



The CMU STARS* Fellowship

A new initiative for recent graduates to build their companies, non-profits, and ideas in Pittsburgh

Carnegie Mellon University Block Center for Technology & Society
Swartz Center for Entrepreneurship
City of Pittsburgh
InnovatePGH

*Student Talent Attraction and Retention Strategy



What would it take to keep more of our alumni in Pittsburgh?

CMU graduates are changemakers—they build new products and lead innovative organizations, but mostly outside of Pittsburgh.

Only 7.6% of CMU's undergraduate alumni live here.

Through targeted efforts, we can better share our greatest asset—our graduates—with the surrounding city.

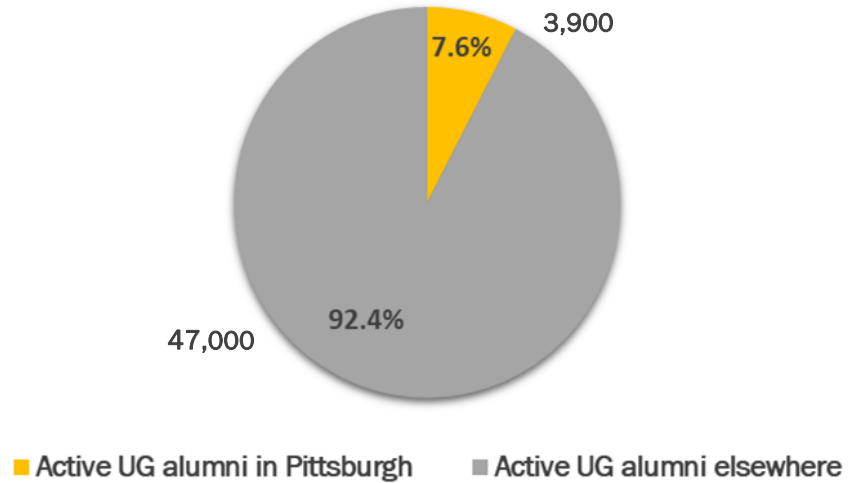
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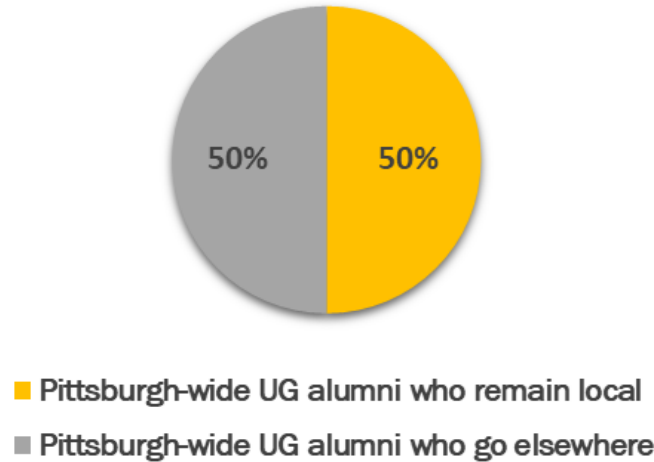
1. Pittsburgh's Economic Headwinds

Pittsburgh has a college student retention problem

The vast majority of CMU's undergraduate alumni leave Pittsburgh

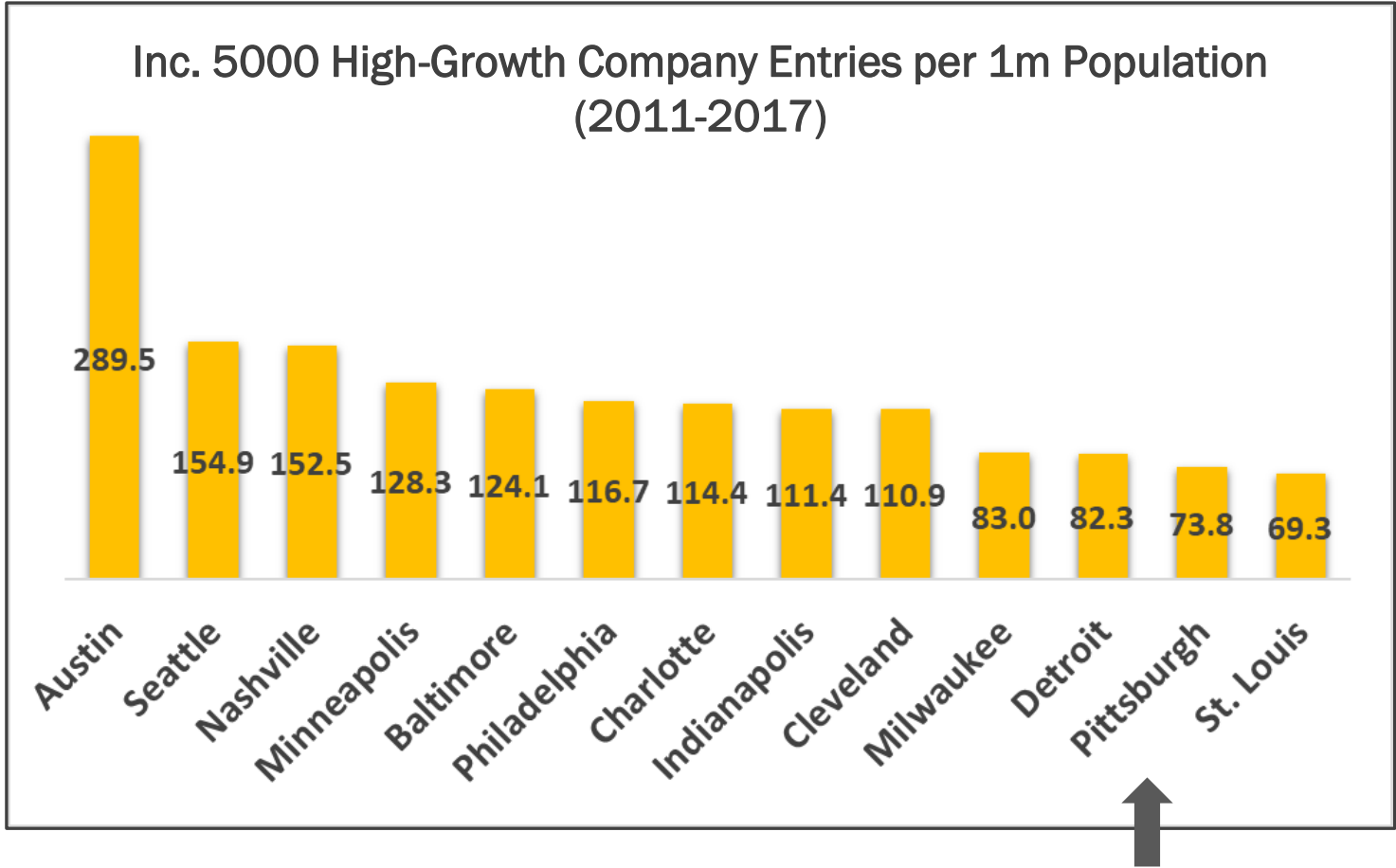


An estimated half of Pittsburgh's annual college graduates leave the region



Sources: Carnegie Mellon University Alumni Office. and "Inflection Point 2017-18." Allegheny Conference. 2017. https://www.alleghenyconference.org/wp-content/uploads/2017/12/018_InflectionPoint.pdf.

