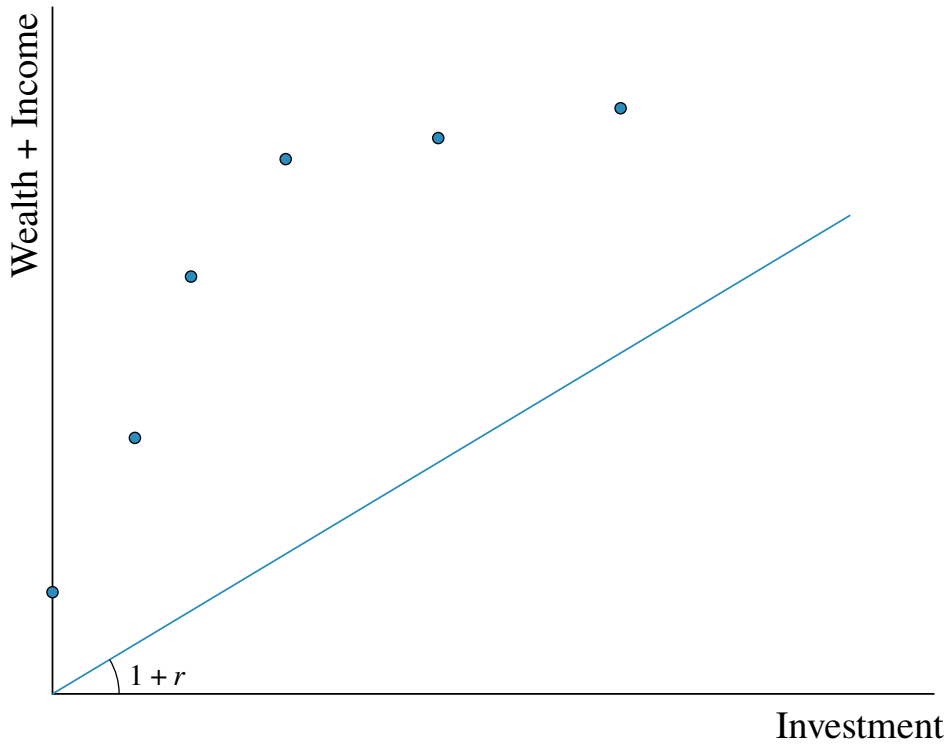
- Financial: $k_t = W_{t+1}$ plus capital income rk_t ($r =$ financial rate of return)
- Human or Entrepreneurial:

