City Structures

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Motivation

- Complexity of modelling spatial interactions implies that theoretical urban literature has traditionally focused on stylized settings
  - Monocentric city
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  - Capture first-order features of the data, such as many locations, heterogeneous productivity and amenities, and transport networks
  - Tractable and amenable to a theoretical analysis of the properties of the equilibrium and comparative statics
  - Parsimonious with small number of structural parameters to estimate
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- These models help us understand evolving city structures
  - Strength of agglomeration and dispersion forces
  - Impact of transport infrastructure improvements
  - Implications of a shift to working from home (WFH)
  - Changes in the types of economic activity concentrated in urban areas

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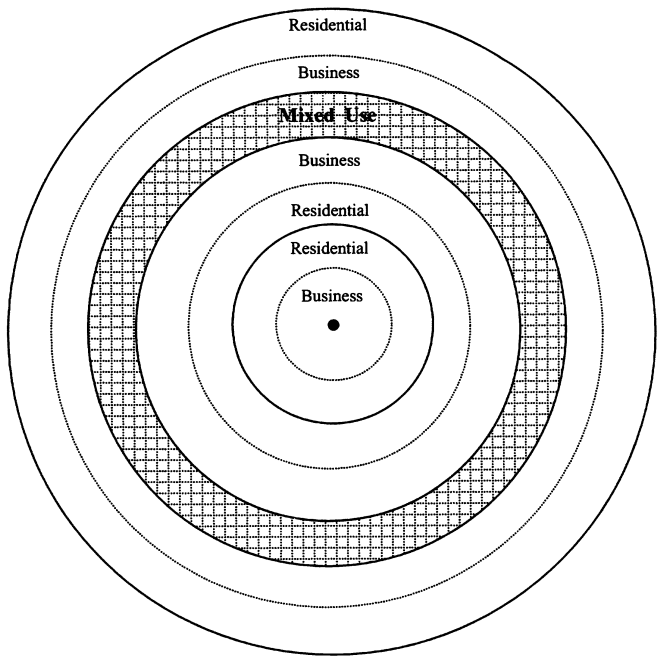
- Path-breaking theoretical models of non-monocentric cities
  - Fujita and Ogawa (1982) (linear city)
  - Lucas and Rossi-Hansberg (2002) (symmetric circular city)

