

# Unequal Global Convergence

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# Convergence: **Known** and **Unknown**

- **What we know:**
  - Last 30 years: Economic Convergence *between* countries (Patel, Subramanian, Sandefur 2021)
  - Poorer nations have caught-up with the more affluent nations
  - Sparse evidence on no convergence *within* countries (exceptions USA, UK)

# Convergence: **Known** and **Unknown**

## ■ **What we know:**

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## ■ **What we don't know:**

- Q1: What is the evolution of **convergence within countries**?
- Is economic growth concentrated in a few regions?
- Q2: What is the role of **structural change**?

# This Paper

- **New dataset** on sub-national GDP & sectoral composition
- **Three Facts** on the Evolution of Convergence
  - #1: Within-Country convergence ↓ for the average country
  - #2: Role of structural change → services
  - #3: Services employment is spatially concentrated
- **Theory**: A spatial model of structural change
  - Consistent with the facts
  - Helps us understand the role of services

## Contributions to the Literature

- Increase in spatial income disparities known for the U.S.  
Gleaser and Gyourko (2006), Ganong and Shoag (2017), Giannone (2017), Eckert, Ganapati and Walsh (2020)
  - Evidence for 34 countries across the world
  - Data: GDP, education, & empl. at the subnat. level
- Structural Transformation and space  
Caselli and Coleman (2001), Eeckert and Peters (2018), Peters and Zilibotti (2022), Budí-Ors and Pijoan-Mas (2022)
  - Role of services for spatial inequality
  - Feedback effect: Growth  $\Leftrightarrow$  Spatial Inequality

# Data

- Sub-national GDP (in international \$):
  - Sub-national units: States or Cities
  - At the State or Province level: 34 Countries
    - A balanced panel: 1980–2017
    - An unbalanced panel from 1960s
    - Years of schooling
    - GDP and Employment by Sector
  - City-level data from The Economist
    - 200 Countries (inc. 19 African Countries), 2004-2019
    - GDP and Population

# Constructing State Level Sub-national GDP

- Gennaioli et. al. (2012) have 80+ Countries
- At least one obs. in each decade 1980, 1990, 2000, 2010, 2015
- This leaves us with 34 countries and 678 sub-national regions

	World	Asia	Europe	N. Am	S. Am	Africa
GDP	80%	75%	78%	100%	75%	24%
Population	65%	77%	62%	90%	77%	14%
N	34	6	16	3	5	3

## Fact 1: A Stall in Within Country Convergence

- Evolution of Convergence between states within countries
- For each country  $c$  at time  $t_0$ :

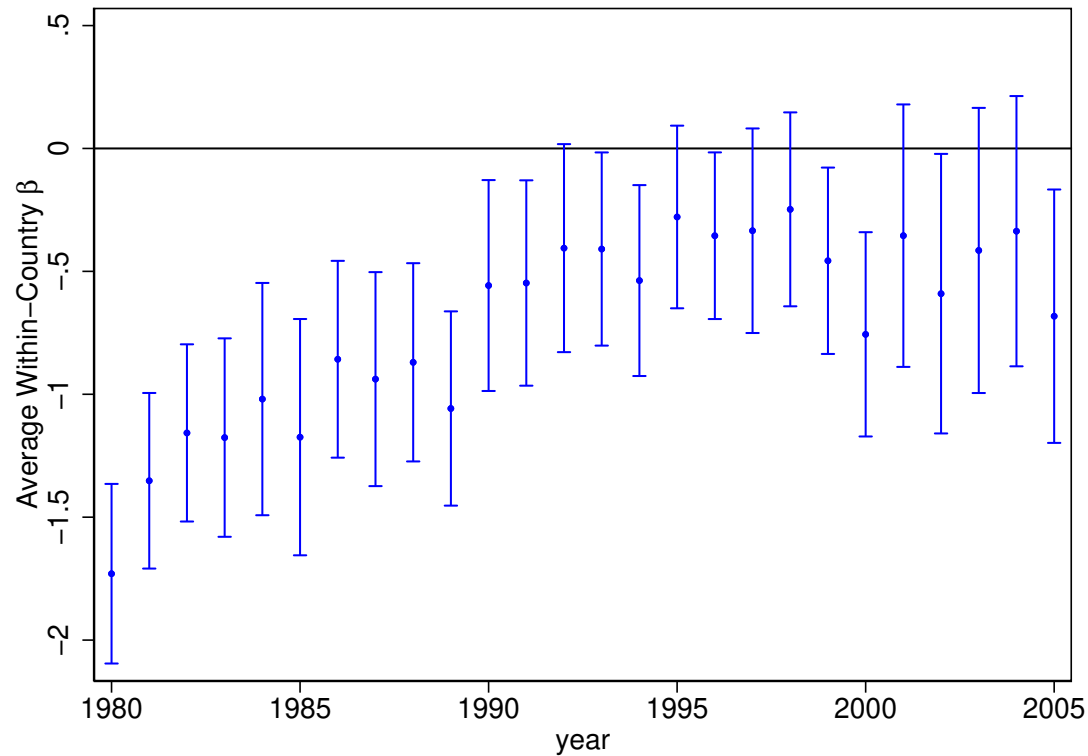
$$\text{Growth GDPpc}_s = \alpha + \beta_c \log \text{GDPpc}_s^{t_0} + \epsilon_s$$

- $s$  = States, Provinces
- Avg. within-country convergence rate:  $\overline{\beta_c} = \frac{\sum_c \beta_c}{N}$
- **Q1:** Within-country convergence on average  $\implies \overline{\beta_c} < 0$



# Fact 1: A Stall in Within Country Convergence

- Q1: Globally, is growth broad-based or concentrated?

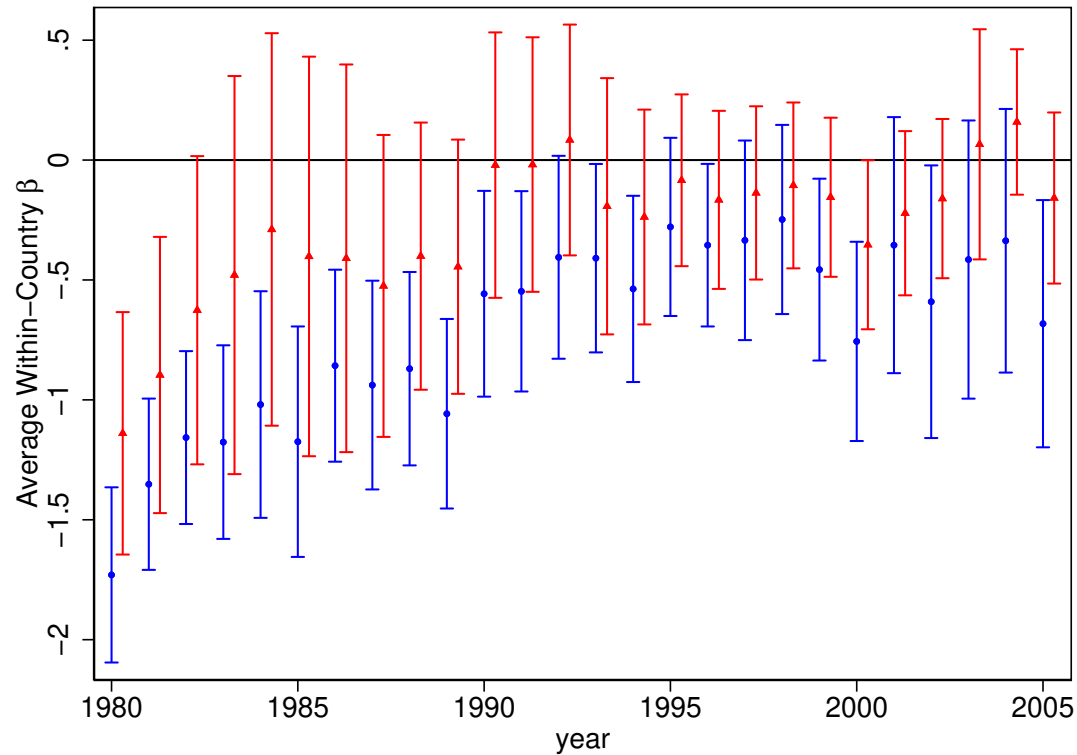


Average within-country  $\beta$  for 34 countries.

