

RIETI BBL Seminar Handout

“The Benefits and Costs of Big Cities”

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<https://www.rieti.go.jp/en/index.html>

The benefits and costs of big cities

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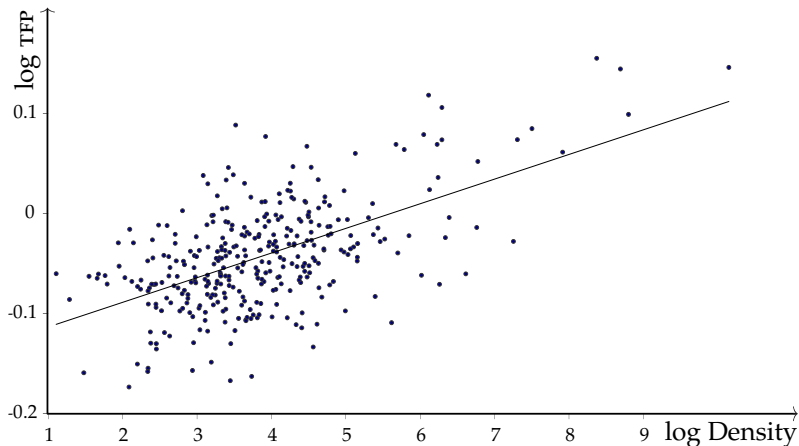
From natural advantages to agglomeration economies

- Throughout history, the locations and sizes of cities have been primarily determined,
 - first, by land fertility,
 - then, by access to natural and built routes of transportation,
 - and subsequently, by proximity to energy sources and primary materials.
- These considerations continue to matter, but much less than before.
- Firms and workers increasingly care about the number and characteristics of other firms and workers near them.

The benefits and costs of big cities

- The scale, density, and diversity of big cities have many benefits:
 - boost productivity and innovation,
 - provide valuable experience and opportunities to use it,
 - improve access to goods and services,
 - encourages energy-efficient construction and transport,
 - facilitates sharing scarce amenities.
- Urban density also has costs:
 - makes living, producing, and moving in cities more costly.
- Cities are the result of the trade-off between these benefits and costs (the ‘fundamental tradeoff of urban economics’, Fujita and Thisse, 2013).

Productivity and density for French employment areas

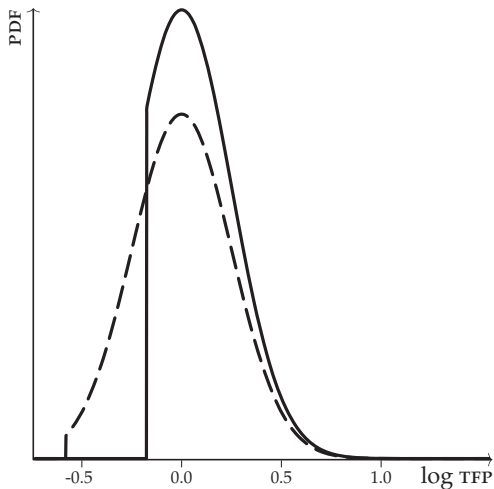


Source: Combes, Duranton, Gobillon, Puga, and Roux (2012)

Agglomeration economies or selection?

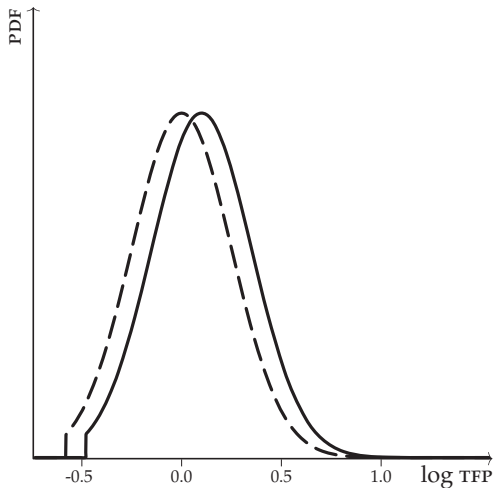
- Higher productivity in large/dense cities:
 - Agglomeration economies: concentration of firms and workers makes them more productive.
 - Alternative explanation: tougher competition in larger markets squeezes out less productive firms (average productivity higher because only the most productive survive).
- Combes, Duranton, Gobillon, Puga, and Roux (2012) develop method to distinguish between agglomeration and firm selection, apply it to French data (computer code now available as Stata library thanks to Keisuke Kondo)
- Similar prediction for average productivity, different predictions for shape of entire productivity distribution.
 - Selection is like a storm, sinking the weakest (local) boats.
 - Agglomeration economies are like the tide, lifting all (local) boats.

