MONOCENTRIC CITY AND REAL ESTATE PRICE

EE464: Urban Economics
EE562: Selected Topics in Development Economics 2
Semester 1 / 2020
Faculty of Economics, Thammasat University

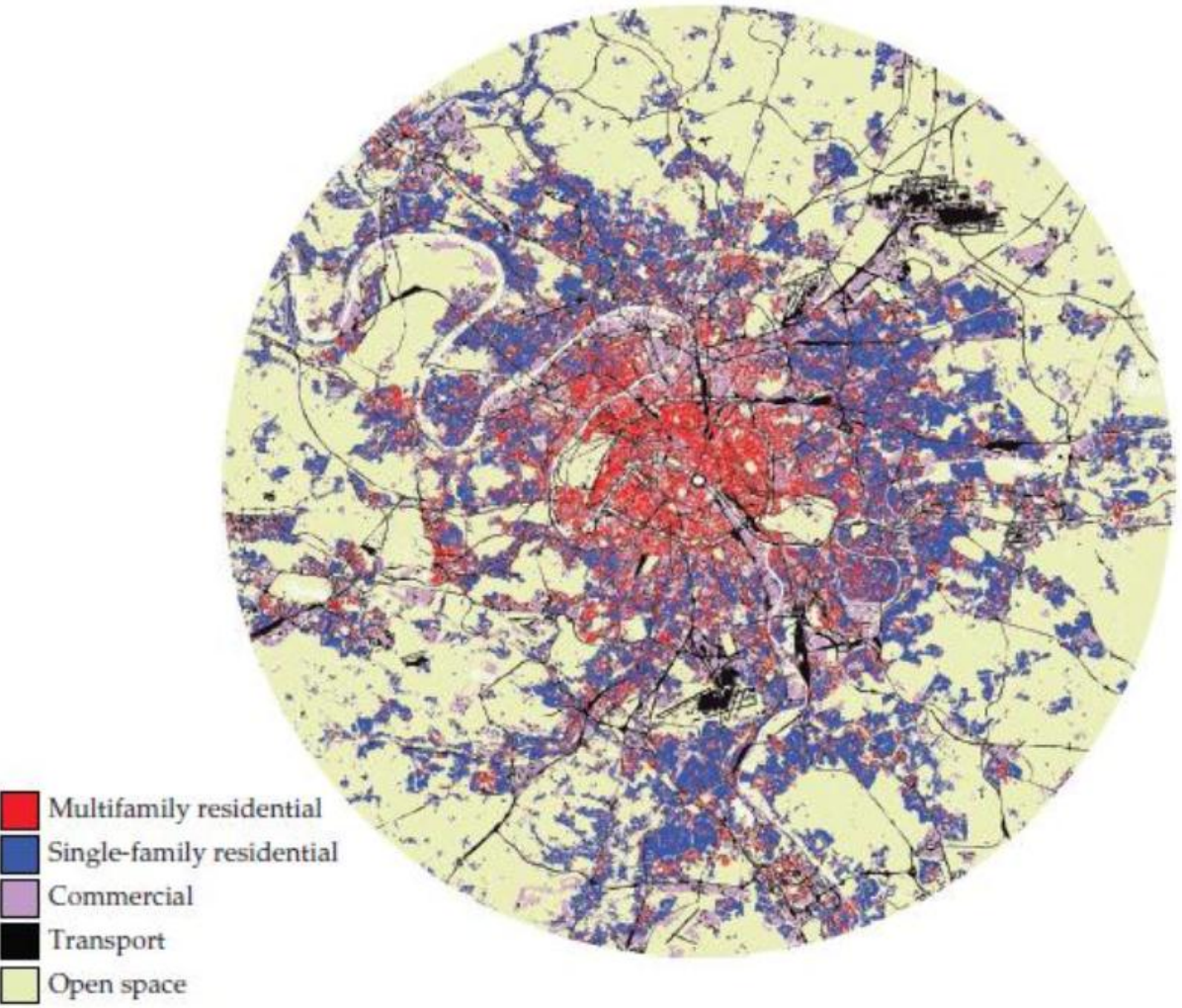
Theoretical Background

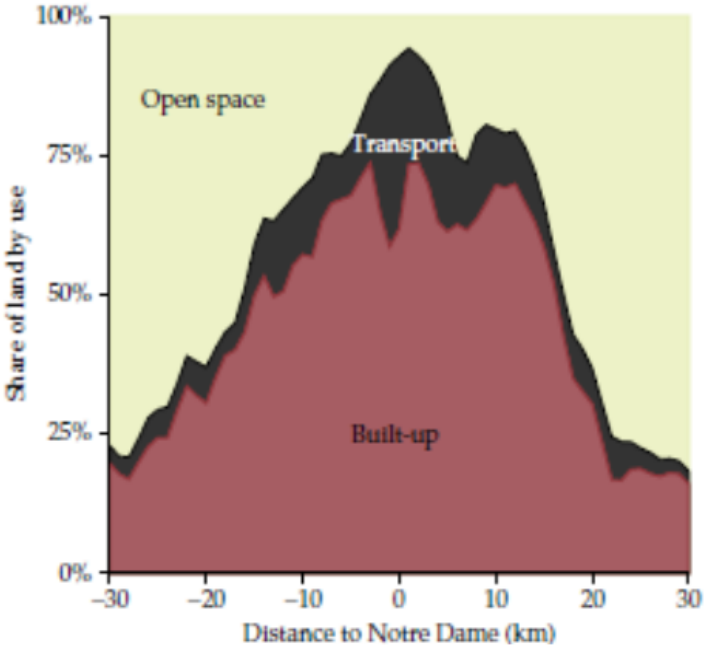
- Alonso, W. (1964). Location and land use. Harvard University Press.
- Mills, E. (1967). An Aggregative Model of Resource Allocation in a Metropolitan Area. American Economic Review 57(2), 197–210.
- Muth, R. (1969). Cities and housing. Chicago: University of Chicago Press.

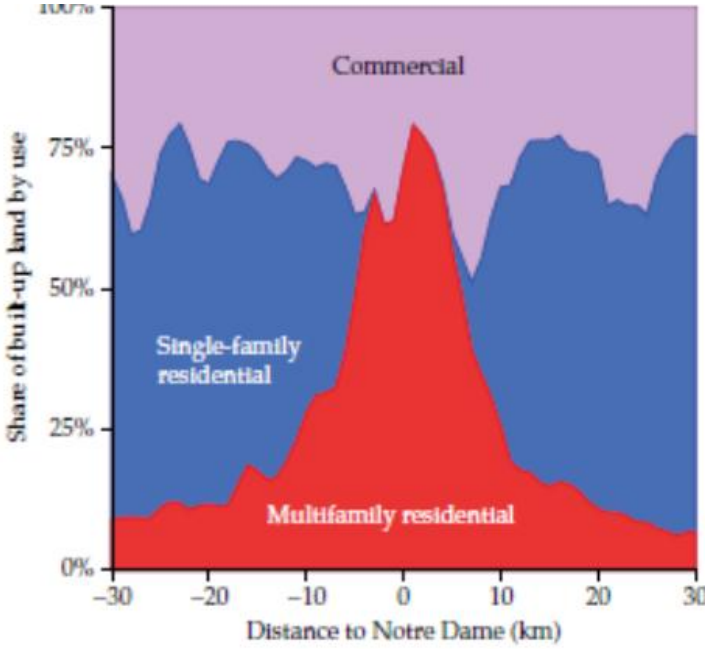
Theoretical Background

- **Empirical regularities** usually observable in actual patterns are influenced by these key factors.
  - Transportation costs
  - Housing prices
  - Housing demand
  - Utilities and profits across space
- All factors lead to the **spatial equilibrium.**

Land use in Paris

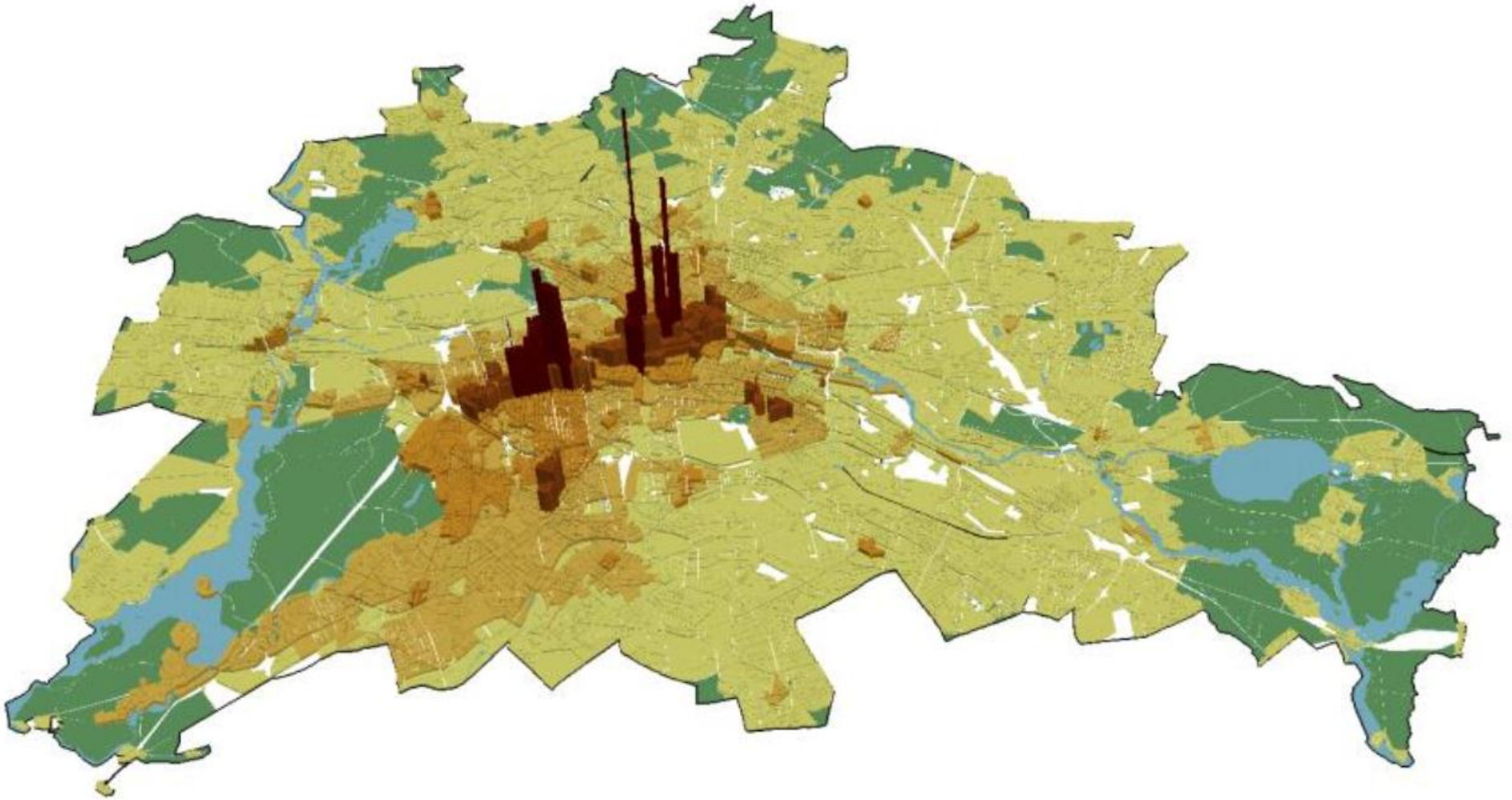






Source: Duranton, G. & D. Puga. 2015. Urban Land Use. In G. Duranton, J.V. Henderson, W.C. Strange (ed.), Handbook of Regional and Urban Economics, Vol 5, 467-560.