$$k_t \to w_u \text{ for } k < \bar{k}$$

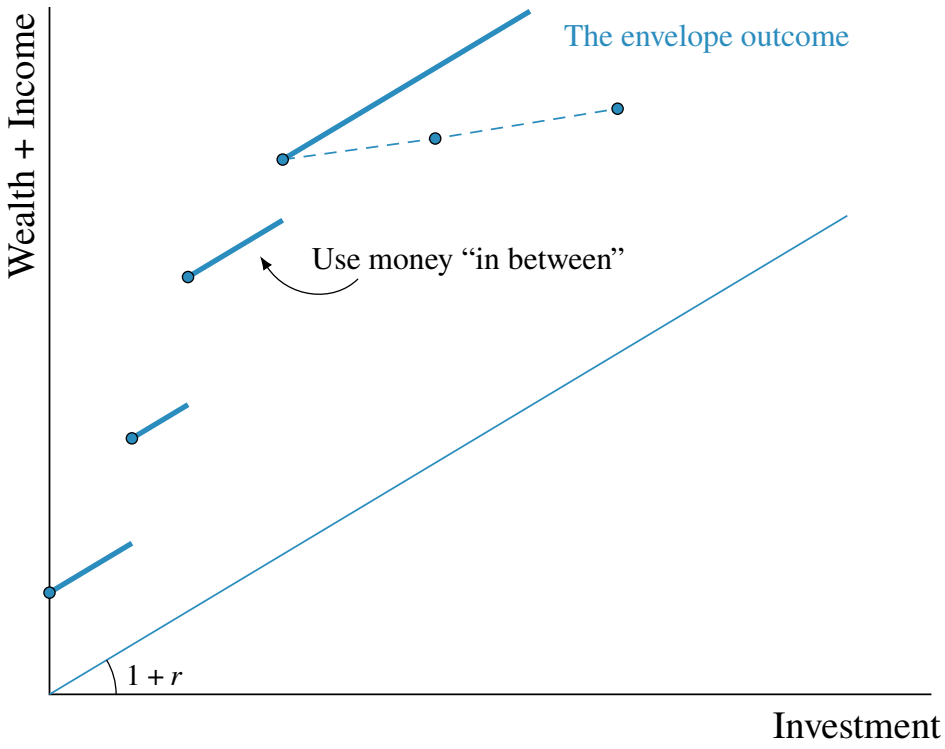
$$\to w_s \text{ for } k > \bar{k}.$$

- where $\bar{k}$ is a training cost to become skilled.
- Easily extended to setup costs, or multiple occupations.
- Also k_t might be divided into both human and financial investments.

The Household's "Production Function"



The Household's "Production Function"



Savings Rates and the Evolution of Wealth

- **Financial investment**: $k_t = W_{t+1}$, so equation (1) becomes

$$W_{t+1} = W_t + y_t - c_t.$$

- Savings rate s out of income: $c_t = (1-s)y_t$. Eliminate c_t:

$$W_{t+1} = W_t + sy_t.$$

- Income $y_t = \underbrace{w_t}_{\text{labor income}} + \underbrace{rW_t}_{\text{capital income}} \equiv (\eta + r)W_t \equiv \rho W_t$, and therefore:

$$W_{t+1} = (1 + s\rho)W_t.$$

- **So** wealth grows at the rate $s\rho$: faster when s is higher.
- If the rich have higher s or ρ (equal to $\eta + r$), they pull away.

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

How Much Do Differential Savings Rates Explain?

- Recall: $W_{t+1} = (1 + s\rho)W_t$.
- For the rich (top 10%, or top 1%, or top 0.1%):
- Their income is a return on their **accumulated wealth** $\hat{W}_t$

  financial wealth, a business, land, education, ...

- Even likely that $\eta \approx 0$, so that $\rho = r$.
- Both $\hat{y}$ and $\hat{W}$ grow together, so that $\hat{y}_t = \hat{y}_0[1 + \hat{s}\rho]^t$.
- Rich income share is $\text{Share}_t = n\hat{y}_t/y_t$, where n is their share (10%, 1% etc.).
- **So:**

$$\textbf{Share}_t = \textbf{Share}_0 \left(\frac{1 + \hat{s}\rho}{1 + g} \right)^t$$

- where g is the overall growth rate of per-capita income.

Backing Out Growth Rates From Shares

- From previous page:

$$\textbf{Share}_t = \textbf{Share}_0 \left(\frac{1 + \hat{s}\rho}{1 + g} \right)^t$$

- where g is the overall growth rate of per-capita income.
- A constant share in national income for the rich requires $\hat{s}\rho = g$, i.e.

$$\rho = g/\hat{s}.$$

- A rising share means $\hat{s}\rho > g$, and to be exact:

$$\hat{s}\rho = [\text{Share}_t/\text{Share}_0]^{1/t}(1 + g) - 1$$

- This is the **required real growth rate** of top incomes:
- To match observed changes in shares.

How Much Do Differential Savings Rates Explain?

- **Top 1% income share, 1980–2022**

Shares: WID pre-tax national income. g: WID real average national income per adult.

	Top 1% share			Required ρ at $\hat{s} =$		
	1980	2022	g	0.35	0.50	1.00
India	7.5	23.1	3.2%	**17.1%**	12.0%	6.0%
South Korea	7.6	14.1	3.9%	**15.6%**	10.9%	5.5%
China*	6.6	14.0	5.3%	**21.5%**	15.1%	7.5%
United States	10.4	20.7	1.4%	8.8%	6.1%	3.1%

*China to 2015: WID's own data-quality flag falls sharply after that year.

- Benchmark: real return on world equities $\approx$ 5.2% (Dimson-Marsh-Staunton, 1900–2024); equities and housing $\approx$ 7% (Jordà et al. 2019, 1870–2015).