Blue: Unweighted Convergence Regressions

# Fact 1: A Stall in Within Country Convergence

- Q1: Globally, is growth broad-based or concentrated?



Average within-country  $\beta$  for 34 countries.

Blue: Unweighted Convergence Regressions

Red: Population Weighted Convergence Regressions

## Fact 1: A Stall in Within Country Convergence

- True for a large fraction of countries
- Compared to 1980s, 19/34 countries had a lower  $\beta$  post-2007

$$1980 \beta < 2007 \beta$$

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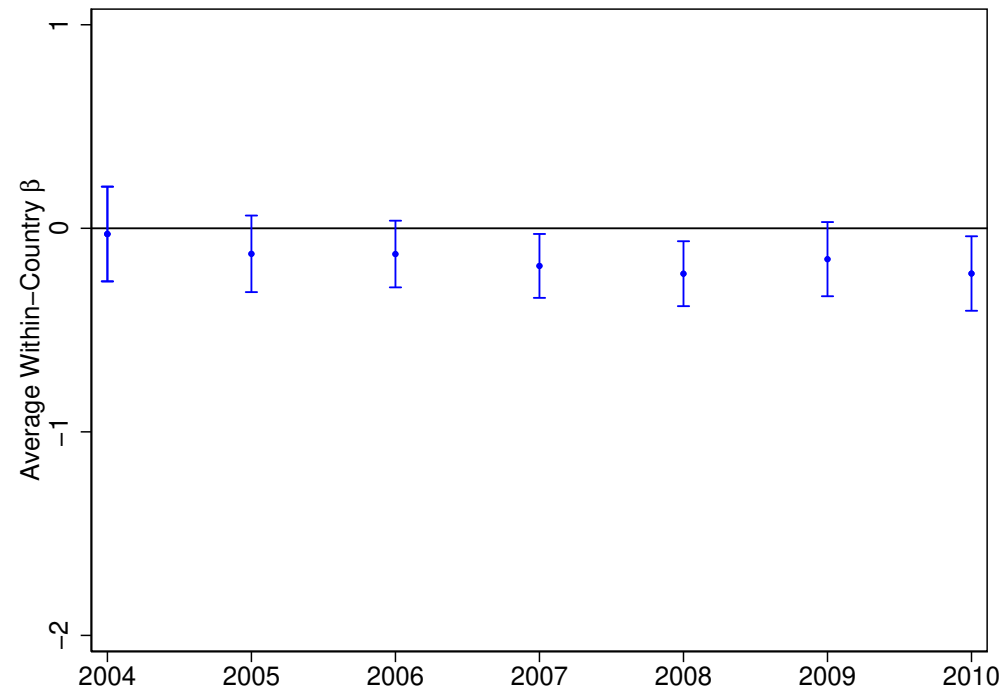
Share of countries	56%
Share of GDP	77.1%
Share of population	69.0%

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## Fact 1: A Stall in Within Country Convergence

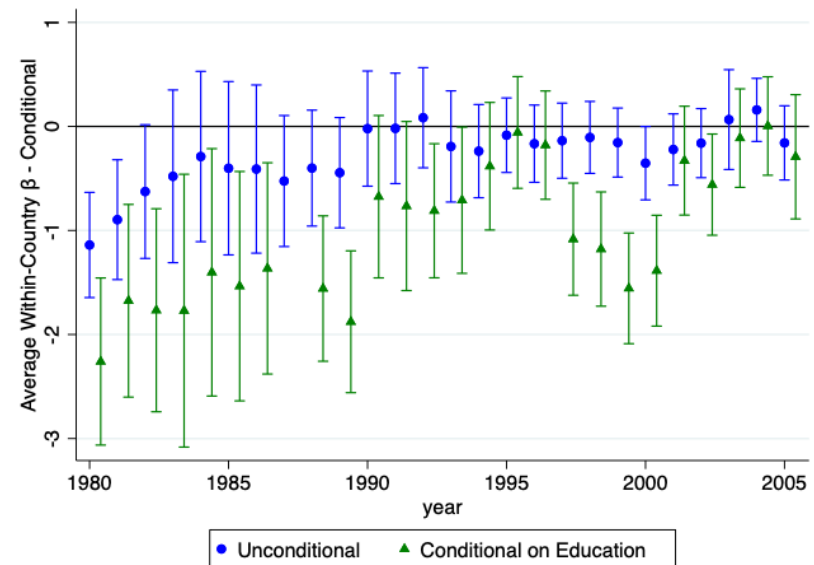
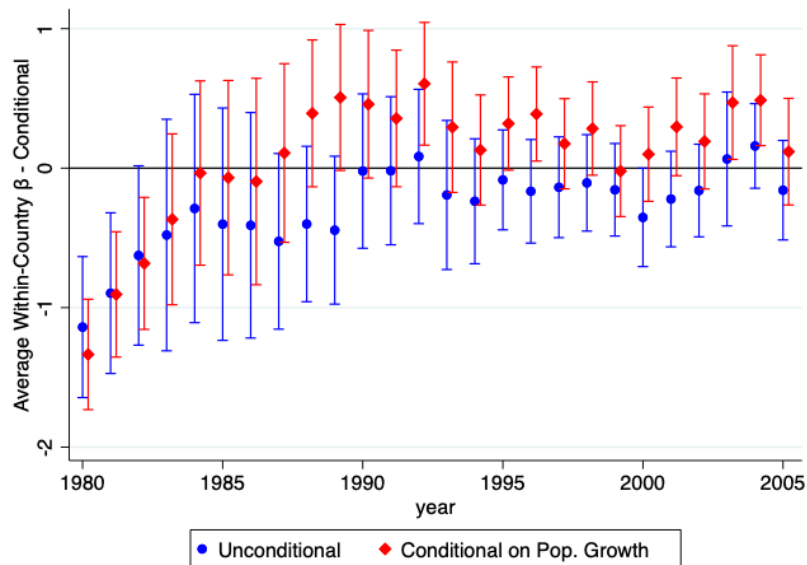
- Convergence b/w Cities within a country
- This figure includes Sub-Saharan Africa



Notes: This figure reports the average  $\beta$  within-country for all the cities in our sample that include the majority of Sub-Saharan Africa as well.