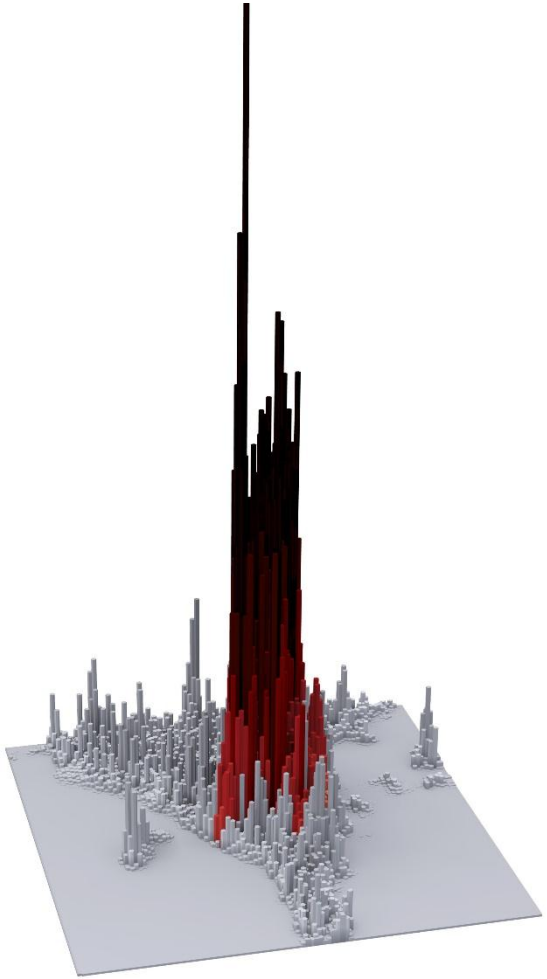
Land prices in Berlin



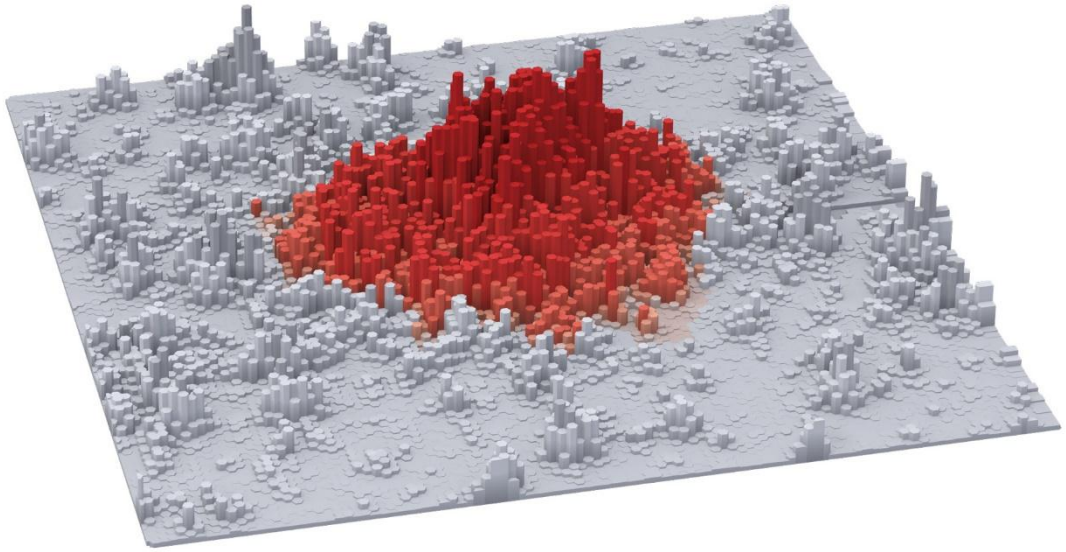
Source: Ahlfedt et al. (2015), *Econometrica.*

Urban centers with populations over 8 million

Cairo, with 153,606 people per square kilometer has the most extreme density with its super-tall spikes and narrow footprint.



London, on the other extreme, is very low and spread out with 18,769 people per square kilometer.

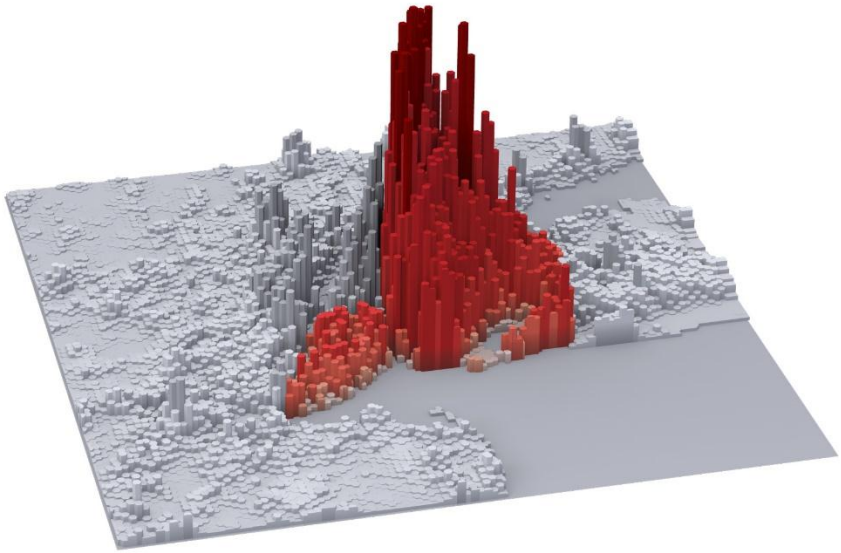


Source: https://www.6sqft.com/see-how-nycs-urban-density-stacks-up-against-other-major-cities/

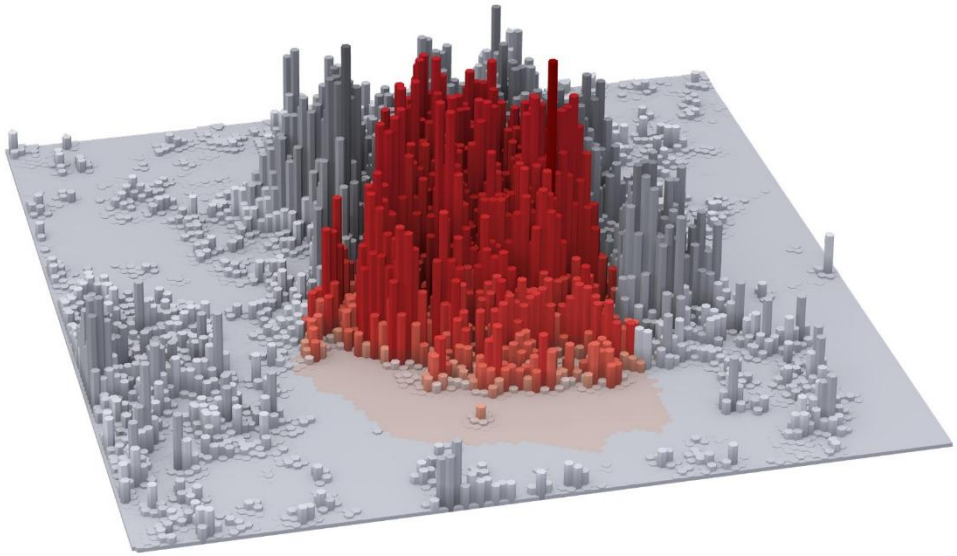
Urban centers with populations over 8 million

New York City's 38,242 people per square kilometer is most similar to Mexico City's 31,598 people per square kilometer and their density diagrams look relatively similar

New York City



Mexico City

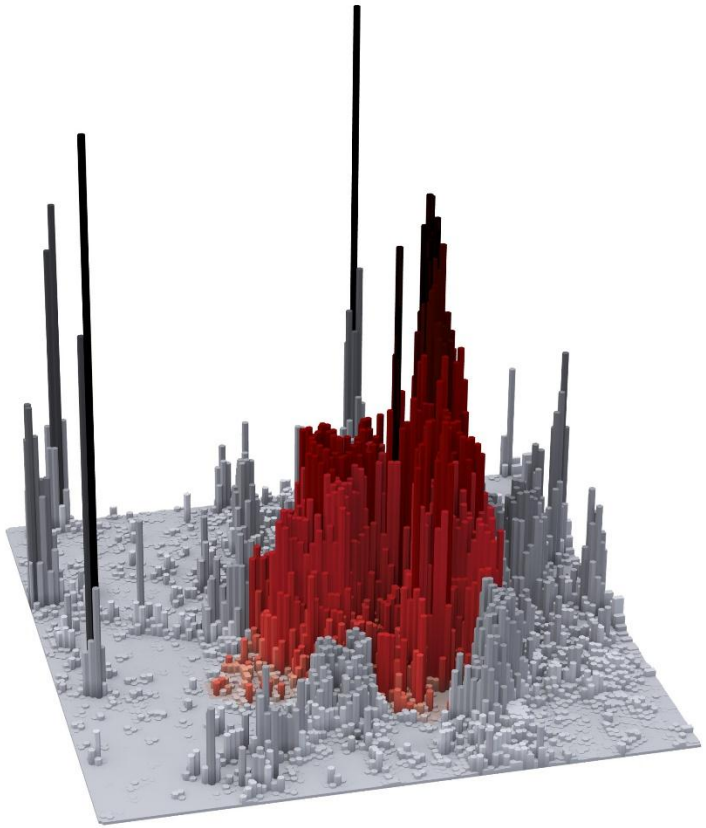


Source: https://www.6sqft.com/see-how-nycs-urban-density-stacks-up-against-other-major-cities/

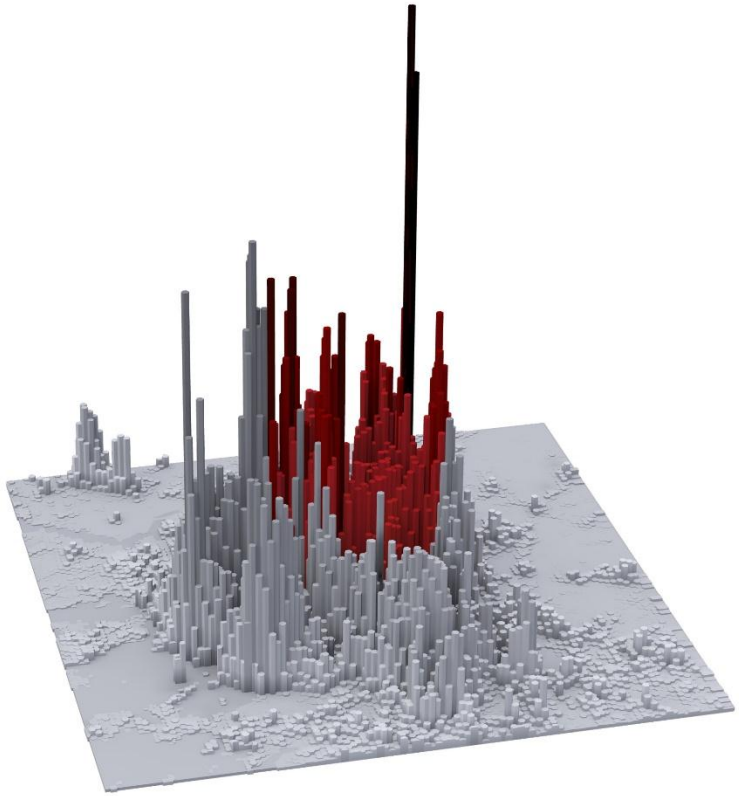
Urban centers with populations over 8 million

Delhi (66,151 people per square kilometer) and Seoul (84,086 people per square kilometer) look quite similar, just with their red and grey colors flipped, therefore Delhi has a higher density in the city limits and Seoul has a higher concentration outside the city limits.

