Lecture 3: Modelo Monocéntrico

Urban Economics

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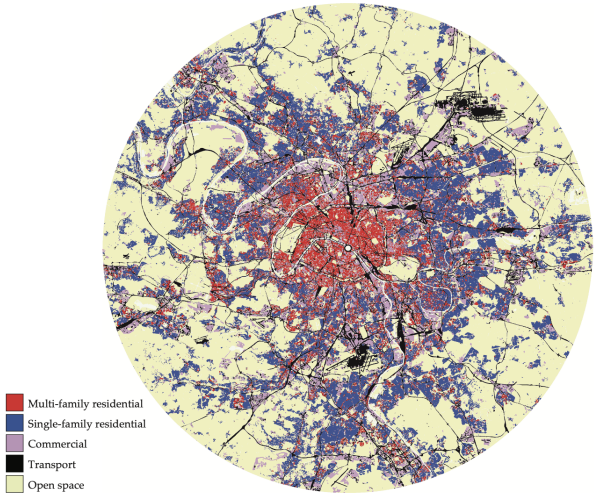
Motivación

Uso de la tierra en París



Fuente: Duranton, G., & Puga, D. (2015). Urban land use. In Handbook of regional and urban economics (Vol. 5, pp. 467-560). Elsevier.

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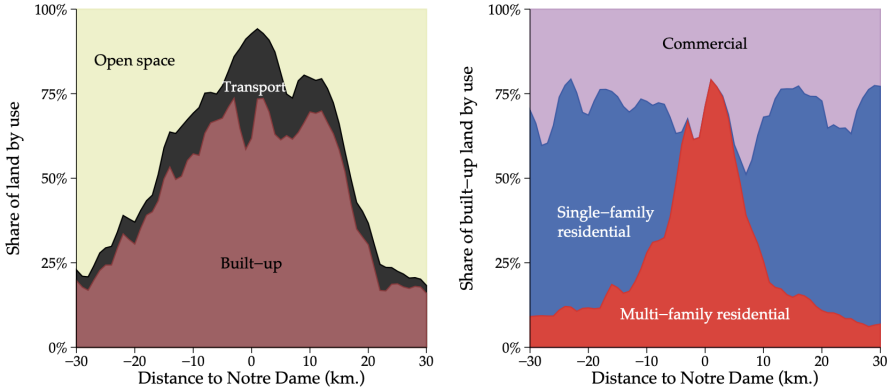

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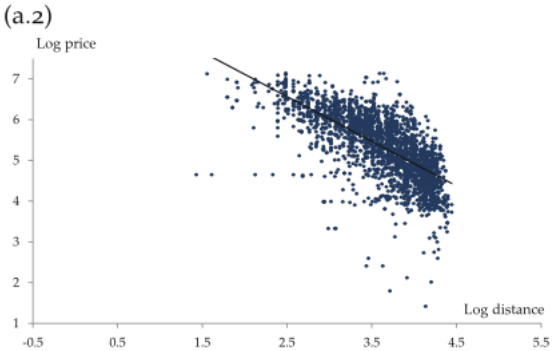
Gradientes en la vida real

Figure 1: Land Values: Paris



Fuente: Combes et al. (2019)

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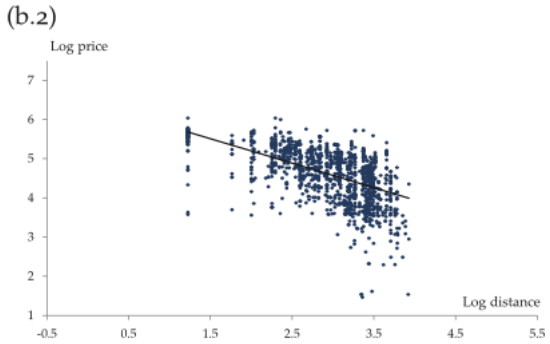
Figure 2: Land Values: Toulouse



Fuente: Combes et al. (2019)

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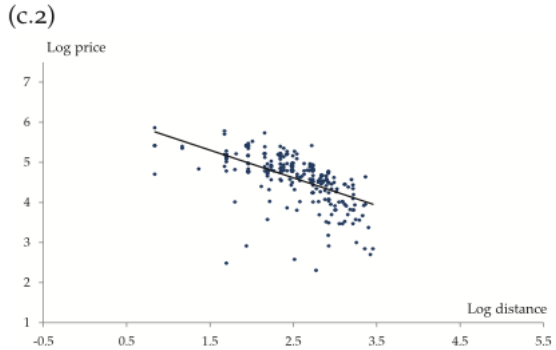
Figure 3: Land Values: Dijon