Pittsburgh underperforms peers in high-growth firms

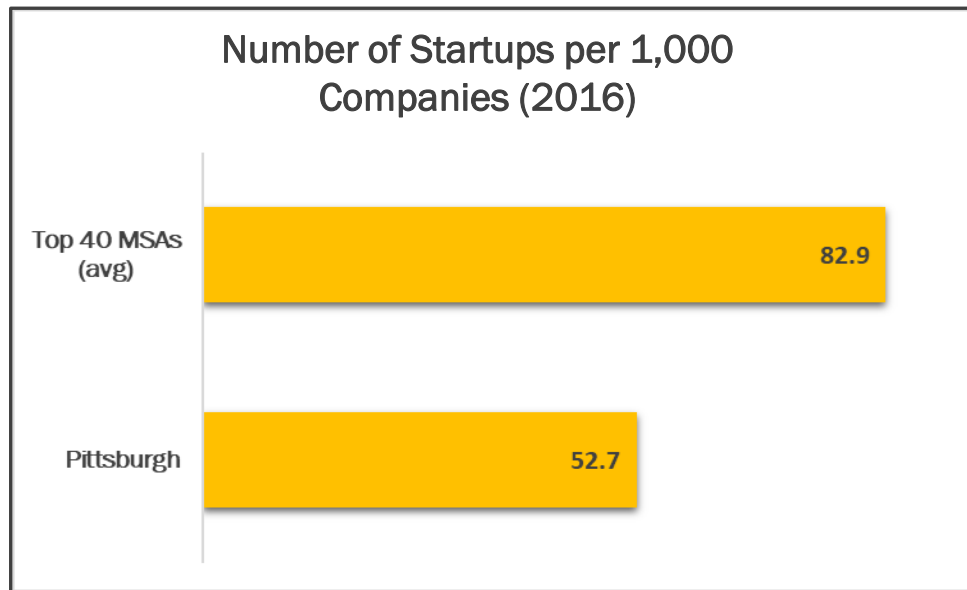


*Firms that grow by 20% in 3 consecutive years starting with at least 10 employees

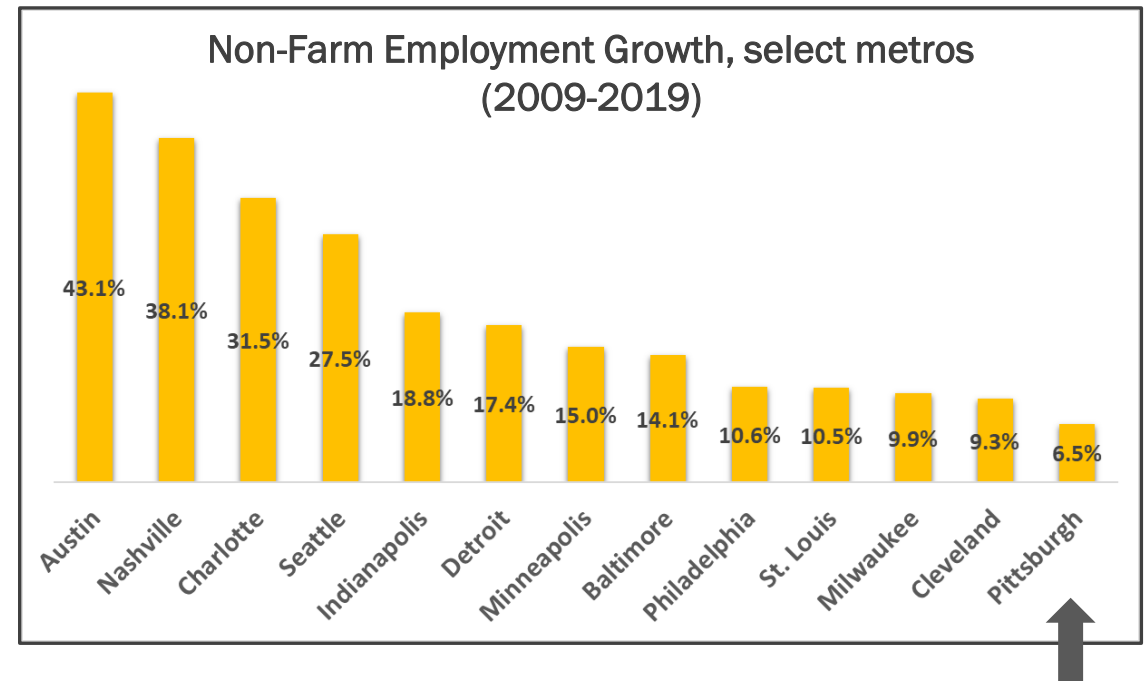
Source: "High-growth firms and cities in the US." Brookings. 2018. <https://www.brookings.edu/research/high-growth-firms-and-cities-in-the-us-an-analysis-of-the-inc-5000/>