Delhi



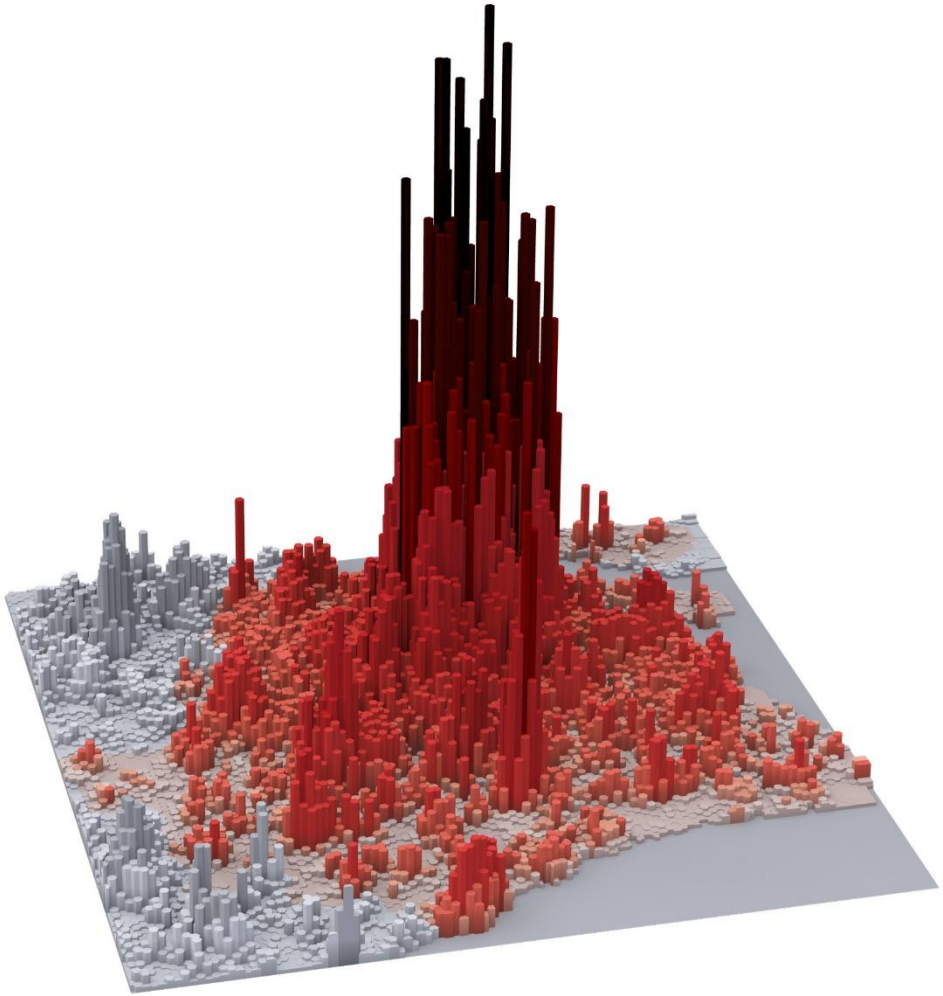
Seoul



Source: https://www.6sqft.com/see-how-nycs-urban-density-stacks-up-against-other-major-cities/

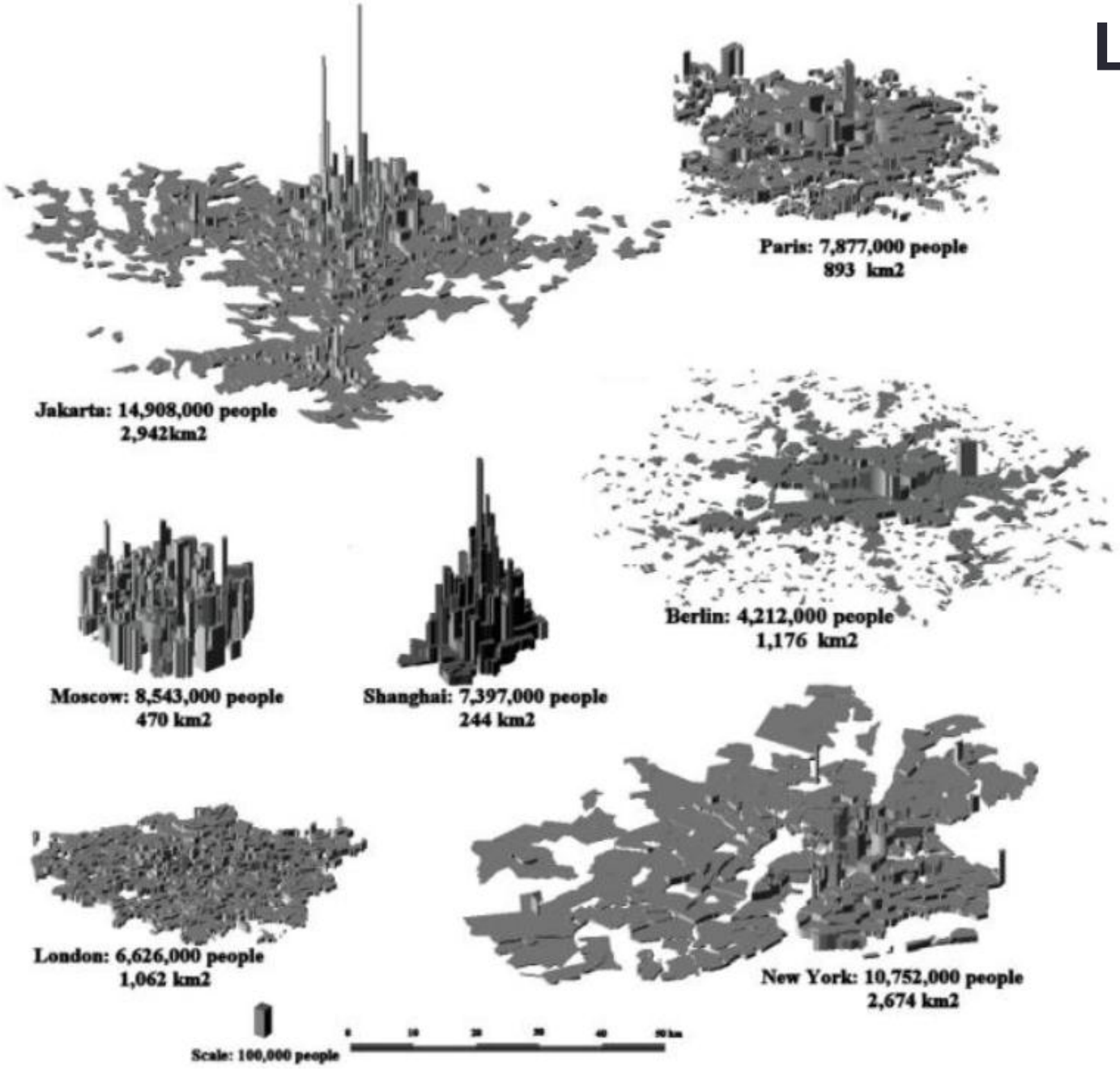
Urban centers with populations over 8 million

Shanghai (77,726 pp/km^2) looks more like what one might expect New York City to look like, high density both inside and outside the city limits.

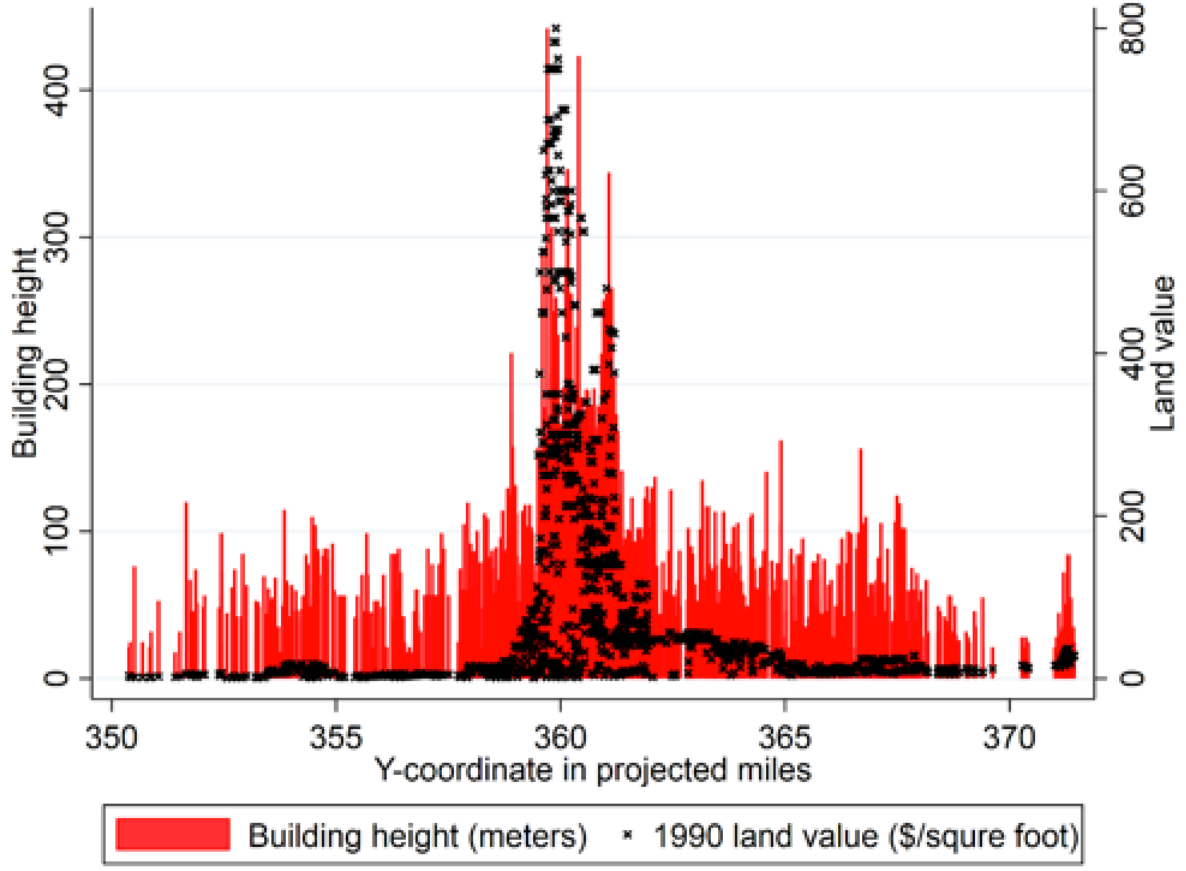


Source: https://www.6sqft.com/see-how-nycs-urban-density-stacks-up-against-other-major-cities/

Land prices in 7 cities



Building height and land prices in Chicago

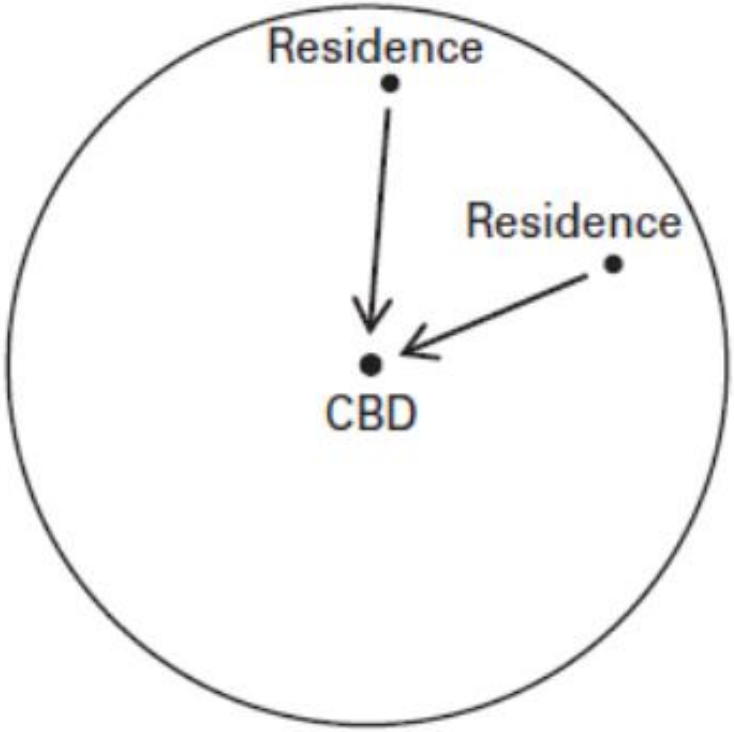


Notes: The building heights in 2014 are from Emporis.com. The 1990 land values are from Olcott's blue books. The y-coordinate is the vertical Cartesian coordinate in the State Plane Coordinate System (Illisnois East).

