Principles of Applied Microeconomics

Ross Summer Connection (2022)
Elird Haxhiu

Causal Inference

Ross Summer Connection (2022)
Elird Haxhiu

Positive Predictions of Supply + Demand

- EX: if apples are found to cure some disease, then the price of apples (in a perfectly competitive market) will increase
- EX: if an invention makes workers way more productive on the job, then the wage rate will go up in a competitive labor market

Positive Predictions of Supply + Demand

- EX: if apples are found to cure some disease, then the price of apples (in a perfectly competitive market) will increase
- EX: if an invention makes workers way more productive on the job, then the wage rate will go up in a competitive labor market

- These claims are **positive** (vs normative), and **falsifiable**
  - They are certainly true in the model…
  - But model is simplified representation of our complex reality…
  - Question: is the claim still true in the real world?

Causal Inference

- Whereas models are theoretical, the methods we use to verify their claims are inherently statistical (including uncertainty)
  - If you want sharp predictions (like in a model), need to abstract away from many things for tractability (aka being able to solve the model)
  - If you want to take reality seriously, must account for the unknown/random

Causal Inference

- Whereas models are theoretical, the methods we use to verify their claims are inherently statistical (including uncertainty)
  - If you want sharp predictions (like in a model), need to abstract away from many things for tractability (aka being able to solve the model)
  - If you want to take reality seriously, must account for the unknown/random

- We study basic methods to answer causal (what if) questions!
- **Causal inference**: the process of determining if one thing causes another thing to change, using data on both things + assumptions

Potential Outcomes + Treatment Effects

- We study the following problem
  - Let $w_i \geq 0$ denote hourly wages of individual i (aka outcome)
  - Let $M_i \in \{0,1\}$ denote whether migrant or not
  - We can write wages as a function of migrant status: $w_i(1)$ and $w_i(0)$

Potential Outcomes + Treatment Effects

- We study the following problem
  - Let $w_i \geq 0$ denote hourly wages of individual i (aka outcome)
  - Let $M_i \in \{0,1\}$ denote whether migrant or not
  - We can write wages as a function of migrant status: $w_i(1)$ and $w_i(0)$

- Possible research questions
  1. For each person, what is the value of treatment effect $\tau_i \coloneqq w_i(1) - w_i(0)$?

Potential Outcomes + Treatment Effects

- We study the following problem
  - Let $w_i \geq 0$ denote hourly wages of individual i (aka outcome)
  - Let $M_i \in \{0,1\}$ denote whether migrant or not
  - We can write wages as a function of migrant status: $w_i(1)$ and $w_i(0)$

- Possible research questions
  1. For each person, what is the value of treatment effect $\tau_i \coloneqq w_i(1) - w_i(0)$?

  2. (More realistic) What is the value of the **Average Treatment Effect** (ATE)

$$ATE \coloneqq E[\tau_i] = E[w_i(1) - w_i(0)]$$

Estimating the ATE

- Research question: what is the average effect of migrating on wages?

$$E[\tau_i] = E[w_i(1) - w_i(0)]$$

Estimating the ATE

- Research question: what is the average effect of migrating on wages?

$$E[\tau_i] = E[w_i(1) - w_i(0)]$$

- How can we learn about this value?
  - More specifically, what do we learn about $E[\tau_i]$ by comparing the wages of people who migrated versus those who did not?
  - What assumptions must hold for this comparison to be a good guess?

Estimating the ATE

- We can write observed wages in terms of potential wages if we know migrant status

$$w_i = M_i w_i(1) + (1 - M_i) w_i(0)$$

so that $w_i = w_i(1)$ if $M_i = 1$ and vice versa

Estimating the ATE

- We can write observed wages in terms of potential wages if we know migrant status

$$w_i = M_i w_i(1) + (1 - M_i) w_i(0)$$

so that $w_i = w_i(1)$ if $M_i = 1$ and vice versa

- Nice since it shows us what we're trying to estimate!

$$\begin{aligned} w_i &= M_i w_i(1) + w_i(0) - M_i w_i(0) \\ &= w_i(0) + M_i[w_i(1) - w_i(0)] \\ &= w_i(0) + M_i \cdot \boldsymbol{\tau_i} \end{aligned}$$

