Which Immigrants Are Most Innovative and Entrepreneurial? Distinctions by Entry Visa

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Debate in the U.S. about level of skilled immigration
- number of H-1B temporary visas for college graduates

Opponents (some senators, computer scientists):
- H–1Bs not skilled
- undercut native wages
- reduce native employment directly and thru offshoring
- L visas and student visas also not good

Proponents (employers)
- firms need best talent to compete in global markets
- speed up transition to permanent residence (also IEEE)

Parties have different objective functions
- but also disagree on factual matters
Incomplete knowledge of skilled immigration

1. This paper examines immigrants’
   - private productivity (wage)
   - activity likely to have public benefits/increase TFP: creation, dissemination, commercialization of knowledge

2. Specifically
   - patenting
   - commercializing and licensing patents
   - authoring books and papers
   - starting successful companies

3. This paper distinguishes by entry visa
   - e.g. permanent resident, student

Immigrants might increase TFP by increasing population (if activities have public component)

Immigrants might perform better than natives; self-selection and visa system may lead to:
- unobservably innovative or entrepreneurial immigrants
- immigrants with high education
- immigrants specialized in areas with high contributions to productivity (e.g. science and engineering)
When will immigrant success boost U.S. TFP?

- if immigrants would have been less innovative abroad (Kahn and MacGarvie 2008)
- if would have been unable to commercialize innovation abroad
- if innovation and commercialization abroad benefit U.S. less than when occurs in U.S. (Eaton and Kortum 1999)
- if not the case that crowd out native innovators and loss in native innovation not compensated by use of native comparative advantage elsewhere in economy (Peri and Sparber 2008, Hunt and Gauthier–Loiselle 2009)
Relevant previous papers

2. Kerr and Lincoln; Peri; Stuen, Mobarak, Maskus
3. Massey and Nalone
5. Lowell and Avato (2007)
What types of visas are in my broader categories?

1. Temporary work visas
   - H–1(B): speciality occupations; college degree
   - L–1: intra–company transferee; college degree
   - O: workers with extraordinary abilities
   - J–1: exchange visitors
   - TN: Canadians/Mexicans with job offer on NAFTA professions list

2. Temporary student/training visas
   - F–1: college, graduate school, high school
   - J–1: if funded from abroad, trainees, medical residents, post–docs

3. Other temporary visas
   - E: treaty traders, investors
   - P: entertainers
   - refugees?
Who chooses immigrants amongst those who apply?

1. Green card
   - as entry visa, most are family reunification
   - so families pick immigrants

2. Work visa
   - government sets framework (college degree)
   - but firms pick immigrants within framework

3. Student/training visa
   - universities/hospitals pick (some high schools, firms)
Notes

1. Spousal employment authorization
   - spouses of F–1, H–1B may not work
   - spouses of J–1, L–1, green card may

2. Transition to permanent residence
   - many get green card thru marriage to US citizen
   - otherwise employment–based green card (harder)

3. Must be permanent resident to start firm, unless
   - E: treaty traders/investors
   - New office L–1: to start subsidiary
National Survey of College Graduates 2003

1. National Science Foundation
2. Stratified sample of college graduates in 2000 census
3. Variables
   - entry visa type
   - (current visa)
   - for each education degree whether obtained in U.S.
   - hourly wage (or annual salary)
   - innovation and firm start-ups
1. If ever worked, asked about previous 5 years
   - books, papers written for publication/presentation at major conference
   - patents applied for/granted/licensed or commercialized

2. If currently working
   - was firm started in last five years
   - smallest firm size ≤ 10
Sample and variables

1. Use respondents <65 (youngest is 23)
2. Drop residents of U.S. territories
3. Samples
   - currently employed (start-ups)
   - currently employed with valid wages (wages)
   - those ever worked (innovation)
## Table 1: Sample composition

<table>
<thead>
<tr>
<th>Category</th>
<th>Patent, publication sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>US native</td>
<td>86.4</td>
</tr>
<tr>
<td>Americans born abroad</td>
<td>1.1</td>
</tr>
<tr>
<td>Born in US territories</td>
<td>0.3</td>
</tr>
<tr>
<td>Green card</td>
<td>5.2</td>
</tr>
<tr>
<td>Work, temporary</td>
<td>1.5</td>
</tr>
<tr>
<td>Study/training, temporary</td>
<td></td>
</tr>
<tr>
<td>- for college</td>
<td>0.9</td>
</tr>
<tr>
<td>- for graduate school</td>
<td>1.2</td>
</tr>
<tr>
<td>- for post-doc</td>
<td>0.3</td>
</tr>
<tr>
<td>- for other</td>
<td>0.7</td>
</tr>
<tr>
<td>Dependent, temporary</td>
<td>1.4</td>
</tr>
<tr>
<td>Other temporary</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>Observations</td>
<td>90,293</td>
</tr>
</tbody>
</table>
Table 2: Outcome means