Source: Ahlfedt and McMillen (2018), Review of Economics and Statistics.

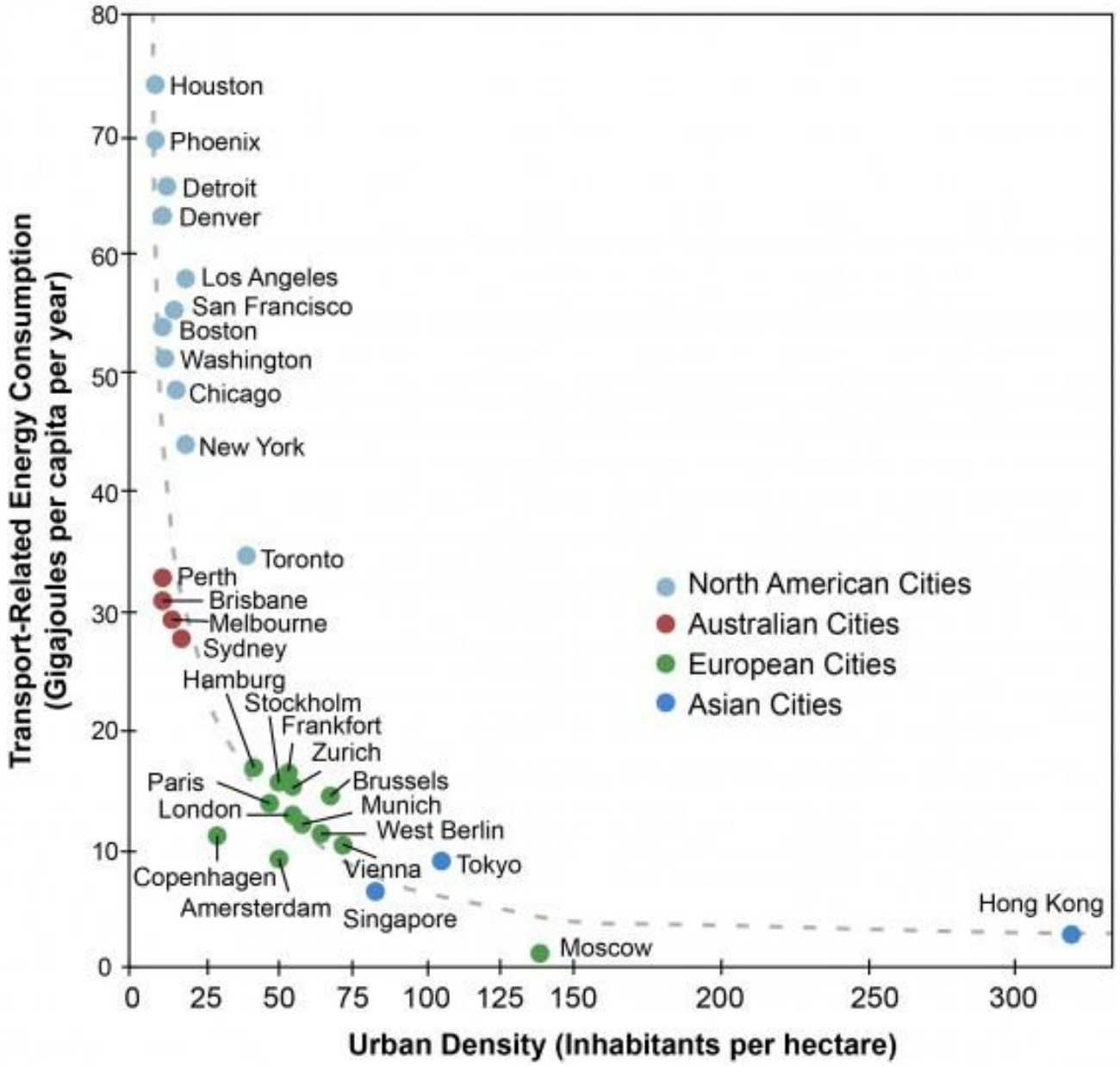
Key Fundamentals

- **All categories of job** are available at **the city center** (CBD)
- A city center is **the hub of all transportation** networks.

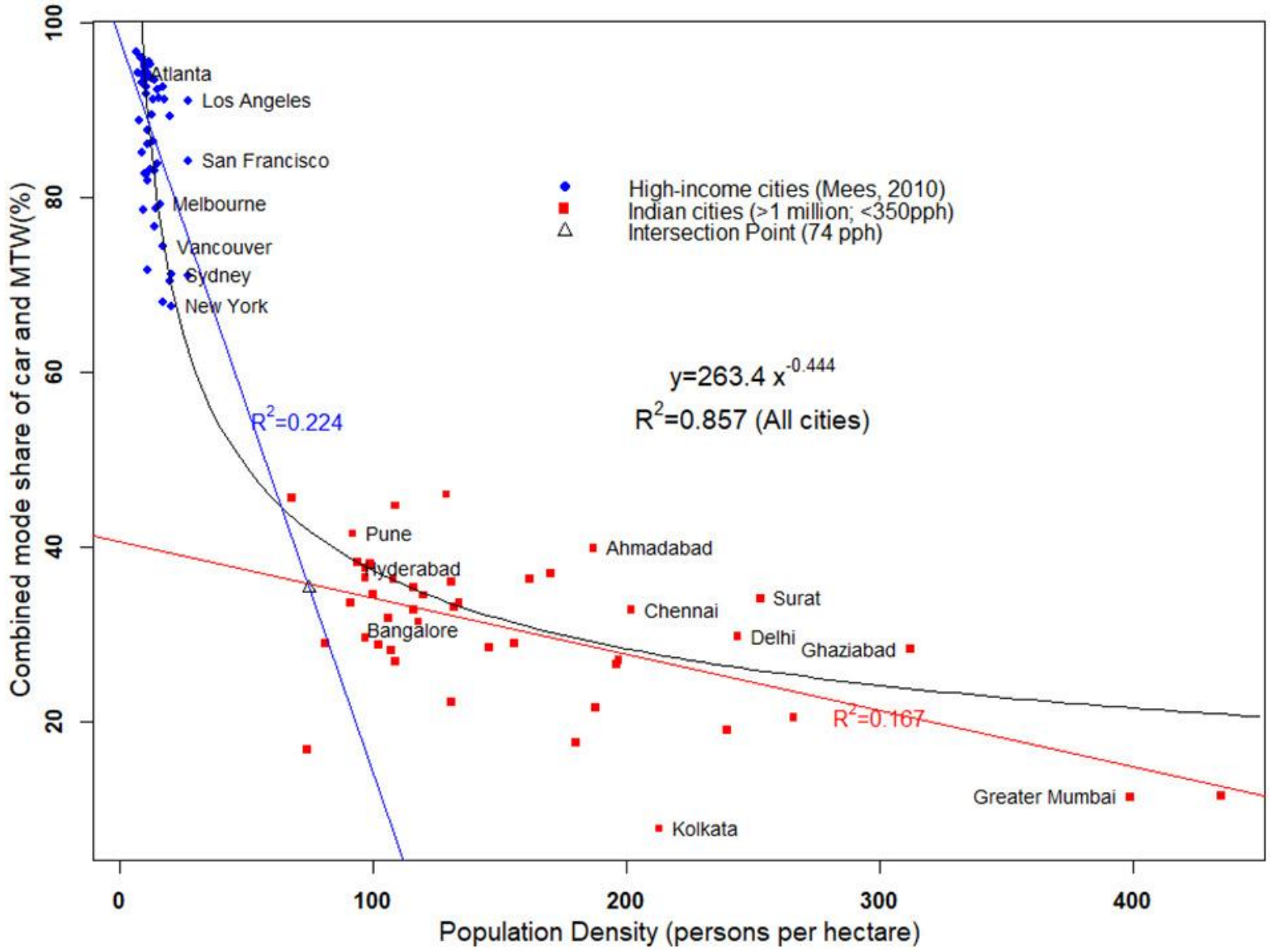


Key Fundamentals

- A radius of **decreasing density** from center of city.
- **Housing price** and **monthly rent** are high at the city center and **declining along with distance** from the city center



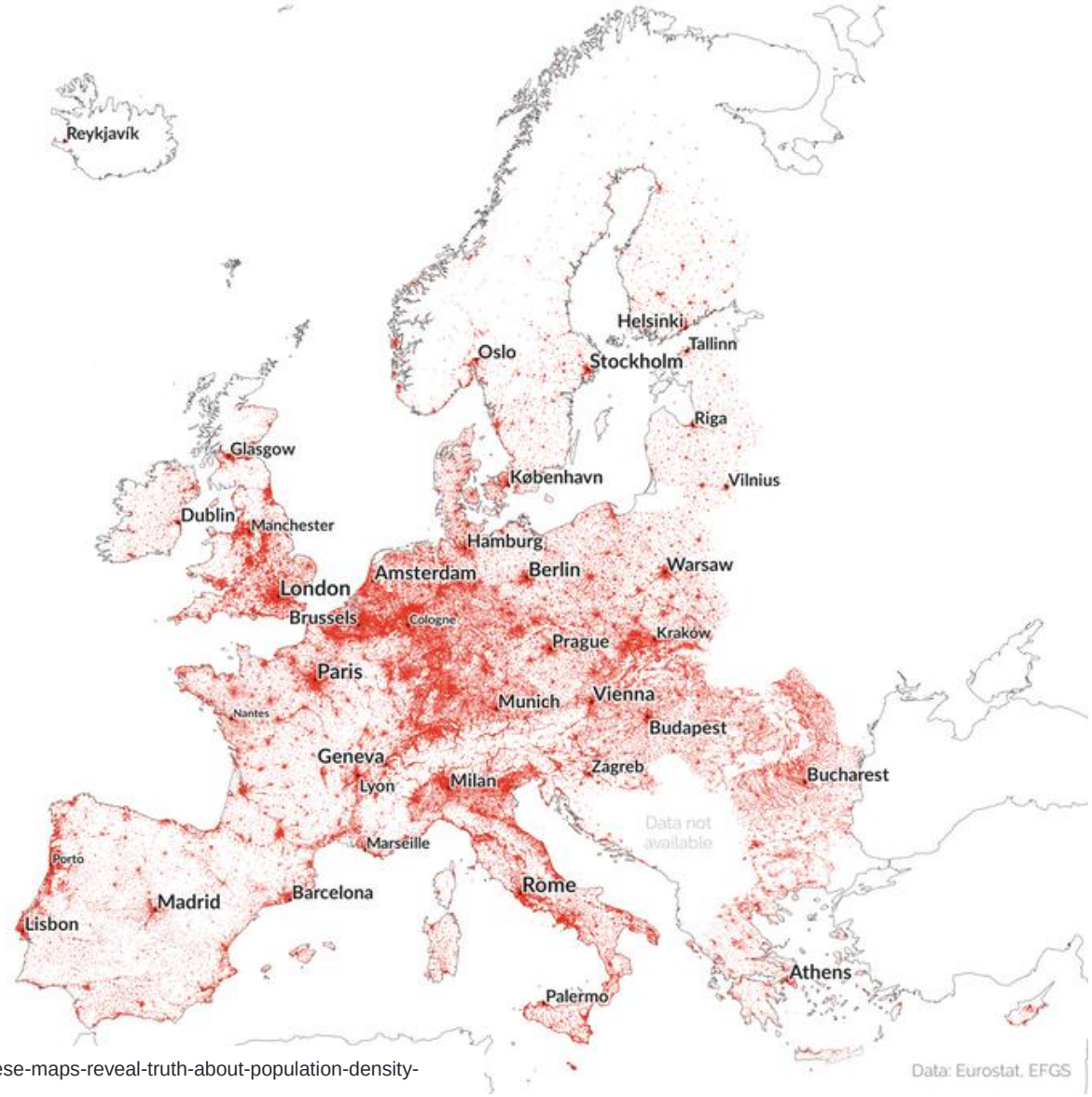
Source: http://css.umich.edu/factsheets/us-cities-factsheet



