

Lecture 2: Modelo Monocéntrico

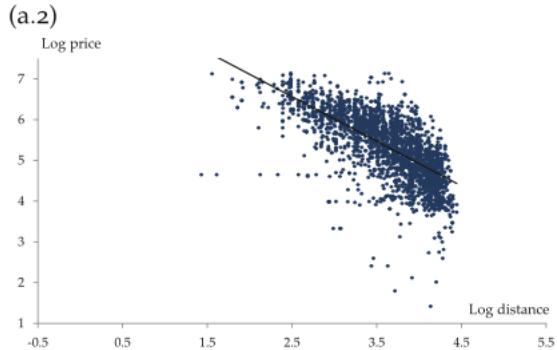
Urban Economics

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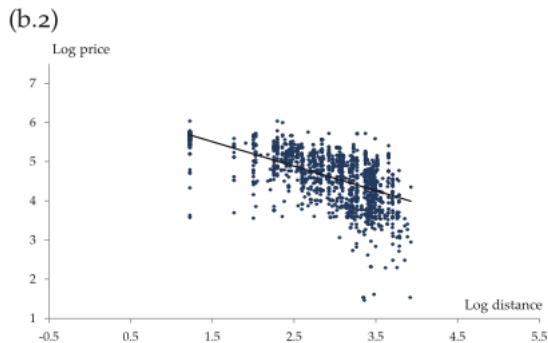
August 12, 2024

Figure 1: Land Values: Paris



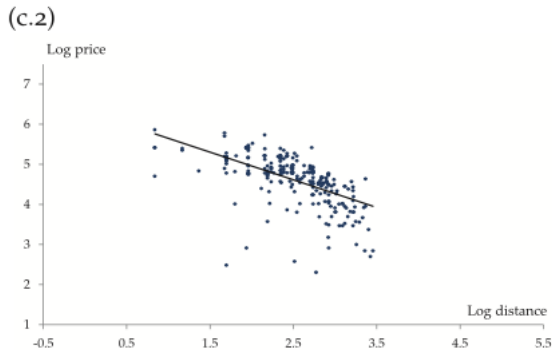
Fuente: Combes et al. (2019)

Figure 2: Land Values: Toulouse



Fuente: Combes et al. (2019)

Figure 3: Land Values: Dijon



Fuente: Combes et al. (2019)

Figure 4: Land Values: Hiratsuka

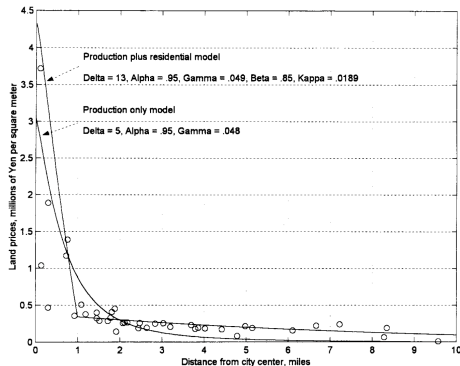


FIG. 11. 1991 land prices in Hiratsuka, Japan.

Fuente: Lucas et al. (2001)

Figure 5: Land Values: Yokohama

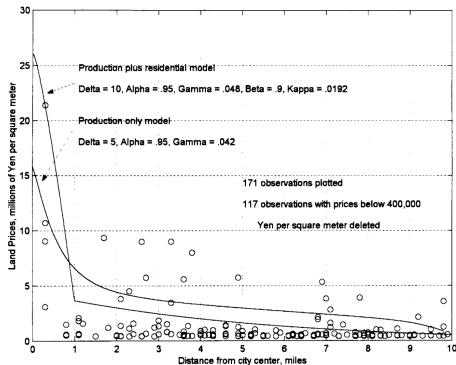
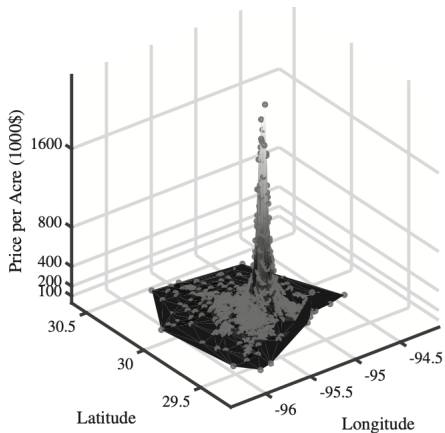


FIG. 12. 1991 land prices in Yokohama, Japan.

Fuente: Lucas et al. (2001)

Figure 6: Land Values: Houston



Fuente: Albouy et al. (2017)

Monocentric Model

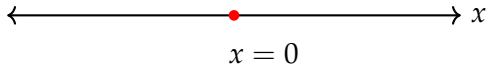
Assumptions

- ▶ The model is based on strategically chosen simplifications, which facilitate a simple analysis.
- ▶ These simplifications are chosen to capture the essential features of cities, leaving out details that may be less important.
- ▶ Once the model is analyzed and its predictions are derived, we can add greater realism, often with little effect on the main conclusions.

Monocentric Model

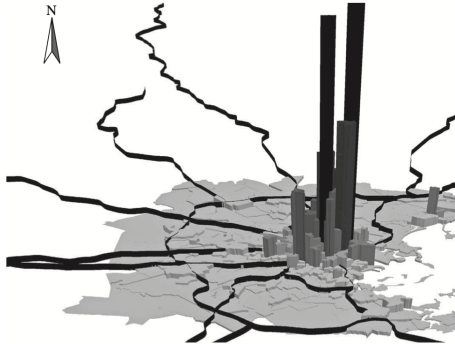
Assumptions

- ▶ We model the city as a line, featurless plane.
- ▶ The the city has a dense network of roads.
- ▶ All the city's jobs are in the center, in an area called the “central business district” (CBD).