Identification

- What happens when we compare migrant vs. non-migrant wages?

$$E[w_i|M_i = 1] - E[w_i|M_i = 0]$$

Identification

- Let's see what this comparison identifies for us

$$E[w_i|M_i = 1] - E[w_i|M_i = 0]$$

$$= E[w_i(1)|M_i = 1] - E[w_i(0)|M_i = 0]$$

$$= E[w_i(1)|M_i = 1] - E[w_i(0)|M_i = 0] + E[w_i(0)|M_i = 1] - E[w_i(0)|M_i = 1]$$

$$= E[w_i(1) - w_i(0)|M_i = 1] + E[w_i(0)|M_i = 1] - E[w_i(0)|M_i = 0]$$

$$= ATT + SB$$

Independence Assumption

- Simple comparison = some real effect + confounding selection bias
- Big lesson: without assumptions, we don’t learn anything

Independence Assumption

- Simple comparison = some real effect + confounding selection bias
- Big lesson: without assumptions, we don't learn anything

- Experimental ideal: those who do/do not migrate are **randomly assigned**

- Mathematically, this design implies the following assumption

$$M_i \perp w(1), w_i(0) \qquad \forall i$$

Estimating the ATE with independence

- Since potential outcomes don't depend on M_i we can write

$$E[w_i|M_i = 1] - E[w_i|M_i = 0]$$

$$= ATT + SB$$

$$= E[w_i(1) - w_i(0)|M_i = 1] + E[w_i(0)|M_i = 1] - E[w_i(0)|M_i = 0]$$

$$= E[w_i(1) - w_i(0)] + E[w_i(0)] - E[w_i(0)] = ATE$$

Conclusions

- Causal inference is the study of causal relationships and the task of estimating them using data from the real world
- Ubiquitous estimation strategy: simple comparisons!!
- Today's lesson: simple comparisons = true causal effects + confounding

Conclusions

- Causal inference is the study of causal relationships and the task of estimating them using data from the real world
- Ubiquitous estimation strategy: simple comparisons!!
- Today's lesson: simple comparisons = true causal effects + confounding

- Issue severe when economic agents chose treatment values by optimizing according to their potential outcomes…
  - Hence, the fundamental problem of causal inference
- Experiments solve this problem, but difficult to find in real world
- Econometrics: field studying statistical methods of causal inference

Break!

- See you in ~10 minutes!

- When we come back

1. Why does diminishing marginal utility imply a downward sloping demand curve for goods by consumers, and labor by firms?

2. Why does diminishing marginal product of labor imply an upward sloping supply curve for goods by firms?

Clemens (2011)

Ross Summer Connection (2022)

Elird Haxhiu

Migration Constraints

- Largest existing distortion in the world economy

- Other barriers to mobility exist (credit constraints, information, risk) but legal restrictions are clearly binding…
  - Gallup poll (2008): 40% of adults in poor countries would like to move
  - US diversity visa lottery (2010): 50k visas, 13.6 millions applications

Migration Constraints

- Largest existing distortion in the world economy

- Other barriers to mobility exist (credit constraints, information, risk) but legal restrictions are clearly binding…
  - Gallup poll (2008): 40% of adults in poor countries would like to move
  - US diversity visa lottery (2010): 50k visas, 13.6 millions applications

- Question: how large are the gains from (going back to) open borders?
  - Theoretical answer: Figure 1 in Clemens (2011)
  - Empirical estimates of answer: Table 1 in Clemens (2011)

The Labor Market

- To understand Figure 1, we need to understand
  1. Firms — operate F in production $Y = F(K, L; \boldsymbol{A})$, hire labor L
  2. Marginal Product — extra output from additional worker, $MP(L) = \frac{\partial}{\partial L} F$
  3. Wage/Labor Demand — worker income $w = MP(L; \boldsymbol{A})$ in perfect competition

Under some intuitive assumptions about F (positive, decreasing marginal products) ⇒ downward sloping labor demand curve…

Where is total output on graph?