# Fact 1: A Stall in Within Country Convergence

## ■ Conditional Convergence on Population Growth and Education

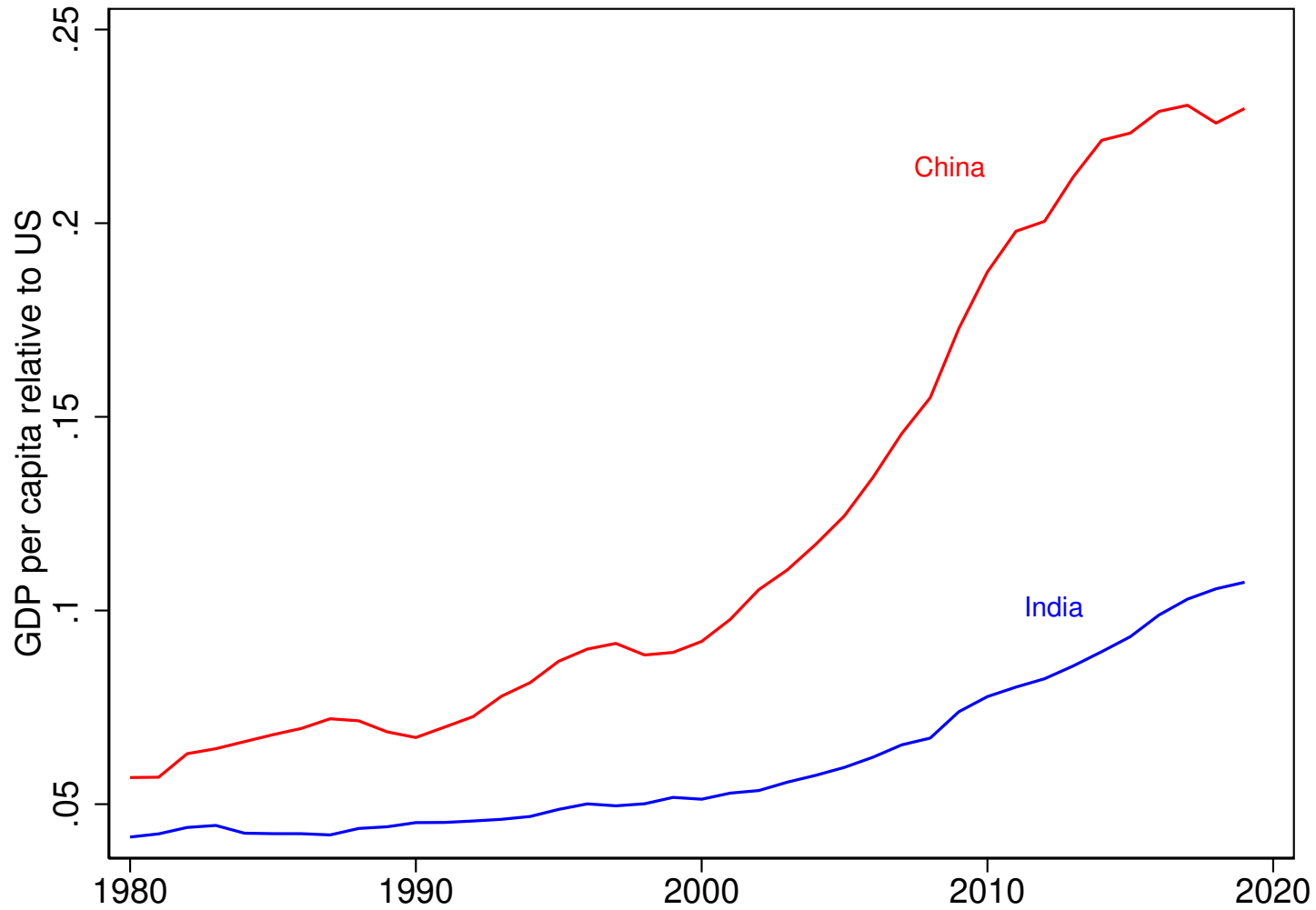


Notes: This figure reports the average  $\beta$  within-country after conditioning for population growth (left) and education (right) for all the countries in our sample.

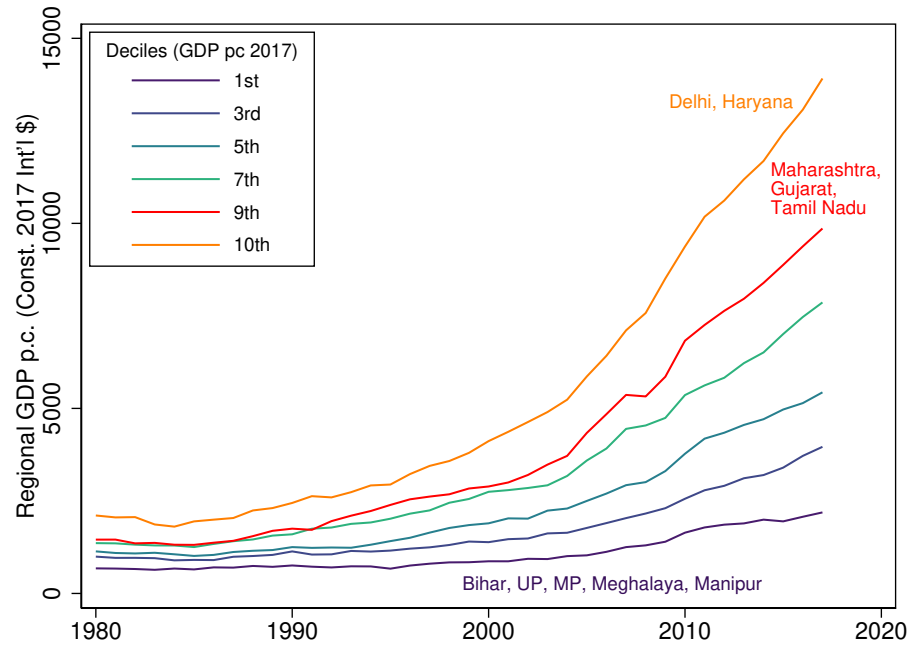
# Robustness & Heterogeneity

- Robustness
  - Excluding India and China →
  - Accounting for regional price differentials →
  - Nightlights →
- Heterogeneity by OECD status and country size →

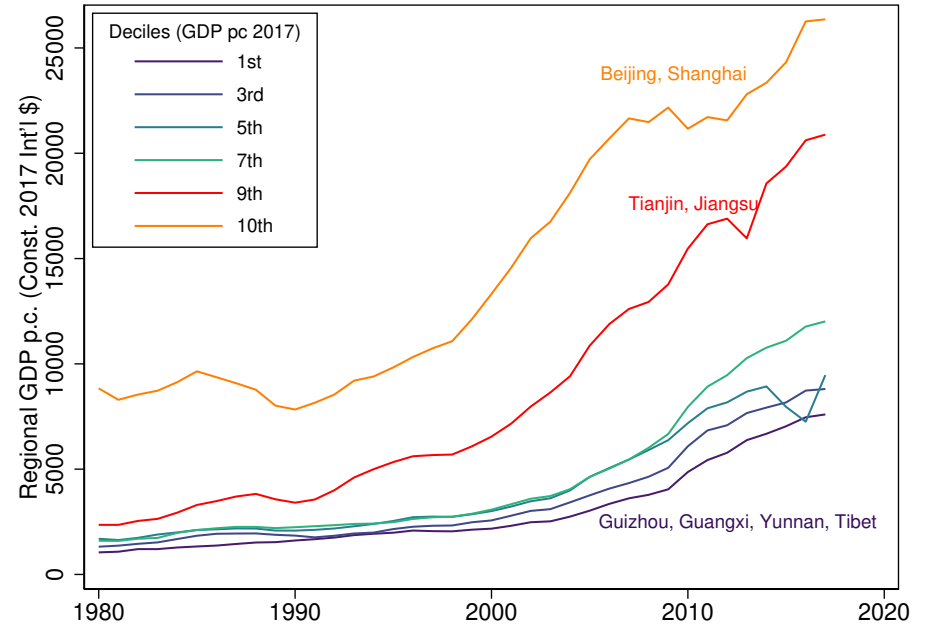
# Story of India or China catching up with the US



