IMMIGRATION AND THE ECONOMY

LABOR MARKETS, EMPLOYMENT AND PRODUCTIVITY
Minimalistic reference point: Internet search

- “Immigrants and Jobs”
- “Immigrants and the Economy”
- One finds two types of websites
Type 1: Immigrants take jobs and depress wages

Immigrants take jobs

They depress wages.

Without them 8 million more jobs for Americans.

Unemployment would be eliminated.
Type 2: immigrants create jobs and help wages

Immigrants stimulate growth

They take jobs that Americans do not want

Help firm expand with job-creation effects.

Without them whole sectors (agriculture, construction, hospitality) would be in crisis.
Minimal bar, provided by Internet:

- Immigrants are really hurting American jobs.
- Or they are really helping them.
- Or they are really doing something in between.
My talk will walk you through

1. “Man in the street”: Immigrants increase supply of labor and hurt native wages and job opportunities. Simplest framework.

2. “Economist, Partial Equilibrium” Immigrants increase supply of some skills/productive abilities more than others. There are heterogeneous effects.

3. “Economist, General Equilibrium” Immigrants generate native workers and firm- responses. We need to account for these margins.
Simplest Model (supply and demand)

- Identify different labor markets, regions/metro areas.

- Inflow of immigrants in those markets and response of native wages and employment.

- Assumptions: immigrants identical to natives. Specialization, capital and technology are fixed.

- Prediction: **Negative effects if nothing else changes (the short run?)** When capital adjusts there are no effects (long run?)
Shift in labor supply, then in labor demand
Variation of immigrants, state-level 1960-2005

Percentage of foreign-born in Employment: 1960-2005

Year | Percentage
--- | ---
1960 | 9.40%
1970 | 5.90%
1980 | 0.30%
1990 | 10.00%
2000 | 5.10%
2004 | 0.20%
2005 | 16.06%
2010 | 6.40%
2015 | 0.50%
2020 | 24.59%
2025 | 8.90%
2030 | 0.80%
2035 | 31.08%
2040 | 13.00%
2045 | 33.17%
2050 | 14.40%
2055 | 1.10%
20 years of Empirical findings

- Regress ln(Wage natives) on Immigrants as share of employment and controls.
- Average Estimate of the effect of immigrant share on native wages: 0.008.
- Inflow of immigrants by 7 percentage points of employment (U.S. 1990-2010) increases native wages 1/20th of a percentage point.
25 years of empirical estimates

Average Estimated Coefficient per Study

Number of Studies

([-0.8, -0.7), [-0.7, -0.6), [-0.6, -0.5), [-0.5, -0.4), [-0.4, -0.3), [-0.3, -0.2), [-0.2, -0.1), [-0.1, 0], [0, 0.1), [0.1, 0.2), [0.2, 0.3), [0.3, 0.4), [0.4, 0.5), [0.5, 0.6), [0.6, 0.7), [0.7, 0.8))
Explaining the 0 effect

- People may move out of the local market, diluting the effect. This was the first margin of adjustment considered.

- Subsequent research analyzed the outflow of native worker (Card and Di Nardo 2000, Card 2005, Peri and Sparber 2009). Did not find significant effects.
Omitted Variables?

- Immigrants may be attracted by “success cities” inflating the effect.
  - Use “push” shocks (e.g. Large inflow of Cuban refugees in Miami, Card 1990)
  - Use variation the aggregate flows and previous local communities. (Card 2001).
  - Use aggregate flows and variation in geography (distance from Mexico) (Peri, 2012)
Skill heterogeneity is a key issue

- Need to distinguish effects on more and less educated.

- There is a large inflow of immigrants in both groups
- They are very different in their production skills and in their effects.
Focus on immigrants as differentiated by skill

- National Labor markets, for each skill group.

- Skill group defined by education and age. Workers in it compete for similar jobs.

- Exploit differences in the inflow of immigrants across skills, to estimate the effect on native wages by skills.

- (Ottaviano and Peri, 2012)
Variation of Immigrants inflows across skill groups 1990-2006
Need to define interaction across skills

- Production uses different skills.