The lack of high-growth firms has led to stagnant job growth

Startup Activity: of the 40 largest U.S. metros, Pittsburgh ranks 39th

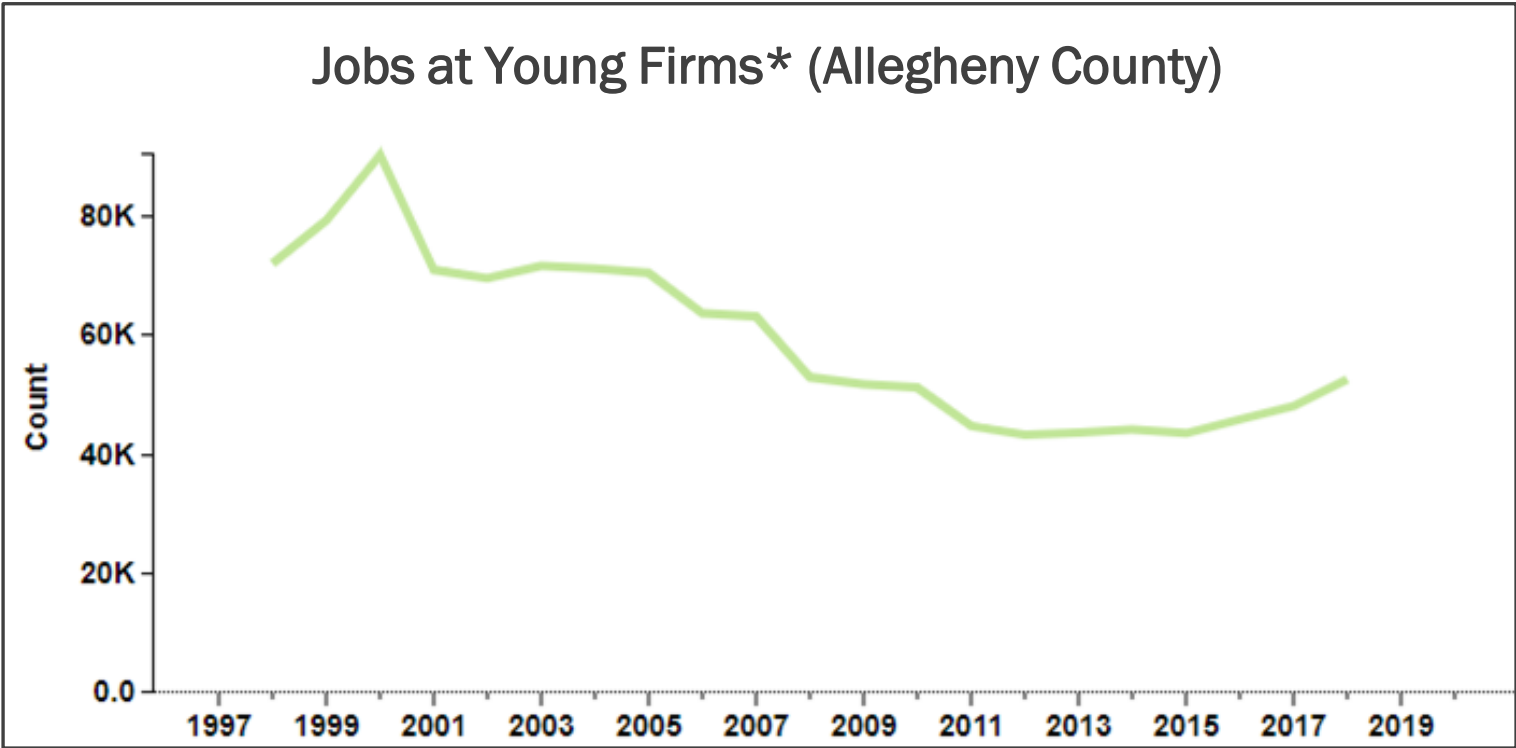


Employment Growth: Of the 50 largest U.S. metros, Pittsburgh ranks 49th



Source: "2016 Startup Activity Index." Kauffman Foundation: https://www.kauffman.org/wp-content/uploads/2019/09/kauffman_index_startup_activity_metro_trends_2016.pdf. and <https://www.bls.gov/opub/ted/2020/all-large-metro-areas-post-10-year-employment-increases.htm>

Entrepreneurs are supporting fewer jobs than in the past



Jobs at Young Firms (Allegh. County):

1998: 72,143

2018: 52,684

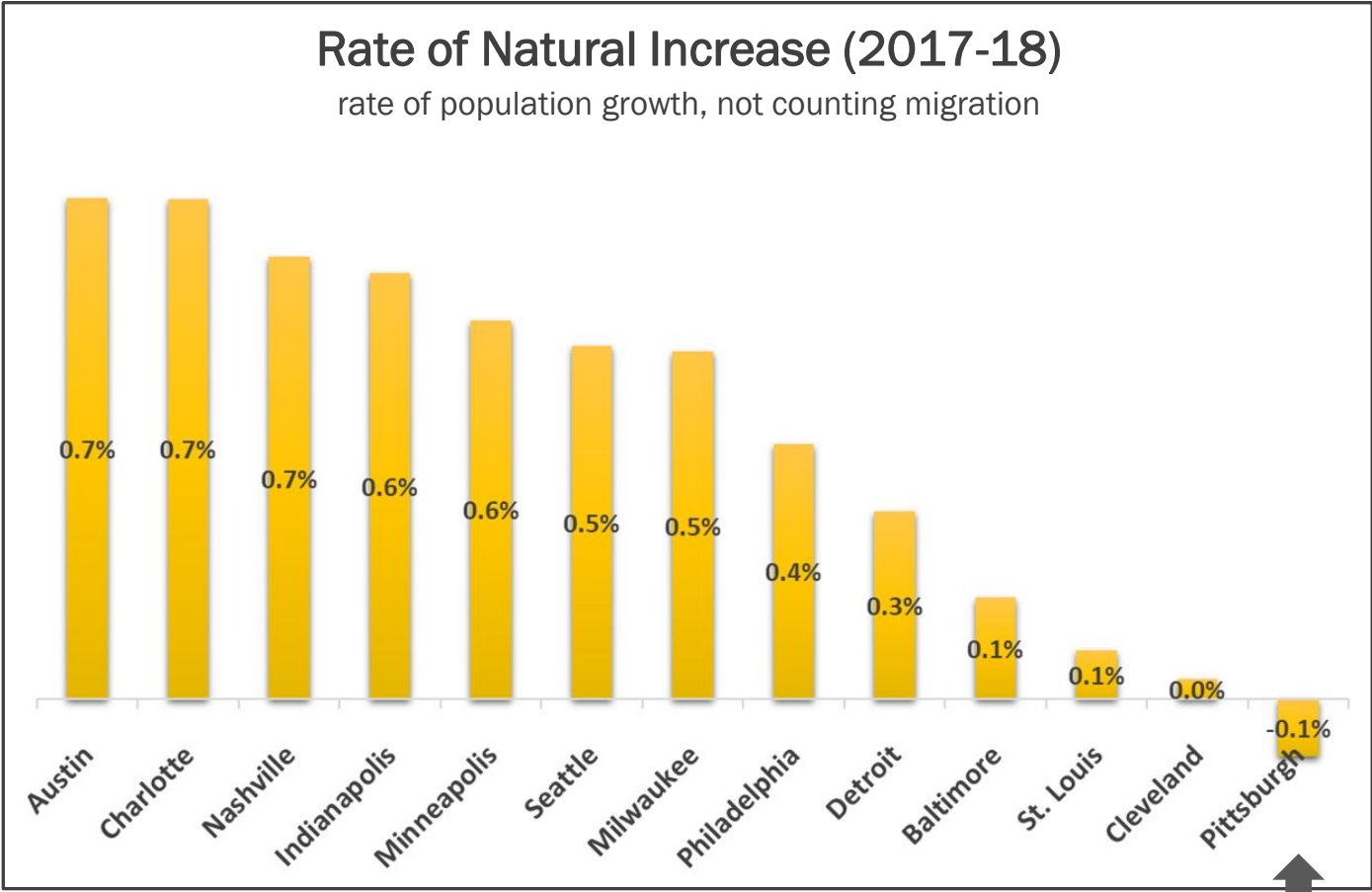
> a 27% drop.

Philadelphia saw the same figure rise by 13%.