# What has happened within India and China?



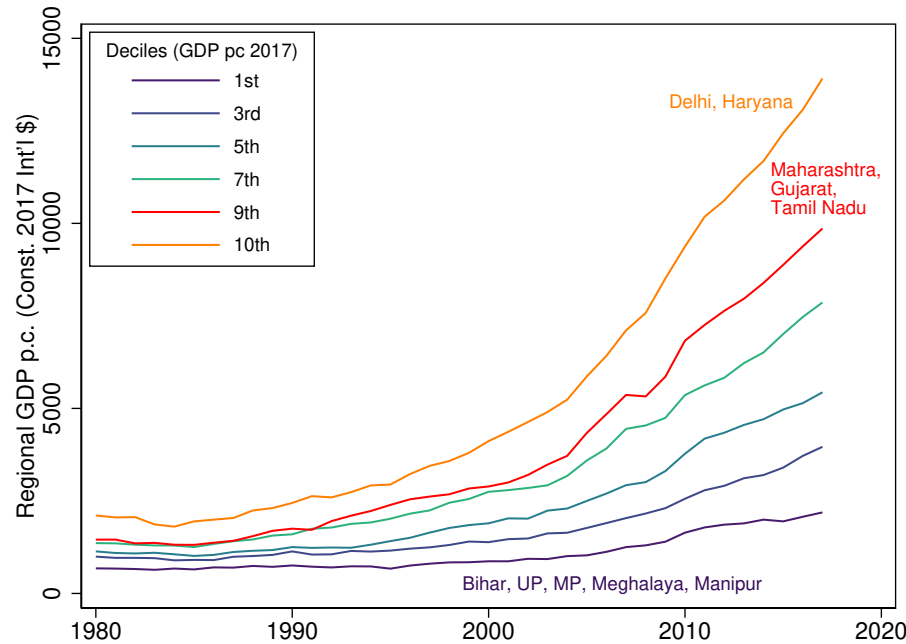
India



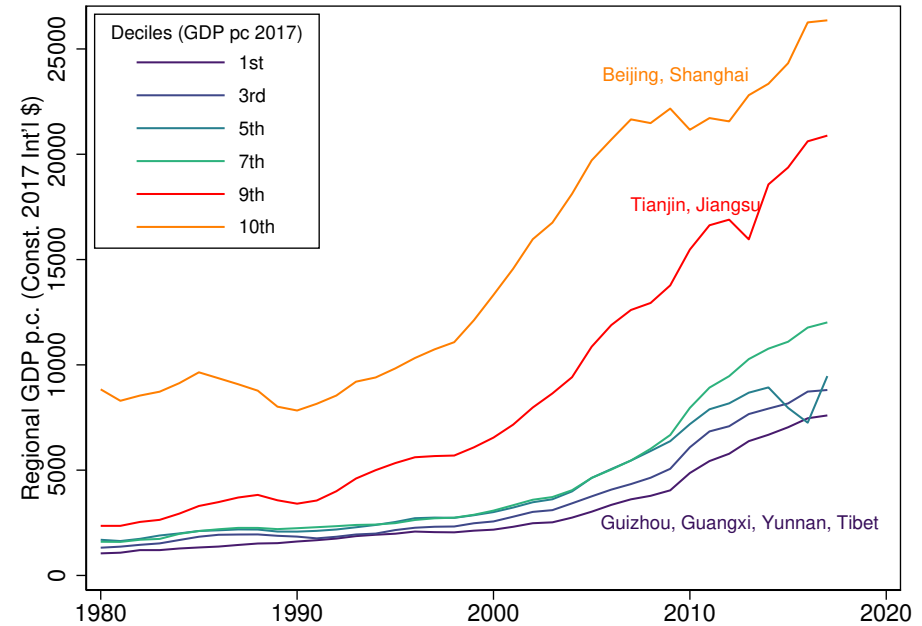
China



# What has happened within India and China?



India



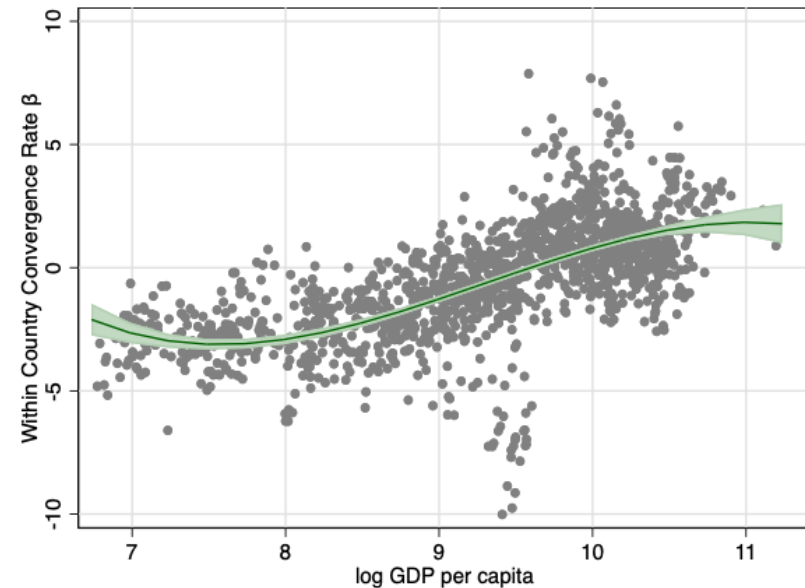
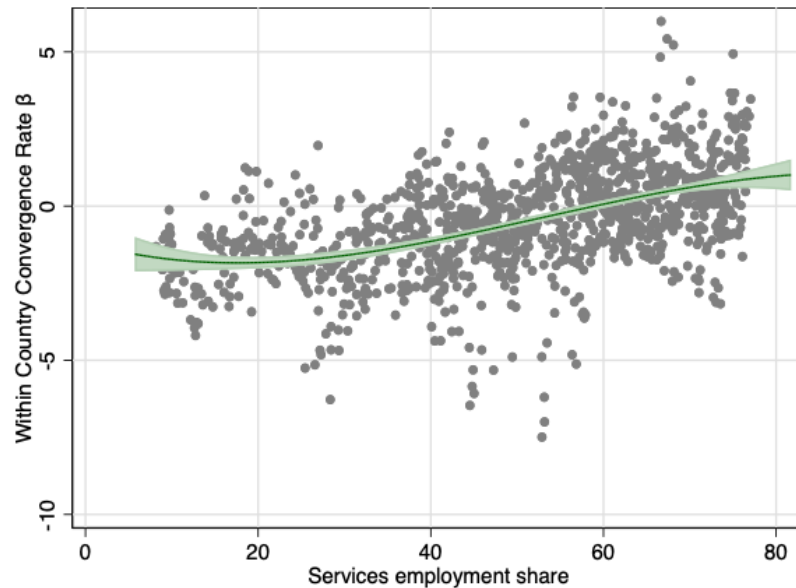
China

## Employment Concentration in the Top 2 Decile Regions

	India		China	
	1980	2009	1980	2000
Services	33.11	33.68	24.23	26.08
Prof., Business	39.35	46.98	24.17	32.30
Manufacturing	27.26	19.49	31.45	31.54

## Fact 2: Structural Transformation & Convergence

- Q2: What is the role of structural change towards services?