Source: Goel, R. & Mohan. D. (2020) Investigating the association between population density and travel patterns in Indian cities—An analysis of 2011 census data. Cities, Vol.100, 1-12.

POPULATION DENSITY IN EUROPE

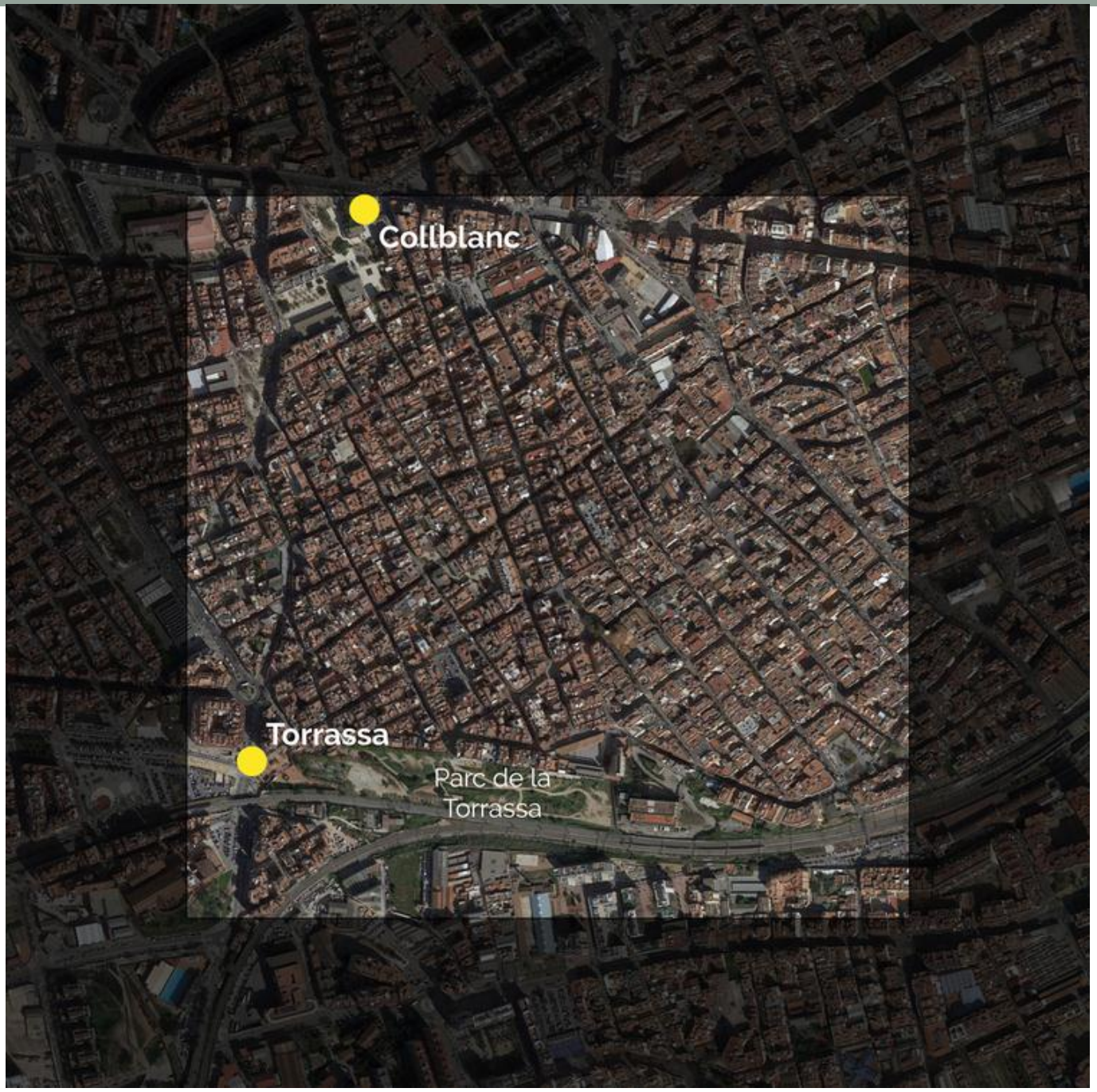
Areas with 250 people or more, per sq. km.



Source: https://www.citymetric.com/fabric/these-maps-reveal-truth-about-population-density-across-europe-3625

Country	Land Area (Sq Km)	Arithmetic Density	Built-up Density ('Lived Density')	Max 1km population	Population 2011	% of 1km cells populated
Monaco	2	18,067	18,067	12,564	36,133	100.0
Andorra	468	182	1,525	9,300	85,406	12.0
Malta	316	1,316	1,382	11,421	415,891	95.3
Spain	505,634	93	737	53,119	46,814,568	12.6
Netherlands	37,321	446	546	23,485	16,627,680	81.6
England	130,279	405	531	20,477	52,697,866	76.2
San Marino	61	420	493	2,034	25,629	85.2
Italy	301,289	197	453	22,113	59,369,049	43.5
Liechtenstein	160	223	447	1,947	35,775	49.8
Belgium	30,544	358	434	29,100	10,939,956	82.5
Romania	238,262	90	402	19,179	21,387,361	22.3
Switzerland	41,289	191	385	21,456	7,899,058	49.6
Greece	129,639	83	379	28,880	10,801,047	22.0
Germany	357,473	224	376	23,379	80,004,386	59.5
Hungary	93,067	107	368	10,451	9,923,425	29.0
Slovakia	49,134	110	358	15,379	5,391,770	30.7
Cyprus	9,487	88	319	5,439	839,063	27.8
Bulgaria	111,073	66	312	23,934	7,364,570	21.3
Luxembourg	2,634	192	308	7,213	505,682	62.3
Portugal	91,632	115	255	21,823	10,560,578	45.2
Czech Republic	78,970	132	236	23,249	10,420,401	55.8
Austria	83,911	100	220	16,984	8,385,332	45.5
Isle of Man	572	147	212	4,654	84,293	69.4
Wales	20,735	147	204	11,291	3,038,049	71.8
Scotland	80,077	63	200	11,069	5,044,291	31.4
Poland	312,101	123	196	32,752	38,497,929	63.0
France	551,695	114	195	52,218	62,744,459	58.4
Iceland	102,285	3	187	5,738	318,700	1.7
Denmark	43,282	128	183	22,381	5,530,902	69.7
Croatia	55,443	77	161	10,202	4,271,221	47.9
Northern Ireland	14,130	128	160	8,555	1,803,600	79.6
Slovenia	20,340	99	153	10,504	2,021,380	65.1
Latvia	64,659	32	116	10,123	2,061,100	27.5
Norway	334,778	15	89	15,673	4,906,148	16.5
Lithuania	64,915	47	85	16,166	3,022,087	54.9
Sweden	450,133	21	84	26,120	9,539,483	25.2
Ireland	70,728	65	81	12,176	4,573,374	80.0
Estonia	45,445	28	62	17,375	1,290,520	45.5
Finland	336,751	16	53	14,933	5,338,841	30.1

Source:
https://www.citymetric.com/fabric/these-maps-reveal-truth-about-population-density-across-europe-3625



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Real Estate Price

Determination of real estate price

p = rent per square meter

q = area (square meter)

i = discount rate

V = the value of a house or land

= the present value of the cash flow generated by future rents

Net Present Value (NPV) of the future rents is $$V = \sum_{t=1}^{T} \frac{p_t q_t}{(1+i)^t} \approx \frac{pq}{i}$$

Real Estate Price

In the case of perpetual rent, the value of real estate is

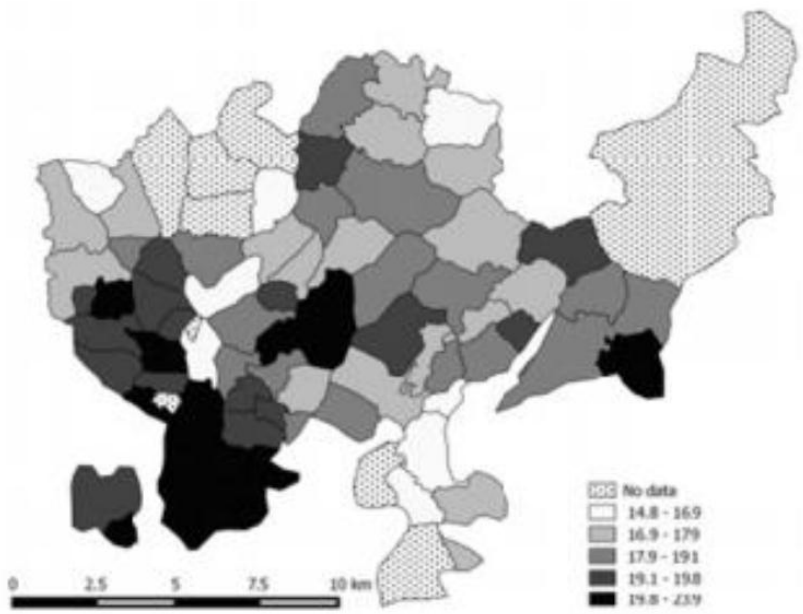
$$V_L = \frac{R_{L1}}{(1+i)} + \frac{R_{L2}}{(1+i)^2} + \frac{R_{L3}}{(1+i)^3} + \frac{R_{L4}}{(1+i)^4} + \cdots$$

$$= \sum_{t=1}^{\infty} \frac{R_{Lt}}{(1+i)^t} \approx \frac{R_L}{i}$$

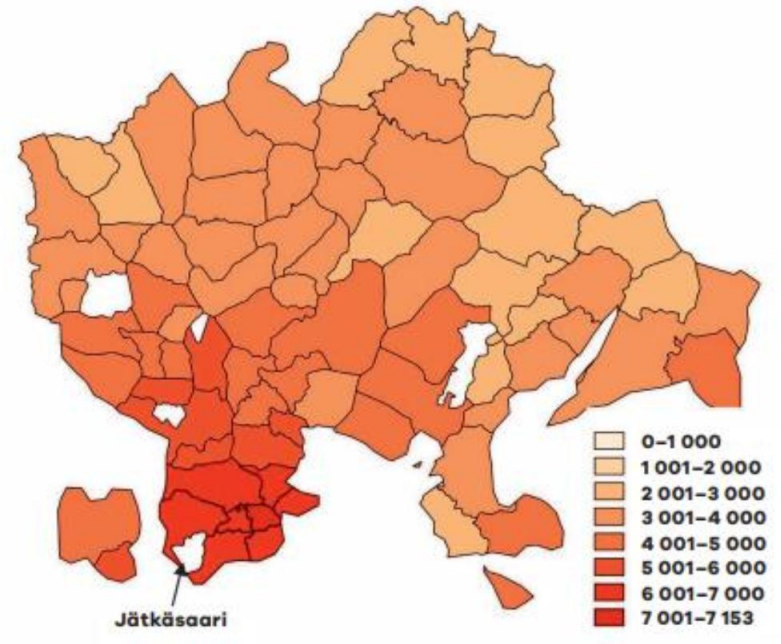
Note: Assuming $q = 1$.

