Urban-Biased Growth: A Macroeconomic Analysis

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Motivation

Large literature on *skill bias* in recent wage growth

- Macro-explanation: capital-skill complimentarity + declining equipment prices

  Krusell, Ohanian, Ríos-Rull, and Violante (2000) or *KORV*

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- Systematically faster wage growth in cities with higher population density

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- Urban-rural political polarization, house price explosion, regional inequality

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We present empirical evidence and theory to explain the source of UBG

- Macro-explanation: input/location choices of large service firms + declining *IT* prices

Paper Overview

1.Empirics

- UBG occurs exclusively in the **Business Services** sector
- *Within* Business Services, large capital-intensive establishments drive UBG

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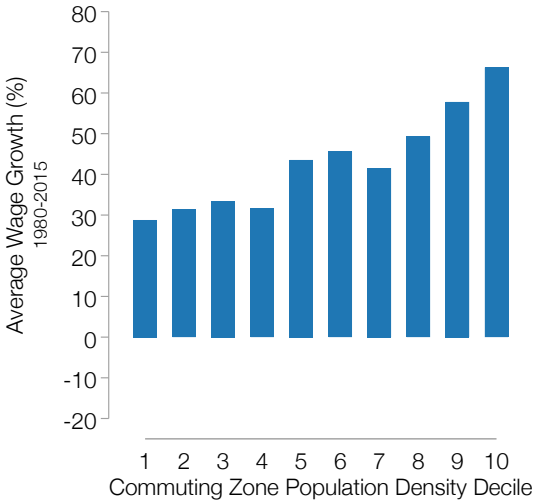
3. (Spatial) Growth Accounting

- Discipline key elasticities using establishment-level investment data
- Observed equipment price decline accounts for 90% of UBG

Empirics

Urban-Biased Growth in the Data



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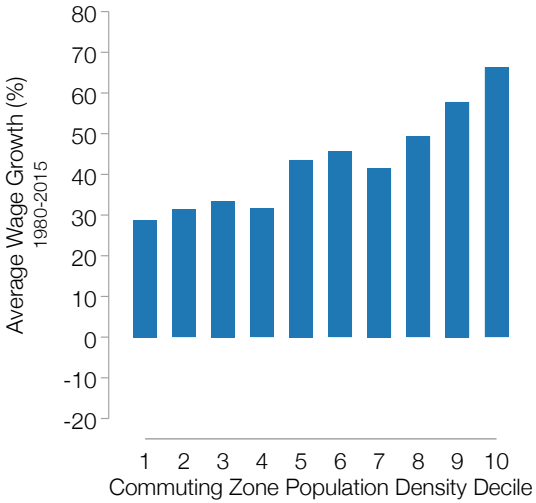
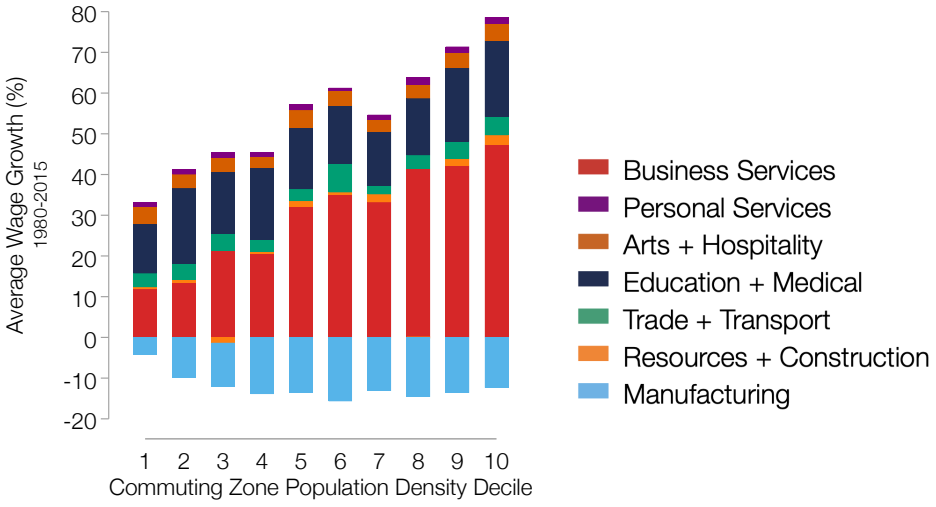