A Minimum Floor on Rate of Return

- Set $\hat{s} = 1$: the rich consume nothing and reinvest every rupee.
- Even then, to match the income shares data:

  India's top 1% needs **6.0%** real, and the top 0.1% needs **7.3%**

  on everything they own, for forty years.
- Korea's top 0.1% needs **6.7%**. China's top 1% needs **7.5%**.
- That exceeds historical return on equities and housing in rich countries:
- and they obviously do consume.
- By contrast, the United States floor of 3.1% and France's 1.7% are easily met.

Two Remarks

- **1. Churn at the top.** The top 1% in 2022 are not the same people as in 1980.
- But we never wanted to track people, just top percentiles.
- Good and bad years shuffle membership, but that doesn't matter in the net.
- **2. Labor income among top incomes?**
- Fine, if we read W broadly:

  earnings $=$ return on accumulated human capital.

  $\rho = r + \eta$. Schooling your children is reinvestment.

Where This Leaves Us: High Returns at the Top

- It isn't that these returns are impossible. Rather it says:
- Rich investments pay far more than the market return on financial wealth.
- The question isn't whether such returns exist
- But rather who can get them — and why.
- **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:

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

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

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

and

$$r_t = \beta e_t$$

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.

Access: Wealth and Rates of Return

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.

Entrepreneurs and Workers

- People indexed on $[0, 1]$: **all identical except for their initial wealth**.
- 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:

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

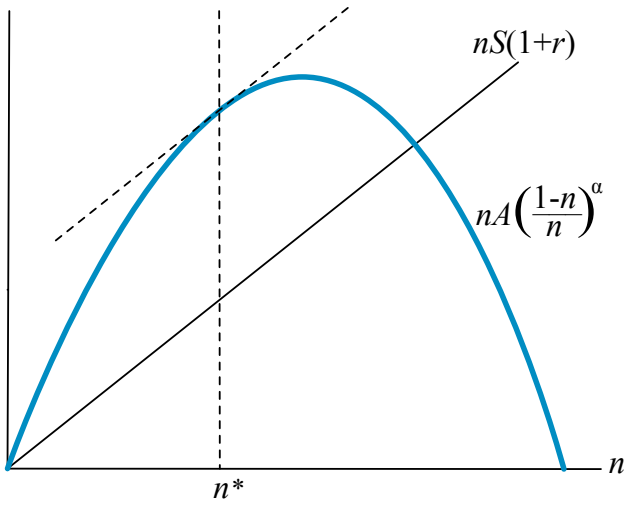
- w adjusts to equate supply and demand.

The Criterion for Social Efficiency

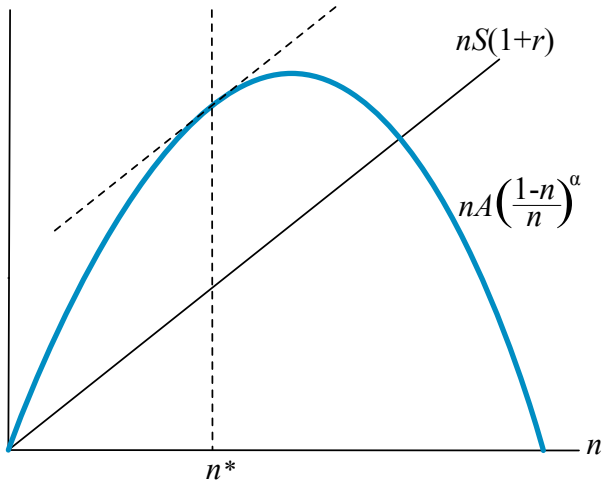
Output net of setup costs: Choose n to maximize

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

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



The Criterion for Social Efficiency



- **First order condition for maximization of net output:**

$$A\left(\frac{1-n^*}{n^*}\right)^{\alpha} - \frac{\alpha}{n^*}A\left(\frac{1-n^*}{n^*}\right)^{\alpha-1} = S(1+r). \qquad (2)$$

- 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:

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

- Wages equal marginal product:

$$w = \alpha A\left(\frac{1-n}{n}\right)^{\alpha-1} \tag{4}$$

- Substitute (4) into (3):

$$A\left(\frac{1-n}{n}\right)^{\alpha} - \frac{\alpha}{n}A\left(\frac{1-n}{n}\right)^{\alpha-1} = S(1+r). \tag{5}$$

- Compare (5) with (2) to **see that** n **equals** n^*.