Fuente: Combes et al. (2019)

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Figure 4: Land Values: Hiratsuka

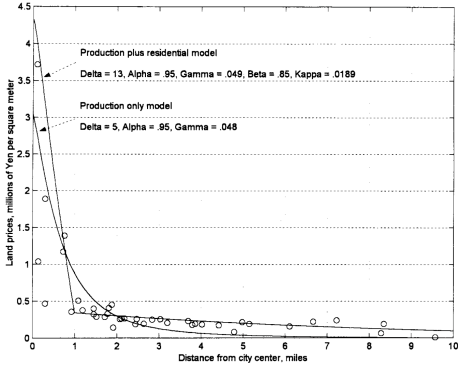

FIG. 11. 1991 land prices in Hiratsuka, Japan.

Fuente: Lucas et al. (2001)

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Figure 5: Land Values: Yokohama

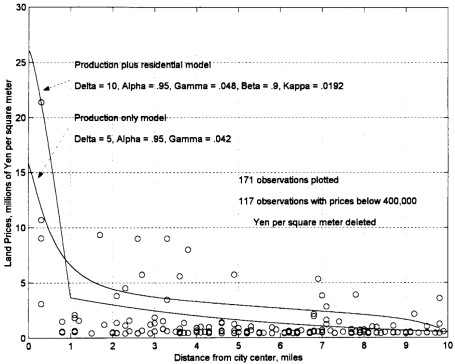

FIG. 12. 1991 land prices in Yokohama, Japan.

Fuente: Lucas et al. (2001)

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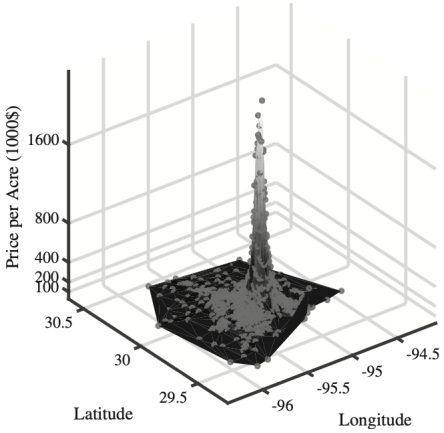
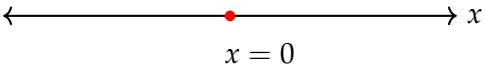
Figure 6: Land Values: Houston



Fuente: Albouy et al. (2017)

Modelo Monocéntrico

Figure 7: Ciudad



Modelo Monocéntrico

- Dos bienes: $\bar{l}$, z ($p_z = 1$)
- Salario w
- Arriendo tierra $R(x)$, $\bar{R}$
- Costos de transporte τ.
- Hay N individuos ídenticos en esta ciudad
- Todas las rentas de la tierra, urbana y agricola, las percibe un "arrendatario ausente" y se va del modelo

Modelo Monocéntrico

- Problema

$$\max_{z,x} U(z)$$

$$st$$

$$w = z + R(x)\bar{l} + t|x|$$

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

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

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

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

$$R^*(x) = \begin{cases} \frac{w - z^* - t|x|}{\bar{l}} & |x| \leq \bar{x} \\ \bar{R} & |x| > \bar{x} \end{cases}$$

Ejemplo: Ciudad Abierta

Problema

Supongamos

- $U(z) = ln(z)$
- $\bar{R} = 0$
- $\bar{u} = 0$
- $\bar{l} = 1$

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

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

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

Ejemplo: Ciudad Abierta

Solución

$$ln(z^*) = 0 \Rightarrow z^* = 1 \tag{4}$$

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

Modelo Monocéntrico: equilibrio espacial

Ciudad Cerrada

$$\bar{N} = \frac{2\bar{x}}{\bar{l}} \Rightarrow \bar{x} = \frac{\bar{N}\bar{l}}{2}$$

Arriendos?