- Avg. wage growth in **high density cities** (New York, Chicago) more than **twice as fast** as low density areas since 1980
- Robust to choice of data set (LBD, QCEW, Census/ACS, …), density measure, and geography (county, commuting zone)
- Urban-biased growth also present in the European data

Business Services is almost entirely responsible



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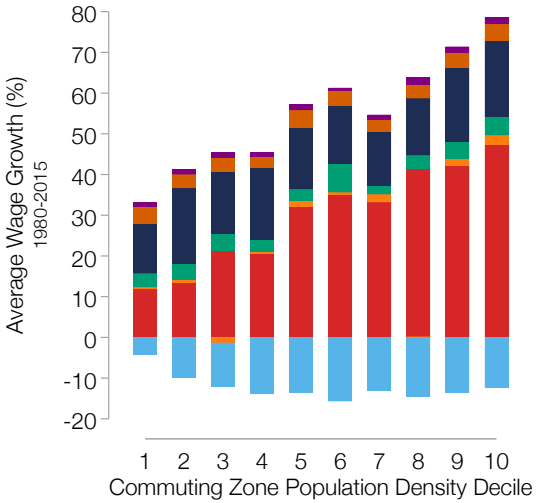

- **Business Services** = Professional Services, Finance, Information, Management, Admin, Real Estate (NAICS 5)
- Wage growth outside is remarkably balanced across space
- Business Services contribution mainly reflects fast wage growth within big cities, not composition changing

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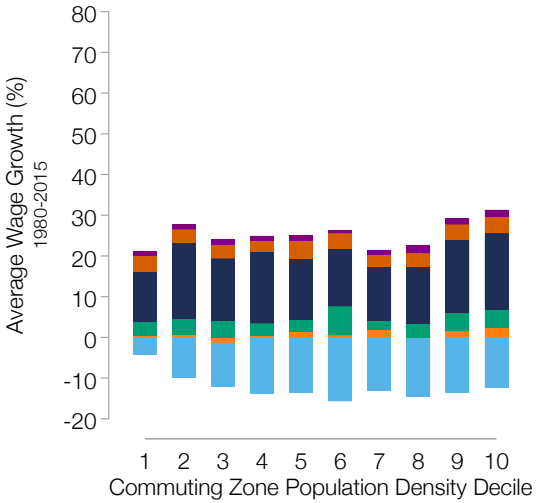

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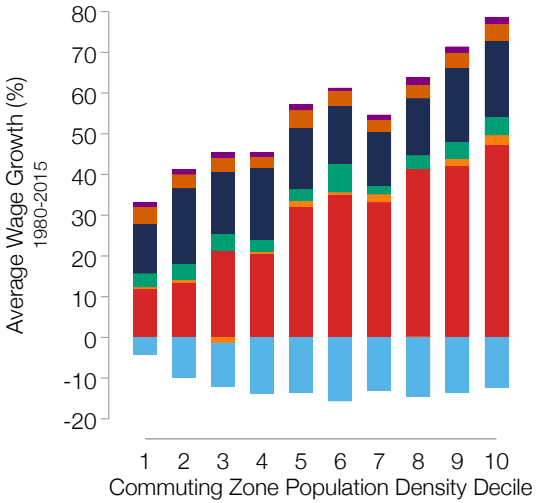

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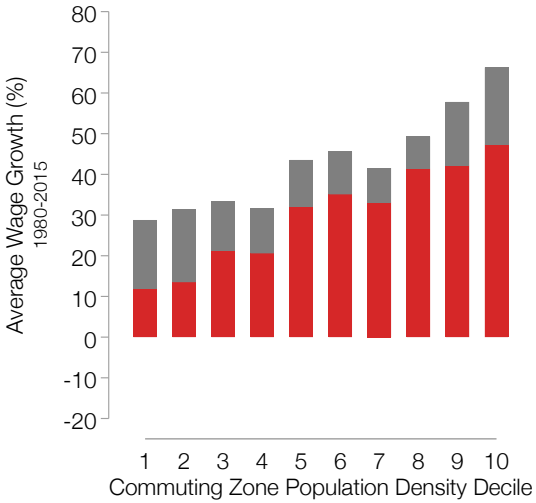