Notes: Population weighted beta vs services employment share (left) and log GDP per capita (right) for the unbalanced panel. Estimates are residualized off country fixed effects. The green line shows the evolution of the average country.

## Fact 2: Structural Transformation & Convergence

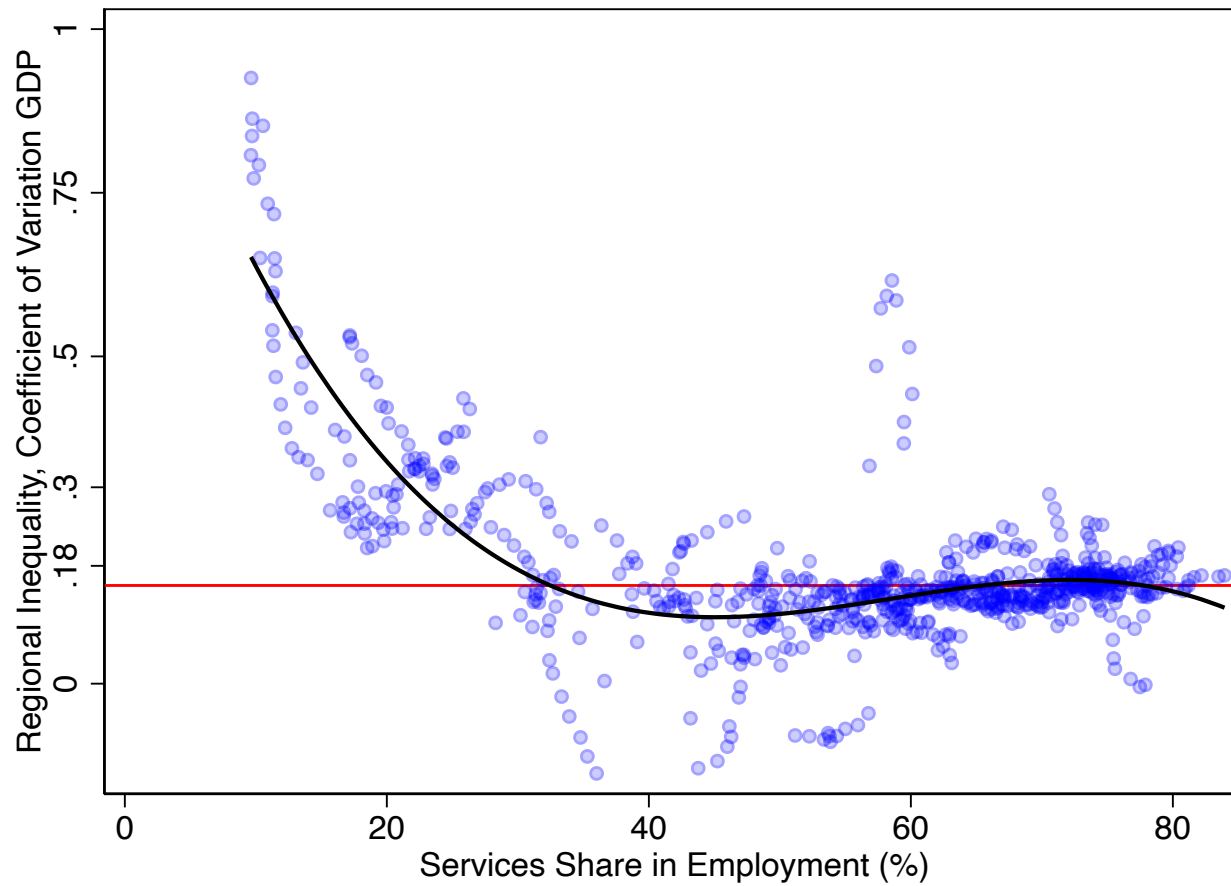
- Q2: What is the role of structural change towards services?

Dependent Variable:	Within-country $\beta_{ct}$			
	(1)	(2)	(3)	(4)
log GDP pc	1.80 (0.40)***			
Employment Shares				
Agriculture		-4.96 (1.74)***		
Manufacturing			-6.99 (3.80)*	-3.85 (3.06)
Services				6.24 (1.55)***
Country FE	✓	✓	✓	✓
N	980	980	980	980
$R^2$	0.30	0.32	0.30	0.37

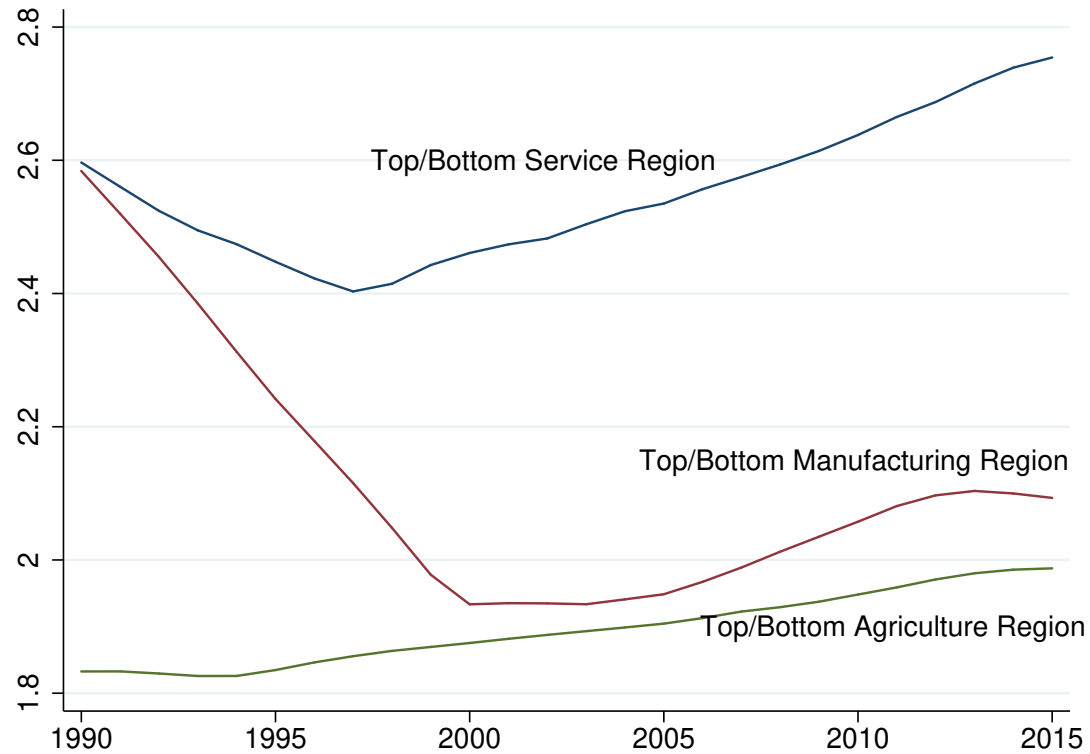
Notes: Data from the unbalanced panel. Standard Errors clustered at country-level reported in parenthesis. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

