Migration: 'The pull of the city'

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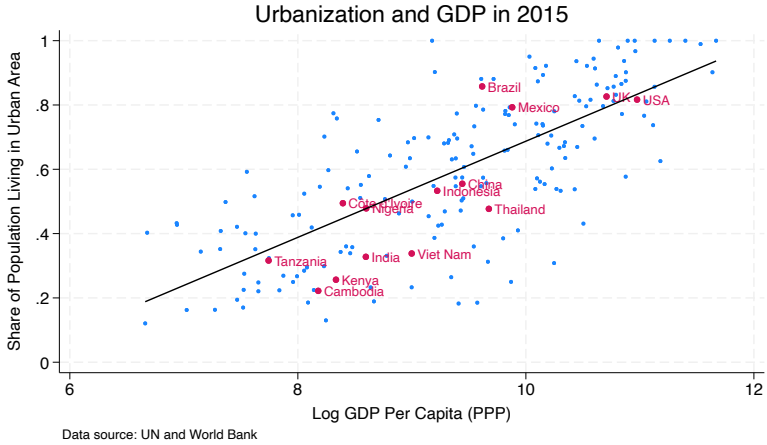
Based on work with Kyra Frye (Stanford)

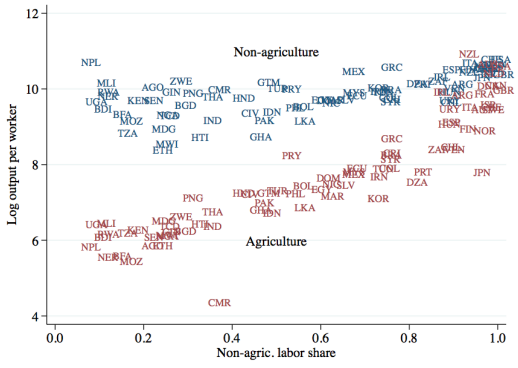
IGC Urban Economics, October 2024

Motivation 1: GDP Urbanization Correlation

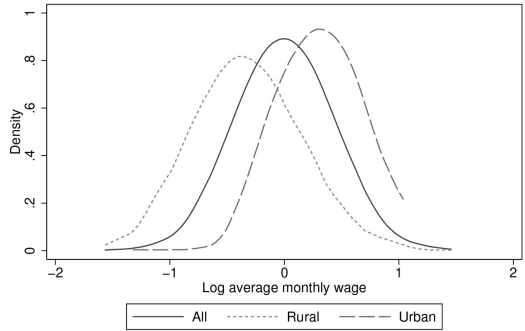


→ Growth causes cities, or cities cause growth? Does migration cause urbanization?

Motivation 2: Rural Urban Gaps



Source: Vollrath from Caselli (2005)



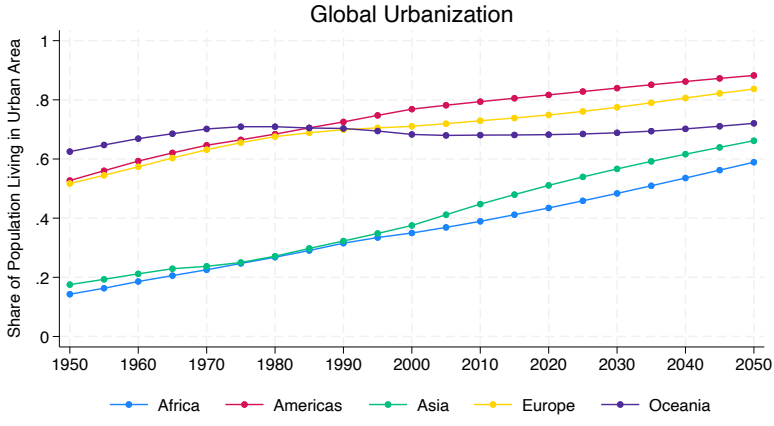
Source: Bryan and Morten 2019

→ Movement frictions, selection, amenity differences

Motivation 3: Existence of Cities

→ Is it, low productivity in cities, or people cannot get to cities?