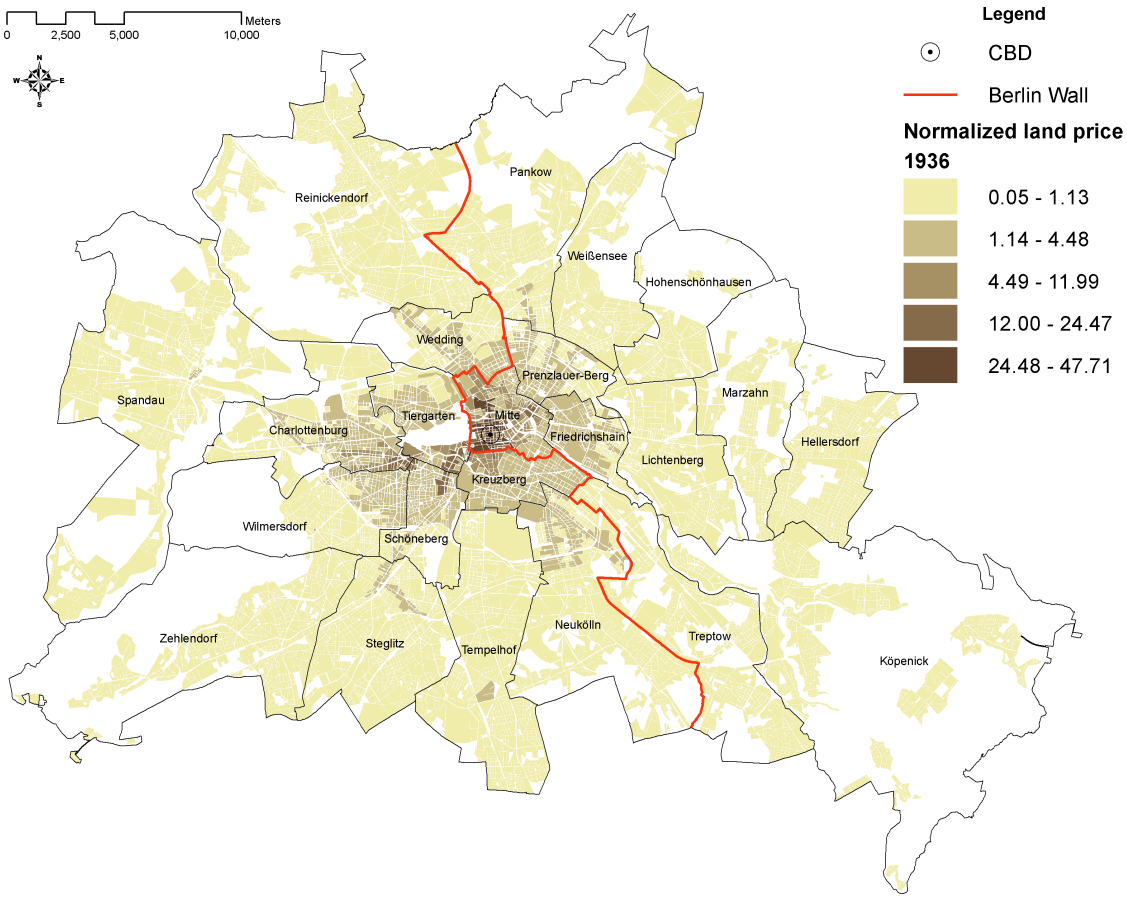


Quantitative Urban Model

- Tractable model of the equilibrium distribution of residents, workers and land rents across locations within a city
- Rationalize observed data on thousands of city blocks
  - Employment by workplace and by residence (or bilateral commuting)
  - Land rents
  - Bilateral transport network and travel times
- Capture empirically relevant differences across locations in
  - Productivity
  - Amenities
  - Supply of floor space
