Review

- Economies of scale in transportation (and comparative advantage) -> trading cities
- Economics of scale in production -> factory cities
- Economies internal to firm
Scale Economies in Production

- Big workforce in one place
- Cities have more than one worksite
- What would cause this to happen?
Silicon Valley
<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>1,295,000</td>
</tr>
<tr>
<td>1990</td>
<td>1,498,000</td>
</tr>
<tr>
<td>2000</td>
<td>1,683,000</td>
</tr>
<tr>
<td>High Tech Establishments</td>
<td>Silicon Valley - 2001</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Establishments</td>
<td>25,787</td>
</tr>
<tr>
<td>Employees</td>
<td>672,825</td>
</tr>
<tr>
<td>Employees</td>
<td>Establishments</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>0 to 19</td>
<td>21,770</td>
</tr>
<tr>
<td>20 to 99</td>
<td>3,050</td>
</tr>
<tr>
<td>100 to 499</td>
<td>786</td>
</tr>
<tr>
<td>500 to 999</td>
<td>93</td>
</tr>
<tr>
<td>1,000 to 2,499</td>
<td>63</td>
</tr>
<tr>
<td>2,500 or more</td>
<td>25</td>
</tr>
</tbody>
</table>
Biggest Establishments in 1980’s

- Hewlett-Packard
- National Semiconductor
- Intel
- Memorex
- Varian
Biggest Establishments in 2002

- Hewlett-Packard
- Intel
- Cisco
- Sun
- Solectron
Establishments in the Valley

☐ A few very large
☐ More than one large establishment
☐ Many very small
☐ Many in same industry
Birth and Death of High Tech Establishments in Silicon Valley

- Startups 1990-2000: 29,247
- Survival rate at age 5: 76%
- Survival rate at age 10: 47%
One Possible Explanation

- Firms share a common labor market of skilled workers
- Advantageous for employees -- Security of employment
- What is advantage for firms?
An Example

- 10 firms
- 10 different cities
- Each has same demand for labor now
- Half will have increase in future
- Half will have decrease
- Some will be hiring, some will be firing
- Workers move from unlucky city to lucky city
The Road Ahead

☐ Work out change in salaries for lucky and unlucky

☐ Compare with situation with all firms in the same area and workers don’t have to move

☐ In which situation would firms be better off?
Initial Situation

- Labor demand
  \[ D = 100 - \frac{W}{1,000} \]
  
  D is workers demanded
  W is annual salary of a worker

- Initial equilibrium
  50 workers in each city
  Demand equals supply
  \[ 50 = 100 - \frac{W}{1,000} \]
  \[ W = \$50,000 \]
5 firms get increase in demand

- New demand
  \[ D = 125 - \left( \frac{W}{1,000} \right) \]

- New equilibrium in lucky cities if workers don’t move
  
  \[ 50 = 125 - \left( \frac{W}{1,000} \right) \]
  
  \[ W = $75,000 \]
5 firms get decrease in demand

☐ New demand

\[ D = 75 - \left( \frac{W}{1,000} \right) \]

☐ New equilibrium in unlucky cities if workers don’t move

\[ 50 = 75 - \left( \frac{W}{1,000} \right) \]
\[ W = $25,000 \]
Workers Move

- Workers move from unlucky to lucky cities
- Wages rise in former, fall in latter
- Suppose moving cost is $20,000
- Migration stops when wages in unlucky cities is $20,000 less than wages in lucky cities
New Equilibrium

- Wage in unlucky cities is $40,000
  \[ D = 75 - \left(\frac{40,000}{1,000}\right) = 35 \]
  35 workers in unlucky cities

- Wage in lucky cities is $60,000
  \[ D = 125 - \left(\frac{60,000}{1,000}\right) = 65 \]

- All workers (500) are employed

- Demand equal supply in each city

- No one wants to move
All Firms and Workers in Same City

- New equilibrium
- Wage is $50,000
- Employees in lucky firms
  \[ D = 125 - \left( \frac{50,000}{1,000} \right) = 75 \]
- Employees in unlucky firms
  \[ D = 75 - \left( \frac{50,000}{1,000} \right) = 25 \]
- All workers employed
A Comparison

- Lucky firms better off with common labor market
  (wage lower)
- Unlucky firms better off if isolated
  (wage higher)
- Each firm has fifty-fifty chance
- What is expected value?
Advantages of Common Labor Market

In Good Times, the wage range is from $40K to $60K, with a gain of $20K. In Bad Times, the wage range is from $50K to $60K, with a loss of $10K.
Common Market Is Better

- For employers, the gain in good times is larger than the loss in bad times.

- For employees, expected wage equal to $(0.5 \times $40,000 + 0.5 \times $60,000 = $50,000)$, but no moving costs.

- Firms have incentive to locate together.
Knowledge Spillovers

- Another external economy
- Firms in same industry learn from each other
- Often employees moving from one to another
- Easier if firms close
## Spin-offs in Silicon Valley by 2001

<table>
<thead>
<tr>
<th>Company</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>71</td>
</tr>
<tr>
<td>Cisco</td>
<td>35</td>
</tr>
<tr>
<td>Hewlett-Packard</td>
<td>99</td>
</tr>
<tr>
<td>Intel</td>
<td>68</td>
</tr>
<tr>
<td>Oracle</td>
<td>57</td>
</tr>
<tr>
<td>Sun</td>
<td>79</td>
</tr>
<tr>
<td>IBM</td>
<td>77</td>
</tr>
</tbody>
</table>
Sharing Input Suppliers

- Firms in same industry use similar inputs
- Silicon chips for computer tech
- Good to be near supplier (Intel) for design
Reasons for Agglomeration

☐ Common labor pool
☐ Knowledge spillovers
☐ Sharing input suppliers
☐ All economies external to firm
Other Examples

- Movie industry in LA
- Publishing in New York
Broadening the Scope

- Argument applied to firms in same industry
- Also applies to firms across industries
Next Time

- What are limits to growth?
- Carey McWilliams, “Southern California: An Island on the Land”
Carey McWilliams

Born 1905

To LA in 1925

USC Law School

*Factories in the Field*, 1939

Sleepy Lagoon trial, 1942

*Southern California: An Island in the Land*, 1946

Editor of *The Nation*, 1955 through 1970s.