Real Estate Price

Monthly rents per square meter in Helsinki



House prices per square meter in Helsinki



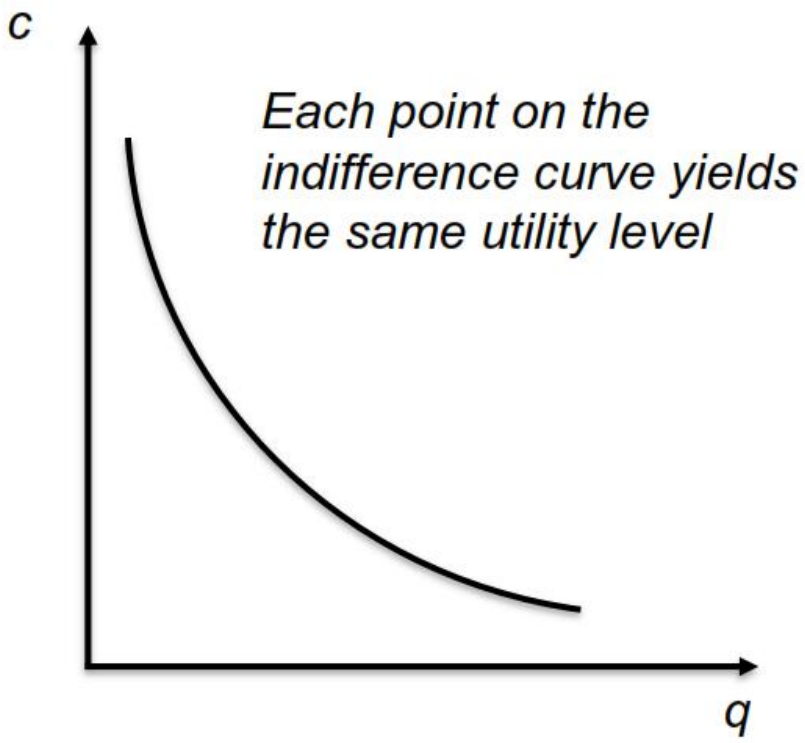
Lähde: Tilastokeskus

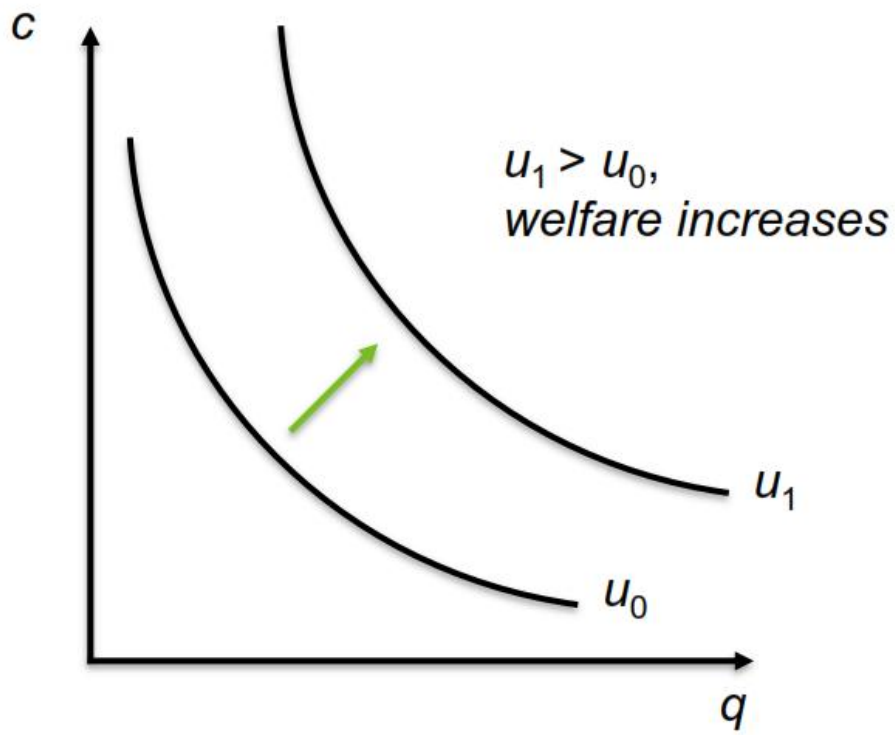
Source: Eerola and Saarimaa (2018), Journal of Housing Economics.

Spatial Equilibrium

Based on microeconomic theory, utility maximization is a decision-making process which is the interaction between utility curve and budget constraint.

Utility curve

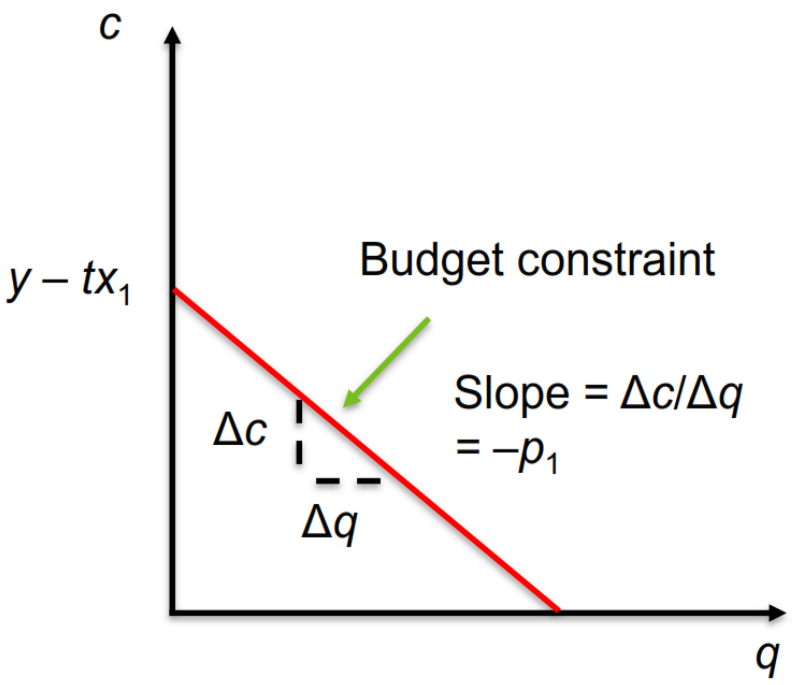




Spatial Equilibrium

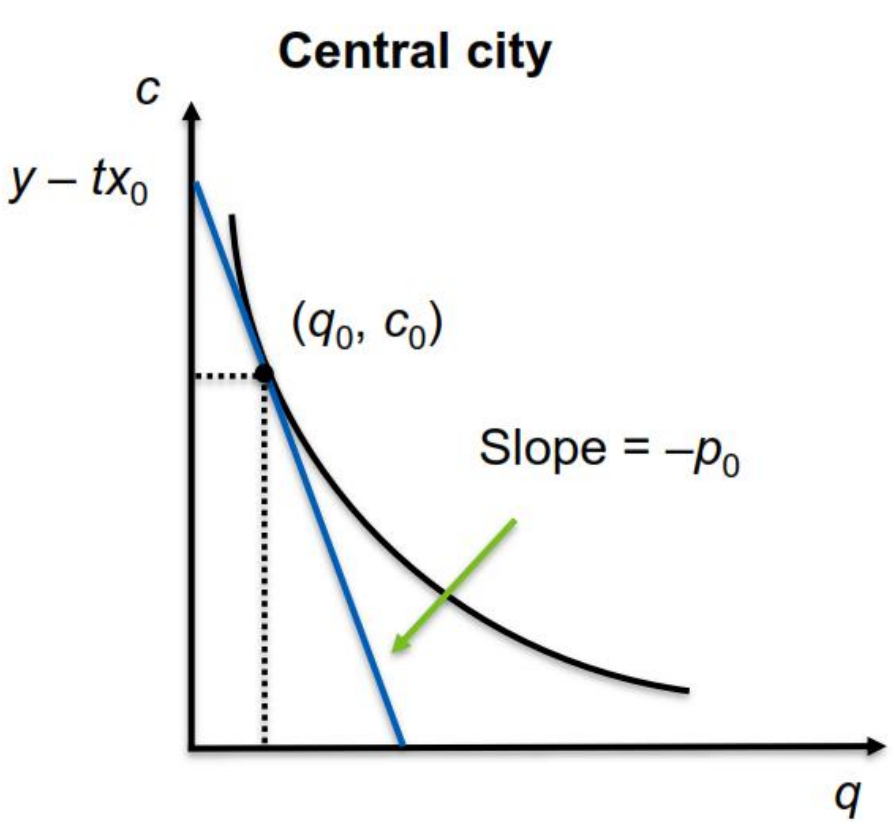
Budget constraint

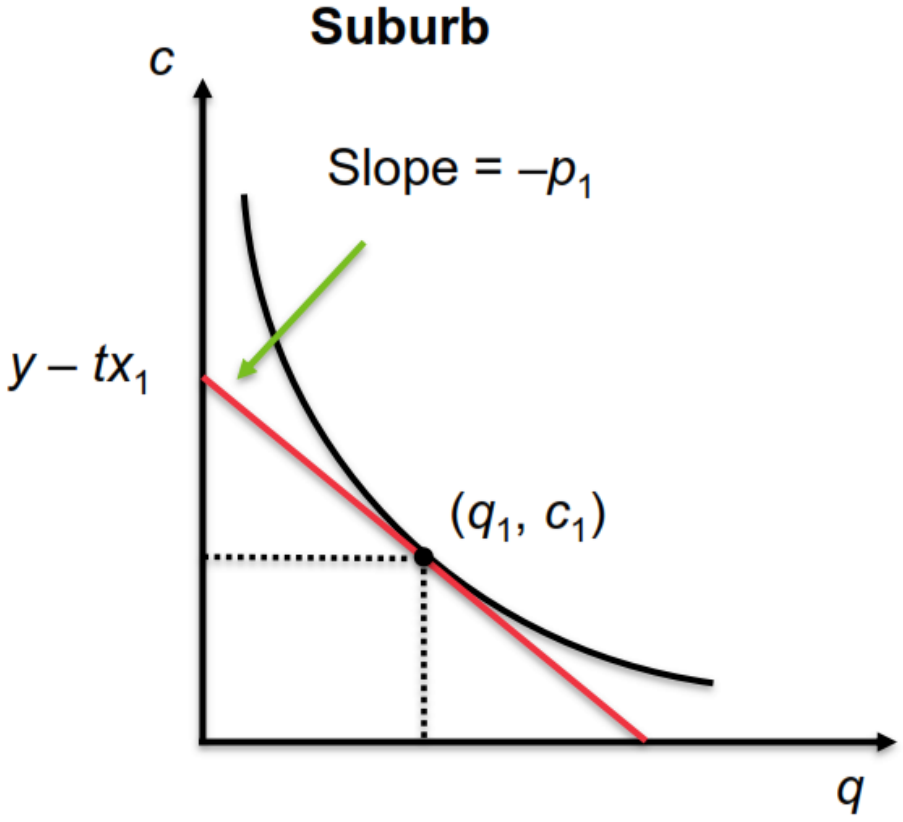
y = income of a household
t = per-kilometer cost of commuting
x = distance from city center
c = consumption expenditure
q = square meters of housing



Spatial Equilibrium

The spatial equilibrium exists with two sets of budget constraints. These utility-maximization behaviors create the spatial distribution of housing.