  - Transportation infrastructure
- Endogenous agglomeration and dispersion forces
  - Production externalities
  - Residential externalities
  - Supply of floor space
  - Commuting costs

Applications

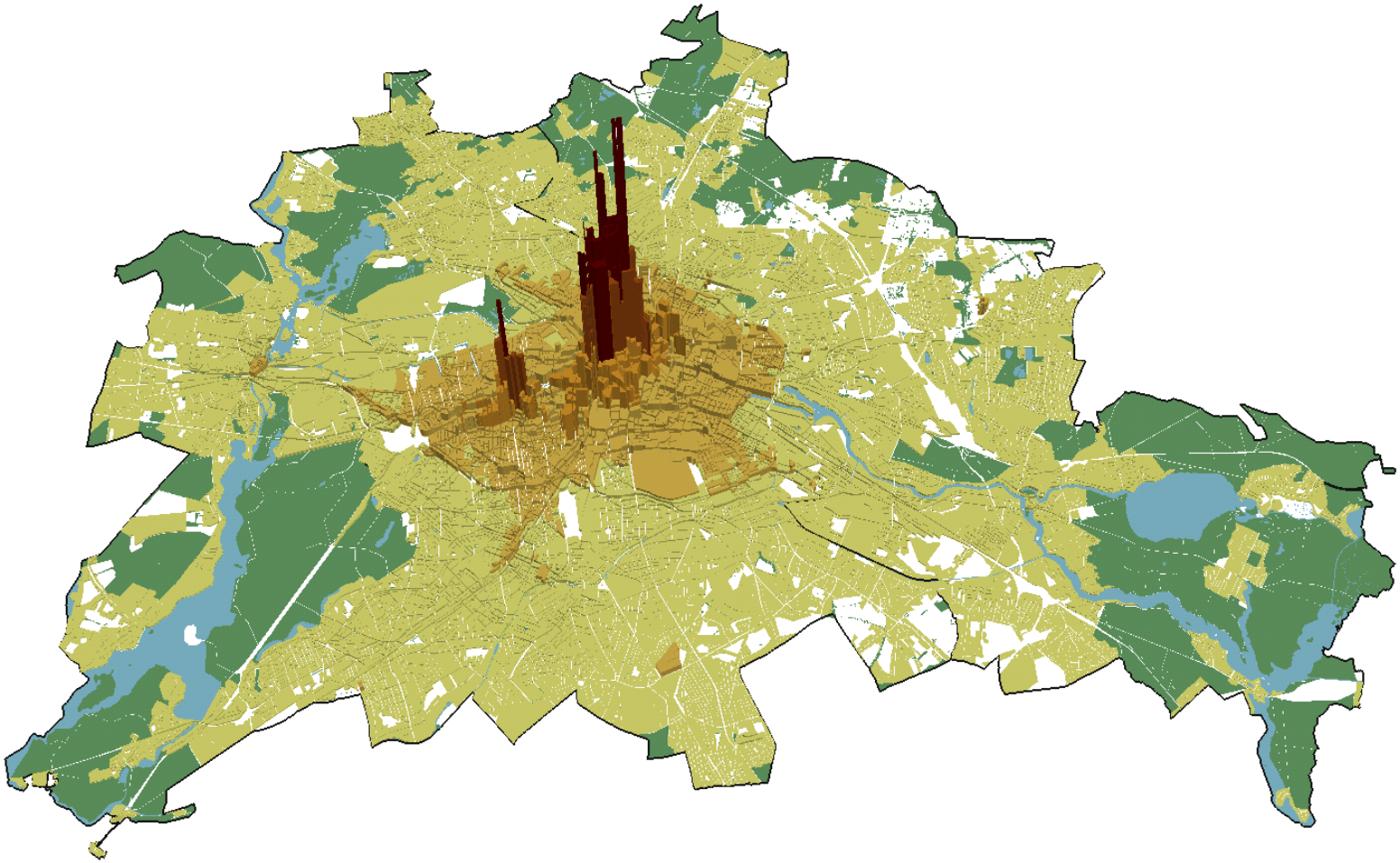
- Strength of agglomeration and dispersion forces
  - Ahlfeldt, Gabriel, Stephen Redding, Daniel Sturm and Nikolaus Wolf (2015) "The Economics of Density: Evidence from the Berlin Wall," *Econometrica*, 83(6), 2015, 2127-2189.