*Employment at privately-owned firms 5 years or younger

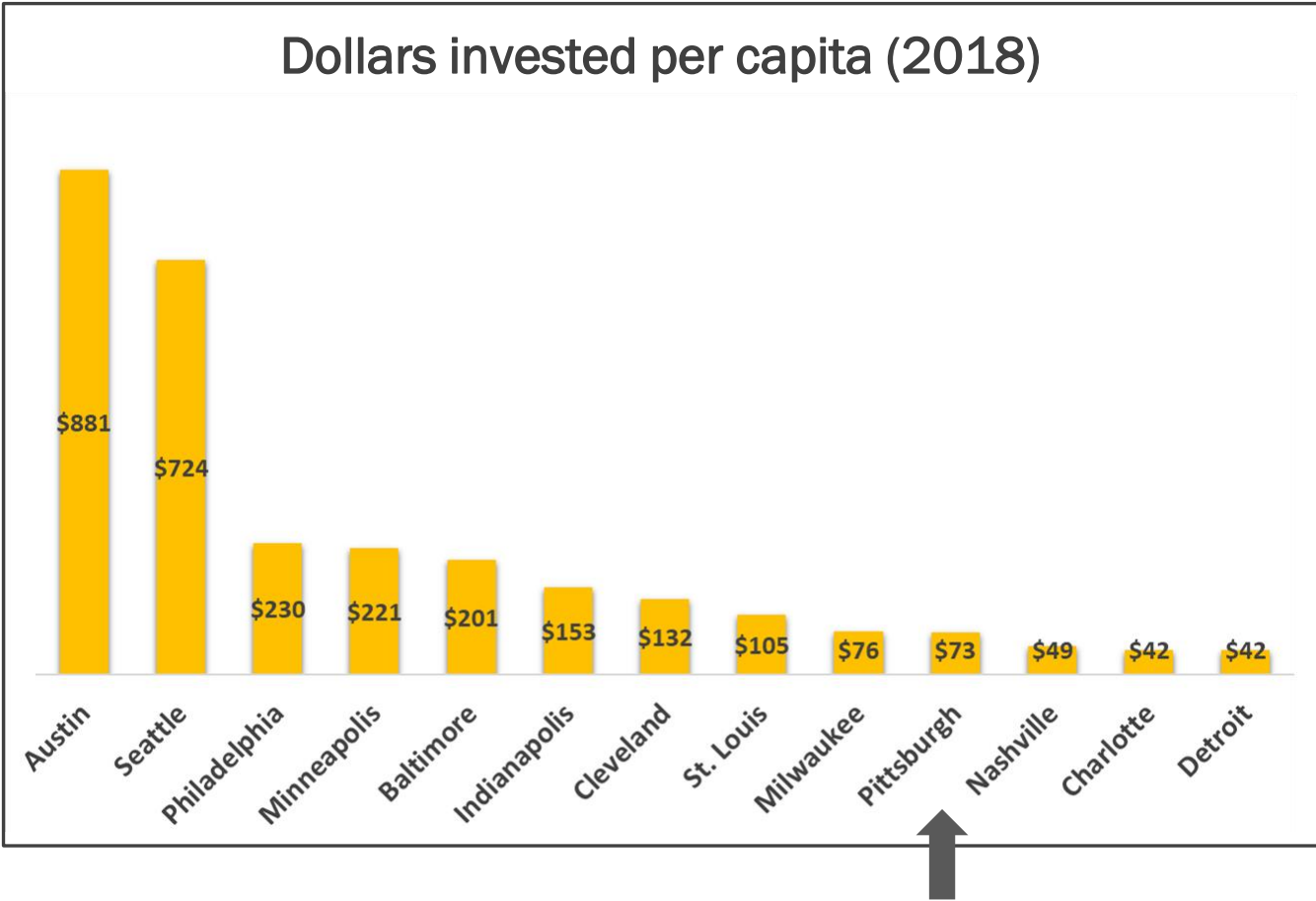
Source: U.S. Census Longitudinal Employer-Household Dynamics Program QWI Explorer. <https://qwexplorer.ces.census.gov/static/explore.html#x=0&g=0>.

The region needs new migrants to weather population loss



Source: U.S. Census Bureau via Social Explorer. 2018 county population estimates.

And new talent is essential to addressing Pittsburgh's startup funding gap

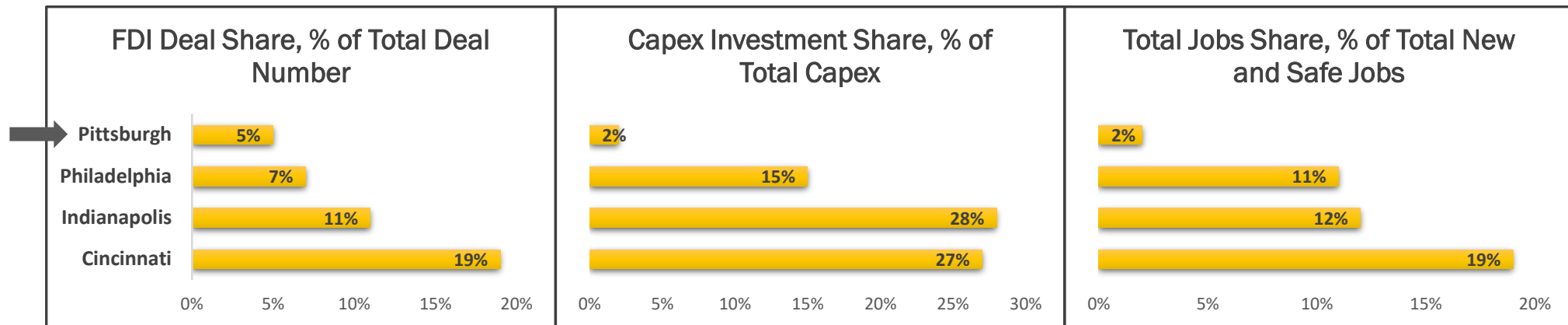


Pittsburgh trails peer cities on investment dollars per capita.

Source: Pitchbook and US Census via Innovation Works: https://www.innovationworks.org/wp-content/uploads/2019/04/07083-191US_1902-3057035-2019-IW-EY-report-Spreads.pdf.

The region lacks the global orientation to attract investment and create jobs

- Pittsburgh had the **lowest percentage of net international migration** of any U.S. top 40 metro, at 0.05%.
- Foreign Direct Investment falls far behind peers, at 5%.



All data is 2011-2018

Sources: City of Pittsburgh Welcoming Pittsburgh Plan. 2015. https://www.immigrationresearch.org/system/files/WelcomingPittsburgh_RoadMap_FullReport_FINAL2.pdf and IncentivesMonitor via McKinsey & Co. 2018.

Competitor cities are already drawing CMU entrepreneurs away from Pittsburgh

- **15 universities in 5 states** run visa programs for entrepreneurs
 - UMass Boston, San Jose State, CU Boulder, Univ. of Alaska, et.al.

Pittsburgh has lost at least one entrepreneur to Boston's program:

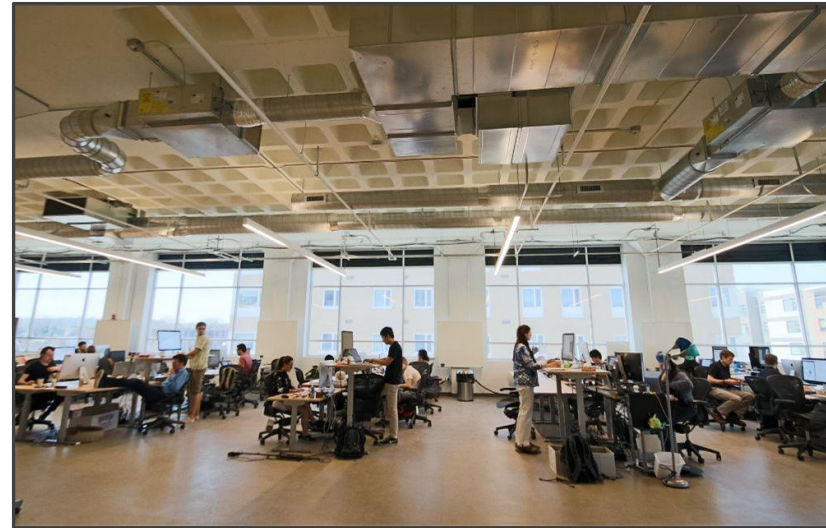
- Srinath Vaddepally, founder of RistCall, a patient-nurse communication system
- Entrepreneur-in-residence for 3 years at UMass Boston



