Who Are America’s Innovators and How Can We Help Them?

Join the Conversation: #WhoInnovates

@ChakaFattah | @RobAtkinsonITIF | @AAUW
@FredHum | @GeorgeMasonU | @ITSMFOline
@Adams_Nager
Overview

1. Why do demographics of innovation matter?
2. Methodology
3. Who innovates?
4. What institutions innovate?
5. Policy implications
The Demographics of Innovation

• There are many assumptions about who drives innovation.

• Stereotype: the young, tech-savvy, college dropout who takes the tech world by storm.
The Demographics of Innovation

Understanding traits of who really drives meaningful innovation is vital to shaping effective innovation policies:

- Quantify the value of high-skill immigration
- Better understand role of STEM education
- Better understand race, gender differences
How Is This Study Unique?

- Most studies focus on who has potential to innovate or who starts high-growth companies.
- Few focus on who actually produces important science and technology.
The Demographics of Innovation

1. Why do demographics of innovation matter?
2. Methodology
3. Who innovates?
4. What institutions innovate?
5. Policy implications
Data Collection

✓ Identified impactful innovations
  • R&D 100 Awards
  • Life sciences triadic patents
  • Materials sciences triadic patents
  • Information technology triadic patents
  • Large advanced technology company triadic patents

✓ Contacted 6,418 innovators

✓ Collected 923 viable survey responses
The Demographics of Innovation

1. Why do demographics of innovation matter?
2. Methodology
3. Who innovates?
4. What institutions innovate?
5. Policy implications
Immigrants Play a Key Role

Innovators by Immigration Status, Country of Birth, and Parents’ Country of Birth

- 54.5% Children of Immigrants
- 18% Noncitizens
- 17.5% Naturalized Immigrants
- 10% 3rd Generation and Beyond Americans
## Most Common Countries of Origin

<table>
<thead>
<tr>
<th>Country</th>
<th>Respondents</th>
<th>Percentage of Foreign-born Innovators</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>68</td>
<td>20.6%</td>
</tr>
<tr>
<td>China</td>
<td>54</td>
<td>16.4%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>24</td>
<td>7.3%</td>
</tr>
<tr>
<td>Canada</td>
<td>12</td>
<td>3.6%</td>
</tr>
<tr>
<td>Germany</td>
<td>12</td>
<td>3.6%</td>
</tr>
<tr>
<td>France</td>
<td>11</td>
<td>3.3%</td>
</tr>
<tr>
<td>Russia</td>
<td>11</td>
<td>3.3%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>11</td>
<td>3.3%</td>
</tr>
<tr>
<td>Italy</td>
<td>9</td>
<td>2.7%</td>
</tr>
<tr>
<td>Ukraine</td>
<td>7</td>
<td>2.1%</td>
</tr>
<tr>
<td>South Korea</td>
<td>6</td>
<td>1.8%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>5</td>
<td>1.5%</td>
</tr>
</tbody>
</table>
Country of Origin for Foreign-Born Innovators

Country of birth for innovators not born in the United States
Women are Underrepresented

Innovators by Gender

- Males: 88.3%
- Females: 11.7%
Female Representation in Innovation

Bachelor's Degrees, 1985
U.S. Population
Doctorate Degrees
U.S. Workforce
STEM Bachelor's Degrees, 1985
Engineering Ph.Ds.
Early Venture Capital Deals
Foreign-Born Innovators
Engineering Bachelor's Degrees, 1985
Innovators
U.S.-Born Innovators

Percentage of Female Representation in Various Populations, as Percentage of U.S. Totals and Percentage of Responding Innovators (Orange Bars and Boxes)
Minorities are Underrepresented

![Pie Chart]

- **92.4%**

- **White / Caucasian**
- **Asian or Pacific Islander**
- **Hispanic**
- **Black or African American**
- **2 or more responses**
- **American Indian or Alaskan Native**

Race and Ethnicity of Innovators Born in the United States
U.S.-born Blacks and Hispanics in Innovation

- U.S.-Born Population
- Ph.Ds., 2012
- Scientists and Engineers
- Ph.Ds., 1985
- Science and Engineers with Ph.Ds.
- Total Innovators
- U.S.-Born Innovators

Percentage of Blacks and Hispanics in the total U.S. Population and Among Respondents (Orange Boxes)
Innovators Have STEM Degrees

Over 90% majored in STEM as an undergraduate.
  • Over half majored in engineering.