# A fall in Inequality with Structural Transformation

- Regional inequality has not ended



## Fact 3: Regional Concentration of Services



- Suggestive evidence of "agglomeration" economies with services compared to manufacturing and agriculture

# Beyond Services: Determinants of Regional Conv.

## Cross-Country relationships

Dependent Variable:	Within-country $\beta_{ct}$				
	(1)	(2)	(3)	(4)	(5)
Service Employment Share	2.09 (2.58)*	5.18 (2.58)*	7.90 (3.79)*	7.93 (3.62)**	7.42 (3.87)*
Growth Services Productivity		44.49 (15.39)***	40.32 (15.42)***	40.54 (16.98)**	40.92 (17.26)**
Road density			-43.23 (41.08)	-43.50 (39.73)	-51.59 (44.22)
Avg. FTAs				0.08 (1.30)	0.23 (1.54)
Years of Education					0.08 (0.26)
Polity IV Score					0.02 (0.07)
Year FE	✓	✓	✓	✓	✓
$N$	314	314	299	299	299
$R^2$	0.17	0.21	0.23	0.23	0.34

Notes: Data from the unbalanced panel. Standard Errors clustered at country-level reported in parenthesis. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

# A Model of Structural Transformation and Geography

- Structural Change (**Canonical**):
  - Three sectors  $i$ : agriculture  $a$ , manufacturing  $m$  and services  $s$
  - Subsistence level of agriculture:  $\bar{c}_a$
- Spatial Equilibrium Model (**Canonical**):
  - Worker mobility across regions
  - Economy has  $J$  regions
- Structural Change+Economic Geography:
  - Key: A higher agglomeration force  $\delta$  in Services

# A Model of Structural Transformation and Geography

- Consumption

- Workers consume a bundle of the three sectors

- $$C_j = C_{s,j}^\gamma C_{m,j}^{1-\gamma-\beta} (C_{a,j} - \bar{c}_a)^\beta$$

- Workers have idiosyncratic taste shocks with shape parameter  $\nu$

- Decide where to locate and consume

- Choose a location to maximize utility

- $$U_{i,j} = \max_{j'} \max_C \log C_{j'} + \nu \mu_{i,j'}$$



# A Model of Structural Transformation and Geography

- Production

- Linear:  $Y_i = A_i N_i$ ,  $N$  : Labor,  $i = a, m, s$

- Productivity Process:

- $A_{ijt} = e^{g_i} A_{ijt-1}$ , for  $i = a, m$

- $A_{sjt} = e^{g_s} A_{ijt-1} N_{sjt}^\delta$

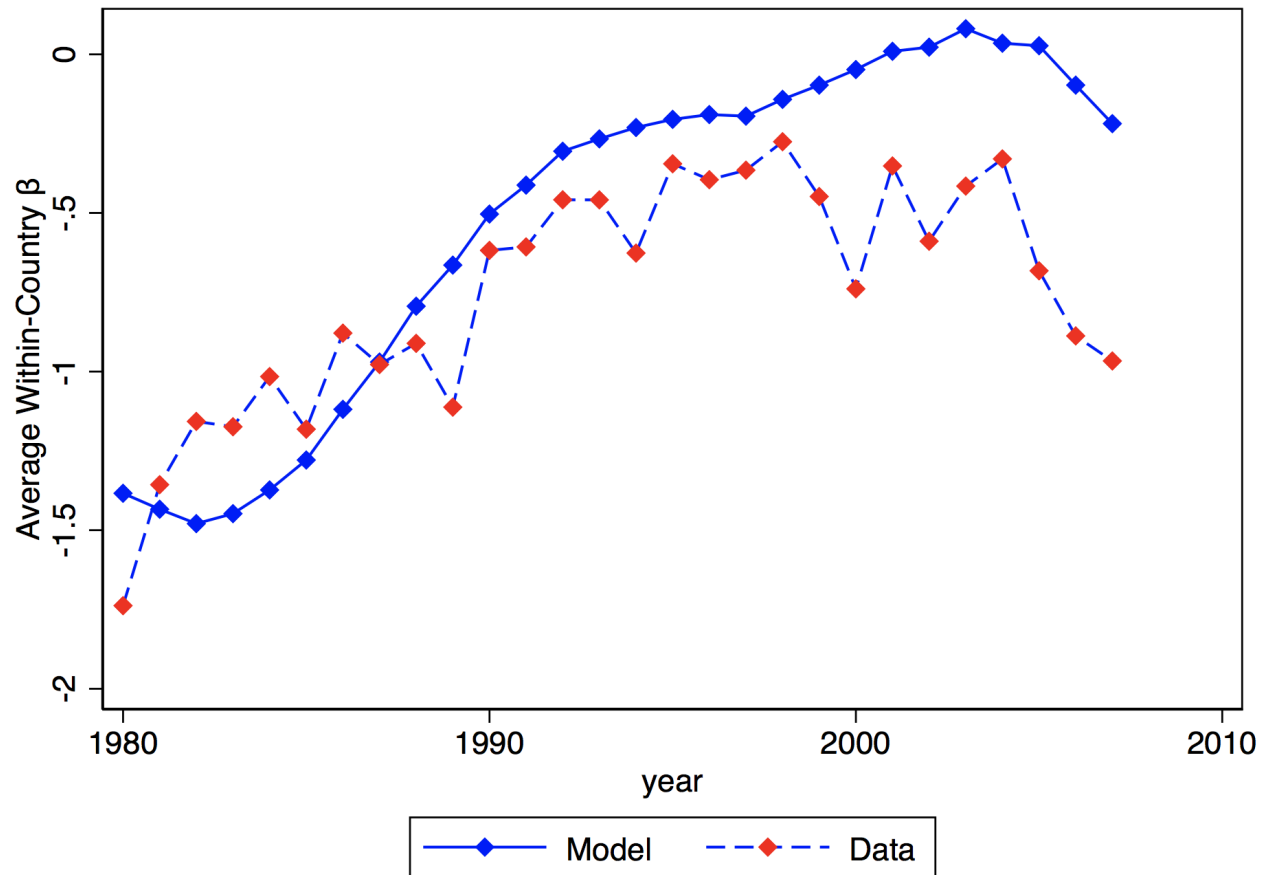
## Calibration - Preliminary

- Calibrate for the average/representative country
- To build this representative country
  - Divide regions within each country into 3 groups by GDP per capita
  - Regions: Top, Middle, and Bottom
  - Cross-country average of GDP pc, Employment by sector for each group
- The representative country with 3 regions matches Fact 1

# Calibration - Preliminary

- 8 Parameters:
  - Initial sectoral productivity and growth rate  $A_i, g_i$
  - Agglomeration in Services  $\delta$
  - Subsistence consumption level in Agriculture
- Target 21 moments
  - Regional Sectoral Employment Share (9)
  - National Sectoral Employment Share (2)
  - Change in National Sectoral Employment Share (3)
  - Convergence Rate  $\beta$  for every 5th year (7)
- Sectoral consumption shares &  $\nu$  set equal to literature

