

Part 1: Rent and the Henry George

- *Defn.* Economic Rent: A payment to a factor in excess of that needed to bring the factor into supply.

- Case of land

—Often reasonable to assume in perfectly inelastic supply

—Then entire factor payment is economic rent.

—see graph



- Case of good in perfectly *elastic* supply.

—Toys (over six month lead time)

—no rent

—see graph

## Deadweight loss of Taxation

- Case of perfectly elastic supply

- Deadweight loss potentially big

- Case of perfectly inelastic supply

- Deadweight loss is zero!

- Henry George's idea

- Tax land only (essentially to a level to confiscate it)

- No tax on improvements

- Has efficiency properties (and maybe even equity properties)

- Limitation: land may not be perfectly inelastic

- farmers and soil quality

- developers takes steps to increase land value

- Some locations (e.g. in Pennsylvania) tax land at a higher rate than improvements
- Minnesota taxes land and improvements at same rate.

—approximately 1% per year for residential

—Why is the effective tax on housing greater than a sales tax of 6.5% on, e.g., restaurant meals?

—But property taxes are deductible and sales taxes not, so good for avoiding Federal taxes (so other states can pay!)

## Part 2: Density Gradients

- Building heights are highest downtown (Central Business District or CBD) and drop off
- Similar relationship holds between population density and distance from CBD
- Formally

— $u$  distance (miles) from CBD

— $D(u)$  average density  $u$  miles out from CBD

—Empirical work uses the following functional form:

$$\ln D(u) = a - bu$$

- So  $b$  is the *percentage* amount that density decreases when move out one mile. We call  $b$  the *density gradient*.
- This is important! We are talking about the *Internal Structure of Cities* here. A decrease in  $b$  means the structure changes and becomes more spread out. Some people call this *sprawl*.

The density gradient in the Minneapolis/St. Paul metro area.

- For each Minnesota city the distances between the city and downtowns of Minneapolis and St. Paul were determined.

Downtown Minneapolis: lat=44.975653, long=-93.272287 (IDS building)

Downtown St. Paul: lat=44.9559, long=-93.1022 (The Capital Bldg)

- The variable  $u_i$  for city  $i$  is the minimum of these two distances.
- Cities with  $u$  less than or equal to 20 miles are kept.

- The longitude and latitude coordinates of each city are from the Census and are defined to be some point, usually the geographic center, in the city.
- Approximation formula for distance between point 1 and point 2:

$$x = 69.1 * (lat1 - lat2)$$

$$y = 69.1 * (long1 - long2) * \cos(lat1/57.3)$$

$$distance = \text{sqrt}(x^2 + y^2);$$

- $land_i$  is land area in in square miles

- $pop1990_i$  and  $pop2000_i$  are the populations in city  $i$  in the 1990 and 2000 Censuses.

$$D2000_i = \frac{pop2000_i}{land_i}$$

- Empirical model (leaving out the notation for Census year)

$$\ln D_i = a - bu_i + \varepsilon_i$$

- Use Excel to run regression to estimate  $b$  for each census year.

—Use the Data Analysis option of the Tools menu.

—If missing select the Add-Ins option from the Tools menu.

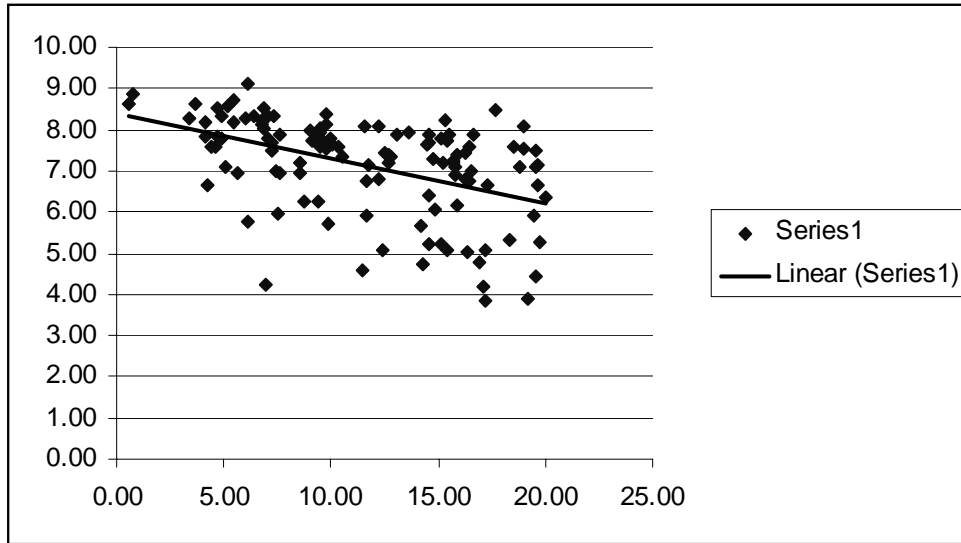


Figure 1: Density Gradient, MSP, 2000

Estimates:

	2000	1990
$a$	8.41 (.25)	8.41 (.26)
$b$	.110 (.019)	.123 (.021)

**TABLE 9-3** Average Density Gradients for Four Metropolitan Areas, 1880-1963\*

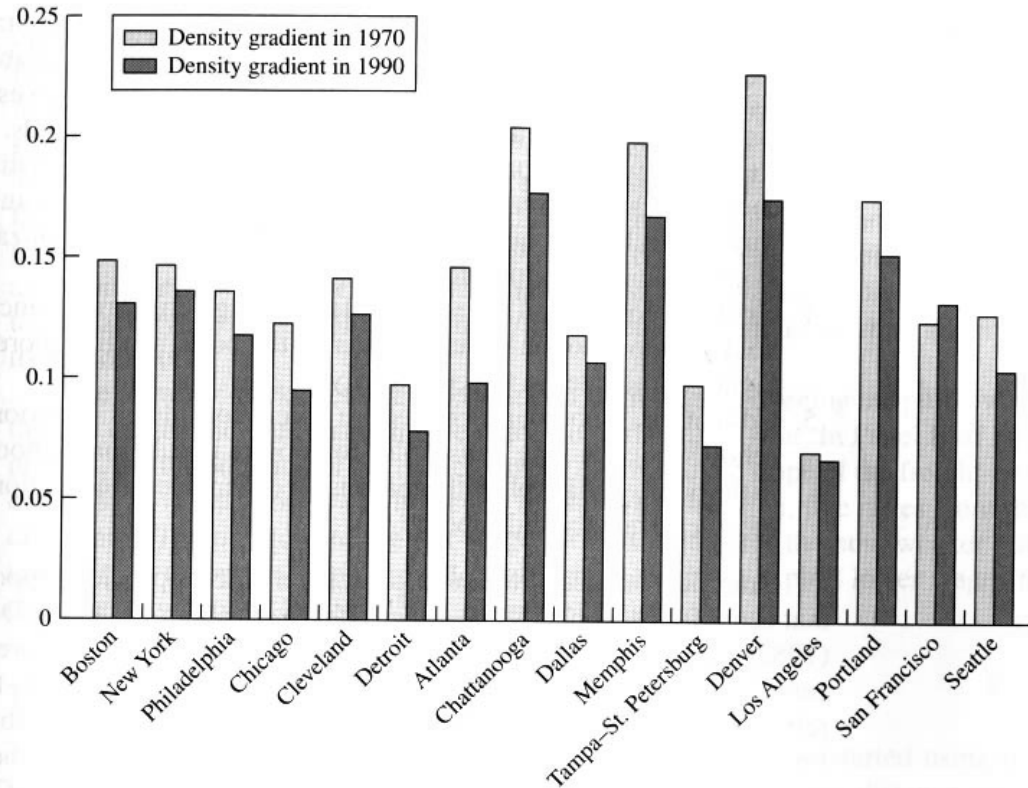
Year	Average Gradient	Percent of Population within 3 Miles of City Center
1880	1.22	88%
1890	1.06	83
1900	0.96	78
1910	0.80	69
1920	0.69	61
1930	0.63	56
1940	0.59	53
1948	0.50	44
1954	0.40	34
1958	0.35	28
1963	0.31	24

\*The metropolitan areas are Baltimore, Milwaukee, Philadelphia, and Rochester.

Source: Edwin S. Mills, *Studies in the Structure of the Urban Economy* (Baltimore: Johns Hopkins, 1972).

Figure 2: Table from p. 206 text

**FIGURE 9-3** Population Density Gradients in Selected Cities, 1970 and 1990



Source: Stacy, Jordan, John Ross, and Kurt Usowski, "U.S. Suburbanization in the 1980s," *Regional Science and Urban Economics* 28, (1998), pp. 611-27.

Figure 3: Figure from p. 207 of text.