2. The Critical Role of Talented Workers

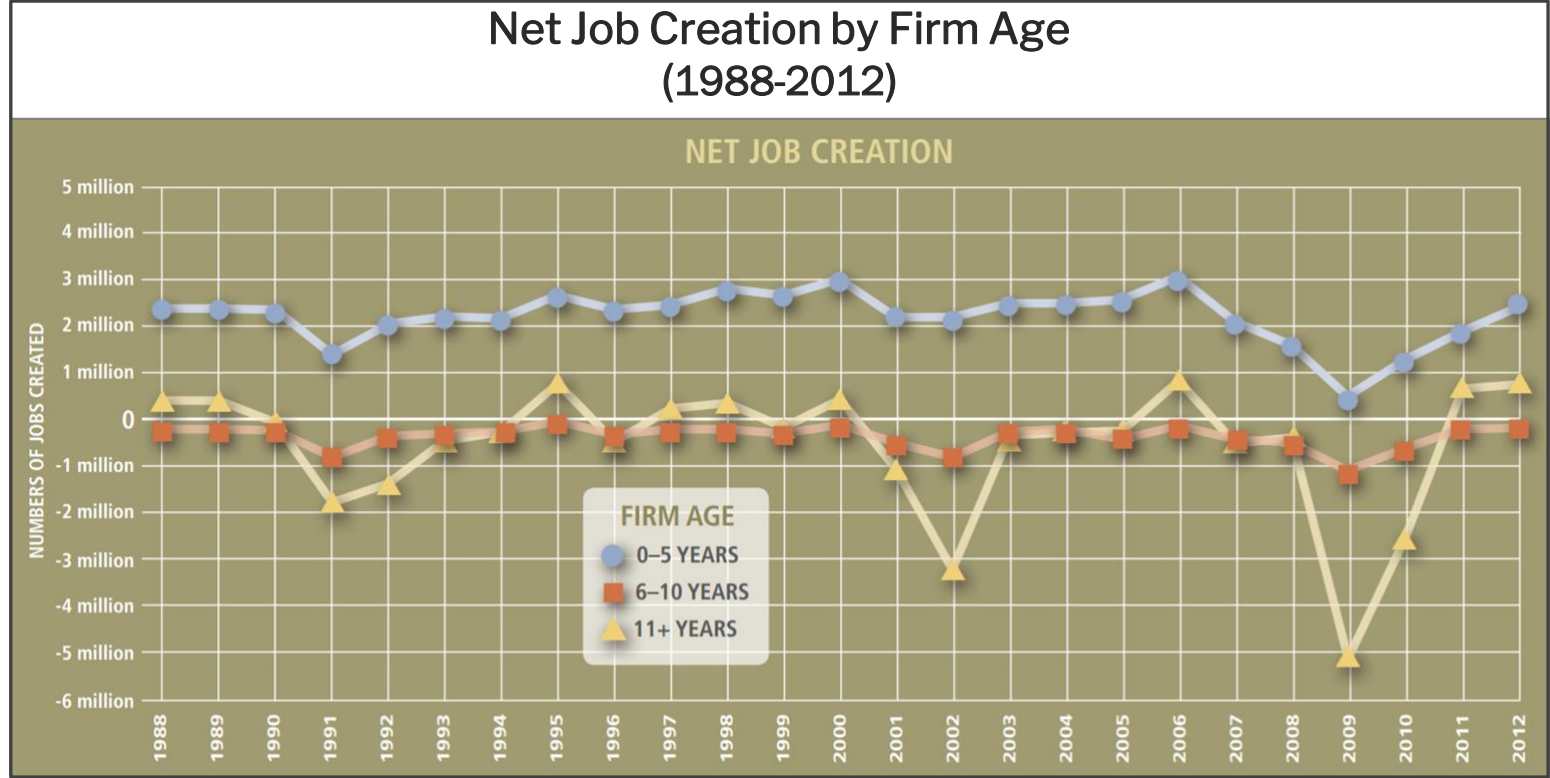
Attracting and retaining world class talent is essential for Pittsburgh's future

- 1) High-growth entrepreneurs create the most jobs
- 2) This is particularly true for foreign-born & science-based entrepreneurs
- 3) CMU civic entrepreneurs can help address the region's equity issues



Images: Duolingo billboard and headquarters, via Luis Von Ahn and Glassdoor

Startups are responsible for the most net new jobs.