# Model Matches Data on $\beta$ convergence



## Key Insights of the Simulation

- Agglomeration Force: High, Low
- #1: Regional Convergence falls when agglomeration is high
- #2: Faster aggregate structural transformation towards services

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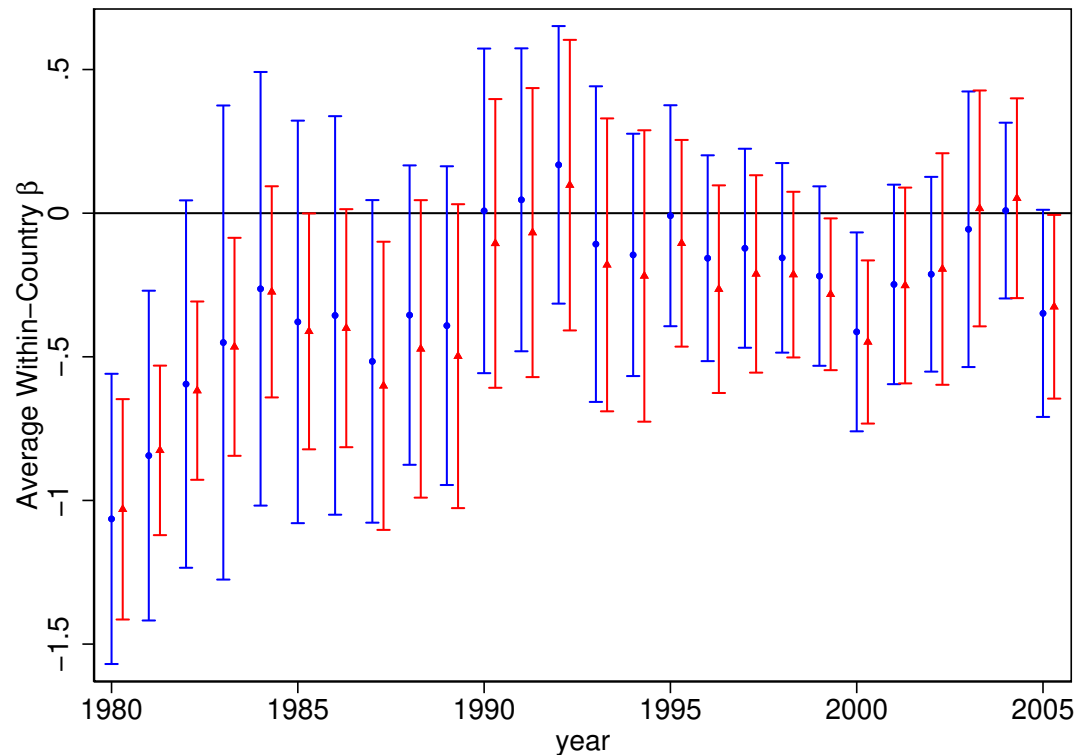
	Baseline High	No agglomeration Low
$\% \Delta \beta$ convergence 1980-2007	78	53
Variance of service share 2007	0.1	0.02
$\% \Delta$ services share 1980-2007	29	26

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# Conclusions and Current Work

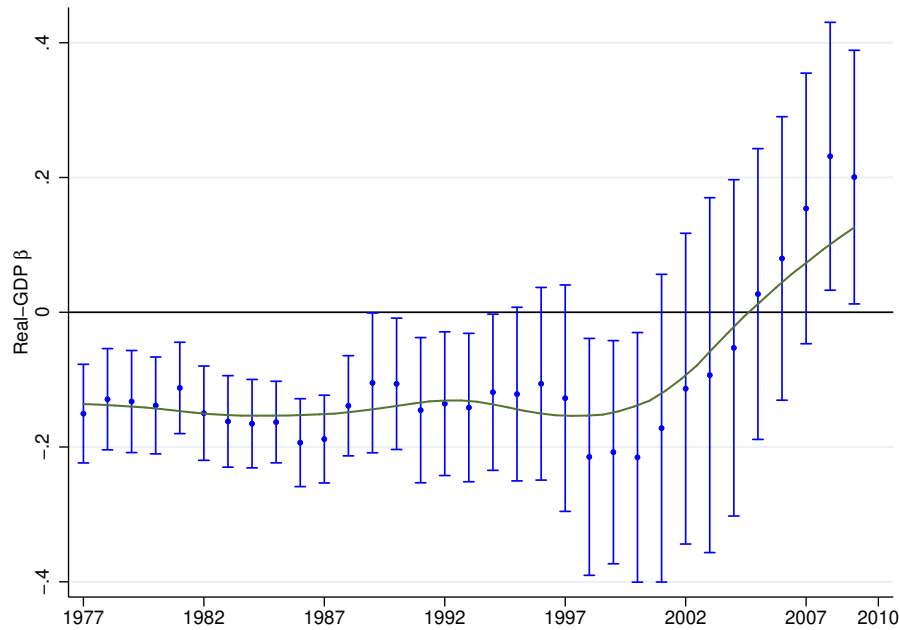
- Q1: Globally, is growth broad-based or concentrated?
  - Concentrated
    - Corollary: Is India catching up with the U.S. or Mumbai with NYC?  
Mumbai with NYC
- Q2: What is the role of structural change towards services?
  - Stalling convergence in spatial inequality
  - Feedback effect: Growth  $\Leftrightarrow$  Spatial Inequality
- On-going work:
  - Improving dataset – regional prices, employment.
  - Improving model calibration.

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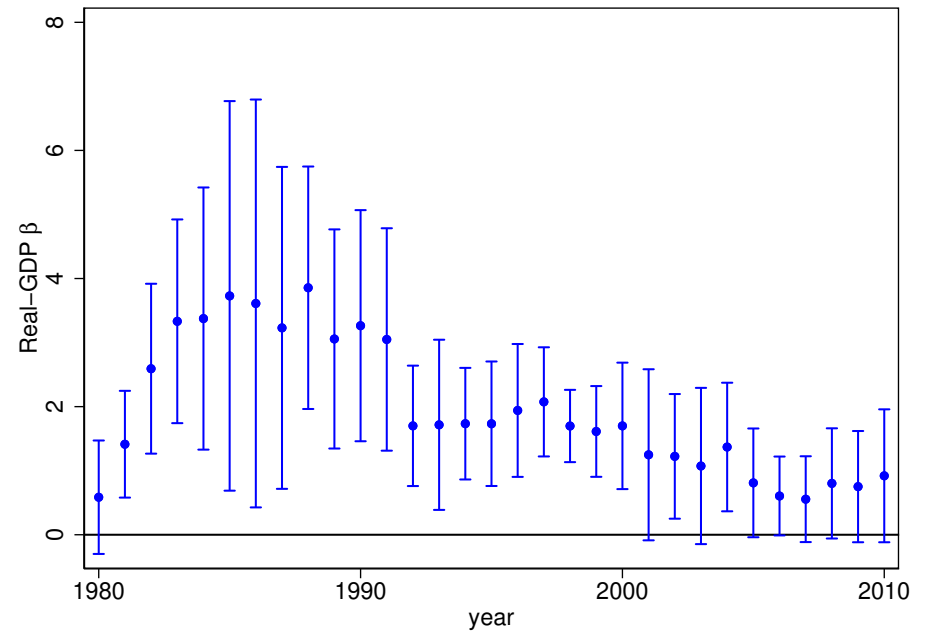


Notes: This figure reports the average  $\beta$  within-country Convergence for the 32 countries in our sample between 1980 and 2015 excluding India and China from the full sample.

