Week 4: Firm Site Selection and Industrial land Use.

- Households as a factor of production versus as a client.
- Historic cities – commerce and industry at the Center.
- Changes in Technology and Transportation.
- Modern Industrial location.
Firm – Household Linkages

• Firms sell products to workers - the friction is “shopping” or client visit transportation costs: Retail stores, “retail” services [insurance dealers, barber shops, retail brokerage offices…]

• Firms sell products nationally and employ workers as a factor of production – the friction is the commuting of workers
Sources of Spatial data on Firms and employment

- Firms (IRS, SEC) versus Establishments (BLS, Census). SIC codes
- Federal Establishment files (8 million)
- State surveys (monthly, quarterly, annual)
- Recent release of detailed data by Zip code – “a revolution”
  [http://www.census.gov/epcd/www/zipstats.html.]
Employment dispersal in Dallas CMSA

(see: Shukla and Waddell, RSUE, 1991)

Courtesy of Elsevier Science BV, from *Regional Science and Urban Economics*. Used with permission.
## Employment decentralization in Boston

<table>
<thead>
<tr>
<th>Employment Category</th>
<th>Boston, City</th>
<th>Boston, Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Non-Agricultural</td>
<td>496,548</td>
<td>492,095</td>
</tr>
<tr>
<td>Mining</td>
<td>180</td>
<td>129</td>
</tr>
<tr>
<td>Construction</td>
<td>23,159</td>
<td>12,589</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>68,078</td>
<td>55,830</td>
</tr>
<tr>
<td>Transportation and public utilities</td>
<td>45,458</td>
<td>39,890</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>45,170</td>
<td>31,622</td>
</tr>
<tr>
<td>Retail trade</td>
<td>87,315</td>
<td>65,420</td>
</tr>
<tr>
<td>Finance, insurance, and real estate</td>
<td>76,743</td>
<td>76,991</td>
</tr>
<tr>
<td>Services</td>
<td>150,445</td>
<td>209,624</td>
</tr>
</tbody>
</table>
Monocentric City: The Historic Central Business District

(Location = rent competition between uses)
1). Profit/unit output ($\pi$)

$$\pi = [S - AC - sd] - \frac{r_f(d)}{Q}$$

- $S$ = sale price/unit
- $AC$ = average cost (inc. capital)
- $s$ = shipping cost to port
- $d$ = distance to port
- $r_f(d)$ = firm rent per acre
- $Q$ = units of output per acre

In equilibrium profits must be fixed across locations.
2). Rent that yields Equal profit.
   \[ r_f(d) = [S - AC - sd - \pi] \times Q \]

3). Slope of firm rent function:
   \[ \frac{\partial r_f}{\partial d} = -s \times Q \]

4). Historic changes in s, Q.
   - From carts to water to rail to truck
   - from 6 story lofts to single story Sheds

5). A “Flat” Industrial Rent Gradient?
   [Buttimer and Rutherford]
With a “flat” rent gradient: Industries move to the edge
Chicago Industrial rents on 6000 properties related to the distance of the property to Chicago’s CBD

\[ y = 2.8046x + 464.62 \]

\[ R^2 = 0.0187 \]
Modern Industrial Location

Why do industries locate:
- Next to Highways
- Next to Airports or seaports
- On land that is recycled, wet, or marginal

But also:
- In areas already developed.
- Near to population?

[Shukla-Waddell, Struyk-James]
If residential rents look like this – then where do industrial properties locate?

**Diagram:**
- **Land Rent**
- **Negative Value of Proximity**
- **Positive Value of Access**
- **Residential rent**
- **Industrial rent**
- **Distance from Highway**
Urban Land Residuals: Residential, Office, Industrial use

<table>
<thead>
<tr>
<th>Location</th>
<th>Residual Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F$</td>
</tr>
<tr>
<td>Industrial</td>
<td>.40</td>
</tr>
<tr>
<td>Office (mid rise)</td>
<td>3.0</td>
</tr>
<tr>
<td>Town House</td>
<td>1.5</td>
</tr>
<tr>
<td>SF Housing</td>
<td>.35</td>
</tr>
</tbody>
</table>

Sales data from the Internet, Costs from RS Means, 2003.