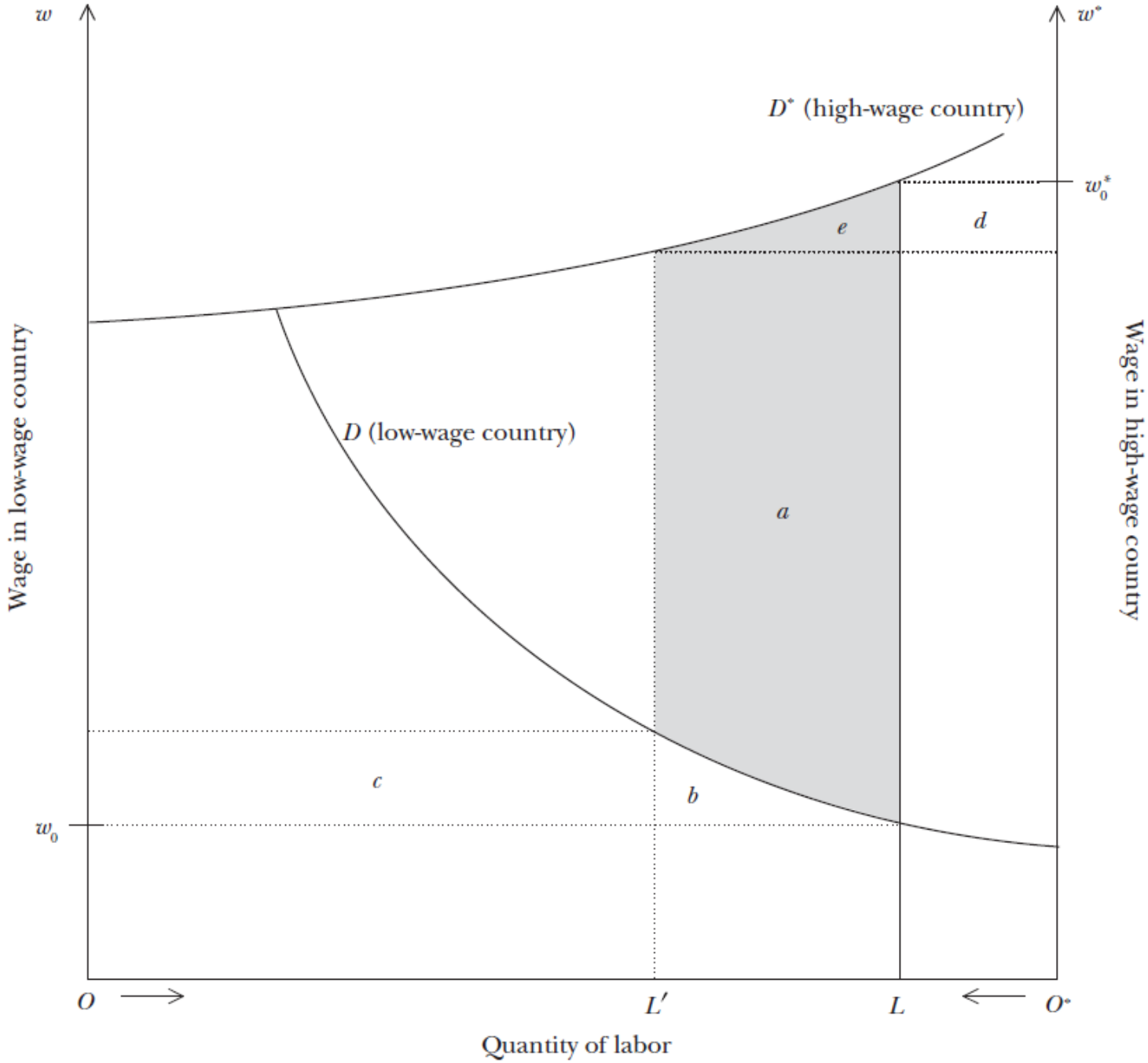
w
w*
D* (high-wage country)
w_0^*
e
d
D (low-wage country)
a
c
b
w_0
Wage in low-wage country
Wage in high-wage country
O
L′
L
O*
Quantity of labor

Table 1

Efficiency Gain from Elimination of International Barriers

(percent of world GDP)