Imperfect Capital Markets: An Introduction

- **The problem of collateral and repayment**:
- 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.

Imperfect Capital Markets: An Introduction

- 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/Net	110,000	185,000

- **Repay** if wealth/collateral is 100,000.

Imperfect Capital Markets: An Introduction

- 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/Net	198,000	185,000

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

Imperfect Capital Markets: An Introduction

- More generally, let:
- (i) $W =$ wealth (ii) $S =$ setup cost (iii) $F =$ jail/fines (iv) $w =$ wage (v) $\ell =$ labor (vi) $r =$ interest rate (vii) $f(\ell) =$ produced output.
- Then repay if

$$S(1+r) - W(1+r) \leq F + \lambda \left[f(\ell) - w\ell \right],$$

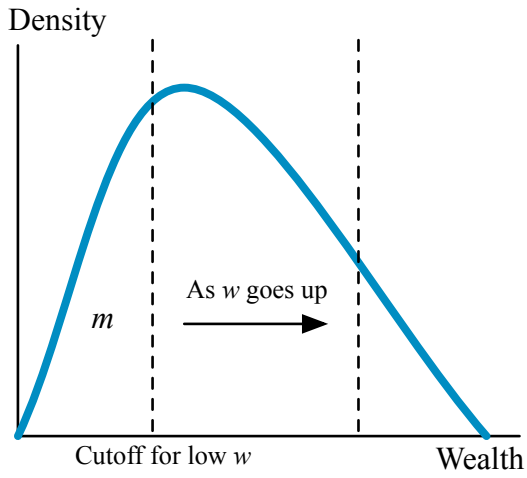
- or rearranging, if

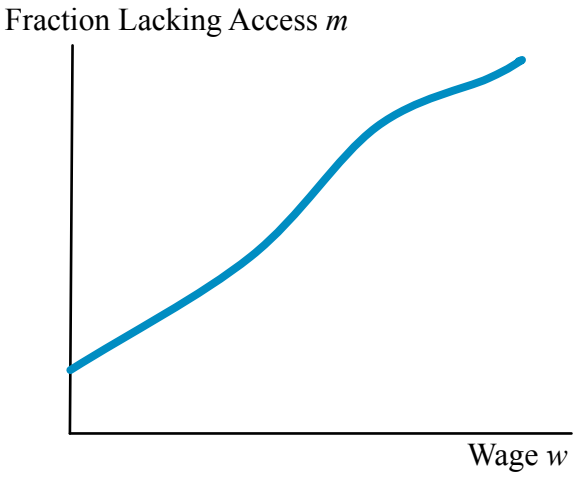
$$W \geq S - \frac{F + \lambda \left[f(\ell) - w\ell \right]}{1+r}$$

Entrepreneurship with Imperfect Capital Markets

Credit access determined by wage rate and wealth:

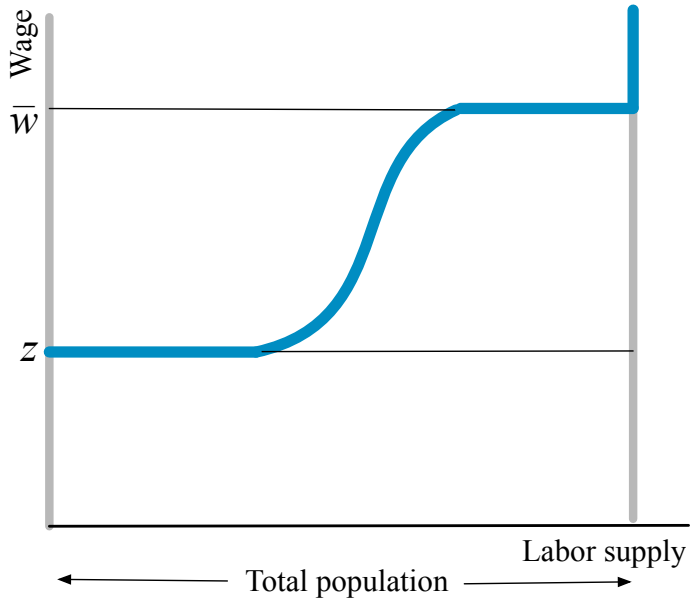
- Threshold defined by $W(w) = S - \dfrac{F + \lambda \left\{ f(\ell) - w\ell \right\}}{1+r}$.