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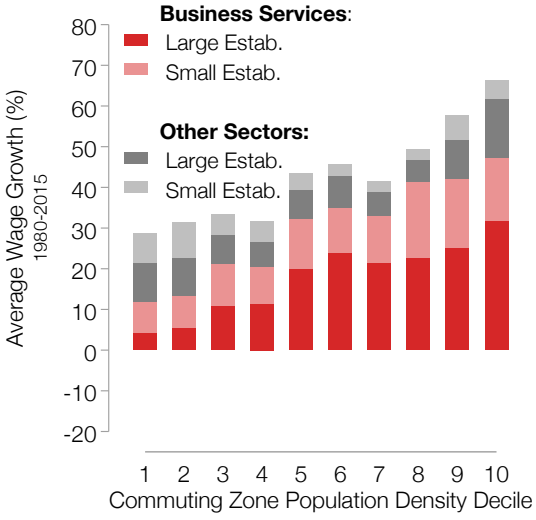
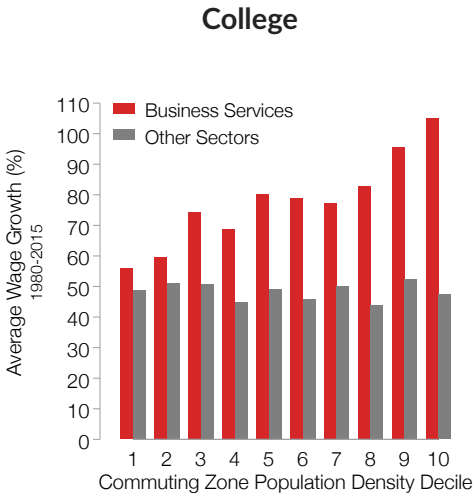
Large establishments within Business Services driving growth

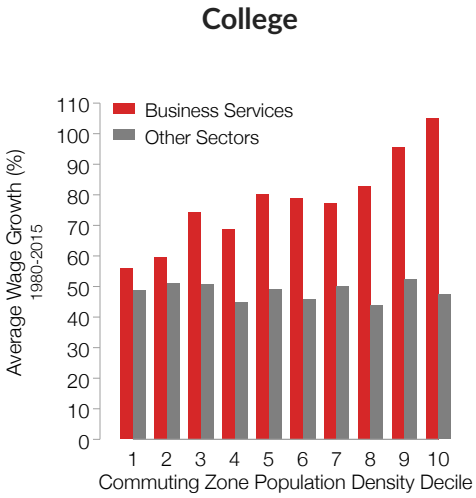


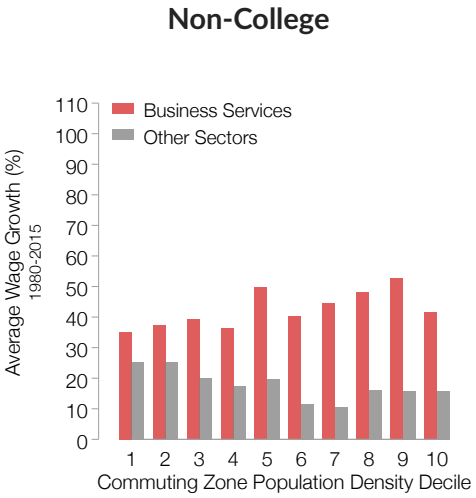
- Large establishments:
  - 200+ employees
  - 50% of aggregate US employment
- Contribution reflects:
  - Size distribution differences (40%)
  - Faster wage growth at large establishments (60%)

