Discussion of "The Impact of Commercial Real Estate Regulations on U.S. Output"

Erik Hurst

March 2024

Overview

- **Question**: What are the effects of barriers to building commercial real estate on aggregate welfare?
- **Answer**: Moderately relaxing commercial real estate regulations would increase US output and welfare by about 5% (quite large).
- **Very interesting paper on a very important topic!**
- **Paper is almost certainly correct qualitatively.** Reducing real estate barriers (both commercial and residential) reduce land prices and have been shown in a variety of models/empirical studies to increase aggregate welfare.
- **My main comments touch on the quantitative aspects of the paper.**

Part 1:
Model Overview and Estimation Strategy

Cobb-Douglas Production of Commercial Real Estate

- **Commercial Real Estate Production Function**

$$B_{it}^{N} = z_i m_{it}^{\gamma} x_i^{1-\gamma}$$

New Commercial Buildings in "tract" *i* in period *t*

Cobb-Douglas Production of Commercial Real Estate

- **Commercial Real Estate Production Function**

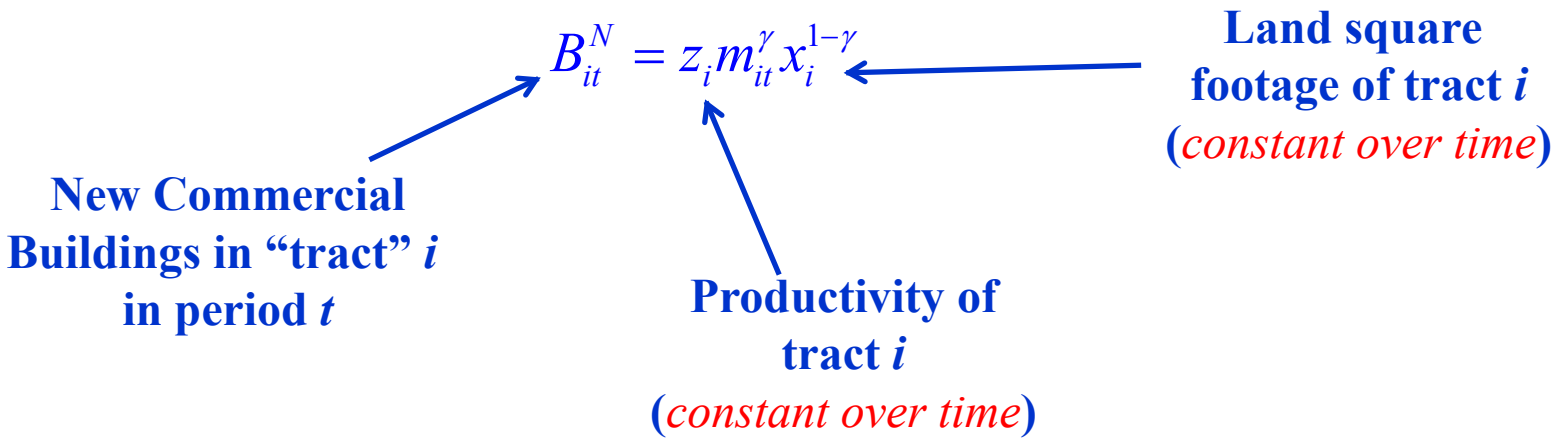
$$B_{it}^{N} = z_i m_{it}^{\gamma} x_i^{1-\gamma}$$

New Commercial Buildings in "tract" *i* in period *t*

Productivity of tract *i* (*constant over time*)