- College educated may compete with other college educated. But they create opportunities for others (engineer-construction worker; doctor-paramedic-nurses)

- Similarly less educated may compete with other less educated. But they provide services that complement college educated.
Production structure; Education and Age skills

- College Graduates
- Some College
- High School Graduates
- Some High School
- Immigrants

Schooling

0-5 5-10 Experience 35-40

Physical Capital

Production structure; Education and Age skills

Some High School Graduates

Some College

College Graduates

Immigrants

Production structure; Education and Age skills

Some High School Graduates

Some College

College Graduates

Immigrants

Production structure; Education and Age skills

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Production structure; Education and Age skills

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Immigrants

Production structure; Education and Age skills

Some High School Graduates

Some College

College Graduates

Immigrants
Focus on Skills: how many cells do we need?

- Important to account for interactions/complementarities between cells in production.

- The biggest effect of relative supply on relative wages seems for college-non college educated.

- Within those broad groups we should look at more relevant production skills, not age and fine education.
Production structure: Two cells needed to capture key substitutability and complementarity
New Important dimensions

- Within high school equivalents: Manual-Physical skills versus Communication skills

- Within College educated STEM-skills (Science, technology, engineering and Math) versus the rest. Math-Analytical/Managerial and Interactive.

- These skill dimensions determine the occupational distribution of groups.
Production structure
College and non-college with occupation skills
Why does this new structure affect the analysis?

1. Immigrants much more concentrated in those skills.

2. Native workers are mobile across occupations. Important margin of adjustment.

3. STEM may have a productivity effect: they drive science and technology.
Foreign-born Share in each Education Group, U.S. workforce 2010

- Manual
- Analytical-STEM
- Cognitive-Communication

Education Levels:
- HS Dropout
- HS Diploma
- Some College
- Associates
- Bachelors
- Masters & Other Prof. Degree
- PhD
- PhD (Science & Engineering)
Skill-distribution of less educated Immigrants and natives

- Define the “skill” content of 333 occupations based on O*NET database that classify the intensity of use of 56 skills
  - Manual (Limb, Hand, and Finger Dexterity; Body Coordination and Flexibility; Strength)
  - Communication (Oral and written expression and comprehension)

- Standardize the measure for each to 0-1 (percentile of occupation using that skill in 2000) average and take the ratio.

