1. The question

- Do immigrants alter the employment opportunities of native workers?
  - “After World War I, laws were passed severely limiting immigration. Only a trickle of immigrants has been admitted since then. . .By keeping labor supply down, immigration policy tends to keep wages high. Let us underline this basic principle: Limitation of the supply of any grade of labor relative to all other productive factors can be expected to raise its wage rate; an increase in supply will, other things being equal, tend to depress wage rates”
2. The empirical puzzle

Summary of findings (circa 2000):


- National Academy of Sciences (1997, p. 220): “The weight of the empirical evidence suggests that the impact of immigration on the wages of competing native workers is small.”

Puzzle: The immigrant supply shock in the United States has been very large, and Hamermesh (1993) concludes that the labor demand curve is not perfectly elastic. Why can’t we observe an impact?
3. Spatial correlation approach

- Suppose there are a number of closed labor markets that immigrants penetrate randomly. We can then relate the change in the wage in a particular market to the number of immigrants in that market. The estimated correlation measures the impact of immigration.

- Immigrants cluster in a small number of geographic areas. Most studies exploit this geographic clustering to test the implications of the textbook model.

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Miami</td>
<td>8.3</td>
<td>9.6</td>
</tr>
<tr>
<td>Comparison cities</td>
<td>10.3</td>
<td>12.6</td>
</tr>
</tbody>
</table>

The comparison cities are Atlanta, Houston, Los Angeles, and Tampa-St. Petersburg.
5. Problems with spatial correlations

- Immigrants may not be randomly distributed across labor markets. If immigrants cluster in cities with thriving economies, there would be a spurious positive correlation between immigration and local employment conditions (Borjas, 2001).

- Local labor markets are not closed. Natives may respond to the immigrant supply shock by moving their labor or capital to other cities, thereby re-equilibrating the national economy.
  - There is an unresolved debate over whether these equilibrating flows exist. See Borjas, Freeman, Katz (1997), Card (2001), Borjas (2006).

- Measurement error (Aydemir and Borjas, 2010)
6. A new type of natural experiment

- “After a wave of raids by federal immigration agents on Labor Day weekend, a local chicken-processing company called Crider Inc. lost 75% of its mostly Hispanic 900-member workforce. The crackdown threatened to cripple the economic anchor of this fading rural town. But for local African-Americans, the dramatic appearance of federal agents presented an unexpected opportunity. Crider suddenly raised pay at the plant. An advertisement in the weekly Forest-Blade newspaper blared “Increased Wages” at Crider, starting at $7 to $9 an hour—more than a dollar above what the company had paid many immigrant workers.” (The Wall Street Journal, January 17, 2007)

- Implied wage elasticity = -0.20
7. An alternative approach (Borjas, QJE, 2003)

- First, pay closer attention to the definition of a skill group. Both schooling and work experience determine a person’s stock of acquired skills.
  - Immigration is not balanced evenly across all experience cells in a particular schooling group. The immigrant influx will tend to affect some native workers more than others. And the nature of the supply “imbalance” changes over time.

- Second, local labor market may not be the right unit of observation. So examine evolution of national wage structure (in the spirit of Murphy-Welch, 1992; Katz-Murphy, 1992, Card and Lemieux, 2001).

- This approach reconfirms that the labor demand curve is indeed downward sloping: An influx of immigrants into a particular skill group lowers the wage of that skill group.
8. Scatter diagram relating wages and immigration (removing decade effects)
9. A structural approach

- A structural approach specifies the technology of the aggregate production function.
- One can then estimate the own-effect of immigrants on the wage of competing native workers and the cross-effects on the wage of other natives.
- Suppose the aggregate production function can be represented in terms of a three-level CES technology: Similarly educated workers with different levels of work experience are aggregated to form the effective supply of an education group; and workers across education groups are then aggregated to form the national workforce.
10. The three-level CES technology

\[ Q_t = \left[ \lambda_{Kt} K_t^v + \lambda_{Lt} L_t^v \right]^{1/v}, \text{with } v = 1 - \frac{1}{\sigma_{KL}}. \]

\[ L_t = \left[ \sum_s \theta_{st} L_{st}^\rho \right]^{1/\rho}, \text{with } \rho = 1 - \frac{1}{\sigma_E}. \]

\[ L_{st} = \left[ \sum_x \alpha_{sx} L_{sxt}^\eta \right]^{1/\eta}, \text{with } \eta = 1 - \frac{1}{\sigma_X}. \]
11. Advantages of three-level CES

- There are 33 factors of production: 32 education-experience groups plus capital.
- A non-structural specification requires estimating 1,089 parameters. Introducing symmetry restrictions reduces this to 561 different parameters. The three-level CES reduces the parameter space to three elasticities of substitution.