All policy barriers to merchandise trade	
1.8	Goldin, Knudsen, and van der Mensbrugghe (1993)
4.1	Dessus, Fukasaku, and Safadi (1999)[a]
0.9	Anderson, Francois, Hertel, Hoekman, and Martin (2000)
1.2	World Bank (2001)
2.8	World Bank (2001)[a]
0.7	Anderson and Martin (2005)
0.3	Hertel and Keeney (2006, table 2.9)
All barriers to capital flows	
1.7	Gourinchas and Jeanne (2006)[b]
0.1	Caselli and Feyrer (2007)
All barriers to labor mobility	
147.3	Hamilton and Whalley (1984, table 4, row 2)[c]
96.5	Moses and Letnes (2004, table 5, row 4)[c]
67	Iregui (2005, table 10.3)[c,d]
122	Klein and Ventura (2007, table 3)[e]

Clemens (2011)

- Estimates of ↑ in world GDP with open borders $\in (67\%, 147\%)$!!!

- Four* important questions about these estimates:

1. What are the external effects of (skilled) emigrants' departure on the productivity of non-emigrants back home?

2. What is the elasticity of labor demand in origin and destination countries?

3. What are the relative contributions of inherent traits vs. location in the observed gap in wages between rich and poor country workers?

4. What future levels of emigration are feasible, given current world?

*

- “Assumptions on the mobility of other factors matter a great deal as well; in KV the majority of global efficiency gains from labor mobility require mobile capital to “chase” labor—as described by Hatton and Williamson (1994).”

1. External effects of emigration

- The large gains from removing migration restrictions may be attenuated if the act of migrating harms non-migrants
- We call this an externality associated with migration (think pollution)

1. External effects of emigration

- The large gains from removing migration restrictions may be attenuated if the act of migrating harms non-migrants
- We call this an externality associated with migration (think pollution)

- In the origin country…
  - Those who remain become less productive (see Bhagwati tax idea)
  - Limited empirical evidence for this (see African-country healthcare workers)
  - Evidence for brain gain rather than brain drain!

1. External effects of emigration

- The large gains from removing migration restrictions may be attenuated if the act of migrating harms non-migrants
- We call this an externality associated with migration (think pollution)

- At destination countries…
  - Reduced quantity of "open space, clean air, publicly-funded amenities, and a **degree of cultural homogeneity** that may be valued by non-migrants."
  - Limited evidence of negative fiscal effects (some at state, local level).
  - Evidence for positive external effects, especially among high-skilled US workers!

Haxhiu (2022)

Emigration and Education

- Remittances are a huge source of income in developing countries
  - Recent evidence for "virtuous cycles" of education/migration in response to migrant income shocks (see KMTY, 2022)
  - Large fraction of long-term gains at origin due to this human capital channel

- Some concern about this increase in skilled emigration
  - Fears of "brain drain" largely overblown (Chand and Clemens, 2019) but not entirely off the mark in some cases (McKenzie and Rapoport, 2011)
  - Often document "brain gains" instead in origin areas…

- Open question: how much of the overall response in human capital to migration shocks is due to remittances, versus changing skill premia?

2. Labor Demand Elasticities

- The slopes of the labor demand curves determines how much can be gained by reallocating workers from poor to rich countries

2. Labor Demand Elasticities

- The slopes of the labor demand curves determines how much can be gained by reallocating workers from poor to rich countries

- What is the effect of immigration on native wages?
- Why does slope of labor demand determine how wages respond to entrance of immigrants under perfect competition?

2. Labor Demand Elasticities

- The slopes of the labor demand curves determines how much can be gained by reallocating workers from poor to rich countries

- What is the effect of immigration on native wages?
- Why does slope of labor demand determine how wages respond to entrance of immigrants under perfect competition?

- Huge literature, with a lot of work in a lot of contexts
  - Immigration wage effects: small, negative (1%) in short-run, null in long-run
  - Emigration effects: larger and positive (8% in Mexico 2000s)
  - For more, see Peri (2016) and Kerr & Kerr (2011)

2. Labor Demand Elasticities

- But even if there is some negative effect on native wages, so what?
  - EX: women's increased labor force participation in second half 1900s US
  - Pecuniary (rather than technical) externalities don't warrant mobility restrictions based on welfare grounds
  - Other grounds: equity, HC, "**homogeneity preference**"

2. Labor Demand Elasticities

- But even if there is some negative effect on native wages, so what?
  - EX: women's increased labor force participation in second half 1900s US
  - Pecuniary (rather than technical) externalities don't warrant mobility restrictions based on welfare grounds
  - Other grounds: equity, HC, "**homogeneity preference**"

- Existing research suggests not much to worry about in terms of getting our estimates correct!
  - But that research is based on low levels of migration in the past…
  - What will those labor demand elasticities be at the much higher levels that would (likely) results under open borders?