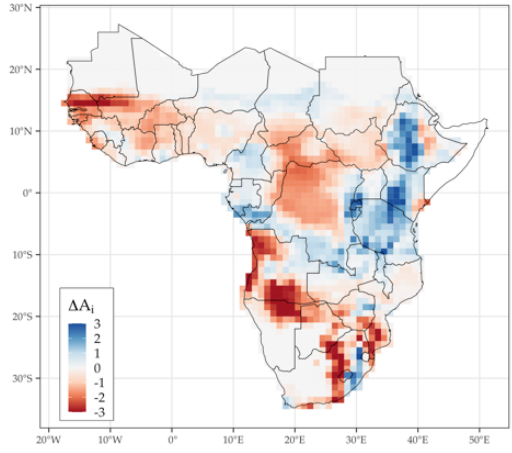
Motivation 4: Urbanization is Coming



→ How should this be managed? Will it be accompanied by a boom in incomes?

Motivation 5: Climate Change Variability

Panel A: Change in average crop suitability.



Source: Conte 2024

→ No problem, just move, or migration is a negative impact of climate change?

Why Model Migration?

I am going to talk about a model of migration. Four goals of the model

1. Measurement (e.g., how costly is migration?)
2. Interpretation (e.g., why cities?)
3. Prediction (e.g., where will people move in response to CC)
   - Positive or normative
4. Policy (e.g., are people in the right places?)

However: makes a lot of simplifications. We'll come back to these later.

Outline

Simple Model: Spatial equilibrium

Spatial equilibrium guides thinking about migration

- Places have characteristics
  - Productivity, amenity, cost of living, cost of moving...
  - Could be endogenous or exogenous
- People migrate in response to utility differences across space.
  - An equilibrium occurs when marginal migrant is indifferent
- Indifference restored after a "shock" by
  - Selection
  - Endogenous change in wage, amenity and/or cost of living

Simple Model: Migration Choices

Locations can be "o", or "d". Migrants take location characteristics as exogenous

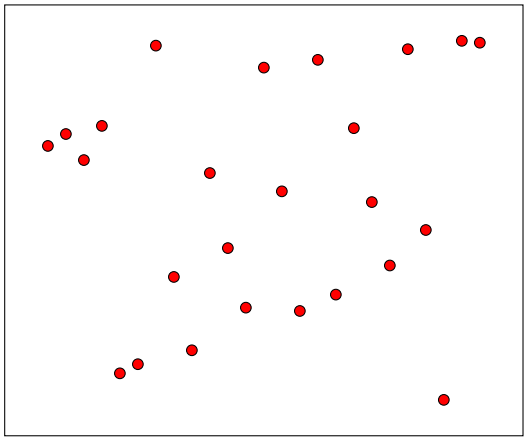
- Wages per unit of human capital (ω_d)
- Schooling availability (h_o)
- Rents (r_d)
- Amenities (α_d)
- Migration costs (c_{od})

Person i's indirect utility of being in d if born in o:

$$V_{od}^i = \frac{\omega_d \alpha_d h_o}{r_d c_{od}} \epsilon_o^i = \frac{V_d h_o}{c_{od}} \epsilon_o^i$$

(Why this functional form? It plays nicely when we try to aggregate below)