Theoretical benchmark: stronger selection in large cities



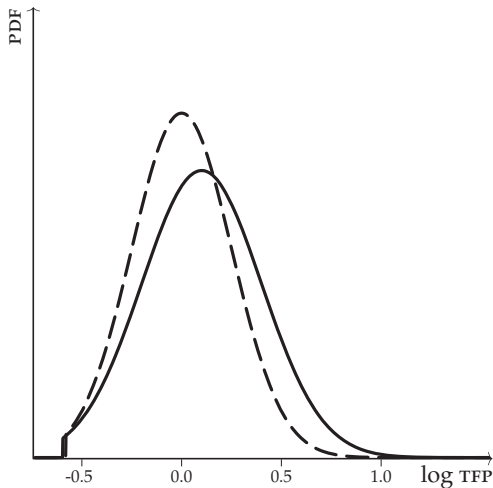
Source: Combes, Duranton, Gobillon, Puga, and Roux (2012)

Theoretical benchmark: stronger agglomeration in large cities



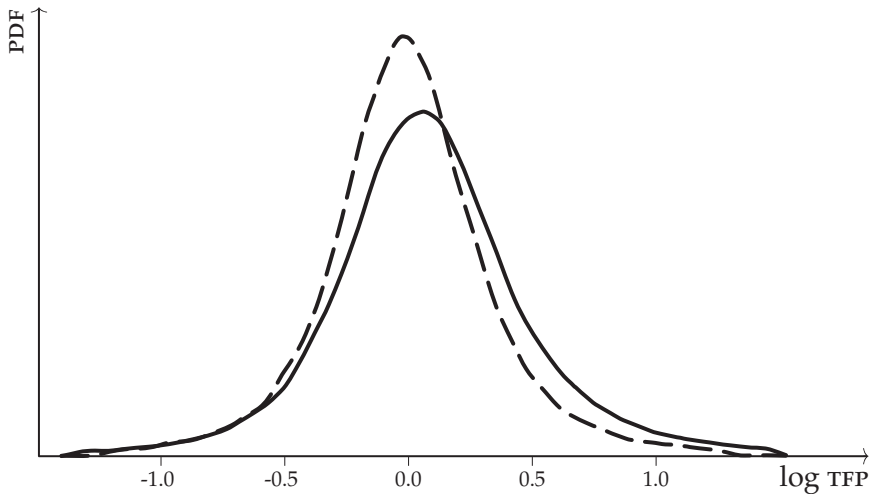
Source: Combes, Duranton, Gobillon, Puga, and Roux (2012)

With even stronger agglomeration for more productive firms



Source: Combes, Duranton, Gobillon, Puga, and Roux (2012)

Actual TFP distribution in French cities

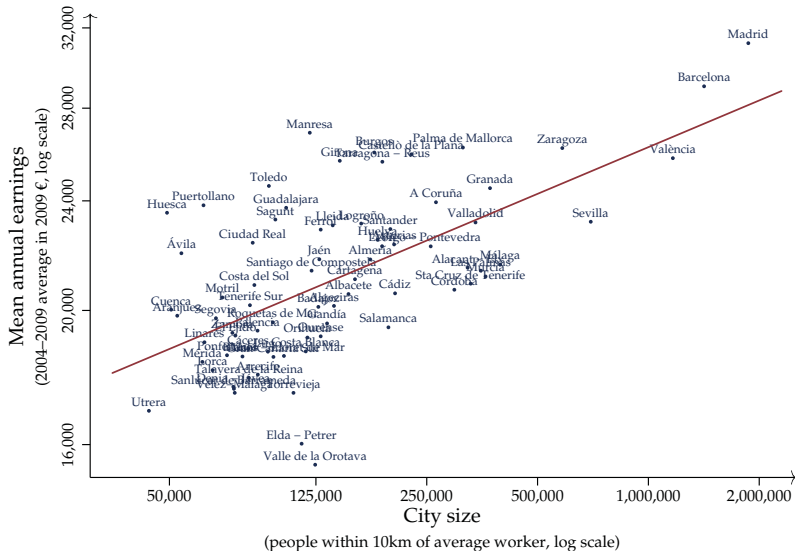


Source: Combes, Duranton, Gobillon, Puga, and Roux (2012)

Magnitude and interpretation

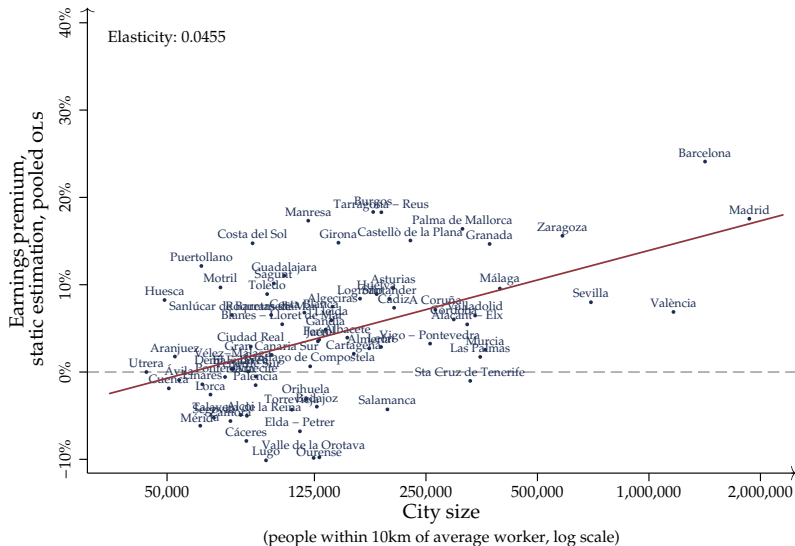
- The log TFP distribution in big cities is best approximated by right-shifting (9%) and dilating ($\times 1.2$) the small-city distribution, without any truncation.
- Firms in denser French local labour markets are on average 9.7% more productive than in less dense areas.
 - For firms in top quartile, 14.4% advantage.
 - For firms in bottom quartile, 4.8% advantage.
- No differences in extent of firm selection.
- Consistent with low transport costs across cities (national competition) but quick spatial decay of agglomeration economies.