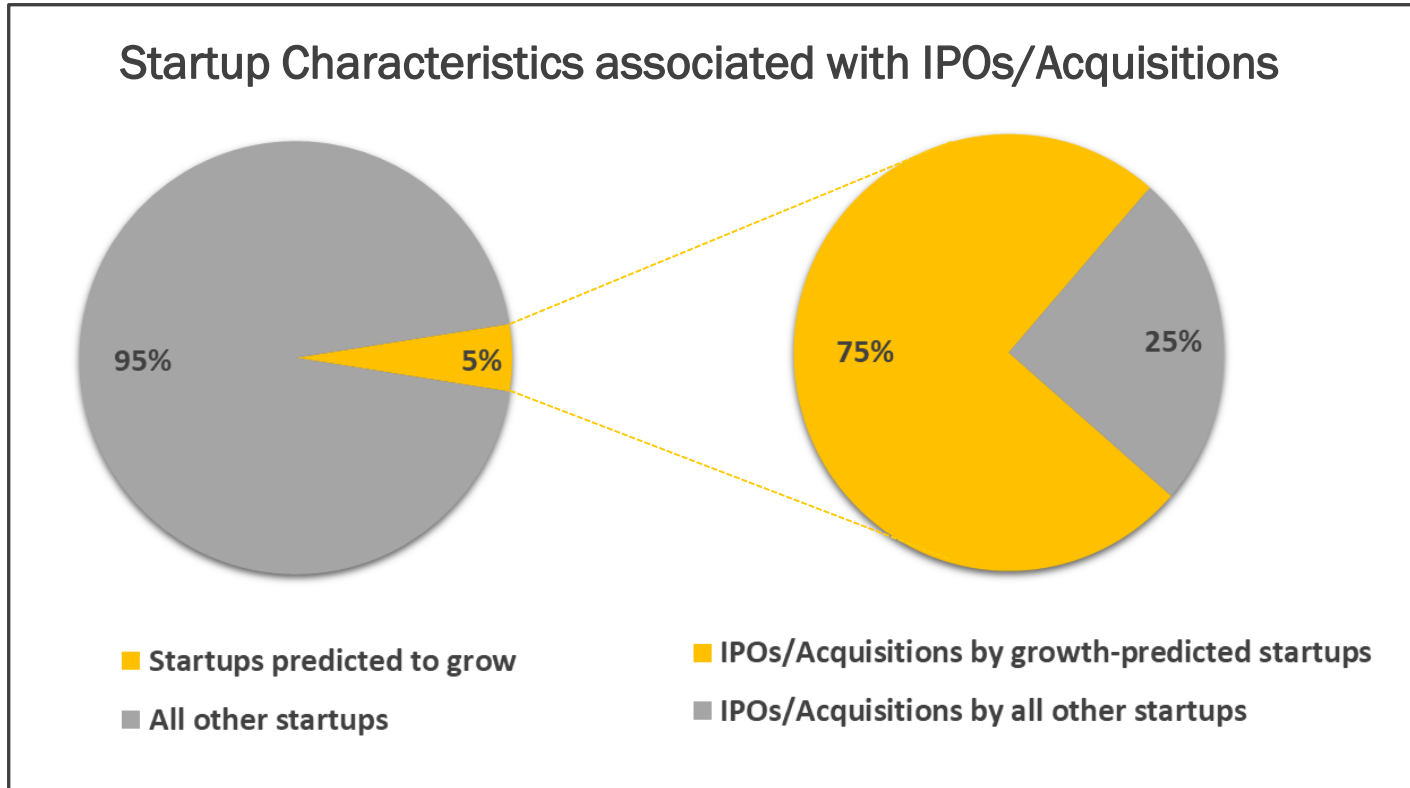


Older companies destroyed more jobs than they created in all but eight years between 1988 and 2012.

Startups create sustainable job growth: when a cohort of firms founded in a given year reaches age five, employment level is on average 80% of the initial value. Growth at surviving firms makes up for firm deaths.

Source: U.S. Census Business Dynamics Statistics via "Entrepreneurship Policy Digest." Kauffman Foundation, 2015. https://www.kauffman.org/wp-content/uploads/2019/12/entrepreneurship_policy_digest_september2014.pdf and Kauffman Foundation, 2010. <https://www.kauffman.org/wp-content/uploads/2019/12/firmformationinception8210.pdf>.

Few high-growth startups create the majority jobs



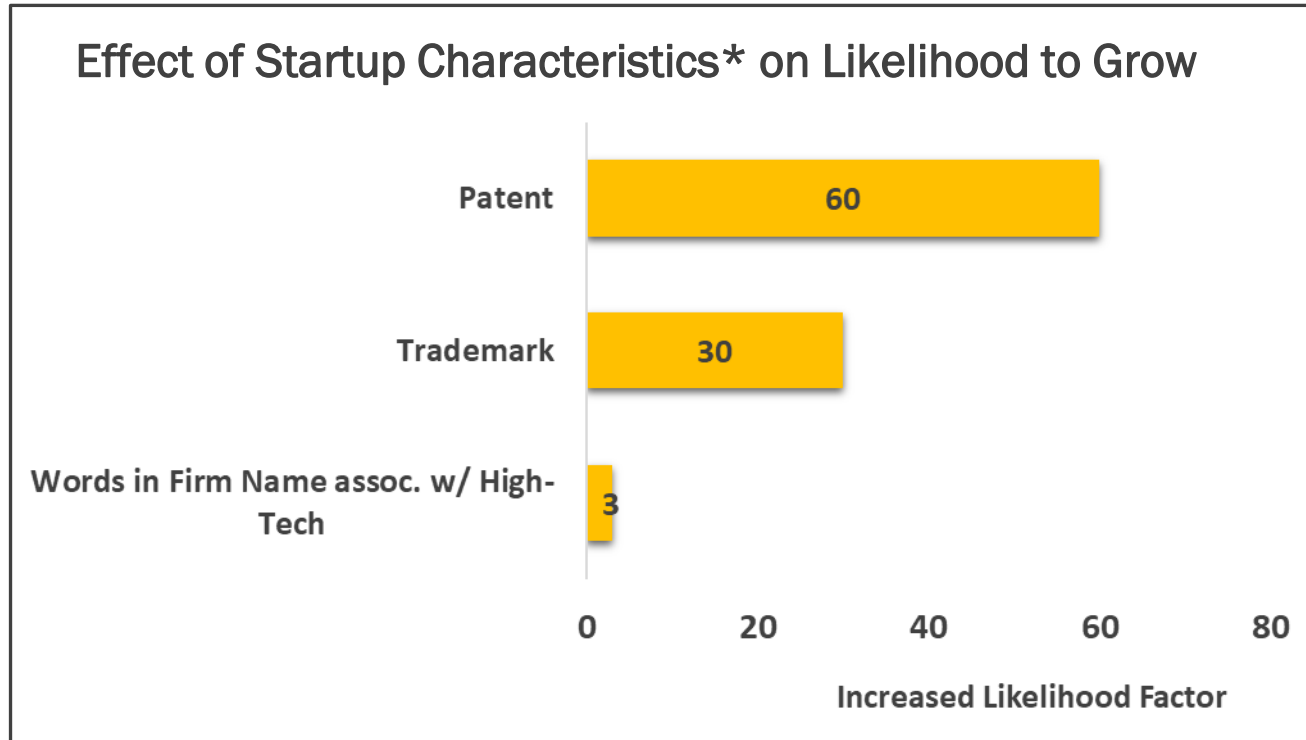
More than 75% of growth outcomes stem from 5% of startups.

Growth prediction based on:

- Local or traded industry
- High-tech industry
- Founder is repeat entrepreneur
- Firm holds a patent or trademark within first year
- Media coverage within first year

Source: "Nowcasting and Placecasting Entrepreneurial Quality and Performance." NBER. 2015. <https://reap.mit.edu/assets/Guzman-Stern-NBER-Nowcasting-and-Placecasting-Entrepreneurial-Quality-and-Performance.pdf>.

Most high-growth firms are science-based startups



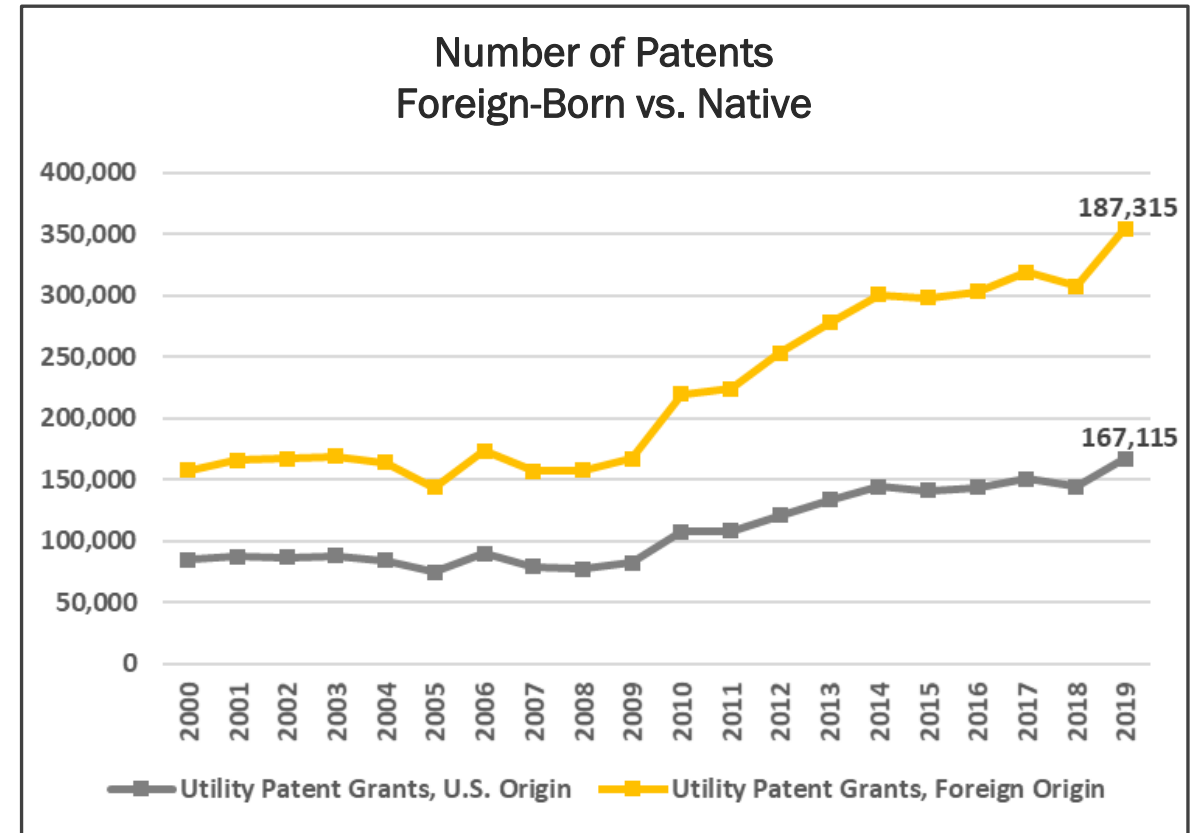
New firms with patents are **60x** more likely to achieve IPO or high-value acquisition.