<table>
<thead>
<tr>
<th></th>
<th>Hour-wage</th>
<th>Start-up (%)</th>
<th>Patent (%)</th>
<th>Publish (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grant</td>
<td>Comm</td>
</tr>
<tr>
<td>US native</td>
<td>29.6</td>
<td>0.6</td>
<td>0.9</td>
<td>0.6</td>
</tr>
<tr>
<td>Immigrant</td>
<td>30.7</td>
<td>0.8</td>
<td>2.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>

- All differences significant except start-up
- Will see by visa type graphically later
- NB only 17% publishing is at universities
Characteristics of immigrants

1. Disproportionately in science/engineering
2. More educated than natives
Probits for patenting, publishing, start-ups

**Which immigrants more likely to patent/publish/start-up?**

\[ P(Y_i) = \beta_0 + I_i \beta_1 + X_i \beta_2 + \epsilon_i \]

1. \( Y \) is one of
   - granted any patent
   - licensed/commercialized any patent
   - published a book or article or presented at conference
   - started a company with at least 10 workers

2. \( I \) is
   - dummies for entry visa type
   - with student visa split by level of study

3. \( I \) includes
   - dummy for born in U.S. territory (mainly Puerto Rico)
   - dummy for born as U.S. citizen outside U.S./territories
Probits for patenting, publishing, start-ups

4. Weight with sample weights, report marginal effects

5. Key $X$’s:
   - field of study of highest degree
   - highest degree
   - highest degree received in US
   - immigrant age at arrival in US

6. Additional $X$’s:
   - age, foreign and US potential experience
   - years since migration, arrival cohort, birth region
   - current enrollment status, sex, black, hispanic
   - for publication: working, working at university
Log wage regressions

Which immigrants earn more?

\[ \log w_i = \gamma_0 + I_i \gamma_1 + X_i \gamma_2 + \eta_i \]

Additional covariates:
- tenure, self–employed, census region
Figure 2: Hourly wages

- Wages
- Wages adjusted for field of study
- Wages adjusted for field of study, education
Figure 3: Hourly wage, additional covariates

Wages adjusted for field of study, education, age

Wages also adjusted for U.S. high degree, foreign/US experience, age at arrival (evaluated at 0)

Wages also adjusted for birth region (Europe), cohort (1990s), years since migration (20)
Figure 6: Any patent commercialized or licensed

Patent probability

Patent probability adjusted for field of study

Patent probability adjusted for field of study, education
Figure 8: More than six papers or books published or presented

- Publication probability
- Publication probability adjusted for field of study
- Publication probability adjusted for field of study, education
Figure 10: Start-up of firm

Start-up probability

Start-up probability adjusted for field of study

Start-up probability adjusted for field of study, education
Conclusions

1. Immigrants who entered on temporary work or student/trainee visas outperform natives in
   - wages
   - patenting
   - commercializing and licensing patents
   - authoring books or papers for publication/conferences

2. Immigrants more likely than natives of similar education to start company
   - start-up niche based on technical knowledge
Ranking of immigrant performance by entry visa

1. Post–docs/medical residents
2. Graduate student visas
3. Work visas
4. College student visas
5. Other student/trainee visas
6. Green cards similar to natives
7. Dependents, other temporary visas worse than natives
Mechanisms

1. Success of skilled immigrants determined by
   - self–selection of immigrants wanting to come to US
   - entry visa framework
   - behavior of US agents selecting applicants for visas
   - self–selection of immigrants wanting to stay in US
   - visa framework for remaining in US

2. Within this system, firms, universities, teaching hospitals best at attracting, selecting immigrants engaged in activities likely to raise US TFP

3. Individuals in US sponsor (college) immigrants similar to (college) natives
Explanations

1. Most immigrant advantage explained by
   - higher education
   - “better” field of study

2. Firms/universities/hospitals are picking good immigrants based on observables
   - immigrants not unobservably more able
   - except perhaps in wages (offset by age at arrival)

3. Exceptions where immigrants outperform similar natives
   - 3 of 4 student groups, for publishing
   - immigrants generally, for start–ups
   - immigrants arriving for college, for final education level

4. Exceptions where immigrants underperform similar natives
   - wages, except college and work visa
## Cost–benefit analysis

1. US saves money thru foreign–financed education
2. But this comes at a price for wages (though not other outcomes)
   - foreign education has lower w return than US education
   - an immigrant with more foreign education arrives older which means a w penalty