Average earnings are higher in bigger cities..



Source: De la Roca and Puga (2017)

... even after controlling for personal and job characteristics



Source: De la Roca and Puga (2017)

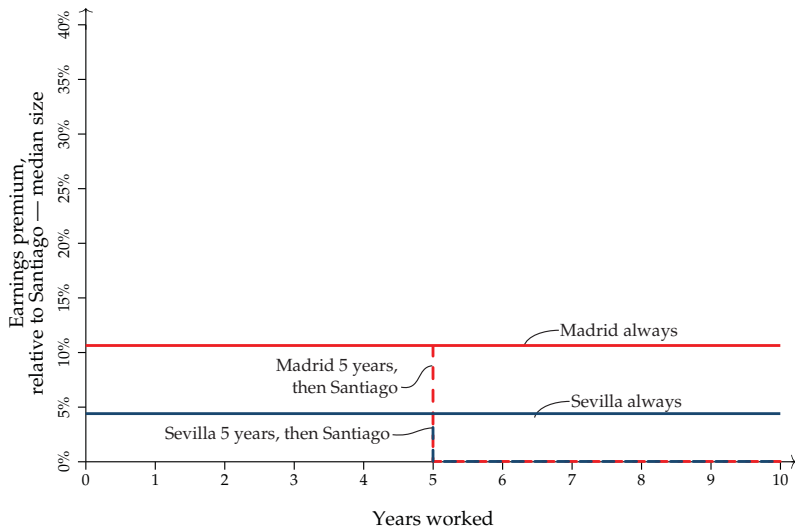
Spatial equilibrium

- From the point of view of workers, higher nominal earnings in bigger cities tend to be offset by differences in the cost of living (housing).
- However, in tradable sectors, if firms are willing to pay higher wages in bigger cities, there must be productive advantages.

The city-size earnings premium

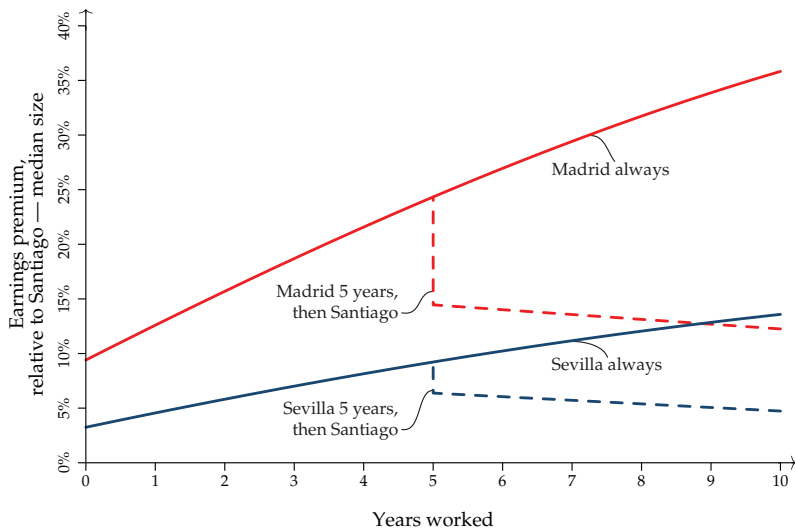
- Average earnings are higher in cities than in rural areas (Glaeser and Maré, 2001).
- Earnings are even higher in bigger/denser cities (Combes, Duranton, and Gobillon, 2008).
 - Not just because more productive workers sort into bigger cities (Glaeser and Maré, 2001; Combes, Duranton, and Gobillon, 2008, using worker fixed-effects).
 - Not just because intrinsic productive advantages attract more workers and make cities larger (Combes, Duranton, Gobillon, and Roux, 2010, instrumental variables and other strategies).
- Comparing recent and older migrants into cities suggests premium increases over time (Glaeser and Maré, 2001).
- Learning by working in bigger cities: the value of experience differs depending on where this is acquired (De la Roca and Puga, 2017).