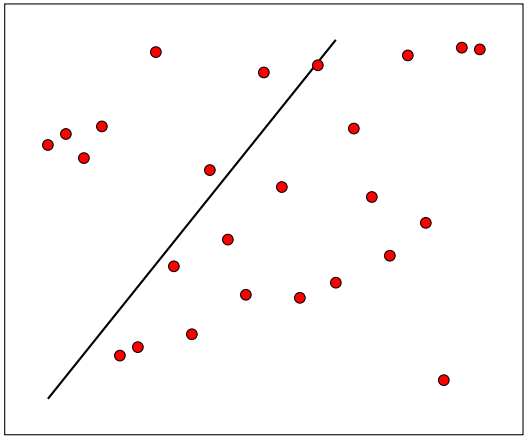
Simple Model: Migration Choices



Two locations

- Rural and Urban
- People start rural

Simple Model: Migration Choices



Two locations

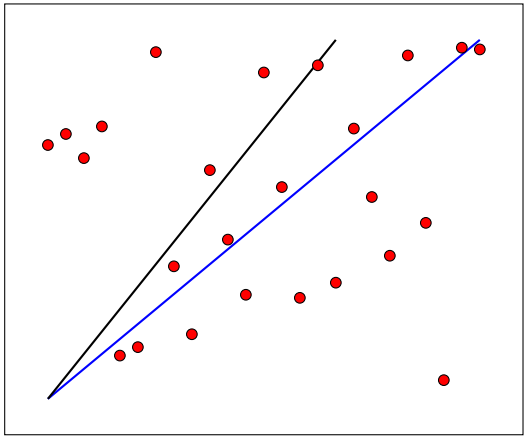
- Rural and Urban
- People start rural

Move to the city if

$$\frac{V_U}{c_{od}}\epsilon_U > V_R\epsilon_R$$

$$\Rightarrow \epsilon_U > \frac{V_R}{V_U}c_{od}\epsilon_R$$

Simple Model: Migration Choices



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Shock - $V_U \uparrow$

- Selection restores equilibrium

Simple Model: Migration Aggregates

Assume ϵ_d is drawn from Fréchet (extreme value type II)

- Why 1: Closed under max - still Fréchet after conditioning!
- Why 2: Gives log linear gravity (Gumbel is linear)

Prob someone from o moves to d

$$\pi_{od} = \frac{(V_d/c_{od})^\theta}{\sum_{d'}(V_d/c_{od})^\theta} = \frac{(V_d/c_{od})^\theta}{\Phi_o}$$

Note four things:

- Gravity: People are drawn to high V locations, but pull weakens with distance
- Dispersion: θ ($\uparrow$ means less dispersion) governs migration response
- Human capital: h_o is irrelevant (cf. Bazzi et al. '16, Hsiao '24)
- Migration market access: Φ_o measures welfare

Model Use 1: Measurement

If $c_{oo} = 1$, then

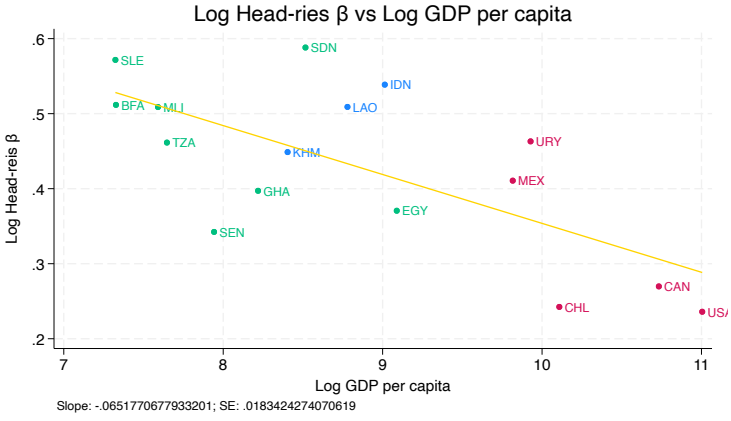
$$\frac{\pi_{oo}}{\pi_{od}} = \frac{(V_o c_{od})^\theta}{V_d^\theta} \quad \text{and} \quad \frac{\pi_{dd}}{\pi_{do}} = \frac{(V_d c_{do})^\theta}{V_o^\theta}$$

Hence, if $c_{od} = c_{do}$

$$\frac{\pi_{oo}}{\pi_{od}} \frac{\pi_{dd}}{\pi_{do}} = (c_{od})^{2\theta} \Rightarrow c_{od} = \left(\frac{\pi_{oo}}{\pi_{od}} \frac{\pi_{dd}}{\pi_{do}} \right)^{\frac{1}{2\theta}}$$

(Head-Ries index for migration)

Model Use 1: Measurement



Richer countries have lower migration costs - but what are these costs?

- Policy Relevant: Credit market failure
- Policy Irrelevant (?): don't like to leave home

Outline

Simple Model: Wage Aggregates

If ϵ is a productivity shock ($wage_{iod} = \omega_d h_o \epsilon_{id}$), then

$$\overline{wage}_{od} = \omega_d \pi_{od}^{-\frac{1}{\theta}} h_o = \left(\frac{c_{od}}{\alpha_d r_d} \right) \Phi_o^{\frac{1}{\theta}} h_o$$

$$\Rightarrow \frac{\overline{wage}_{od}}{\overline{wage}_{od'}} = \left(\frac{c_{od}/c_{od'}}{\alpha_d r_d / \alpha_{d'} r'_d} \right)$$

Note that ω_d does not occur. A rise in ω_d:

- Increases wages for those already in d
- Leads to in migration of lower ϵ_d people.
- Fréchet implies these balance

No wage gaps within origin if $c_{od} = 1 \forall d$ and $\alpha_d r_d = \alpha_{d'} r_{d'}$

Model Use 2: Interpretation - What explains spatial wage gaps?