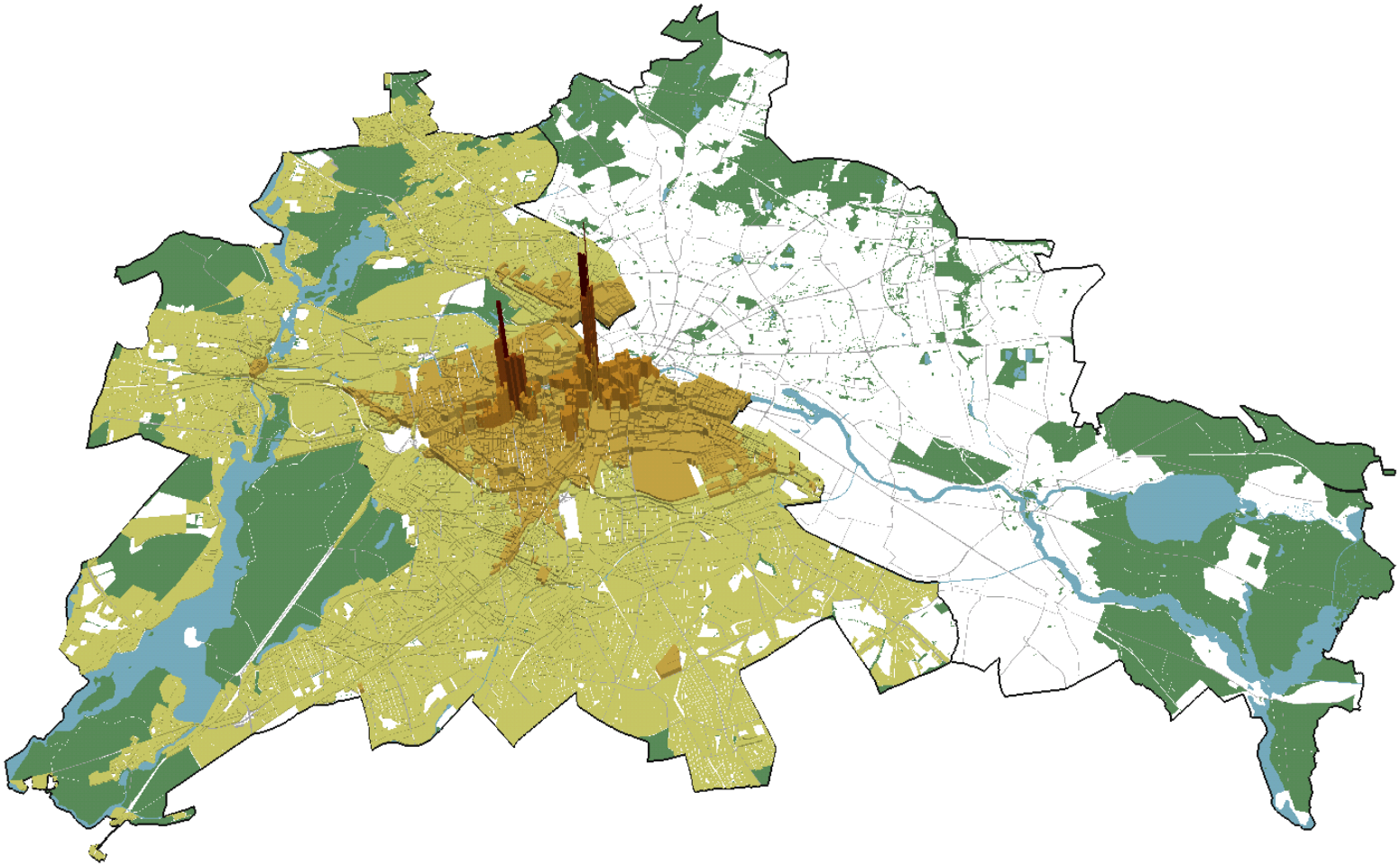
Model Setup

- We consider a city embedded within a larger economy, which provides a reservation level of utility $(\bar{U})$
- The city consists of a set of discrete blocks indexed by i, with supply of floor space depending on the density of development (φ_i)
- There is a single final good which is costlessly traded and is chosen as the numeraire
- Markets are perfectly competitive
- Workers choose a block of residence, a block of employment, and consumption of the final good and floor space to max utility
- Firms choose a block of production and inputs of labor and floor space to max profits
- Floor space within each block optimally allocated between residential and commercial use
- Productivity depends on fundamentals (a_i) & spillovers (Υ_i)
- Amenities depend on fundamentals (b_i) & spillovers (Ω_i)
- Workers face commuting costs