Modelo Monocéntrico

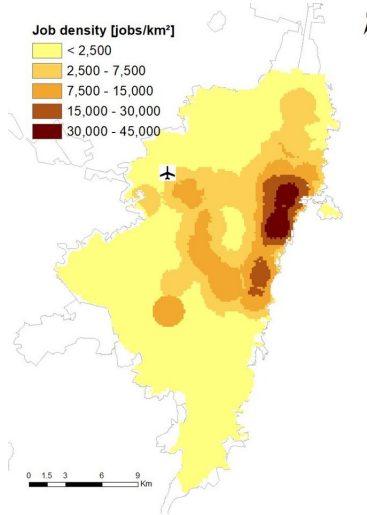
MAP 7-2 The Spatial Distribution of Employment: Boston



MAP 7-1 The Spatial Distribution of Employment: Portland



Modelo Monocéntrico



Job density

Fuente: Guzman, L. A., Arellana, J., Oviedo, D., & Aristizábal, C. A. M. (2021). COVID-19, activity and mobility patterns in Bogotá. Are we ready for a '15-minute city'?. *Travel Behaviour and Society*, 24, 245-256.

Monocentric Model

Assumptions

- ▶ The city contains identical households.
- ▶ Each household has the same preferences over consumption goods,
- ▶ Each earns the same wage from work at the CBD
- ▶ The city's residents consume only two goods: housing and a composite good that consists of everything other than housing.

Monocentric Model

Assumptions

- ▶ The parameter t represents the cost of commuting
- ▶ The cost of commuting to work at the CBD is higher the larger is x

Modelo Monocéntrico: equilibrio espacial

“Todos los hogares resuelvan el problema del hogar y nadie quiera mudarse”.

“No hay ganancias de cambiar de ubicación”

Modelo Monocéntrico: equilibrio espacial

- ▶ Para el modelo de ciudad monocéntrico, el equilibrio espacial viene en dos sabores:
 - ▶ 'Ciudad Abierta'. Los individuos son indiferentes (alcanzan el mismo nivel de utilidad) entre las ubicaciones en la ciudad y su opción externa. En este modelo, la población se ajusta.
 - ▶ 'Ciudad Cerrada'. Los individuos son indiferentes entre las ubicaciones en la ciudad, pero no se les permite irse de la misma. La población de la ciudad es fija, y el nivel de utilidad constante se ajusta.

Modelo Monocéntrico: equilibrio espacial

Ciudad Abierta

$$U(z^*) = \bar{U}$$

$$z^* = w - R(x)\bar{l} - t|x|$$

$$\bar{x} = \frac{w - z^* - \bar{R}\bar{l}}{2t}$$

$$N^* = \frac{2\bar{x}}{\bar{l}}$$

Ejemplo: Ciudad Abierta

Problema

Supongamos

$$\blacktriangleright U(z) = \ln(z)$$

$$\blacktriangleright \bar{R} = 0$$

$$\blacktriangleright \bar{u} = 0$$

$$\blacktriangleright \bar{l} = 1$$

$$\max_{z,x} \ln(z) \tag{1}$$

$$s.t. \tag{2}$$

$$w = z + R(x) + t|x| \tag{3}$$

Ejemplo: Ciudad Abierta

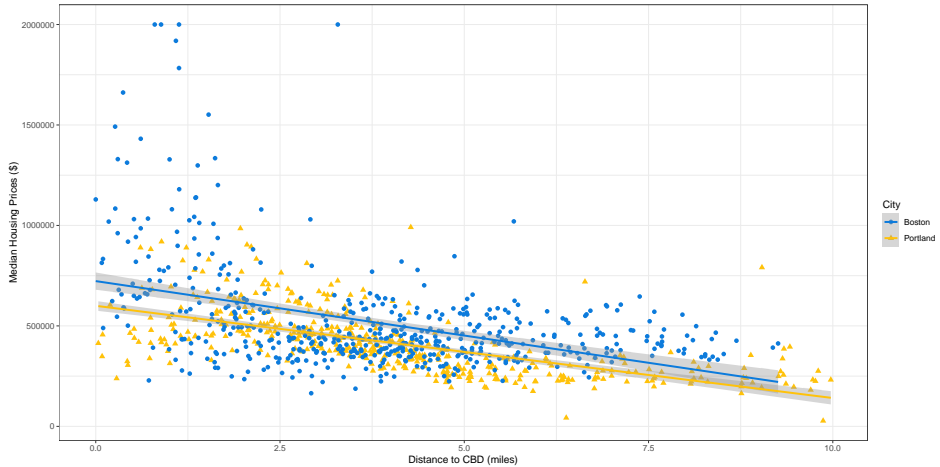
Solución

$$\ln(z^*) = 0 \Rightarrow z^* = 1 \quad (4)$$

$$R^*(x) = \begin{cases} w - 1 - tx & \text{si } 0 < x < \frac{w-1}{t} \\ w - 1 + tx & \text{si } 0 > x > -\frac{w-1}{t} \\ 0 & \text{si } |x| > \frac{w-1}{t} \end{cases} \quad (5)$$

Cont.

Estática Comparativa



Fuente: Elab. propia en base a datos de la ACS 2018.