**Main disadvantage:** the CES greatly restricts the types of substitution that can exist.

- Results are extremely sensitive to assumption about the trend in the relative demand of education groups. Katz-Murphy assumed linear trend. This is NOT an innocuous assumption.

<table>
<thead>
<tr>
<th>Education group:</th>
<th>Short run</th>
<th>Long run</th>
</tr>
</thead>
<tbody>
<tr>
<td>All workers</td>
<td>-3.4%</td>
<td>0.0%</td>
</tr>
<tr>
<td>High school dropouts</td>
<td>-8.2</td>
<td>-4.8</td>
</tr>
<tr>
<td>High school graduates</td>
<td>-2.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Some college</td>
<td>-2.7</td>
<td>0.7</td>
</tr>
<tr>
<td>College graduates</td>
<td>-3.9</td>
<td>-0.5</td>
</tr>
</tbody>
</table>


Short run: Capital stock is fixed
Long run: Rental price of capital is fixed
### 13. Ottaviano-Peri long run simulation, 2006, Table 7

<table>
<thead>
<tr>
<th>Specification</th>
<th>1 Low $\sigma=5$</th>
<th>2 Median $\sigma=6.6$</th>
<th>3 High $\sigma=10$</th>
<th>4 $\sigma$, imposed = $\infty$</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Real Wage Change of US Born Workers Due to Immigration, 1990-2004</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) HS dropouts US-born</td>
<td>-0.2%</td>
<td>-1.1%</td>
<td>-2.1%</td>
<td>-4.2%</td>
</tr>
<tr>
<td>2) HS graduates, US-born</td>
<td>+2.9%</td>
<td>+2.4%</td>
<td>+2.0%</td>
<td>+1.0%</td>
</tr>
<tr>
<td>3) CO dropouts, US-born</td>
<td>+3.7%</td>
<td>+3.4</td>
<td>+3.1%</td>
<td>+2.4%</td>
</tr>
<tr>
<td>4) CO graduates, US-born</td>
<td>+1.4%</td>
<td>+0.7%</td>
<td>0.0%</td>
<td>-1.5%</td>
</tr>
<tr>
<td>5) Average, US-born</td>
<td>+2.3%</td>
<td>+1.8%</td>
<td>+1.2%</td>
<td>+0.1%</td>
</tr>
</tbody>
</table>

| % Real Wage Change of Foreign Born Workers Due to Immigration, 1990-2004 |
| 6) HS dropouts Foreign-born       | -20.2%           | -16.3%                 | -12.3%            | -4.4%                         |
| 7) HS graduates, Foreign-born     | -31.7%           | -23.5%                 | -15%              | +1.0%                         |
| 8) CO dropouts, Foreign-born      | -17.4%           | -12.3%                 | -7.3%             | +2.4%                         |
| 9) CO graduates, Foreign-born     | -31.6%           | -24.2%                 | -16%              | -1.6%                         |
| 10) Average Foreign-born          | -26.3%           | -19.8%                 | -13.3%            | -0.9%                         |
| 11) Overall Average:              | 0%               | 0%                     | 0%                | 0%                            |

Native and US-Born
Impact of immigration disappears if, in addition to the Ottaviano-Peri complementarity, one also assumes that:

**High school dropouts and high school graduates are perfect substitutes.**

Why does this matter?

Note specification of the CES relative wage equation: relative wages depends on relative quantities.

Suppose we define skill groups in such a way that immigration doesn’t affect relative quantities much (e.g., high school equivalents and college equivalents). Then:

Immigration **cannot** have a wage impact.

So question becomes: are hs dropouts and hs graduates perfect substitutes?
15. Conclusion

- Wage response to immigration is a crucial parameter in any assessment of the efficiency and distributional impact of international migration.
- Previous estimates—particularly those at the MSA level—may have underestimated the impact because of attenuation bias introduced by sampling error and behavioral responses.
- A number of puzzles and confusing conjectures remain:
  - Why do spatial correlations lead to contradictory conclusions in the minimum wage and immigration literatures?
  - How do “pre-existing workers” respond to immigration?
  - How does capital respond to immigration?
  - How long does it take to reach the long run?
  - Does immigration lead to factor price equalization?
16. References