*At or within first year of founding.

Source: "Nowcasting and Placecasting Entrepreneurial Quality and Performance." NBER. 2015. <https://reap.mit.edu/assets/Guzman-Stern-NBER-Nowcasting-and-Placecasting-Entrepreneurial-Quality-and-Performance.pdf>.

Immigrant student entrepreneurs disproportionately create science-based startups

- **Immigrants outperform natives in entrepreneurship and innovation**
 - Account for ~25% of new firms and patents while only 14% of the workforce
 - Among new firms raising >\$250,000 in VC, immigrant-owned firms raise more \$ than native-owned
- **Immigrants' propensity for entrepreneurship and innovation is mostly explained by greater STEM degree attainment.**
 - 2/3 of foreign students pursuing a degree are in STEM or business fields, versus 48% of American students



Source: "Immigrant Entrepreneurship." NBER. 2016. <https://www.nber.org/papers/w22385> and https://www.hbs.edu/faculty/Publication%20Files/20-105_aac0d5ae-e6e3-4570-8225-31bcc127f693.pdf and "The Geography of Foreign Students in U.S. Higher Education." Brookings. 2014. https://www.brookings.edu/wp-content/uploads/2014/08/Foreign_Students_Final.pdf.

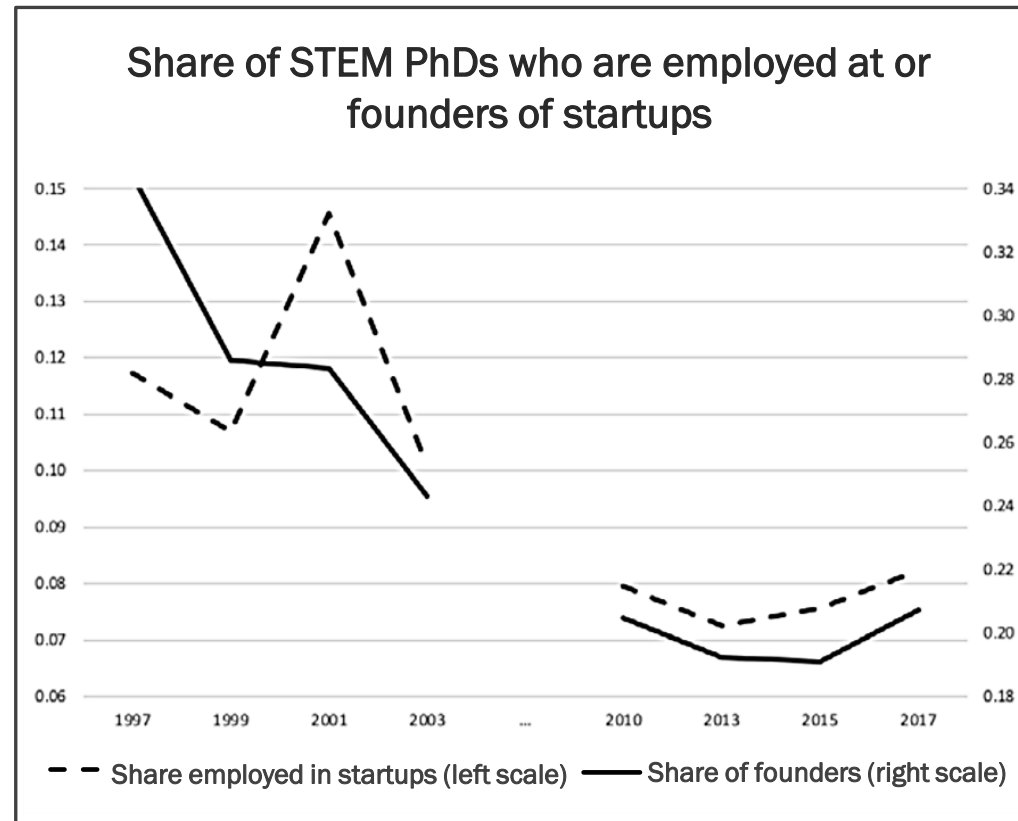
Yet fewer PhD students are starting their own firms

Share of STEM PhDs who are
founders:

1997: 34%

2017: 21%

>> a 38% drop.