Cobb-Douglas Production of Commercial Real Estate

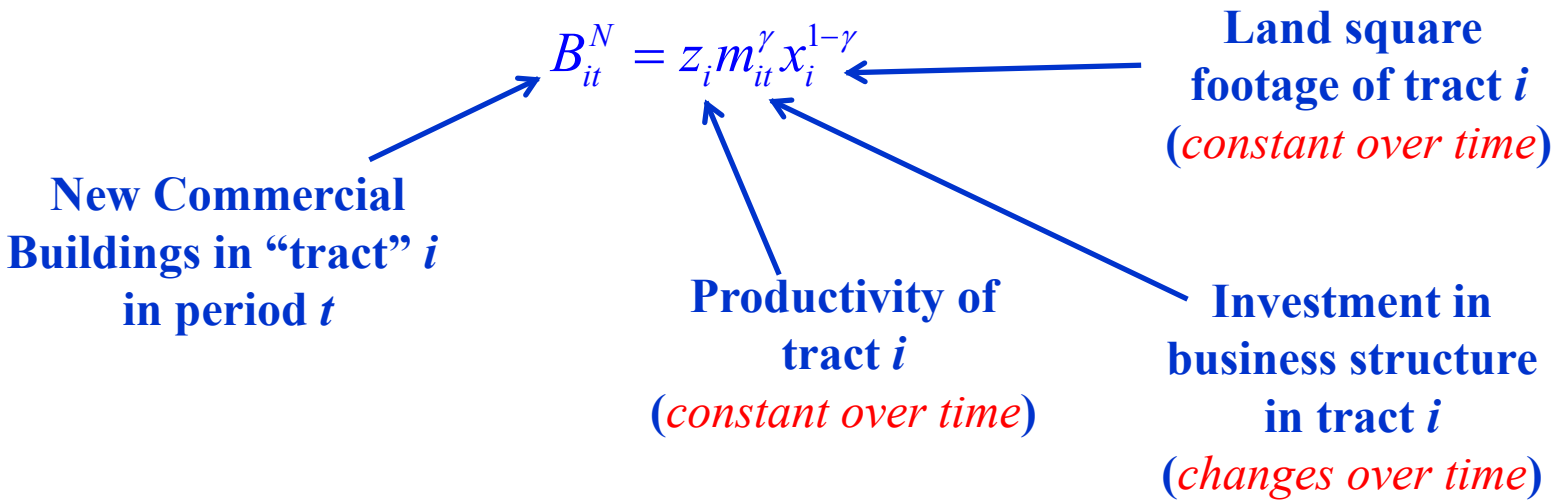
- **Commercial Real Estate Production Function**



- *Each tract i is defined by its fixed productivity (z), its fixed land size (x), and its cost of developing the land (q) (q will be discussed soon)*

Cobb-Douglas Production of Commercial Real Estate

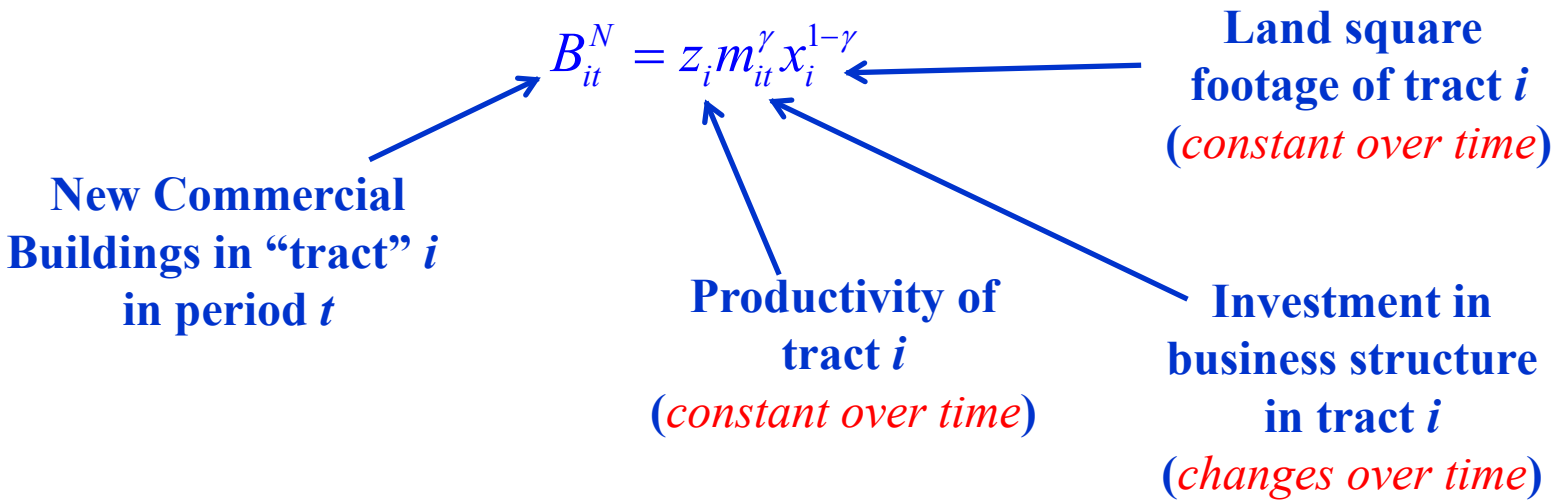
- **Commercial Real Estate Production Function**