The traditional view of the city-size earnings premium



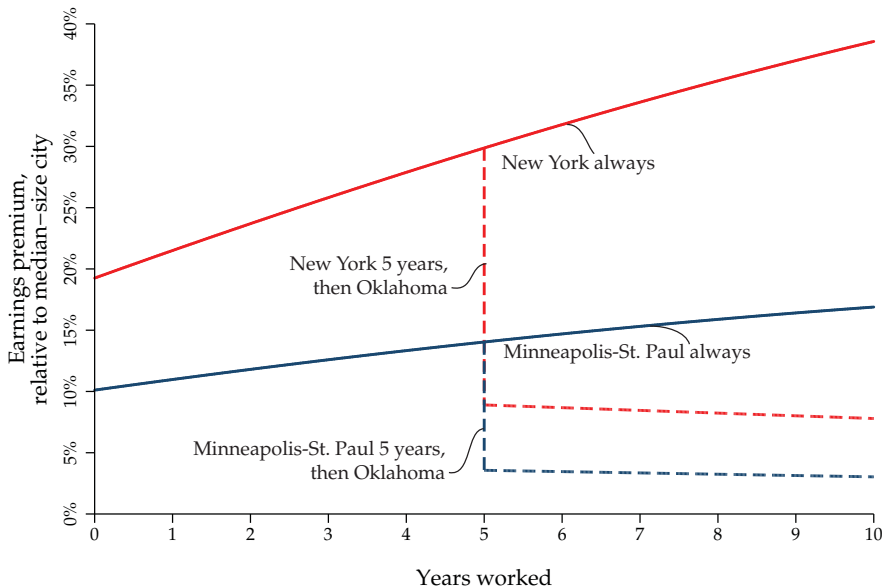
Source: De la Roca and Puga (2017)

Our view of the city-size earnings premium



Source: De la Roca and Puga (2017)

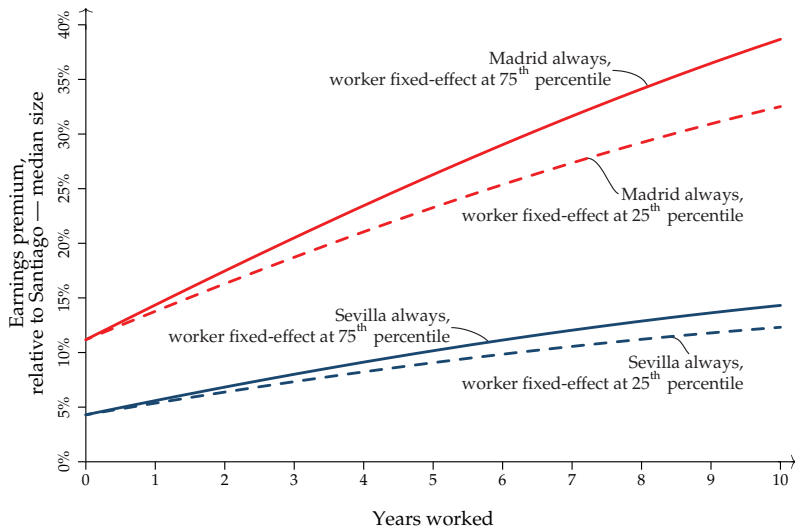
Learning by working in big US cities



Learning by working in big cities

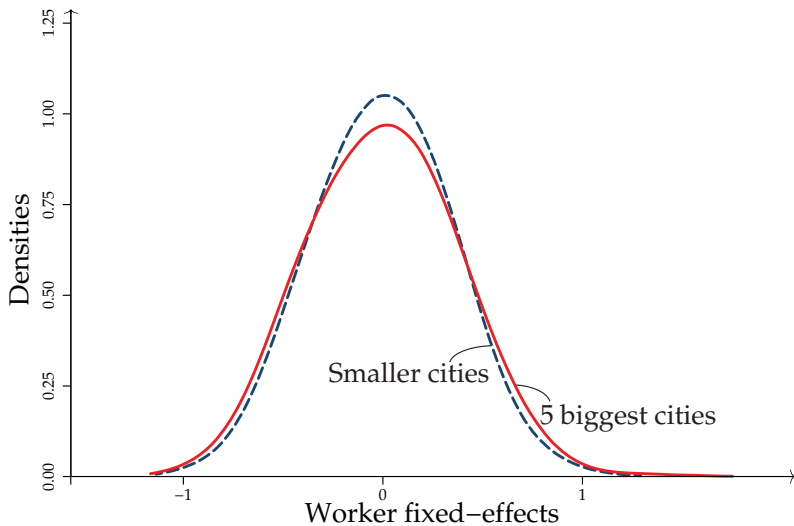
- By tracking not only workers' current job location, but also their entire workplace location histories, De la Roca and Puga (2017) show that
 - an earnings premium is attained upon arrival in a big city,
 - workers accumulate more valuable experience in a big city,
 - and take most of the accumulated premium when they relocate.
- Furthermore, differences in worker skills across cities
 - appear not to be the result of sorting (workers in big and small cities appear initially very similar),
 - but the result of workers accumulating more valuable experience in bigger cities,
 - and this benefiting more able workers more.
- Results are consistent with bigger cities fostering greater rates of human capital accumulation on the job, or “learning”, especially for highly skilled workers.

City-size earnings premium heterogeneity



Source: De la Roca and Puga (2017)

Similar distribution of worker fixed effects



Source: De la Roca and Puga (2017)

Heterogeneous big-city benefits but little sorting

- Bigger cities
 - involve higher costs of living,
 - but also provide higher earnings.(the “fundamental trade-off”, Fujita and Thisse, 2002)
- Higher earnings in bigger are largely associated with the value of experience (De la Roca and Puga, 2017):
 - they allow workers to accumulate more valuable experience, and
 - provide greater opportunities to use previously acquired experience.
- Larger big-city benefits for high ability workers.
- Urban costs are higher in big cities for everyone.
- And yet, more able workers are *not* more likely to go to a big city.