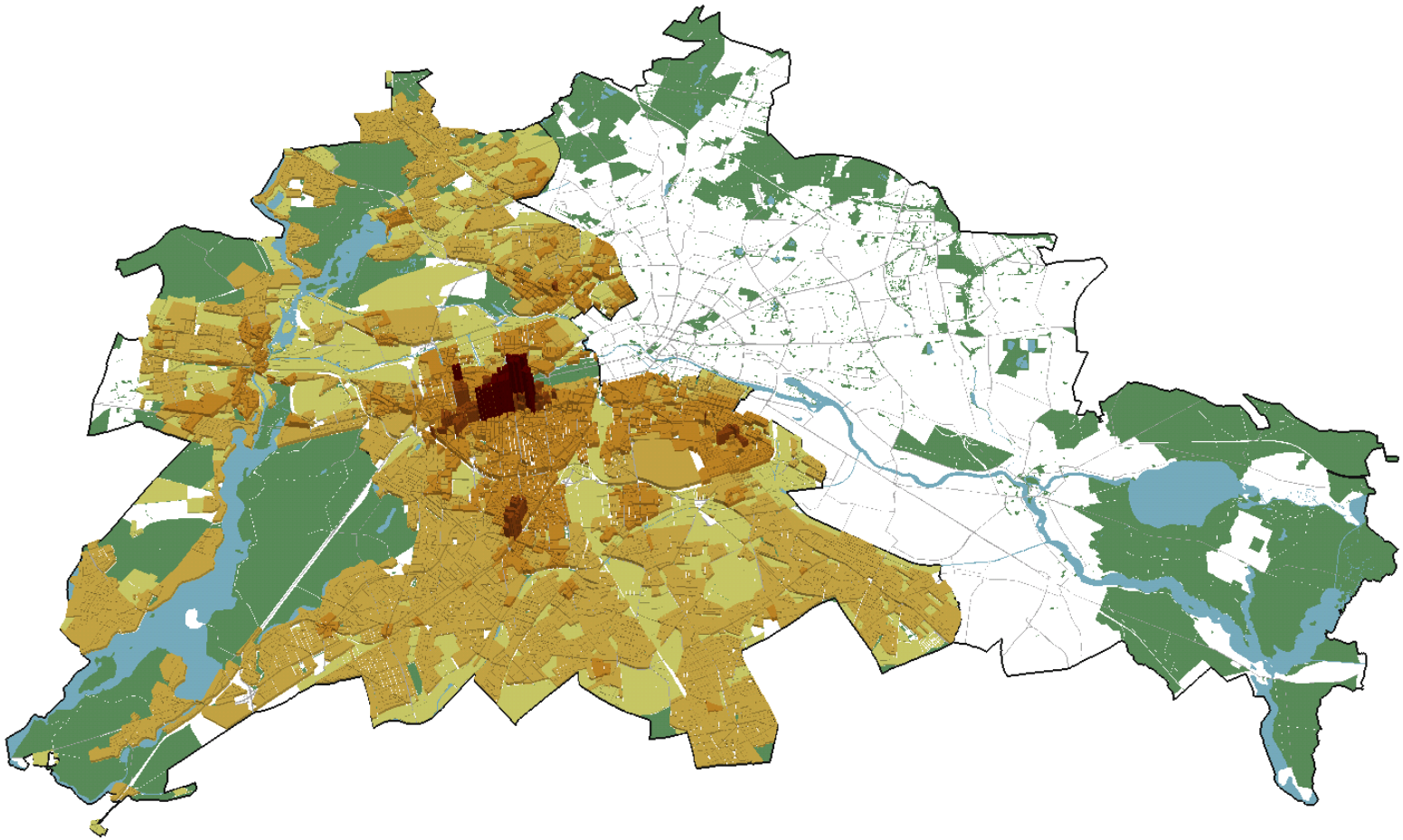
Berlin 1936



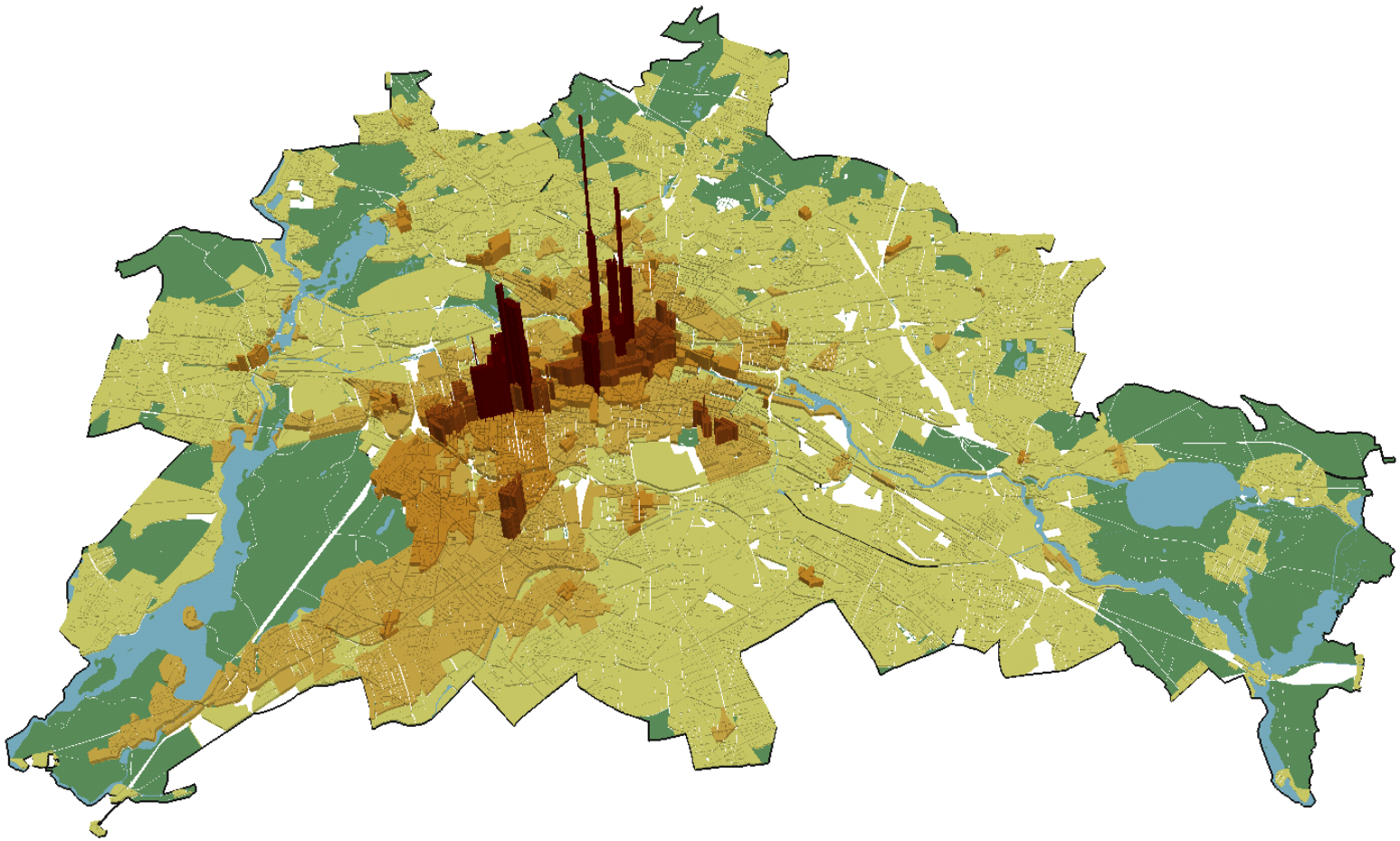
West Berlin 1936



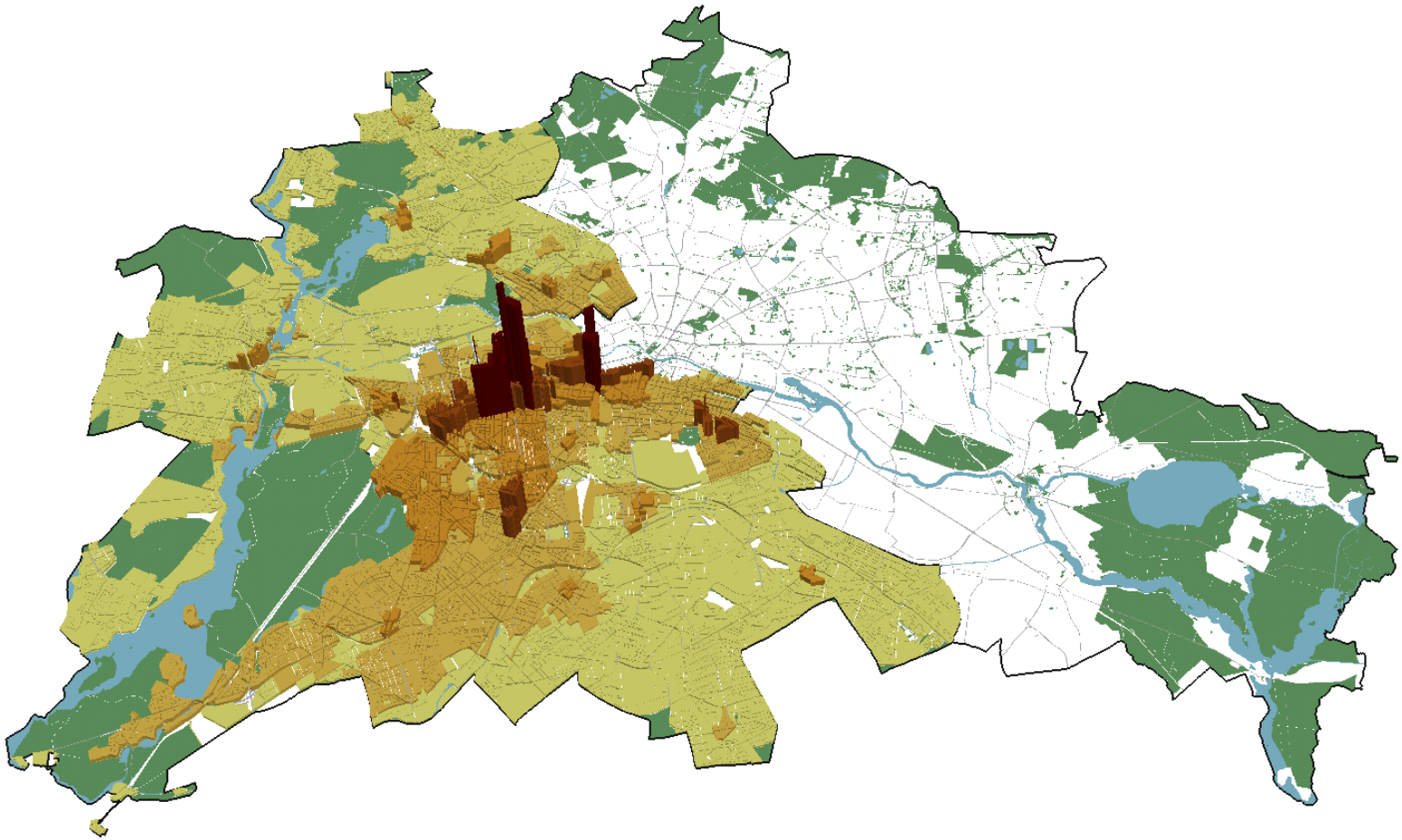
West Berlin 1986



Berlin 2006

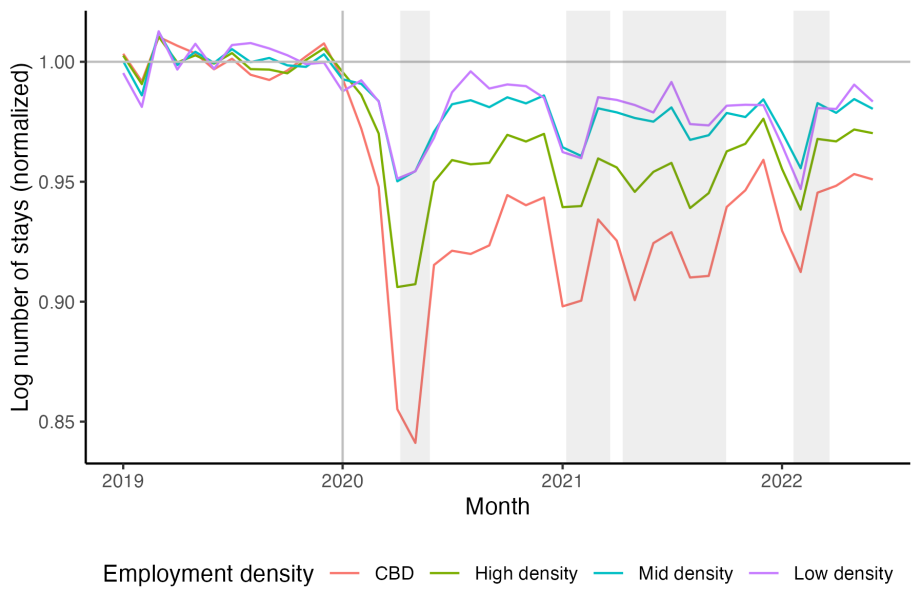


West Berlin 2006



Work From Home

- As people stopped commuting downtown to work, this led to a collapse in local demand for non-traded services (e.g., coffee shops)
  - Miyauchi, Yuhei, Kentaro Nakajima and Stephen Redding (2024) "The Economics of Spatial Mobility: Theory and Evidence Using Smartphone Data," Princeton University, mimeograph



Task Specialization in Cities

- Broader process of changes in tasks concentrated in urban areas
  - Michaels, Guy, Ferdinand Rauch and Stephen Redding (2019) "Task Specialization in U.S. Cities from 1880-2000," *Journal of the European Economic Association*, 17(3),754-798.