- Peri and Sparber (2009)
Some Examples of occupational skill content

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>Agricultural Sector</strong></td>
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<td></td>
</tr>
<tr>
<td>Agricultural Laborer</td>
<td>63%</td>
<td>0.72</td>
<td>0.28</td>
<td>2.5</td>
</tr>
<tr>
<td>Farm Coordinator</td>
<td>4%</td>
<td>0.30</td>
<td>0.70</td>
<td>0.43</td>
</tr>
<tr>
<td><strong>Construction Sector</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Helper</td>
<td>66%</td>
<td>0.97</td>
<td>0.03</td>
<td>43</td>
</tr>
<tr>
<td>Construction Supervisor</td>
<td>8%</td>
<td>0.31</td>
<td>0.69</td>
<td>0.44</td>
</tr>
<tr>
<td><strong>Postal Services</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mail Handling-Machine Operator</td>
<td>48%</td>
<td>0.94</td>
<td>0.06</td>
<td>17.5</td>
</tr>
<tr>
<td>Mail Clerk/Deliverer</td>
<td>7%</td>
<td>0.14</td>
<td>0.86</td>
<td>0.17</td>
</tr>
<tr>
<td><strong>Food Preparation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous Food Preparation</td>
<td>33%</td>
<td>0.56</td>
<td>0.44</td>
<td>1.63</td>
</tr>
<tr>
<td>Supervisor Food Preparation</td>
<td>14%</td>
<td>0.36</td>
<td>0.64</td>
<td>0.58</td>
</tr>
<tr>
<td><strong>Transportation Services</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxi Driver</td>
<td>40%</td>
<td>0.98</td>
<td>0.02</td>
<td>49.5</td>
</tr>
<tr>
<td>Supervisor, Motor Vehicle Operators</td>
<td>10%</td>
<td>0.31</td>
<td>0.67</td>
<td>0.45</td>
</tr>
<tr>
<td>Occupation</td>
<td>Communication Intensity Index</td>
<td>Manual Intensity Index</td>
<td>C/M Percentile</td>
<td>Change in Foreign-Born Share of Less-Educated Employment 1970-2000 (Percentage Points)</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------------------------------</td>
<td>------------------------</td>
<td>----------------</td>
<td>-----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Four Occupations with Highest Communication/Manual Values</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial managers</td>
<td>0.83</td>
<td>0.23</td>
<td>0.999</td>
<td>+5.7</td>
</tr>
<tr>
<td>Managers of properties and real estate</td>
<td>0.74</td>
<td>0.21</td>
<td>0.997</td>
<td>+1.8</td>
</tr>
<tr>
<td>Editors and reporters</td>
<td>0.87</td>
<td>0.27</td>
<td>0.991</td>
<td>+12.2</td>
</tr>
<tr>
<td>Operations and systems researchers and analysts</td>
<td>0.64</td>
<td>0.20</td>
<td>0.990</td>
<td>+4.1</td>
</tr>
<tr>
<td><strong>Five Occupations with Average Communication/Manual Values</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cashiers</td>
<td>0.38</td>
<td>0.73</td>
<td>0.562</td>
<td>+12.0</td>
</tr>
<tr>
<td>Cooks, variously defined</td>
<td>0.32</td>
<td>0.67</td>
<td>0.530</td>
<td>+19.9</td>
</tr>
<tr>
<td>Hairdressers and cosmetologists</td>
<td>0.30</td>
<td>0.62</td>
<td>0.498</td>
<td>+17.0</td>
</tr>
<tr>
<td>Repairers of industrial electrical equipment</td>
<td>0.36</td>
<td>0.77</td>
<td>0.490</td>
<td>+9.5</td>
</tr>
<tr>
<td>Kitchen workers</td>
<td>0.28</td>
<td>0.62</td>
<td>0.489</td>
<td>+2.8</td>
</tr>
<tr>
<td><strong>Four Occupations with Lowest Communication/Manual Values</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle washers and equipment cleaners</td>
<td>0.04</td>
<td>0.72</td>
<td>0.021</td>
<td>+20.6</td>
</tr>
<tr>
<td>Furniture and wood finishers</td>
<td>0.01</td>
<td>0.72</td>
<td>0.021</td>
<td>+13.4</td>
</tr>
<tr>
<td>Roofers and slaters</td>
<td>0.01</td>
<td>0.64</td>
<td>0.020</td>
<td>+26.4</td>
</tr>
<tr>
<td>Drywall installers</td>
<td>0.00</td>
<td>0.72</td>
<td>0.006</td>
<td>+24.2</td>
</tr>
</tbody>
</table>
Low educated immigrants: Pushing less educated natives out of manual jobs
Increase in Immigrants, increases intensity of communication tasks in native occupations

<table>
<thead>
<tr>
<th>Effect of an increase in share of immigrants by 1 percentage point of employment</th>
<th>Basic</th>
<th>Basic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic</td>
<td>Including Cognitive</td>
</tr>
<tr>
<td>Dependent Variables:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln(Communication/Manual)</td>
<td>( \gamma )</td>
<td>0.34** (0.05)</td>
</tr>
<tr>
<td>Ln(communication)</td>
<td>( \gamma^C )</td>
<td>0.31** (0.03)</td>
</tr>
<tr>
<td>Ln(Manual)</td>
<td>( \gamma^M )</td>
<td>-0.03 (0.02)</td>
</tr>
</tbody>
</table>

2SLS estimation with imputed share of Mexican in the population and distance from Mexico-Aggregate flows as Instruments.
Does this margin matter for wage adjustment?