The progressive quandary: how to design an immigration policy that balances competing objectives


blogs.lse.ac.uk/politicsandpolicy/immigration-progressive-quandary/

February 24, 2022

There is a tension between strong employment rights, a supportive welfare state, equal rights for migrants and locals, and an open, non-selective immigration policy that creates hard decisions for progressive politicians – but the quandary should not be avoided, says **Alan Manning.**

Those on the progressive side of politics tend to be in favour of strong employment rights for workers and a generous welfare state for those unable to work, whether because of unemployment or sickness/disability. And when it comes to migration policy, they tend to be in favour of equal rights for locals and migrants and an immigration policy that is relatively open and non-selective.

There are ways in which one can use the academic literature on the impacts of immigration to argue that one can have all the above: the

3. Wage Gaps: Who or Where?

- How productive (relative to natives) will migrants be when they arrive? Unlikely to be 100%, especially early on…

3. Wage Gaps: Who or Where?

- How productive (relative to natives) will migrants be when they arrive? Unlikely to be 100%, especially early on…

- One way to answer this: compare wages of migrants to observationally equivalent non-migrants at origin
  - Huge gap in earnings between them: 1000% in CMP (2008).
  - Could be due to a location effect (aka ATE) or traits/selection bias (SB)!
  - Need a research design which allows us to assume independence…

3. Wage Gaps: Who or Where?

- McKenzie, Gibson, and Stillman (2010): Tonga to New Zealand
  - Study a naturally randomized visa lottery.
  - Find that the gains from emigrating are only somewhat lower than the simple wage difference for observably identical workers inside and outside Tonga
  - That is, little evidence for selection bias!

3. Wage Gaps: Who or Where?

- McKenzie, Gibson, and Stillman (2010): Tonga to New Zealand.
  - Study a naturally randomized visa lottery.
  - Find that the gains from emigrating are only somewhat lower than the simple wage difference for observably identical workers inside and outside Tonga
  - That is, little evidence for selection bias!

- Clemens (2010): Indian emigration
  - Another randomized visa lottery.
  - Find that large gains to overseas work experienced by Indian software workers cannot be primarily the result of unobserved positive self-selection.

3. Wage Gaps: Who or Where?

- McKenzie, Gibson, and Stillman (2010): Tonga to New Zealand.
  - Study a naturally randomized visa lottery.
  - Find that the gains from emigrating are only somewhat lower than the simple wage difference for observably identical workers inside and outside Tonga
  - That is, little evidence for selection bias!

- Clemens (2010): Indian emigration.
  - Another randomized visa lottery.
  - Find that large gains to overseas work experienced by Indian software workers cannot be primarily the result of unobserved positive self-selection.

- Main takeaway: it's mostly place, and not "inherent" traits!

4. How much emigration is feasible?

- As much as rich-country voters and their governments allow…
- Their opposition is due to distributional concerns and so called "**preferences for homogeneity**"
- Distributional concerns valid but could be addressed with transfers

But open borders just isn't practical now…

Furthermore, economists should be open to the possibility that dramatic changes in what is practical can happen over several decades. After all, changes in geographic labor mobility that were unthinkable only a few decades ago have come to pass. Through the 1980s, a Polish national attempting to emigrate to West Germany could be shot by soldiers sealing the Inner German border from the east. Today, Polish jobseekers may move freely throughout Germany. The world has summarily discarded vast systems of restrictions on the labor mobility of medieval serfs, slaves, women, South African blacks, indigenous Australians, and a long list of others.

Next time

- We start working on the gender wage gap within countries
- Focus on the US experience

- EC1 available: watch Netflix documentary, answer some questions

- READ: Blau and Kahn (2000)