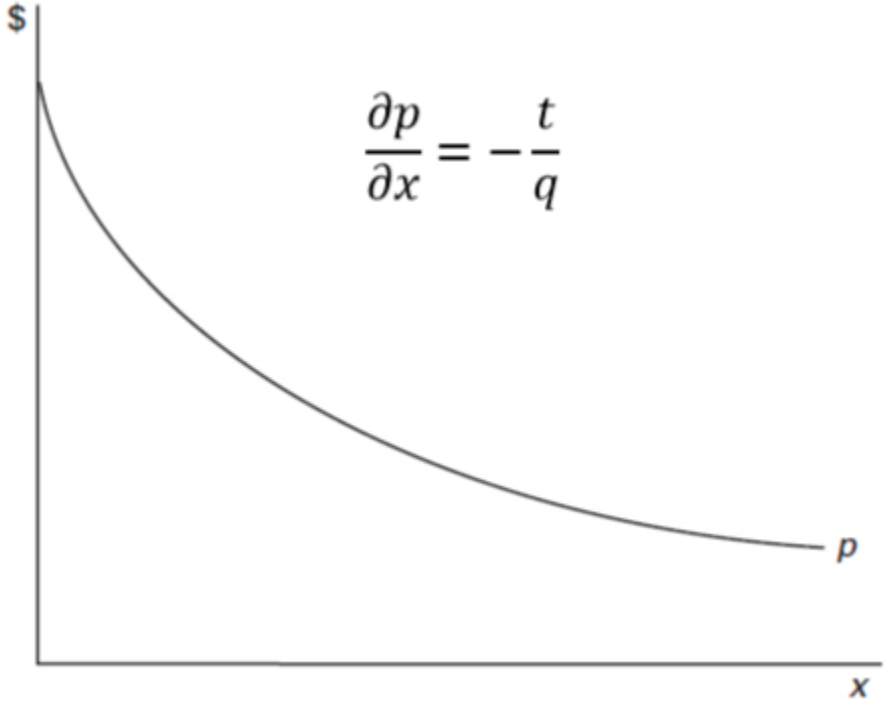




- A substitution between transportation cost and housing space.
- A substitution between consumption expenditure and distance from the city center.

Spatial Equilibrium

Real estate's price curve

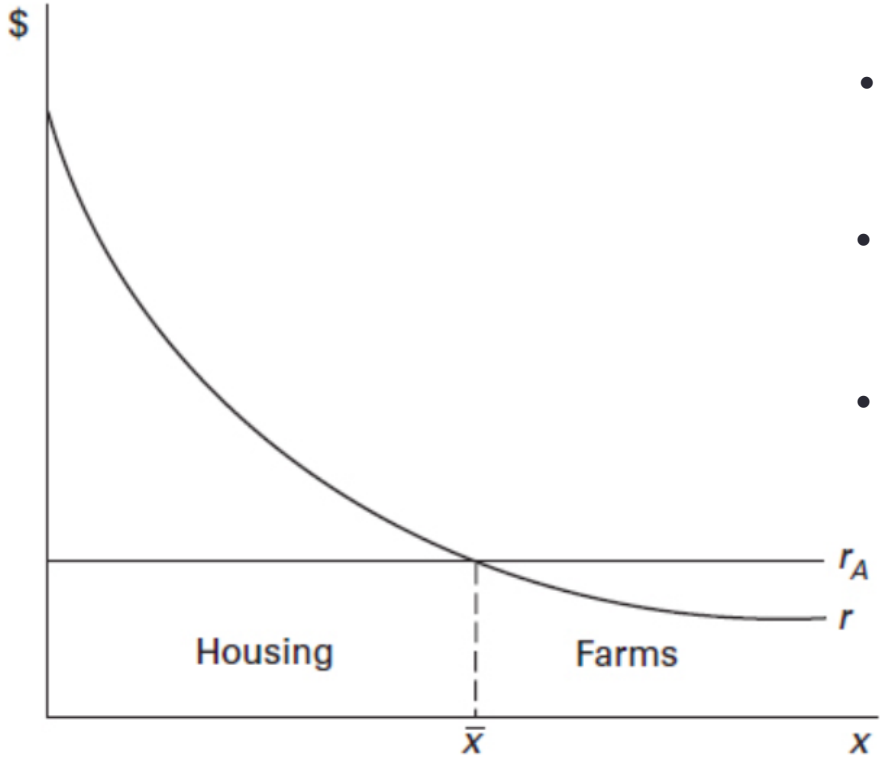


- The price curve is convex because *p* is **negatively associated** with *x.*
- The slop of the price curve depends on:
  - *t* (per-kilometer cost of commuting)
  - *q* (housing space)

Spatial Equilibrium

Supply-demand equilibrium of the city

- The city's boundary is the outcome of **competition** between **urban activity** and **agriculture**.

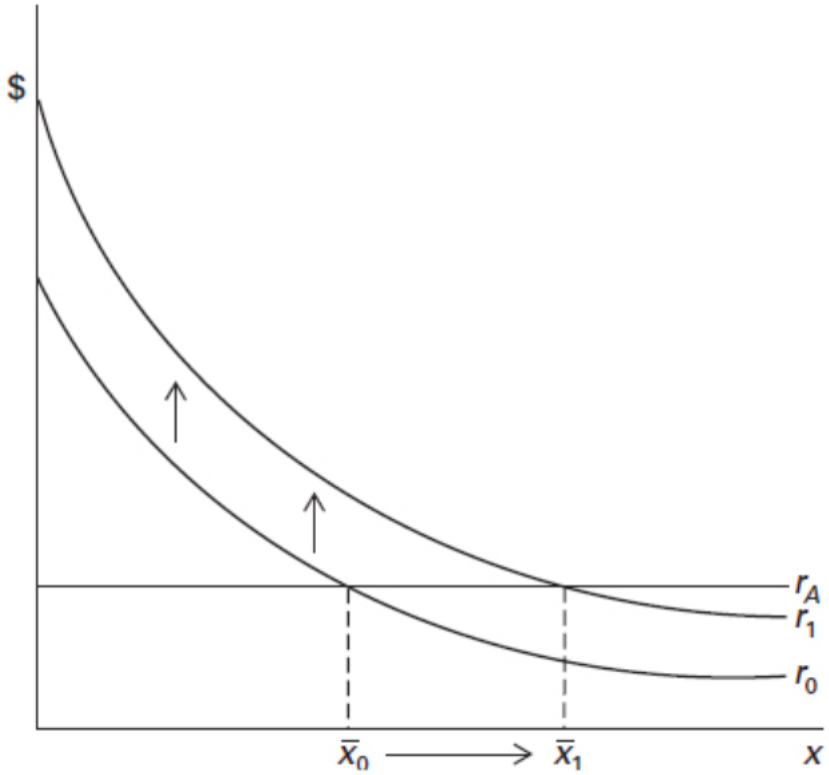


- r_A is rent for farming activity which is constant for all areas.
- $\bar{X}$ is the location where the rent of both urban and agricultural activities are equal.
- $\bar{X}$ is the boundary of the city.

Spatial Equilibrium

Expansion of city

- The **city's boundary** will **expand** if the number of **population increase**, leading to a higher demand for housing.

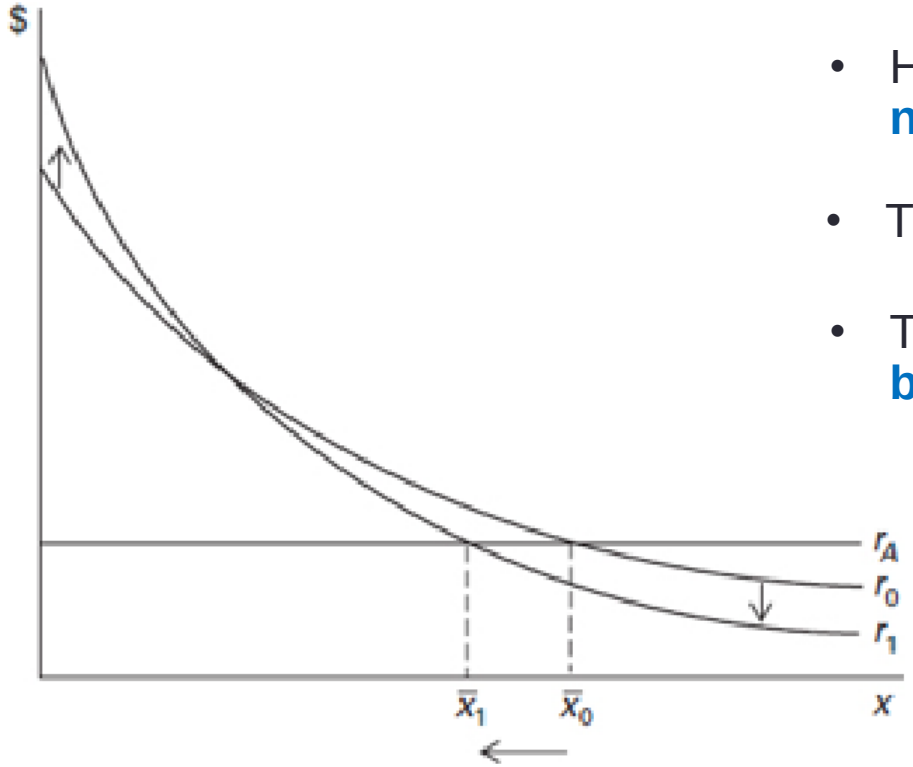


- The rent is increased from r_o to r_1 causing the boundary of city to expand from $\bar{X}_0$ to $\bar{X}_1$.