**Effects of Immigration on wage of high school natives 1990-2000**

<table>
<thead>
<tr>
<th>Selected States</th>
<th>Percentage Change in Wage of Less-Educated, Assuming Only Competition</th>
<th>Percentage Change in Wage of Less-Educated due to Task Complementarities and Specialization</th>
<th>Overall Percentage Change of Average Wage Paid to Less-Educated Natives</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>-4.5%</td>
<td>2.3%</td>
<td>-2.2%</td>
</tr>
<tr>
<td>New Jersey</td>
<td>1.6%</td>
<td>1.3%</td>
<td>2.9%</td>
</tr>
<tr>
<td>New York</td>
<td>-0.7%</td>
<td>1.6%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Texas</td>
<td>-4.8%</td>
<td>1.8%</td>
<td>-3.0%</td>
</tr>
<tr>
<td>United States</td>
<td>-1.2%</td>
<td>0.9%</td>
<td>-0.3%</td>
</tr>
</tbody>
</table>
Native response, looking more in depth

- Does this occupational upgrading of natives in response to immigrants take place for individuals?
- How long does it take?

- Evidence from Denmark (Foged and Peri 2013).
  - Large inflow of non-EU refugees.
  - Flexible labor markets and frequent change in occupation
  - Ability to follow individuals (merged employer employee data)
The Interesting Danish case


- Overall non-EU flow was relatively large. 3.1% of employment, between 1994 and 2008.

- Danish Labor markets are flexible in the private sector: low costs of hiring and layoffs, large turnover, decentralized (firm-level) bargaining (resemble the US).
Denmark: Immigration of non-EU 1994-2008

Figure 1: Foreign born share in Denmark, 1991-2008
Very unevenly distributed across municipalities, based on existing communities
Difference between more and less exposed provinces

Figure 3: Differential trend in non-EU share of employment
Manual Intensity and non-EU inflow in Denmark 1994-2004

Table 2: Skill content of occupations and their non-EU inflow between 1994-2008

<table>
<thead>
<tr>
<th></th>
<th>Non-EU share</th>
<th>Skill content of occupation</th>
<th>Complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lowest inflow</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managers of small enterprises</td>
<td>-0.018</td>
<td>0.666</td>
<td>0.677</td>
</tr>
<tr>
<td>Legislators and senior officials</td>
<td>0.002</td>
<td>0.897</td>
<td>0.989</td>
</tr>
<tr>
<td>Corporate managers</td>
<td>0.003</td>
<td>0.796</td>
<td>0.796</td>
</tr>
<tr>
<td>Armed forces</td>
<td>0.003</td>
<td>0.441</td>
<td>0.390</td>
</tr>
<tr>
<td>Skilled agricultural and fishery workers</td>
<td>0.007</td>
<td>0.362</td>
<td>0.248</td>
</tr>
<tr>
<td><strong>Highest inflow</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drivers and mobile plant operators</td>
<td>0.039</td>
<td>0.352</td>
<td>0.265</td>
</tr>
<tr>
<td>Laborers in mining, construction, mfr. and transport</td>
<td>0.045</td>
<td>0.215</td>
<td>0.156</td>
</tr>
<tr>
<td>Machine operators and assemblers</td>
<td>0.057</td>
<td>0.276</td>
<td>0.146</td>
</tr>
<tr>
<td>Other elementary occupations</td>
<td>0.087</td>
<td>0.260</td>
<td>0.205</td>
</tr>
<tr>
<td>Sales and services elementary occupations</td>
<td>0.148</td>
<td>0.126</td>
<td>0.103</td>
</tr>
</tbody>
</table>

Notes: The skill content of each occupational grouping (2-digit ISCO) is the population weighted average of the underlying occupations (4-digit ISCO).
Use a diff in diff approach

- Select individuals based on their province in 1988 (well before beginning of event) and follow their outcomes.