By destination

1. Migration costs $c_{od} \neq 0$
2. Compensating differentials $\alpha_d r_d \neq \alpha_{d'} r_{d'}$
3. Relative educational access
   - $\overline{wage}_d \uparrow$ if c_{od} high for low skill origins

$\rightarrow$ NOT: relative productivity

Model Use 2: Interpretation - What explains spatial wage gaps?

Table: Consumption, Public goods, Crime, and Pollution By Density

	Q1	Q2	Q3	Q4
Private consumption				
Finished roof	0.41	0.5	0.67	0.88
Child stunted (low height for age)	0.4	0.4	0.38	0.29
Public goods				
Electricity grid	0.39	0.42	0.48	0.72
Health clinic	0.59	0.58	0.62	0.73
Electricity grid	0.39	0.42	0.48	0.72
Health clinic	0.59	0.58	0.62	0.73
Crime				
Property crime	0.28	0.31	0.31	0.33
Feel unsafe	0.37	0.39	0.38	0.45
Air pollution				
PM2.5	19.45	20.24	18.55	18.15

Source: Gollin et al. 2021

→ Are we left with migration frictions and human capital?

Outline

General Equilibrium: Endogenous Prices

For prediction and policy we have to say how prices change

- Prediction: e.g., GE will matter for climate predictions
- Policy: e.g., efficiency depends on how markets work

Typical assumptions (examples)

- $w_d = A_d$, $A_d = \bar{A}_d L_d^{\gamma}$ (competitive market, with externality)
- $r_d = B_d$, $B_d = \bar{B}_d L_d^{\lambda}$ (competitive markets, with congestion)
- Should also specify how c_{od} comes about, and also α_d

Could really choose anything ... but

- Tractability: model must work!
- Measureability: how do i estimate γ?
- Interpretability: What do spacial wage differences represent?

Aside Model Use 2: Interpretation - What Explains Cities?

Cities are a result of

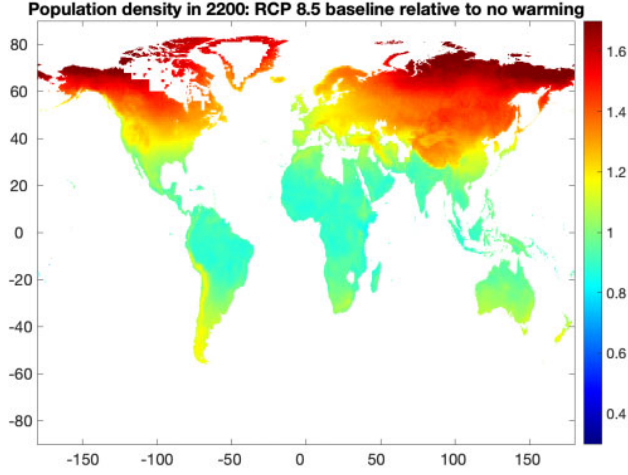
- Spatial variation in baseline productivity ($\bar{A}_d$), and/or
- Agglomeration externalities $\gamma > 1$

But only if

- Migration costs are not too high, and
- Congestion costs are not too high (λ small) otherwise amenities low
- Both are, to my mind, migration constraints

Note, wage gaps and small cities have the same explanations ...

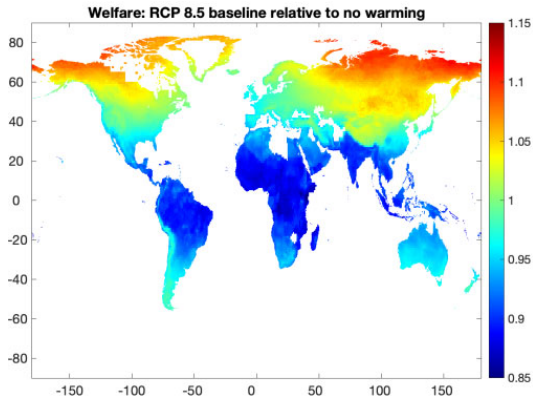
Model Use 3: Prediction (positive)