Spatial Equilibrium

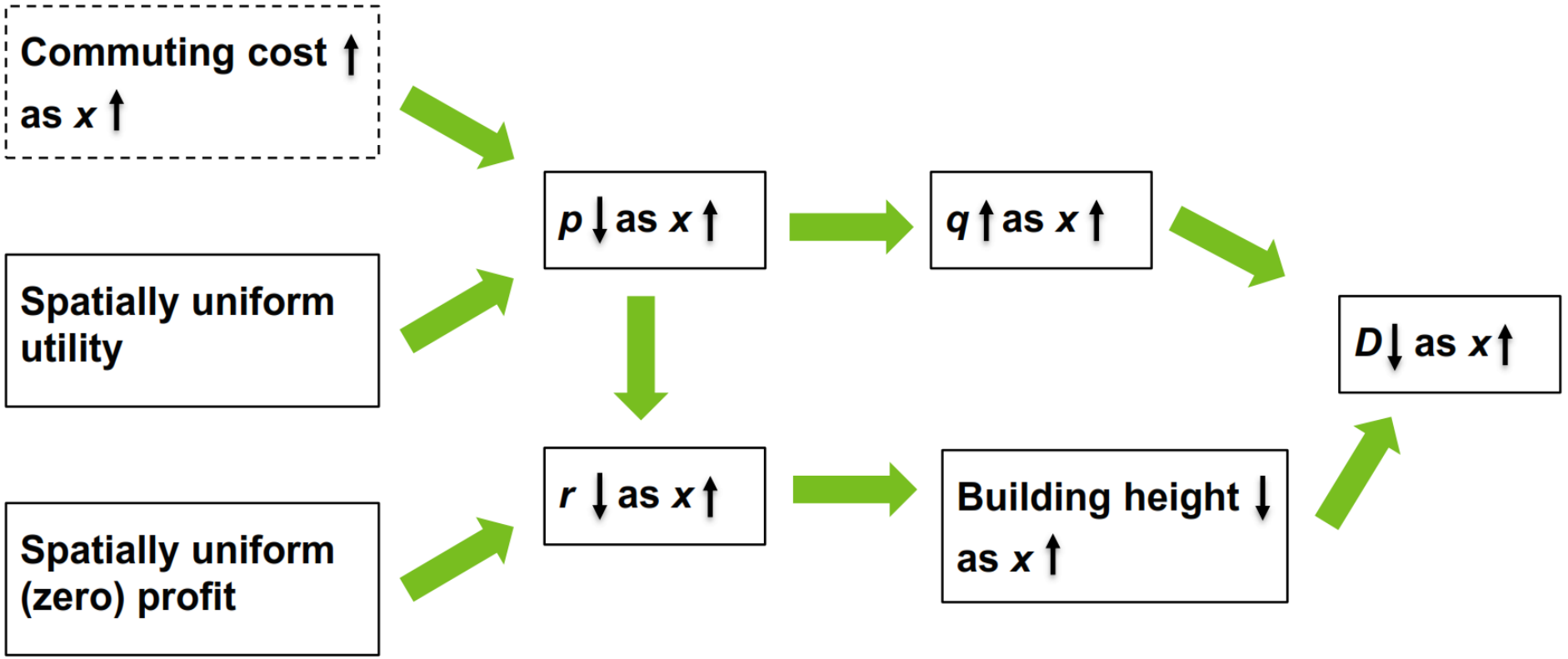
Increase in commuting cost

- People living in the suburb will **increase their utilities** by **moving closure** to the city center.



- Housing prices will increase to reach the **new spatial equilibrium**.
- The price curve will **rotate clockwise**.
- These changes will **relocate** the **boundary** of city.

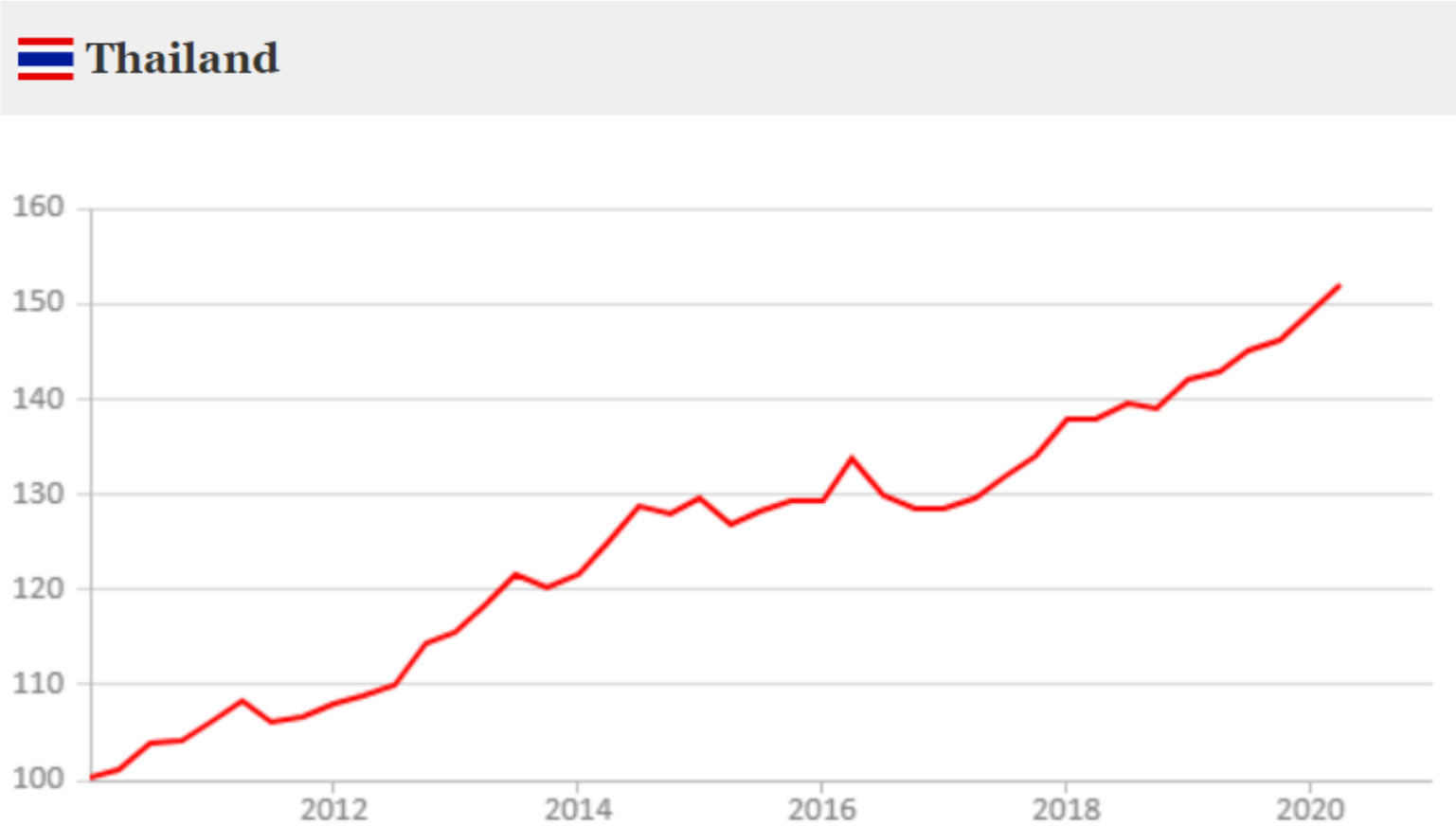
Spatial Equilibrium



D = population density

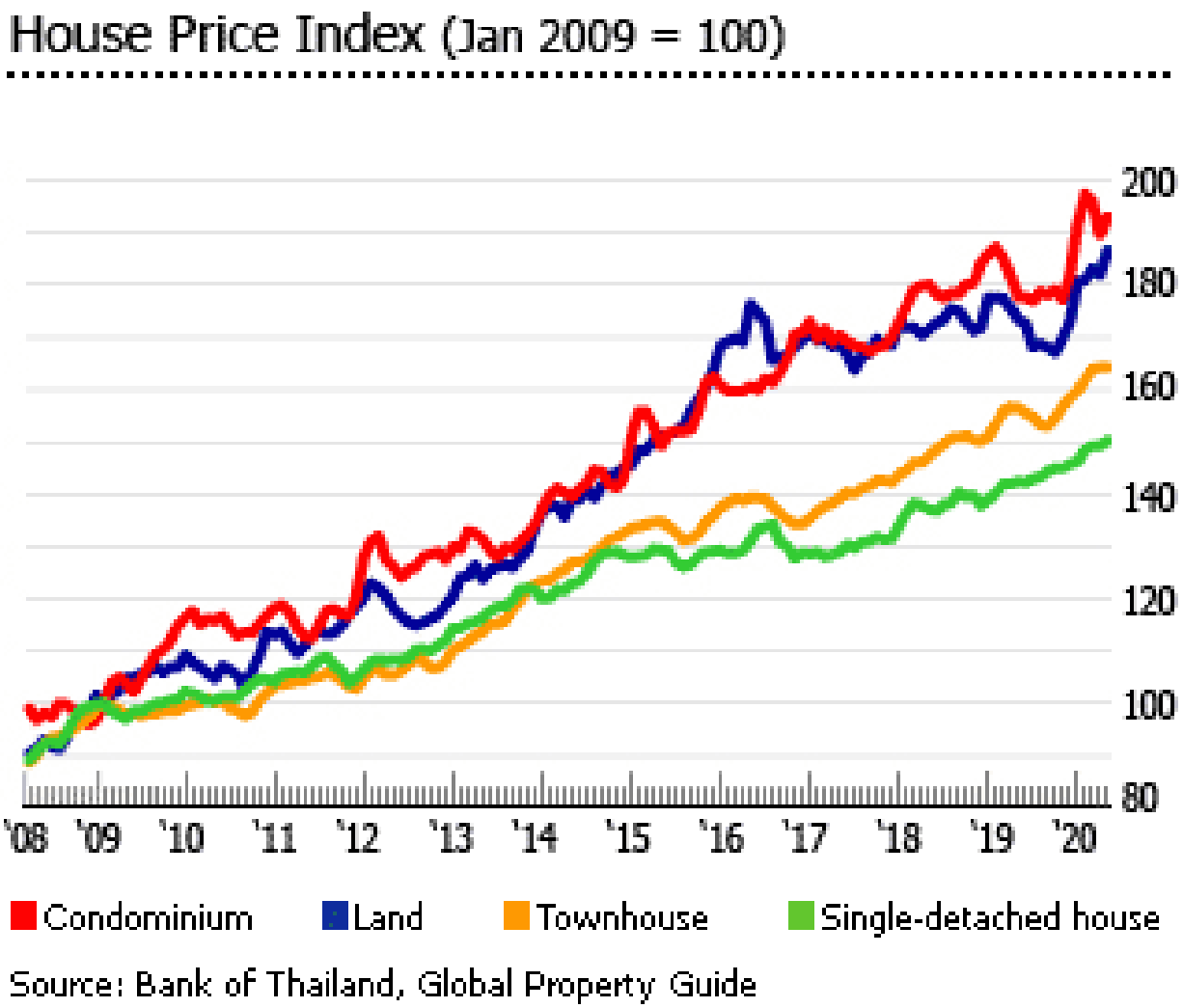
Real Estate Price: Thailand

Thailand house prices: single detached landed houses (2009 = 100)



Source: https://www.globalpropertyguide.com/Asia/Thailand/Price-History

Real Estate Price: Thailand



Source: https://www.globalpropertyguide.com/Asia/Thailand/Price-History

Real Estate Price: Thailand

House price changes in Thailand, nominal and inflation-adjusted ('real')

% change over a year earlier

Source: https://www.globalpropertyguide.com/Asia/Thailand/Price-History

Real Estate Price: Thailand

Last Updated: June 14, 2019

BANGKOK - condos	COST (US$)		YIELD (p.a.)	PRICE/SQ.M. (US$)	
	TO BUY	MONTHLY RENT		TO BUY	MONTHLY RENT
Sukhumvit area	335,561	1,373	5.13%	5,266	22.53
Silom-Sathon area	341,931	552	4.65%	4,559	17.67

All yields are gross - i.e., before taxes, repair costs, ground rents, estate agents fees, and any other costs. Net yields (what you´ll really earn) are typically around 1.5% to 2% lower.

Districts researched:
Sukhumvit area: near BTS Ekkamai, BTS Thong Lo and BTS Phrom Phong
Silom-Sathon area: near BTS Chong Nonsi and BTS Krung Thon Buri

Source: https://www.globalpropertyguide.com/Asia/Thailand/Rental-Yields