- Identify as treated provinces those with high share of non-EU immigrants in 1988 (in average they got many more)

- Show differential outcome treated-untreated in each year
Estimated Specification

\[ y_{int}^{NAT} = \tilde{x}_i'\alpha + \sum_{t=-3}^{-1} \gamma_t M_{im} D(\text{year} = t) + \sum_{t=1}^{14} \gamma_t M_{im} D(\text{year} = t) + \tilde{\phi}_{t,IND} + \tilde{\phi}_{t,REG} + \tilde{\phi}_{t,EDUC} + \tilde{\phi}_{t,OCC} + \tilde{\phi}_m + \epsilon_{it} \]

\( M \) is the dummy for being “treated” i.e. in a municipality with large density of non-EU immigrants before 1988

Control for individual characteristics, industry-time, region-time, occupation-time and education-time effects
Dynamic response (high-low immigration municipalities): complexity, wages.

Figure 5: The long-run effect on low skilled (event-like study)

- Occupational complexity
- Hourly wage
- Annual earnings
- Fraction of year worked
Who responds the most?
Important Margin of response

- Native specialization

- Ethan Lewis 2013: Firms may choose technology more efficient in manual workers if they are abundant (less mechanization, less substitution of capital).

- Young Native may stay in school longer if many non college educated immigrants are in the area (Jennifer Hunt 2013)
What about the effect of STEM workers?

- Use the H1B visa cap variation over time and the uneven distribution of H-1B across cities, to estimate their effect on productivity.

- The labor market analysis has not allowed for a productivity effect. Only for relative wage effects. Here we do allow for productive effects.

- Peri Shih and Sparber (2013)
Foreign STEM workers as % of employment

Foreigners: Main source of STEM net growth in last 20 years

<table>
<thead>
<tr>
<th>Year</th>
<th>Foreign STEM</th>
<th>Total STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.26</td>
<td>2.11</td>
</tr>
<tr>
<td>1990</td>
<td>0.45</td>
<td>2.90</td>
</tr>
<tr>
<td>2000</td>
<td>0.87</td>
<td>3.52</td>
</tr>
<tr>
<td>2005</td>
<td>1.00</td>
<td>3.52</td>
</tr>
<tr>
<td>2010</td>
<td>1.10</td>
<td>3.71</td>
</tr>
</tbody>
</table>
Identify causal effect of STEM on wage and employment

- Use pre-existing foreign STEM by nationality as of 1970 in US metropolitan areas.
- H-1B aggregate inflow 1990-2010 (controlled by a cap)
- Combine those to instrument for actual change in foreign STEM.
- Back up implied productivity effects

\[
y_{ct}^{\text{Native},X} = \phi_t + \phi_c + b_{y,X} \frac{\Delta STEM_{ct}^{\text{Foreign}}}{E_{ct}} + b_3 Controls_{ct}^X + \varepsilon_{ct}
\]
Effects of foreign STEM on wages/employment of natives
US metro areas (219 metro areas 1990-2010)

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</thead>
<tbody>
<tr>
<td>Based on imputed H-1B/ inflows</td>
<td>6.65 (4.53)</td>
<td>8.03*** (3.02)</td>
<td>3.78** (1.75)</td>
<td>0.53 (0.56)</td>
<td>2.47 (4.69)</td>
<td>-5.17 (4.19)</td>
</tr>
</tbody>
</table>
Impact of more STEM workers

- Improvements in Science and Technology

- Increased productivity, and beneficial effects.

- The effect is stronger for college educated (skill-biased).

- It qualifies the positive local productivity and growth effects of human capital found by Moretti (2012), Glaeser (2011).
Other potential adjustment margins

- Immigrants supply house-keeping services and increase the work participation of educated women (Cortes 2009)

- Immigrants increase the variety of skills and creativity and productivity (Alesina et al 2013)

- Immigrants decrease price of local non-traded services (gardening, house keeping, restaurants) increasing real wages.
Who looses?

- Native non high school educated doing manual jobs. Very few young native workers do these jobs (about 6% of labor force).

- The same group is also aredisadvantaged by the evolution of technology and trade.

- Immigrants doing manual jobs are usually paid less than natives. However much more than in countries of origin.
In Summary

- Accounting for adjustment margins and total equilibrium effects, there is little evidence of negative effects.

- Accounting for productivity effects (high skilled) there is evidence of positive effects.

- Why?
  - Complementarities of manual and communication skills
  - Adjustment of native specialization.
  - Positive productivity effects of STEM.