Urban sorting and the idiosyncrasy of migration

- Why do we observe little sorting on ability despite big-city benefits for more able workers?
- Partly due to limited mobility and migration decisions being very idiosyncratic:
 - Many (most) people don't move,
 - migration flows react slowly to (even large) shocks,
 - gross flows many times larger than net flows,
 - apparently similar people simultaneously move in opposite directions (Davis, Fisher, and Veracierto, 2016; Monras, 2018).

The role of networks in residential mobility

- Büchel, Ehrlich, Puga, and Viladecans-Marsal (2020) use anonymised cellphone call detail records to study the role played by the location of a person's social network in determining
 - whether to change residence
 - and to which city and neighbourhood.
- A significant part of the cost of moving is leaving friends and family behind.
 - Individuals with few local contacts are more likely to change residence.
 - When people move, they strongly prefer places where they already have more contacts living close-by.

Why contacts matter

- Contacts matter for residential location choices for three main reasons.
 1. Proximity to contacts is itself valuable and complements attractive location characteristics.
 2. Contacts reduce moving costs, for instance by reducing search frictions when looking for a new home.
 3. Social connections provide hard-to-find local information that is useful when choosing among alternative locations.
- Not only direct connections but also second-order links (friends of friends who are not one's friends) matter.
- Taking into account where each person's contacts live doubles our ability to predict who will move and where,

Urban sorting and flawed self-assessment

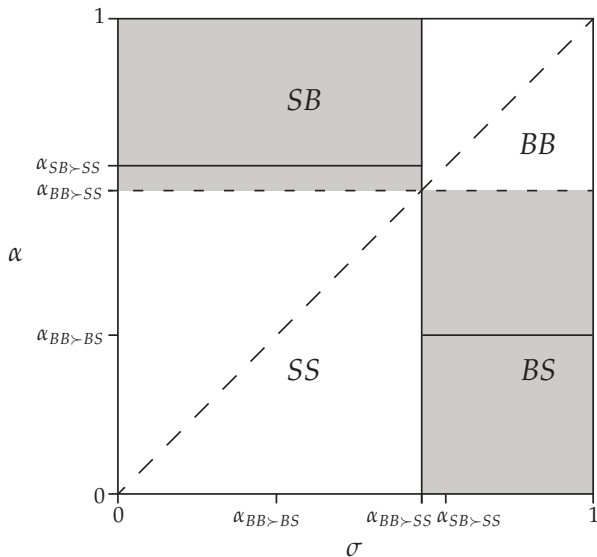
- Little sorting partly due to limited mobility, but even conditional on moving sorting is weak.
- De la Roca, Ottaviano, and Puga (2023) offer new explanation: flawed self-assessment of ability.
 - When young, individuals may have an imperfect assessment of ability.
 - They choose a small/big city based on this (imperfect) assessment or self-confidence.
 - Later in life, they learn their ability and may relocate accordingly.
 - But early decisions may have a lasting impact and reduce their incentives to move.

Distribution of self-confidence and ability



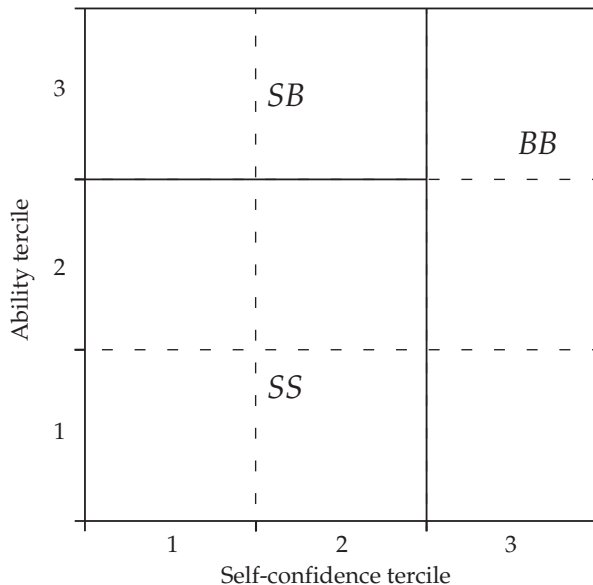
Source: De la Roca, Ottaviano, and Puga (2023)

Sorting on self-confidence and ability: theory



Source: De la Roca, Ottaviano, and Puga (2023)

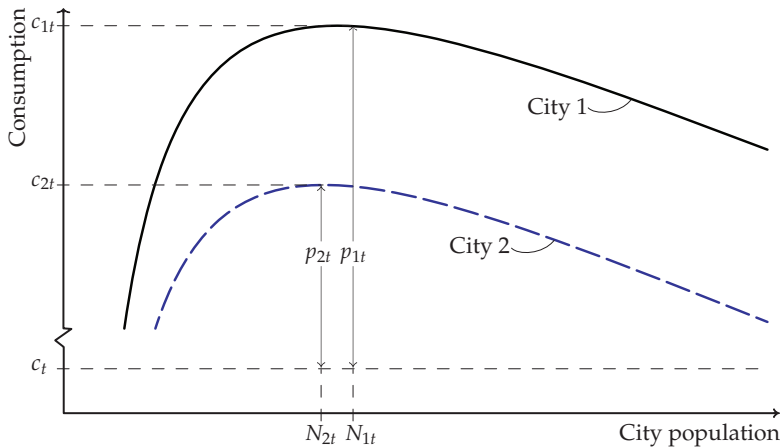
Sorting on self-confidence and ability: data



Two urban trade-offs

- Density has benefits but also costs.
 - In choosing where to live within each city, trade-off between better accessibility and higher housing costs.
 - In choosing whether to live in a bigger city, trade-off between urban benefits (higher productivity and earnings) and costs (more expensive housing, longer and slower commutes).