- *Developers will endogenously choose the structure (m) that is to be placed on the land.*

Cobb-Douglas Production of Commercial Real Estate

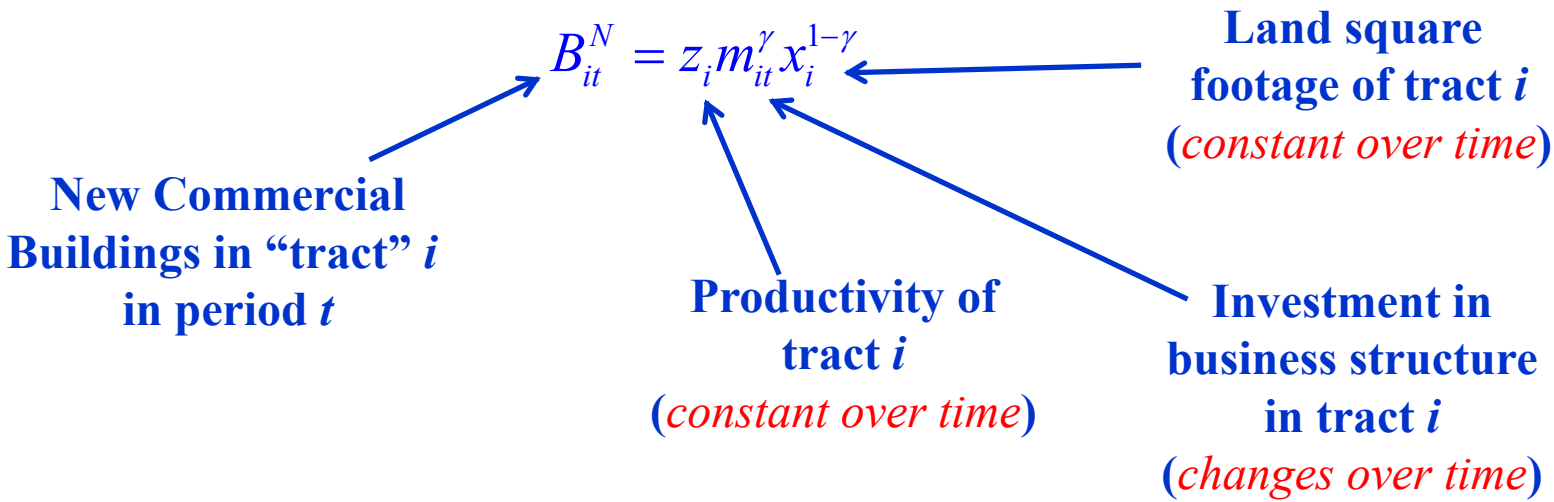
- **Commercial Real Estate Production Function**



- *Note: The Cobb-Douglas production structure will be leveraged heavily in the paper's quantitative work.*

Cobb-Douglas Production of Commercial Real Estate

- **Commercial Real Estate Production Function**



- *Note: The Cobb-Douglas production structure will be leveraged heavily in the paper's quantitative work.*
- *Note: γ – Cobb Douglas exponent - will play a crucial role is estimation.*