# Fact 1: A Stall in Within Country Convergence



(a) United States

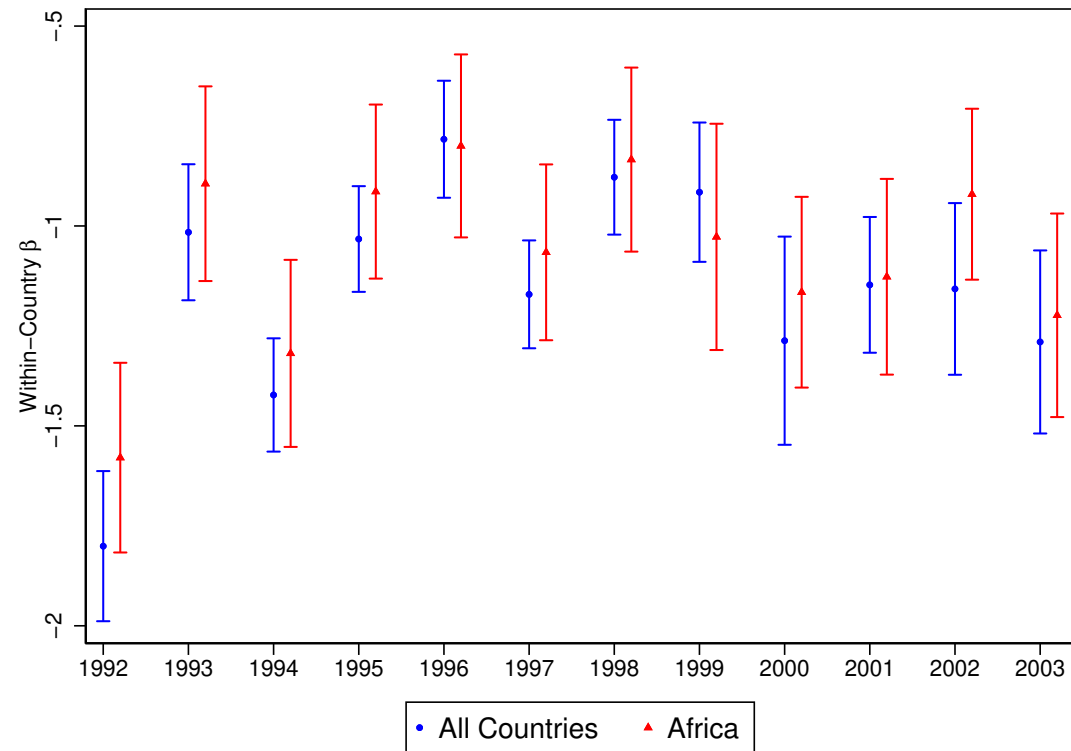


(b) India

This figure reports the within-country  $\beta$ -convergence rates using Real GDP per capita.

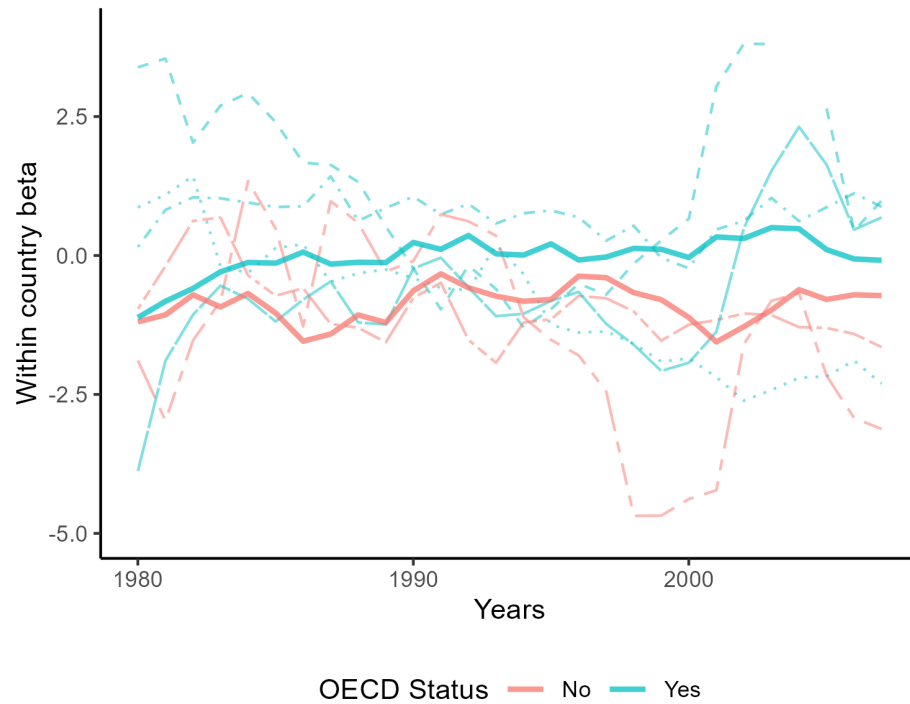


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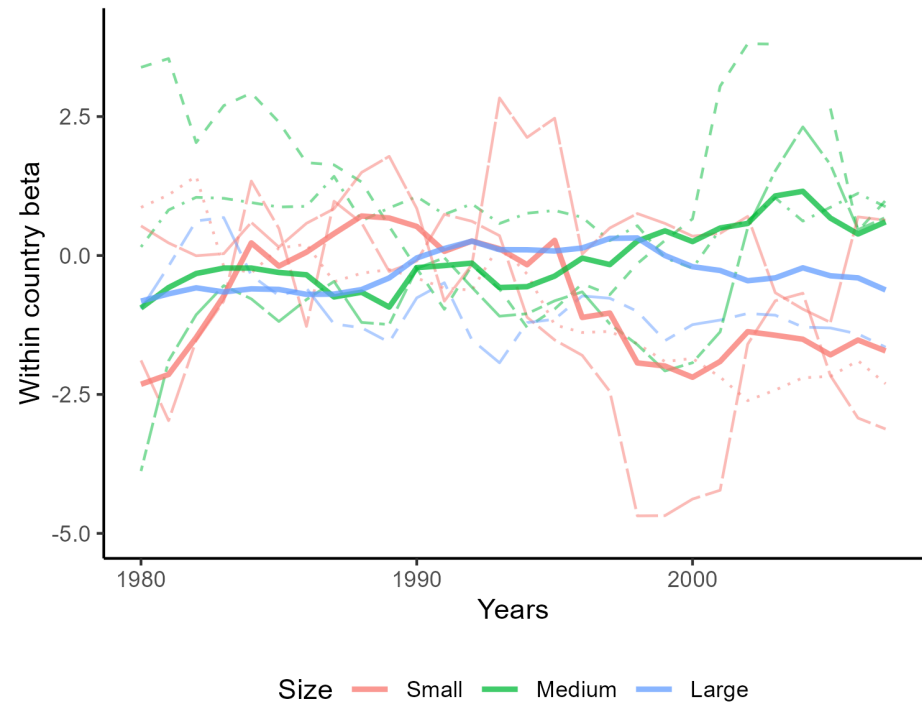


Back

# Fact 1: A Stall in Within Country Convergence



(a) OECD Status



(b) Size (Population) of Countries