The city-size trade-off



Source: Duranton and Puga (2022)

Urban growth and its aggregate implications

- Duranton and Puga (2022): A system of cities framework with an agglomeration - urban costs tradeoff, location heterogeneity, and planning regulation.
- Multiple cities, heterogeneous in underlying productivity advantages and geographical constraints to expansion.
- In each city, the “fundamental tradeoff” of urban economics: agglomeration economies versus urban costs.
- Solution to the urban benefit-cost framework:
 - Henderson (1974): free entry and perfect competition amongst city developers, who each completely control a city site and collect land rents.
 - Duranton and Puga (2022): city size controlled by incumbents through planning regulation at the expense of potential newcomers.

City-size costs: Transportation within each city

- Individual transport costs:

$$T_{it}(x) = \tau_{it}x^{\gamma} ,$$

where the cost per unit of distance is

$$\tau_{it} = \tau_t(N_{it})^{\theta} .$$

- Three urban cost parameters: γ , θ , τ_t :
 - Distance travelled by each city resident x^{γ} increases with elasticity $\gamma > 0$ with the distance x between her dwelling and the city centre.
 - Congestion makes travel over a given distance slower in more populous cities, with population elasticity θ .
 - τ_t captures changes in technology and in the value of time in vehicle.

Empirical estimates of the model's key parameters: γ

- 3 approaches and 3 sources of variation to estimate γ :
 1. γ corresponds to the elasticity of distance travelled with respect to distance to the center.

We can estimate this using household-level travel data (NHTS).
 2. At the spatial equilibrium within cities, a marginal increase in accessibility must be matched by a marginal increase in housing costs (Alonso-Muth condition).

γ also corresponds to the elasticity of differential house prices with respect to distance to the center.

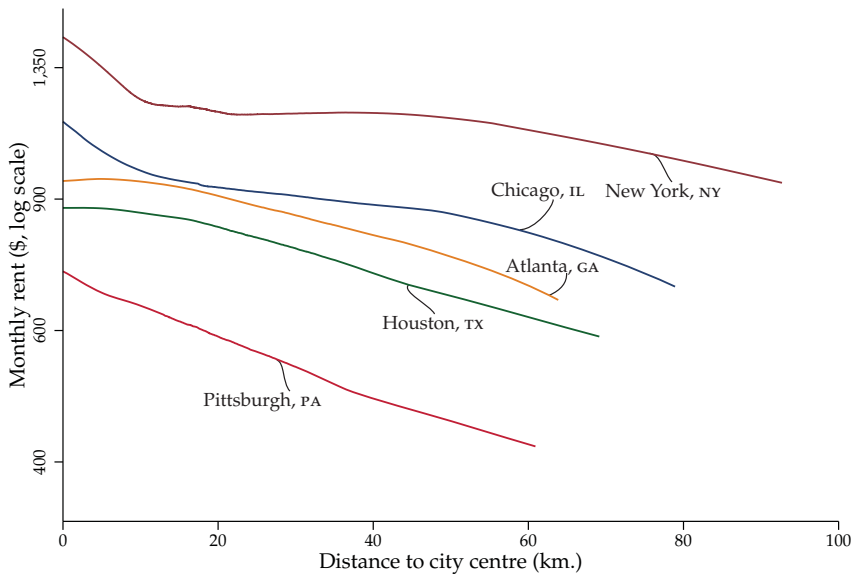
We can estimate this using block-group-level housing data (ACS)
 3. At the spatial equilibrium across cities, γ corresponds to the elasticity of city-centre house prices plus consumption for the marginal newcomer with respect to the city's spatial extent, controlling for travel speed.

We can estimate this using ACS and NHTS data.
- All three sources of variation to estimate γ result in $\gamma \approx 0.07$.
- Also estimate $\theta \approx 0.04$.
- Change in τ driven mainly by value of travel time rising with income.