No UBG for college workers outside Business Services

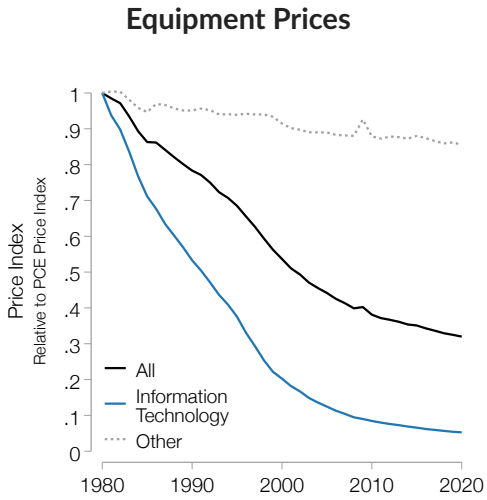


UBG occurs for all Business Services workers, but more for skilled



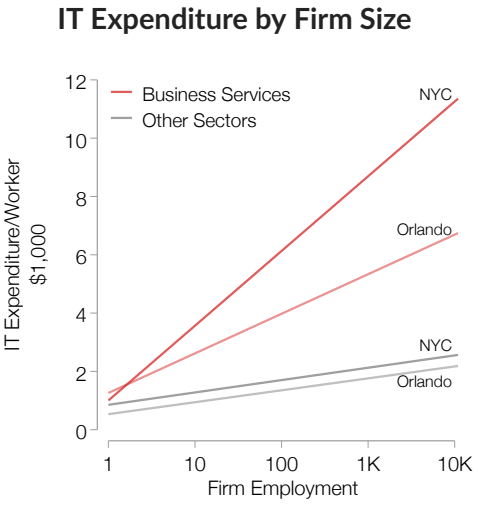


General investment-specific technical change is driven by IT



- Equipment capital price declines dominated by IT price declines (Moore's law)
- Intellectual property prices look similar, driven by software
- IT capital used much more intensively by **Business Services**

Large Business Service estabs in big cities spend most on IT/worker



- IT capital **input choices** differ systematically:
  - For Business Services and Other
  - For large and small firms
  - For large and small cities
- Large establishments more likely to **locate** in large cities, leading to greater exposure

Taking Stock

1. Urban-Biased Growth is mainly occurring in large **Business Services** firms

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Proposed Channel: Large Business Services firms' **input** and **location** choices create big city exposure to declining IT capital prices

Theory

Setup: A General Spatial Growth Model

- Economy with discrete locations ℓ, sectors s, time periods t
  - Locations and sectors differ in productivity, amenities
- Firms produce with capital and labor: $y_i = z_i F_{\ell s}(y_i; k, l)$
  - Allow for non-homotheticity: marginal products vary with scale
  - Competitive fringe of entrants in each location-sector
  - Freely traded final good made up of sectoral intermediates
- Heterogenous workers choose locations and sectors

A simple formula relates wage growth to capital price declines

Urban-Biased Growth and Technical Change

Suppose investment cost of capital p^K falls. The general equilibrium average wage change is:

$$d \log \bar{w}_{\ell s} = -\Lambda_{\ell s} d \log p^K + (1 + \Lambda_{\ell s}) d \log \mathcal{D}_s$$

where

$$\Lambda_{\ell s} := \frac{\text{Discounted Payments to Capital}}{\text{Discounted Payments to Labor}}$$

and $\mathcal{D}_s$ is aggregate sectoral demand.

What Determines Exposure?

- Exposure governed by two forces: **neoclassical** and **scale**
- In more productive places (higher productivity $A_{\ell s}$):

$$\frac{d \log \Lambda_{\ell s}}{d \log A_{\ell s}} = \overbrace{(\sigma_{KL} - 1) \frac{d \log \bar{w}_{\ell s}}{d \log A_{\ell s}}}^{\text{Neoclassical}} + \overbrace{\underbrace{\frac{\partial \log k/l}{\partial \log y} \frac{d \log y}{d \log A_{\ell s}}}_{\text{Non-Homotheticity}} + \underbrace{\theta_{\ell s} \frac{d \log y/A_{\ell s}}{d \log A_{\ell s}}}_{\text{Entry vs. Variable Cost}}}^{\text{Scale}},$$

- Neoclassical: if capital + labor are complements, higher wages lead to lower exposure
- Scale: interaction of non-homothetic input choices and firm size across space