Profit Maximizing Developers

$$\max_{m_{it}} \underbrace{p_{jt} z_i m_{it}^{\gamma} x_i^{1-\gamma}}_{\text{Revenue from building}} - \underbrace{\frac{q_i}{\tau_i} m_{it}}_{\text{Cost of buiiding}}$$

Profit Maximizing Developers

$$\max_{m_{it}} \underbrace{p_{jt} z_i m_{it}^{\gamma} x_i^{1-\gamma}}_{\text{Revenue from building}} - \underbrace{\frac{q_i}{\tau_i} m_{it}}_{\text{Cost of builiding}}$$

Price of commercial real estate in entire MSA *j*
(constant across all tracts within city j)

- *Any variation in prices across the tracts within a city are embedded in z_i.*

Profit Maximizing Developers

$$\max_{m_{it}} \underbrace{p_{jt} z_i m_{it}^{\gamma} x_i^{1-\gamma}}_{\text{Revenue from building}} - \underbrace{\frac{q_i}{\tau_i} m_{it}}_{\text{Cost of builiding}}$$

Price of commercial real estate in entire MSA *j*
(constant across all tracts within city j)

Per unit monetary cost of building in tract *i*
(constant over time)

- **Captures track level differences in the difficulty to build or potential differences in construction material costs and labor costs across cities.**

Profit Maximizing Developers

$$\max_{m_{it}} \underbrace{p_{jt} z_i m_{it}^{\gamma} x_i^{1-\gamma}}_{\text{Revenue from building}} - \underbrace{\frac{q_i}{\tau_i} m_{it}}_{\text{Cost of buiilding}}$$

Price of commercial real estate in entire MSA *j* ***(constant across all tracts within city j)***

Commercial Real Estate "Regulations" (*constant over time*)

Per unit monetary cost of building in tract *i* ***(constant over time)***

- **τ proxies for all the non-monetary (hassle) costs that increase cost of building in tract i. These costs proxy for the commercial real estate regulations.**

Profit Maximizing Developers

$$\max_{m_{it}} \underbrace{p_{jt} z_i m_{it}^{\gamma} x_i^{1-\gamma}}_{\text{Revenue from building}} - \underbrace{\frac{q_i}{\tau_i} m_{it}}_{\text{Cost of buiilding}}$$

- **Some Definitions**

TV_{it} = Total value of building inclusive of the land and structure ($p_{jt} B^N_{it}$)
MV_{it} = Total value of structure ($q_{it} m_{it}$)
LV_{it} = Total value of land ($p_{jt} B^N_{it} - q_{it} m_{it}$)

- **First order condition of builder maximization (constant structure value out of total land value):**

$$\gamma \tau_i = \frac{q_i m_{it}}{p_{jt+1} z_i m_{it}^{\gamma} x_i^{1-\gamma}} = \frac{MV_{it}}{TV_{it}}$$

Profit Maximizing Developers

$$\max_{m_{it}} \underbrace{p_{jt} z_i m_{it}^{\gamma} x_i^{1-\gamma}}_{\text{Revenue from building}} - \underbrace{\frac{q_i}{\tau_i} m_{it}}_{\text{Cost of buiilding}}$$

- **Some Definitions**

TV_{it} = Total value of building inclusive of the land and structure ($p_{jt} B^N_{it}$)
MV_{it} = Total value of structure ($q_{it} m_{it}$)
LV_{it} = Total value of land ($p_{jt} B^N_{it}$ - $q_{it} m_{it}$)

- **First order condition of builder maximization (constant structure value out of total land value):**

$$\gamma \tau_i = \frac{q_i m_{it}}{p_{jt+1} z_i m_{it}^{\gamma} x_i^{1-\gamma}} = \frac{MV_{it}(data)}{TV_{it}(data)}$$