Over 55% hold a STEM Ph.D.
  • Among foreign-born innovators, two-thirds hold doctorates.

Highest Level of Education for Innovators

- 55.7% Ph.D.
- 19.4% Masters
- 13.6% Other Graduate Degree
- 8.2% Undergraduate Degree
- 2.9% No Degree
Innovators Are *Not* Generally Young

**Age at Time of Innovation**

- **R&D 100 Awards**
- **Subject Field Patents**
- **Large Tech Companies**
The Demographics of Innovation

1. Why do demographics of innovation matter?
2. Methodology
3. Who innovates?
4. What institutions innovate?
5. Policy implications
## Innovating Institutions

<table>
<thead>
<tr>
<th>Institution</th>
<th>Percent of Innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Organization/Public Research Institute</td>
<td>12.5%</td>
</tr>
<tr>
<td>University</td>
<td>7.3%</td>
</tr>
<tr>
<td>Publicly Traded Company</td>
<td>59.5%</td>
</tr>
<tr>
<td>Privately Owned Company</td>
<td>20.7%</td>
</tr>
</tbody>
</table>

20% of innovations were collaborations between two or more institutions.

- Half of these were public-private partnerships.
Most Innovating Companies Are Big and Mature

Number of Employees

- Fewer than 25
- Between 25 and 99
- Between 100 and 500
- More than 500

Age of Company

- Less than 5 years
- Between 5 and 10 years
- More than 10 years
### Barriers to Commercialization

Of 28% of innovations reporting barriers to commercialization:

<table>
<thead>
<tr>
<th>Barriers to Innovation</th>
<th>Percentage of Innovations with Listed Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of funding for further development</td>
<td>57.9%</td>
</tr>
<tr>
<td>Insufficient market demand</td>
<td>50.9%</td>
</tr>
<tr>
<td>Competition from other innovators</td>
<td>41.5%</td>
</tr>
<tr>
<td>Technical infeasibility of the innovation</td>
<td>39.6%</td>
</tr>
<tr>
<td>Regulatory challenges</td>
<td>33.3%</td>
</tr>
<tr>
<td>Company unwilling to bring to market</td>
<td>24.5%</td>
</tr>
</tbody>
</table>
15% of All Innovations Received Public Grants

- Innovations received grants from:
  - 5.1% from Small Business Innovation Research
  - 4.7% from Department of Energy
  - 3.4% from Department of Defense
  - 1.3% from State Government

- 60% of respondents’ companies that had fewer than 25 employees received public grants.

- 72% of those were through the Small Business Innovation Research program.
Distribution of Triadic Patents Innovations (Weighted by State Population)
Distribution of R&D 100 Award Winning Innovations (Weighted by State Population)

R&D 100 Awards per Million People
- More than 2
- Fewer than 2
- Fewer than 1.5
- Fewer than 1
- Fewer than 0.5
The Demographics of Innovation

1. Why do demographics of innovation matter?
2. Methodology
3. Who innovates?
4. What institutions innovate?
5. Policy implications
Policy Implications

☑ Expand STEM immigration.
☑ Redouble efforts to increase the number of women and minorities in STEM fields.
☑ Increase the number of STEM graduates.
☑ Increase public support for R&D and technology commercialization.
Thank You!

Rob Atkinson | ratkinson@itif.org | @RobAtkinsonITIF
Adams Nager | anager@itif.org | @Adams_Nager