$$R^*(\bar{x}) = \bar{R} \tag{6}$$

$$\bar{R} = \frac{w - z^* - t\bar{x}}{\bar{l}} \Rightarrow \tag{7}$$

$$z^* = w - (\bar{R} + \frac{tN}{2})\bar{l} \tag{8}$$

Modelo Monocéntrico: implicaciones

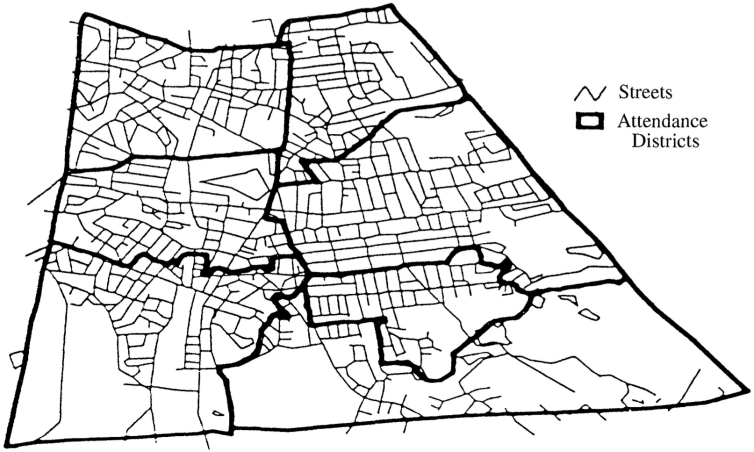


FIGURE I
Example of Data Collection for One City: Melrose
Streets, and Attendance District Boundaries

Modelo Monocéntrico: implicaciones

$$\ln(Price_{iaj}) = \alpha + \gamma test_{aj} + \beta X_{iaj} + \epsilon_{iaj} \tag{9}$$

Modelo Monocéntrico: implicaciones

TABLE II
REGRESSION RESULTS[a]
(ADJUSTED STANDARD ERRORS ARE IN PARENTHESES[b])
DEPENDENT VARIABLE = ln (HOUSE PRICE)

Distance from boundary:	(1)	(2)	(3)	(4)	(5)
	All houses[d]	0.35 mile from boundary (616 yards)	0.20 mile from boundary (350 yards)	0.15 mile from boundary (260 yards)	0.15 mile from boundary (260 yards)
Elementary school test score[c]	.035 (.004)	.016 (.007)	.013 (.0065)	.015 (.007)	.031 (.006)
Bedrooms	.033 (.004)	.038 (.005)	.037 (.006)	.033 (.007)	.035 (.007)
Bathrooms	.147 (.014)	.143 (.018)	.135 (.024)	.167 (.027)	.193 (.028)
Bathrooms squared	−.013 (.003)	−.017 (.004)	−.015 (.005)	−.024 (.006)	−.025 (.007)
Lot size (1000s)	.003 (.0003)	.005 (.0005)	.005 (.0005)	.005 (.0007)	.004 (.0006)
Internal square footage (1000s)	.207 (.007)	.193 (.01)	.191 (.01)	.195 (.02)	.191 (.012)
Age of building	−.002 (.0003)	−.002 (.0002)	−.003 (.0005)	−.003 (.0006)	−.002 (.0004)
Age squared	.000003 (.000001)	.000003 (.0000006)	.00001 (.000002)	.000009 (.000003)	.000005 (.000002)
Boundary fixed effects	NO	YES	YES	YES	NO
Census variables	Yes	No	No	No	Yes
N	22,679	10,657	6,824	4,594	4,589
Number of boundaries	N/A	175	174	172	N/A
Adjusted R^2	0.6417	0.6745	0.6719	0.6784	.6564

a. Each regression includes quarter year dummies. Dummies are also included to indicate missing bedroom data, bathroom data, lot size data, and age of establishment data.
b. Standard errors are adjusted for clustering at the attendance district level.
c. Test scores are measured at the elementary school level and represent the sum of the reading and math scores from the fourth grade MEAP test averaged over three years (1988, 1990, and 1992). *Source:* Massachusetts Department of Education.
d. This regression also includes neighborhood characteristics such as the percentage of Hispanics, the percentage of non-Hispanic blacks, the age distribution of the neighborhood, the percentage of female-headed households with children, the educational distribution of the neighborhood, and the median household income, all of which are measured at the census block group level from the 1990 Census, along with school

Modelo Monocéntrico: implicaciones

Dependent Variable = ln (house price)					
Distance from boundary:	(1)	(2)	(3)	(4)	(5)
	All houses[d]	0.35 mile from boundary (616 yards)	0.20 mile from boundary (350 yards)	0.15 mile from boundary (260 yards)	0.15 mile from boundary (260 yards)
Elementary school test score[c]	.035 (.004)	.016 (.007)	.013 (.0065)	.015 (.007)	.031 (.006)

Fuente: Do Better Schools Matter? Parental Valuation of Elementary Education (1999) QJE