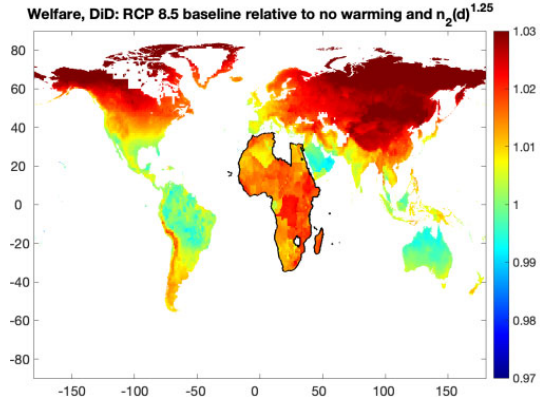
Cruz and Rossi-Hansberg 2024

Model Use 3: Prediction (normative)

Baseline Cost to Leave Africa



Higher Cost to Leave Africa



Cruz and Rossi-Hansberg 2024

Model Use 3: Calibration

Predicting the impact of climate change is important and hard

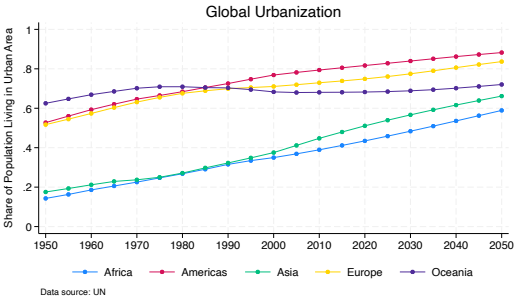
- Simplifying is necessary
- E.g., parameters like γ taken from developed countries
- E.g., labor markets assumed to be competitive

But, if these are wrong, it will affect the results

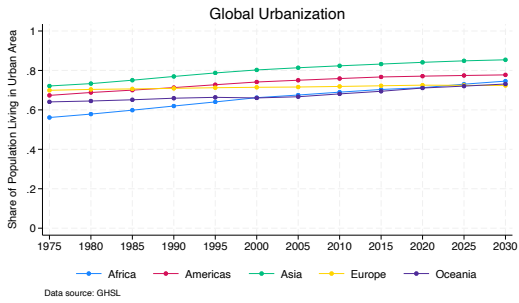
- Both positive, and normative

Model Use 3: Density Impact on Productivity

Country Definitions



Density Threshold (GHSL)

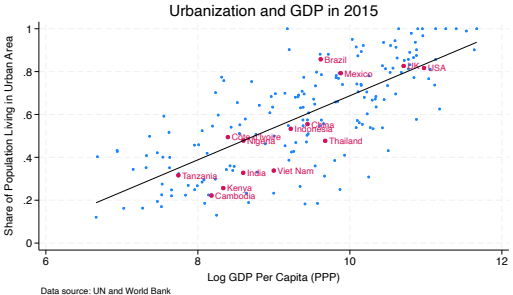


Very different narrative:

- Urbanization is coming, we must prepare and it could be great
- Urbanization has happened ...

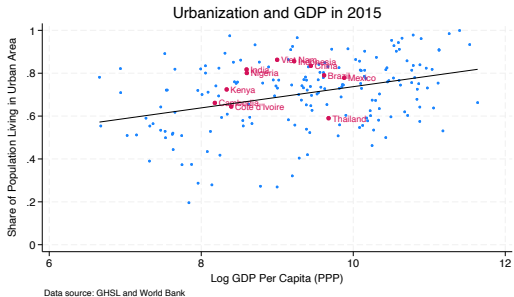
Model Use 3: Density Impact on Productivity

Country Definitions



Data source: UN and World Bank

Density Threshold (GHSL)



Data source: GHSL and World Bank

Model Use 3: Density Impact on Productivity

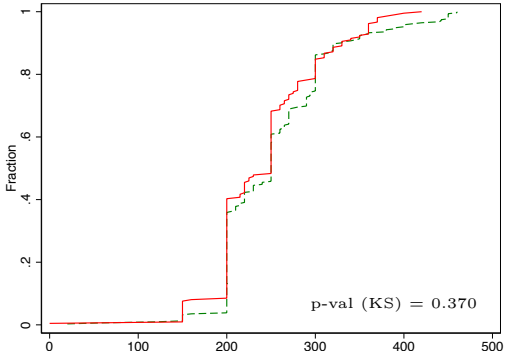
What must we account for?