Aggregation and Estimation

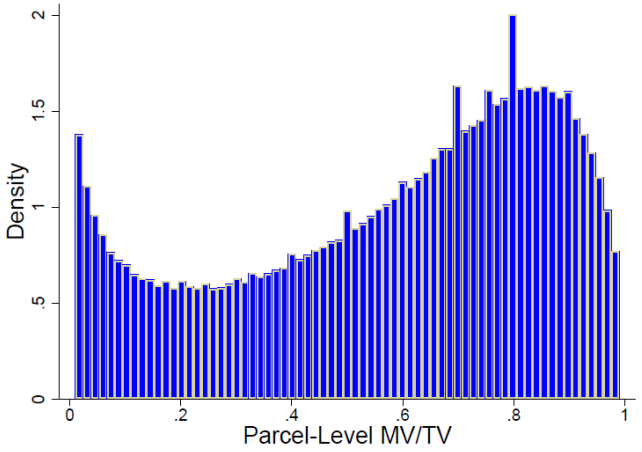
$$\gamma\tau_i = \frac{MV_{it}(data)}{TV_{it}(data)} \qquad \textbf{Tract level}$$

$$\gamma T_j = \frac{\sum_{i \in j} MV_{it}}{\sum_{i \in j} TV_{it}} \qquad \textbf{MSA level}$$

- To identify T_j need to make an assumption on γ.
- *Assume that Midland Texas is undistorted. Data from Midland implies $\gamma = 0.92$.*

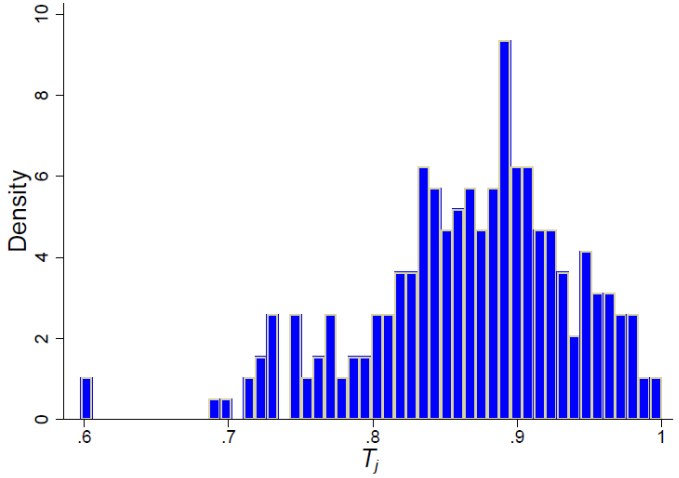
Some Results

Figure 1: Distribution of $MV_{i,t} / TV_{i,t}$



Tract level

Figure 3: Distribution of T_j



MSA level

Part 2:
Main Comment

Potential Treats to "Identification"

$$\gamma T_j = \frac{\sum_{i \in j} MV_{it}}{\sum_{i \in j} TV_{it}}$$

- "Identification": Anything that causes the share of structure-value-to-total–building-value to be less than γ will show up as "commercial real estate regulation".

- **Threats to identification assumption:**

  (a) γ varies across locations even in base model
  (b) The cost of building does not scale linearly with amount of building
  (c) The production function is not Cobb-Douglass
  (d) There are demand side factors that limits structure size that vary spatially

Heterogeneity in Commercial Real Estate

- **Types of Commercial Real Estate (share of market excluding Ag/vacant land)**:
  - Multifamily Housing: 42% (biggest component, not in their data)
  - Industrial: 21% (warehouses, small vs. heavy manufacturing, etc.)
  - Offices: 16%
  - Retail: 13% (includes shopping centers, big box stores, grocery, local shops)
  - Hotels: 7%
- **A lot of heterogeneity across types. Spatial variation in concentration across places.**

(a) Is γ constant across locations?