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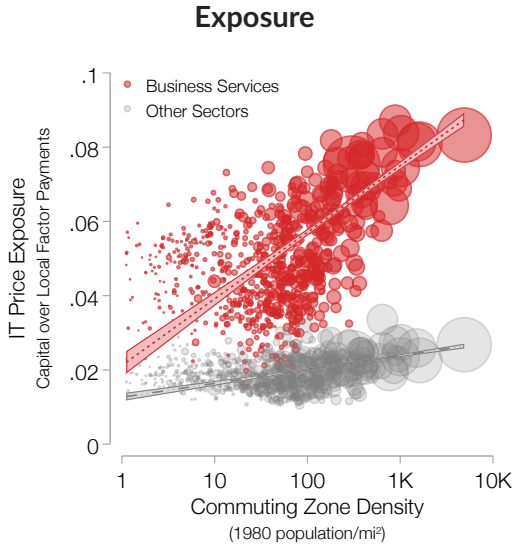
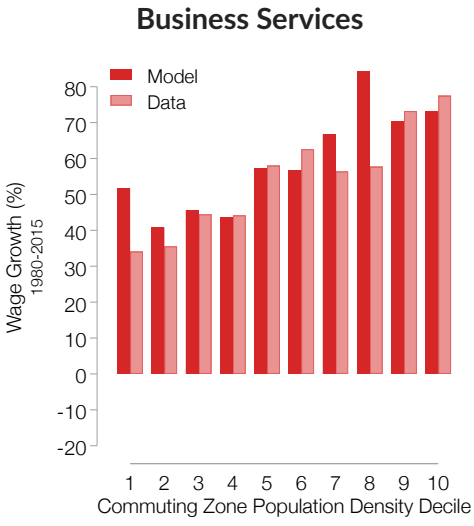
Exposure to the IT price decline across regions and sectors

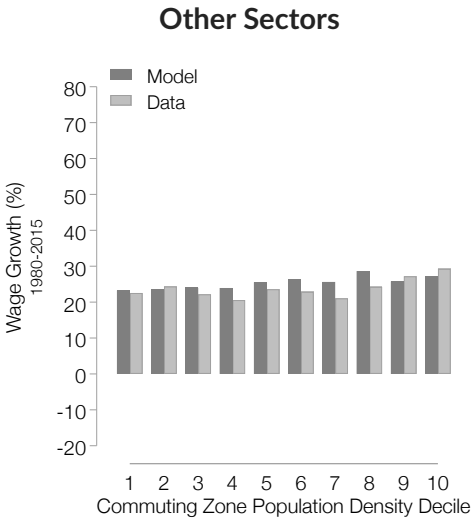


- Slope depends on:
  1. Non-homothetic **input choices**
  2. Firm **location choices** by size
- We additionally match wages and employment across location-sectors by inverting productivity and amenity residuals

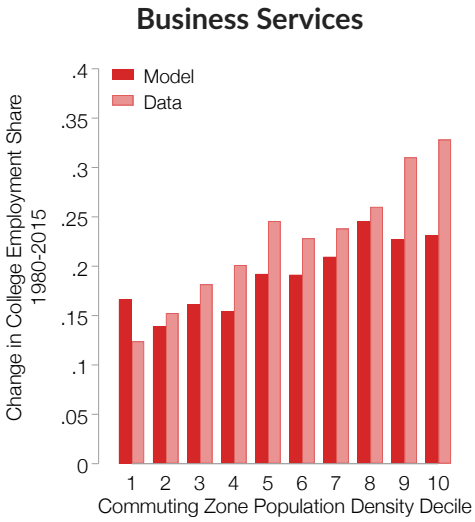
Growth Accounting

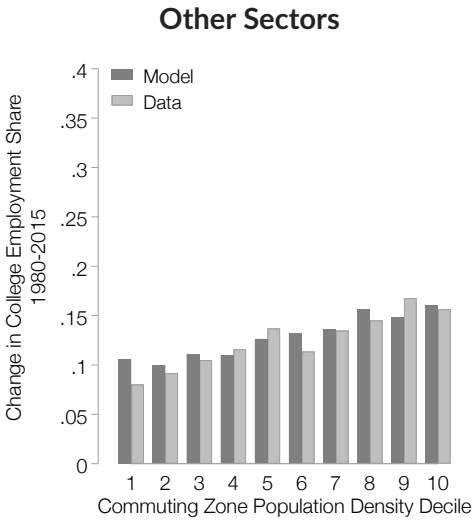
Urban-Biased Wage Growth in the Model





Skill Shifts Across Sectors and Space





Conclusion

- **Urban-biased growth** has been an important force shaping the US economy
- **Business Services** are entirely responsible
- Observed decline in IT prices explains **90% of urban bias**
- This offers a unified perspective on the skill and urban bias in recent growth

Thank You!