Planning regulations and periphery house prices

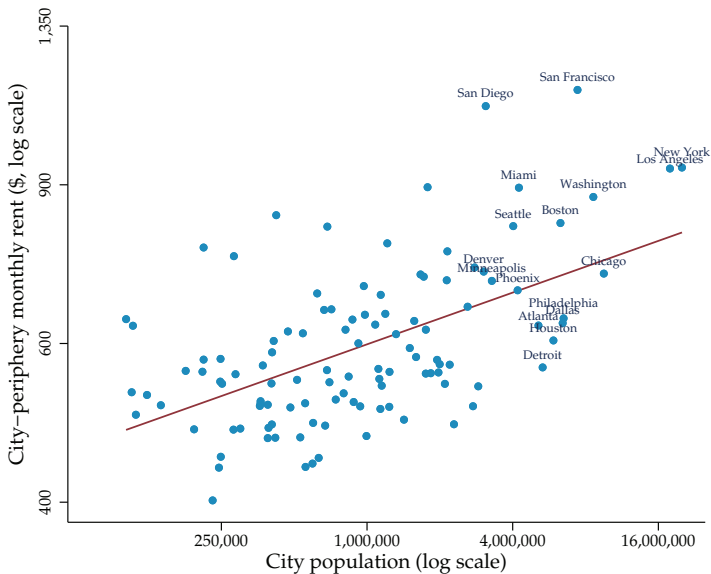
- Duranton and Puga (2022) has common features with the monocentric city model (Alonso, 1964; Muth, 1969) and models of urban systems (Henderson, 1974):
 - Within each city, gradient of house prices to offset commuting costs.
 - City sizes result from trade-off between agglomeration economies and crowding costs.
 - Bigger cities feature higher house prices at the centre and higher earnings.
- One important difference:
 - In standard monocentric city and urban system models, house prices at the city edge are equated across cities.
 - In our framework, incumbent residents use local planning regulations to curb new construction in reaction to any local positive shock.
- Testable implications: permitting costs and house prices at the edge should be higher in bigger cities (also increasing with geographical constraints).

House price gradients in selected cities



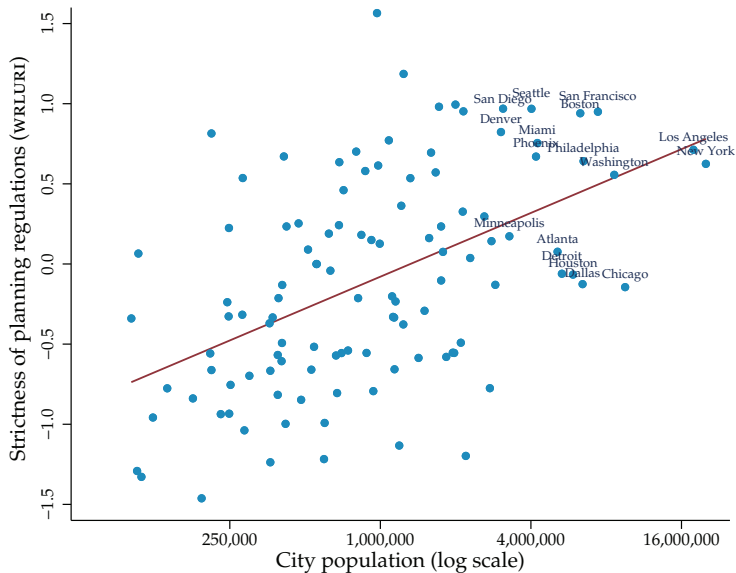
Source: Duranton and Puga (2022)

Periphery prices and city population



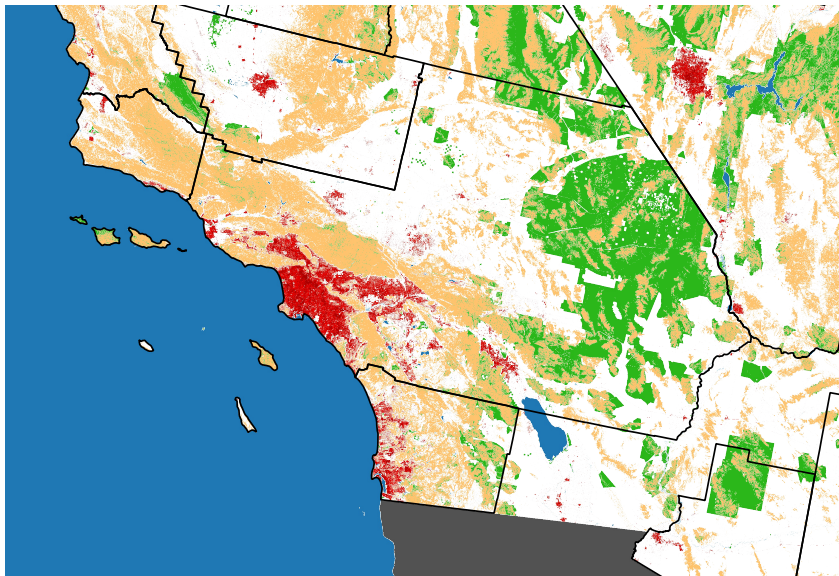
Source: Duranton and Puga (2022)

Planning regulation and city population



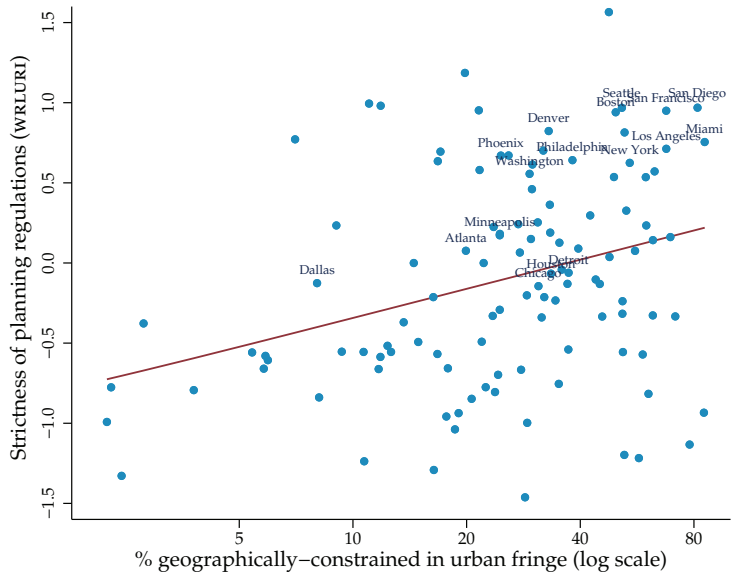
Source: Duranton and Puga (2022)