TABLE 2. Verbs most and least strongly correlated with metro area employment shares.

Rank	1880	1900	1920	1940	1960	1980	2000
Panel A: Verbs most strongly correlated with metro area employment shares							
1	Thread	Thread	File	File	Document	Identify	Develop
2	Stretch	Stitch	Distribute	Bill	Schedule	Document	Determine
3	Interfere	Telephone	Record	Take	File	Advise	Analyze
4	Hand	Sew	Notice	Compile	Record	Concern	Factor
5	Ravel	Hand	Telephone	Distribute	Distribute	Report	Review
6	Sew	Assist	Bill	Pay	Compile	Schedule	Confer
7	Braid	Visit	Envelope	Letter	Notice	Develop	Advise
8	Visit	Describe	Document	Notice	Identify	Analyze	Report
9	Receive	Number	Learn	Record	Send	Determine	Concern
10	Sack	Stamp	Number	Send	Notify	Notify	Plan

Conclusion

- Real-world cities feature complex internal structures, with a rich specialization by residential and commercial land use and an intricate division of labor
- Quantitative urban models highlight the role of agglomeration forces (in addition to natural advantage) in explaining this specialization
- Wealth of newly-available sources of GIS data promises to offer new opportunities to distinguish between mechanisms for agglomeration
- Over the centuries, cities have changed drastically — from marketplaces, to the locus of manufacturing industry, to clusters of office and retail development, and to centers of consumption
- As long as there are benefits to reduced costs of moving people, goods, and ideas, cities in some form are likely to thrive and prosper

Thank You