- Developing world has cities (it is urban by density)
- Has larger urban rural gaps
- But its cities are far less productive

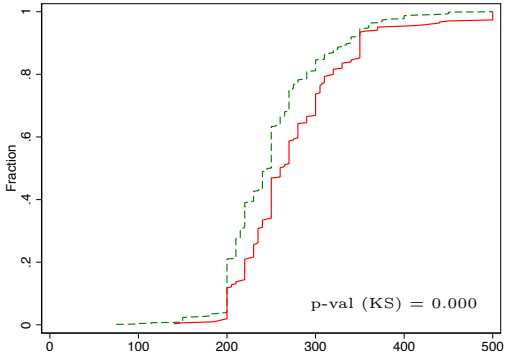
Many possible explanations

- Is γ lower in the developing world?
- E.g., informality means smaller effective density?
- How does this affect predictions?

Model Use 3: Competitive Markets?



(1A) Wage - Lean



(1B) Wage - Semi-peak

Labor markets do not appear to be competitive ... Breza et al. 2021

Model Use 3: Summary

Models are important

- They must simplify

But, we need to do more to understand whether these simplifications matter

- Data collection/experimentation (development economics)
- Spatial modelling and simulation (urban economics)

Outline

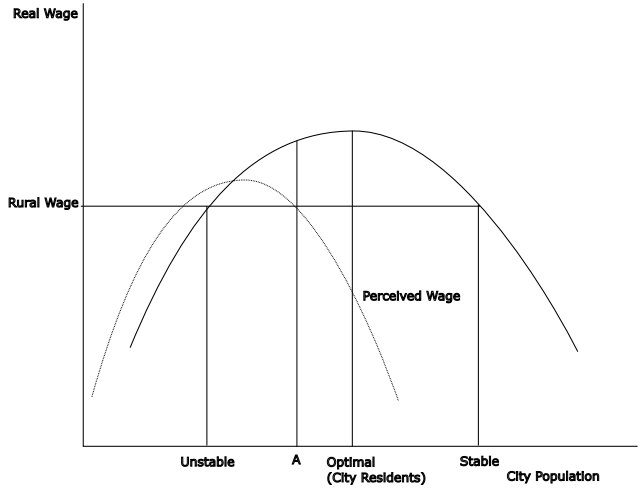
Measurement: Migration Costs

Interpretation: Spatial Gaps

Prediction: Migration and Climate Change

Policy: To Much Migration?

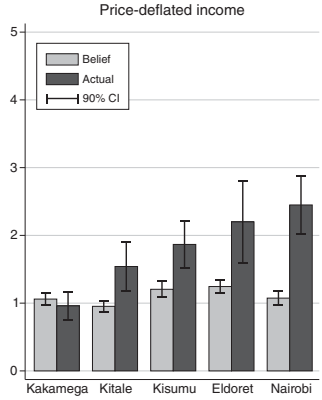
Model Use 4: Policy - Too much migration?

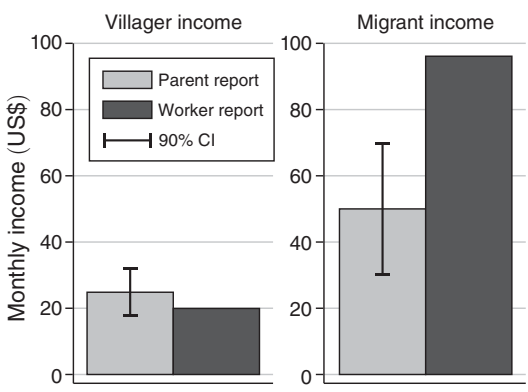


Source: Duranton and Puga 2004

→ Theory of the second best complicates policy

Model Use 4: Policy - Too much migration?





Source: Baseler 2023

→ Is this enough to say cities are too small?

Conclusions

Understanding migration is important to understand key development questions

- What will happen with climate change?
- What explains spatial inequality?
- Should there be more small cities?

Spatial models are essential to answering these questions

- No reduced form approach will tell us about climate!

But, development countries are characterized by market frictions

- We need more work that combines
- In country, data intensive measurement of frictions (development economics)
- With spatial models (urban economics)