Geographical barriers to urban expansion



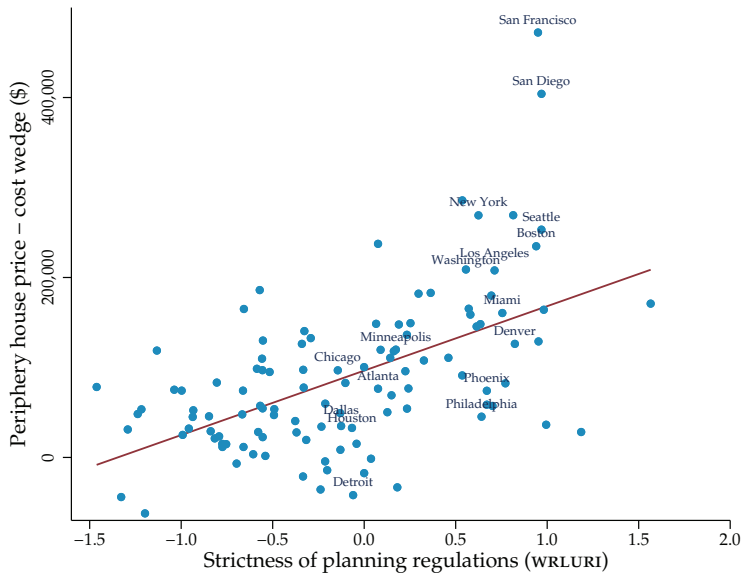
Source: Duranton and Puga (2022)

Planning regulation and geographical barriers



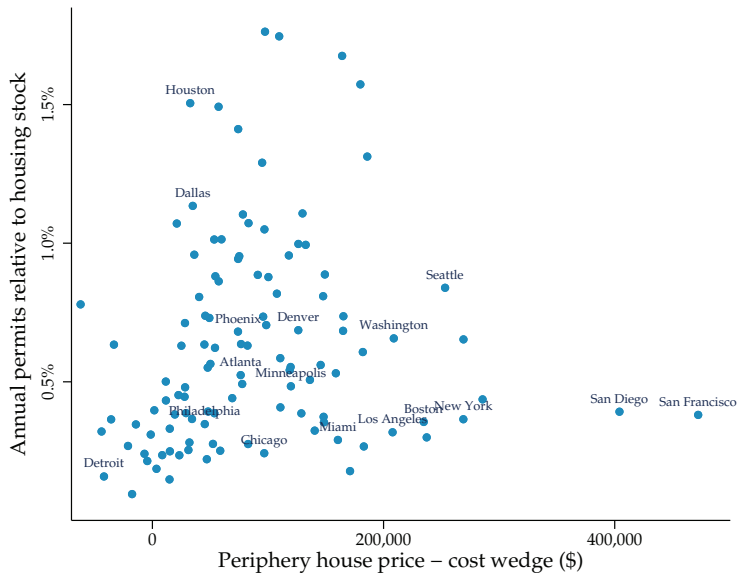
Source: Duranton and Puga (2022)

Periphery prices and planning regulation



Source: Duranton and Puga (2022)

Residential permits and periphery prices



Source: Duranton and Puga (2022)

Increasingly different, increasingly interdependent cities

- Big cities are not just scaled-up versions of small cities (with greater magnitude of same benefits and costs).
- Over the last few decades, important changes have made cities increasingly different from each other.
 - Some differences because firms and workers with certain characteristics are more likely to locate in big cities.
 - Other differences because choosing to locate in big cities has consequences that make firms and workers evolve differently.
- And yet, as big and small cities have become more different, they have also become more interdependent.

Increasingly interdependent cities

- Cities are increasingly interrelated, cannot be understood in isolation.
 - Workers acquire more valuable experience in bigger cities, value remains if they move to smaller cities (De la Roca and Puga, 2017).
 - Nursery cities (Duranton and Puga, 2001):
 - * Innovations most frequently arise in bigger and more diverse cities (diversity fosters trial and experimentation),
 - * but can then be exploited in smaller cities to save on costs.
 - From sectoral to functional specialisation (Duranton and Puga, 2005):
 - * The cost of transporting goods, people, and ideas has declined dramatically over the last century.
 - * As the costs of remote management fall, firms find it worthwhile to fragment their activities.
 - * The combined decision of multiple firms changes the urban landscape, which is itself what makes firms' decision worthwhile.
 - * Cities become less specialised by sector and more specialised by function, with management concentrated in big cities and production in smaller cities.
- Firms and workers can “sow” and “reap” in different locations.

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