- There is likely heterogeneity in γ across different types of commercial real estate properties.
- Imagine differences in **γ** between farm land, an oil refinery, car manufacturing plants, a banking headquarters and large apartment complexes.
- Do large apartment complexes may have a lower **γ?** Renters may value both the structures (m) and the amenities of the neighborhood. Builders may respond to that by investing in amenities around the neighborhood as opposed to bigger structures.
- *Any variation in γ across space will bias estimates of commercial real estate barriers. [Note – authors show that γ's seem similar for broad industry classifications].*

(b) A More General Cost Function

- **Alternate Cost Function:** $q_{0i} + q_{1i} m_{it}^{q_{2i}}$

- **New mapping of model to data**

$$\underbrace{\gamma\tau_i \left[\frac{q_{0i} + q_{1i} m^{q_{2i}}}{q_{2i} q_{1i} m^{q_{2i}}} \right]}_{General\ Case} = \underbrace{\gamma\tau_i \left[\frac{1}{q_{2i}} \right]}_{q_{0i}=0} = \underbrace{\gamma\tau_i \left[\frac{q_{0i}}{q_{1i} m^{q_{2i}}} + 1 \right]}_{q_{2i}=1} = \frac{MV_{it}(data)}{TV_{it}(data)}$$

- **Need to take a stance on building costs and how they vary across locations if use a more general building cost function.**

- **Evidence that costs increase sharply if need to build upwards.**

(c) A More General Production Function

- **Alternate Production Function:**

$$B_{it}^{N} = z_i \left(\varphi_m m_{it}^{\gamma} + \varphi_x x_i^{\gamma} \right)^{\frac{1}{\gamma}}$$

- **New mapping of model to data**

$$\underbrace{\varphi_m \tau_i \left[\left(\frac{m_{it}}{B_{it}} \right)^{\gamma} \right]}_{General\ Case} = \frac{MV_{it}(data)}{TV_{it}(data)}$$

- **Inference is more complicated with a more general production function. Cobb-Douglas makes inference easy. Is the production of commercial real estate Cobb-Douglas? Not much evidence.**

(d) Other Demand Side Constraints?

- Suppose a manufacturing plant on a plot of size x sells in Midland for 10 (inclusive of both land and structure) and in Chicago for 100 (inclusive of both land and structure). Suppose construction costs q are the same in both cities. Finally, assume $\gamma = 0.9$.

- Production structure implies that the structure size (m) should be 9 in Midland and 90 in Chicago.

- Question: What if there isn't demand for a production facility of size 90 in Chicago? One answer … could have a mixed use building. But, what if office workers and renters do not want to live on top of a noisy manufacturing plant?

- *I am not sure if this something worth thinking about more – but, I was trying to think about frictions on the product demand size that may manifest as something that looks like τ in estimating equation.*

Part 2:
A Few Smaller Comments to Guide Discussion

Additional Comment 1: Owner Occupied Housing in Model

- The model excludes "housing" (either owner-occupied or commercial multi-use).
- How should one think about welfare when residential real estate and commercial real estate are linked? There should be an equilibrium condition pinning down an arbitrage relationship between two types of land use.
- Is residential real estate equally distorted? How does that interact with zoning?
- If residential real estate is relatively less distorted, would developers switch to developing residential real estate when commercial real estate markets are distorted? Would this provide an offsetting welfare gain to workers?
- *If I was editing this paper, this is one addition to framework that I would like to see explored.*

Additional Comment 2: Heterogeneity Among Households

- Usually, real estate restrictions are put in place to benefit incumbent real estate owners at the expense of non-owners.
- Individuals vote for zoning restrictions to prop up their property values.
- Individuals also vote for commercial real estate restrictions to prop up their amenity values.
- Removing zoning restrictions would hurt some incumbent real estate owners and benefit many others.
- *Understanding that heterogeneity would be illustrative – particularly when understanding the political economy of implementing land use deregulation.*

Part 3:
Concluding Thoughts

Concluding Thoughts

- *Really nice paper on a very important topic!*
    - This is a paper I could have written (in nearly the identical form) – most of my comments are small relative to the paper's contributions.

- Reducing land use regulations can have big welfare gains for the population and should be something policy makers strongly consider!
    - That was also a big take away on my paper exploring policies that reduce the impact of gentrification. (Couture, Gaubert, Hanbury, and Hurst 2023)