Equilibrium Under Imperfect Credit Markets

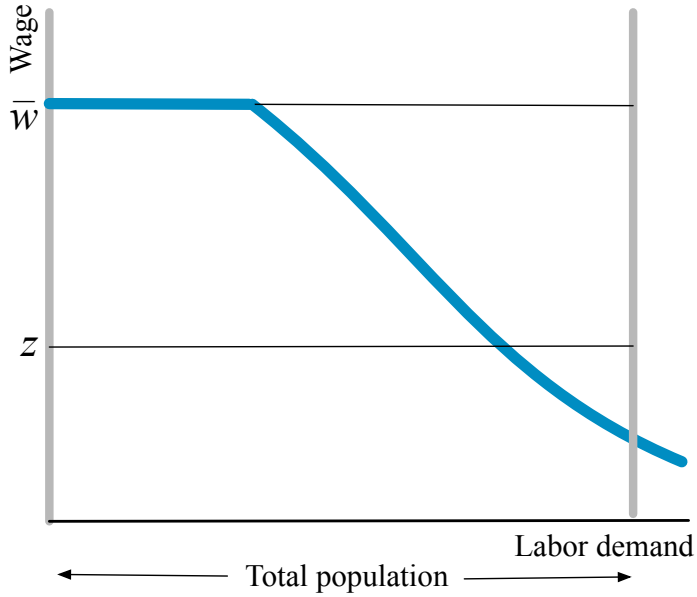
- **This generates supply and demand curves for labor:**



- $z =$ work subsistence; supply curve mirrors the "lack of access" diagram.

Equilibrium Under Imperfect Credit Markets

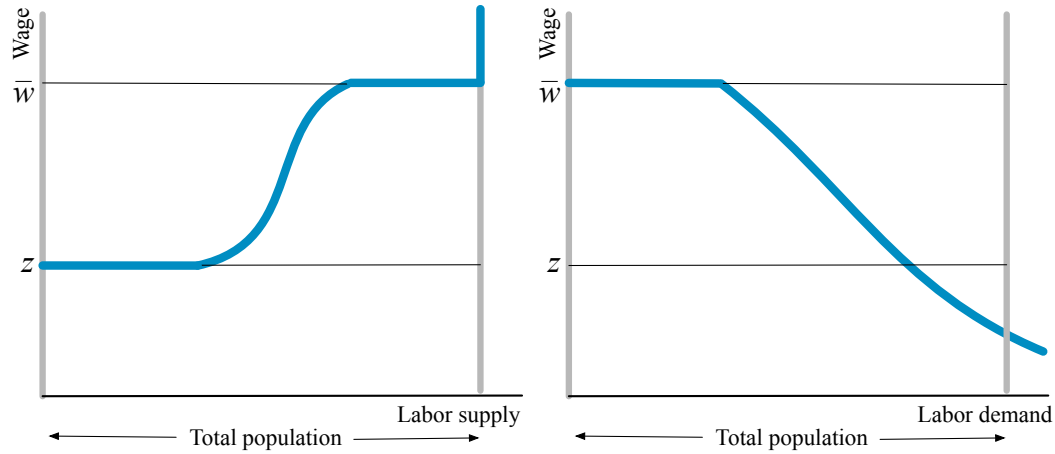
- **This generates supply and demand curves for labor:**



- Demand curve combines access and firm-level demand for labor.

