City-Specific Innovation and Income

1. Utility per Worker = Income - Commuting Costs.

2. As city size increases, initially income increases faster than commuting costs increase, so utility per worker rises.

3. Agglomeration economies are greater than the diseconomies associated with commuting (noise, air pollution and congestion).

4. As city size continues to increase at some point utility decreases since the agglomeration economies are less than the diseconomies of commuting.

5. Suppose initial equilibrium is at point i, with 6 million workers in each city and utility per worker is $70.

6. Suppose one of the two cities experiences technological advances that increase worker productivity and income. This city's utility curve shifts upward so that utility per worker is $80 (point j) in the innovation city.

7. Workers in the other city migrate to the innovative city.

8. Migration continues until utility and income is equal in both cities ($75 per worker) at point s and b.

9. Workers in the innovative city increases to 7 million, while the number of workers falls in the other city to 5 million.

10. Thus the benefits of innovation in one city are spread to the other cities in the region.

Region-Wide Innovation and Income

1. Both cities simultaneously get the same innovation.

2. Utility curves of both cities shift upward and utility per worker increases to $80 (point j) in both cities.

3. No migration occurs and both cities retain 6 million workers.