Equilibrium Under Imperfect Credit Markets

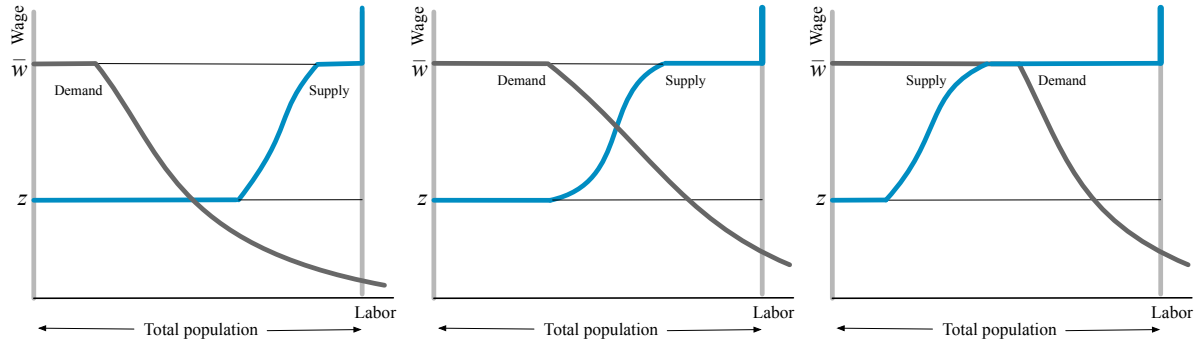
- **This generates supply and demand curves for labor:**



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

Equilibrium Under Imperfect Credit Markets

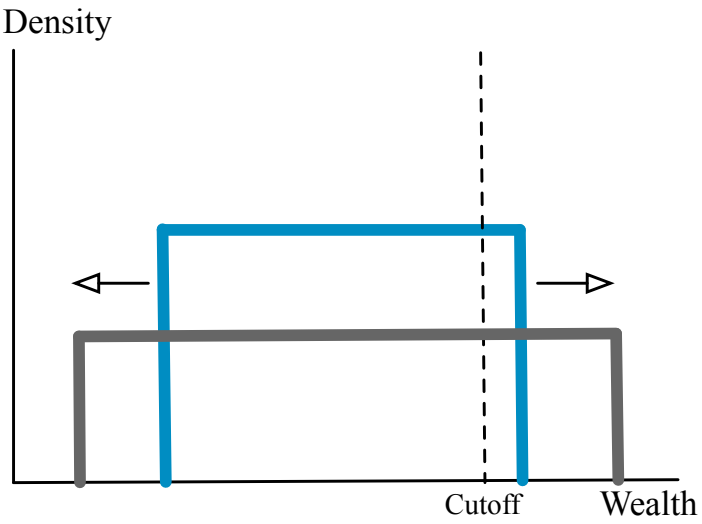
- **Three regimes:**



- **Inefficiency** in Panels A and B compared to the social planner’s outcome.
- **Efficiency** in Panel C. (Always the solution with perfect capital markets.)

Inequality and Inefficiency

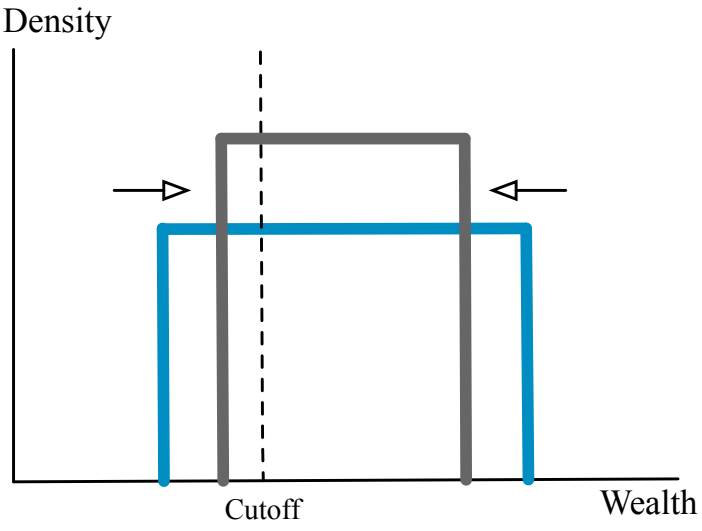
- **Does inequality hinder efficiency or move the system towards it?**
  - It depends on how poor the economy is to begin with.



- Disequalization can help when average wealth levels are low relative to setup costs.

Inequality and Inefficiency

- **Does inequality hinder efficiency or move the system towards it?**
  - It depends on how poor the economy is to begin with.



- Equalization helps when average wealth levels are not so low relative to setup costs.

Inequality and Development

- 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).