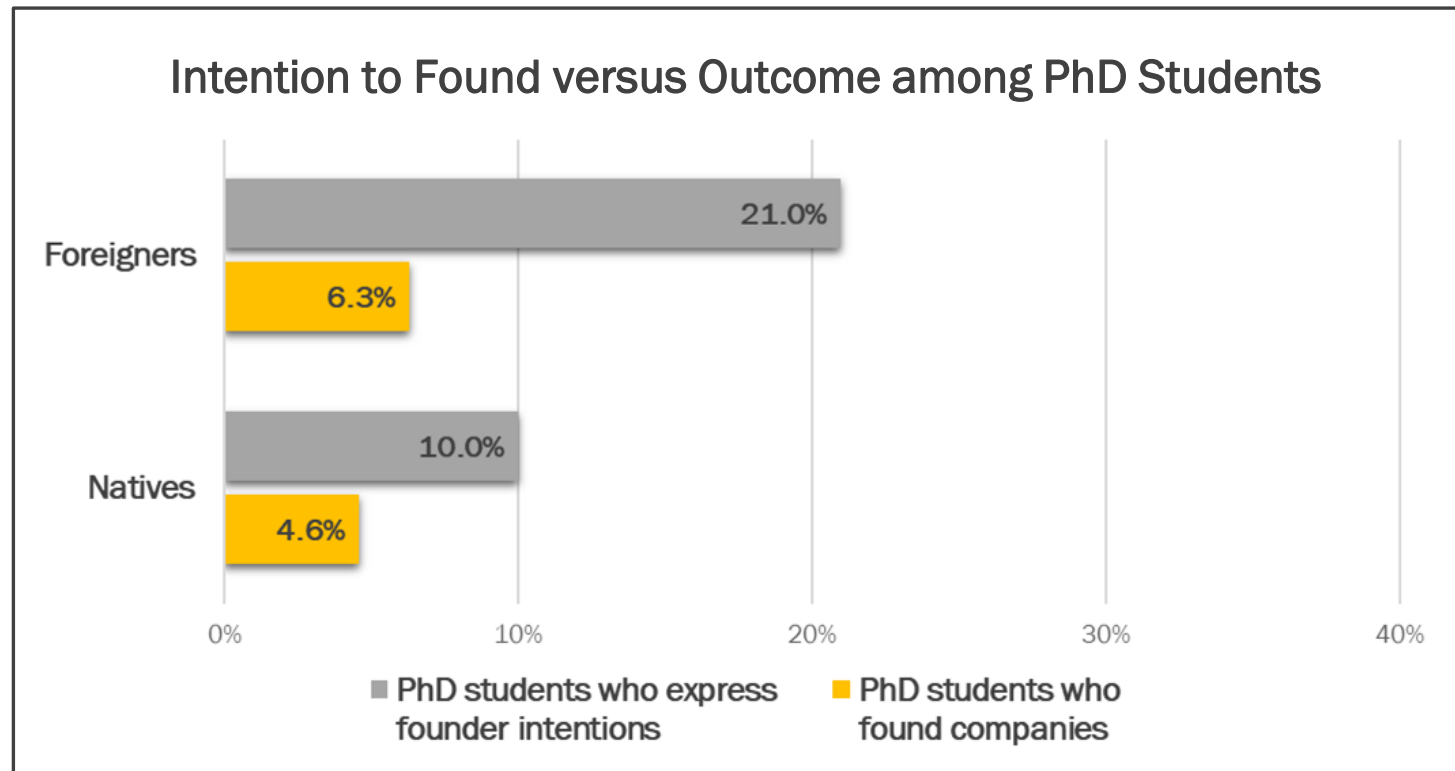


*Employed PhD's, from U.S. institutions, residing in the U.S.

Source: "Declining Business Dynamism among Our Best Opportunities: The Role of the Burden of Knowledge." NBER, 2020. <https://www.nber.org/papers/w27787>.

Even when they intend to be entrepreneurs, they opt for existing jobs, especially immigrants

Foreign-born PhD students hope to be founders at higher rates than their native-born counterparts, but are 30% less likely to actually found companies after graduation.



Source: "Foreign-Born Entrepreneurial Human Capital in the US: The Preference-Outcome Gap." 2019. https://www.realclearpublicaffairs.com/public_affairs/2019/11/28/foreign-born-entrepreneurial-human-capital-in-the-us-the-preferenceoutcome-gap_78649.html#:~:text=The%20study%20finds%20that%20foreign,percent%20of%20native%20PhD%20students.

CMU civic entrepreneurs can help address long-standing racial equity and access challenges

Pittsburgh's non-profit sector is a critical jobs generator for minority workers.



CMU civic and private-sector entrepreneurs are already making a difference in Pittsburgh

Local organizations founded by CMU alums:



CMU needs a bold strategy to attract and retain the best in Pittsburgh

1. Improve alumni retention rate
2. Support our highest-potential graduates
3. Boost job growth locally
4. Turn Carnegie Mellon into a *growth engine* for the region



Image: CMU 2017 Alumni Weekend

3. The STARS Fellowship

The plan: Positions for entrepreneurs and innovators

80/20: Fellows spend 80% of their time launching their startup or initiative, and 20% collaborating with students and the community.

Benefits for...

- The City of Pittsburgh:
 - **Retention of world class talent** tied to the region
 - Pipeline of community **mentorship**
- Fellows:
 - Ability to **build their company or non-profit**
- Universities:
 - **Mentors** affiliated with industry
 - **Commercial applications** of our research
 - Affiliation with successful **startup brands**



Image: CMU Swartz Center

STARS Fellows' Roles on Campus

- Teach, TA, or guest-lecture classes, contributing current industry issues
- Train student interns
- Guide capstone projects
- Participate in community lunch & learns
- Bolster Swartz & Block Center programs
- Engage with alumni



Image: CMU INFORMS Student Chapter

Resourcing and Alumni Relations

- The Fellowship provides a new avenue to connect with alumni
- Each Fellow could be sponsored by a foreign-born alumni, from their home country, or not
- The community benefit element and novelty of the program creates fundraising opportunities from local and national philanthropy



Image: CMU

STARS aligns with CMU's 2025 Strategic Plan

- Support for **entrepreneurial activities** on campus
 - “Expanding the resources available to faculty and students pursuing entrepreneurial pursuits, including nonprofits and public-sector innovation.”
- Expand **scholarship and fellowship** resources
 - “Significantly increase resources available for scholarships and fellowships to improve recruitment and retention of a diverse student population”
- Create opportunities for **engagement with alumni** on a global scale.
 - “Offer alumni meaningful ways to engage with current students, faculty, staff and each other, including mentoring, career planning and internship programs.”
- Expand **access to apprenticeship and mentorship** educational models for undergraduate and masters students
 - “Provide majors and non-majors with opportunities to gain experience solving real-world problems, learn how to pose important questions, deal with uncertainty and engage deeply with expert faculty mentors and advisors.”
- Define and deliver an integrated approach to a **transformative educational experience** for all graduate students
 - “Engage graduate students in work that anticipates and moves ahead of the cutting edge of their fields”

Improving CMU's existing strengths

What we already do:

- Provide an effective pipeline for employee visas
- Offer part-time employment for students in a variety of areas
- Support students' startups

What we could do:

- Use our alumni entrepreneurs as part of a targeted alumni engagement strategy
- Offer follow-along support for post-OPT startups
- Create a stronger 'pull' for students from outside the region to stay in Pittsburgh— Particularly among underrepresented groups

4. Other Cities' Success with the Model



Boston: Global Entrepreneurship-in-Residence program

- **Lead:**
 - UMass Boston Venture Development Center
- **Progress since founding (2015):**
 - 314 entrepreneurs from 14 different universities applied; 66 entrepreneurs (21%) accepted.
 - 100% visa approval rate (H-1B, O-1, EB1)
 - 74% of GEIR entrepreneurs are still active in the US; their companies have 940 employees; and raised \$523,208,000 in venture capital.
 - GEIRs have participated in 37 courses in 4 different colleges at UMass Boston, benefitting 740 students.
 - Pilot case: PillPack, acquired by Amazon for \$1B
- **Logistics:**
 - State-funded (Massachusetts Technology Collaborative)
 - After UMass sponsors visa, founders apply for the concurrent H1-B visa allowing them to take a salary



Detroit: Global Entrepreneurship-in-Residence program

- **Lead:**
 - Global Detroit, Univ. of Michigan, Wayne State Univ.
- **Progress since founding (2019):**
 - Four entrepreneurs accepted with visas approved
 - Pilot case:
 - Founder: Ashok Seetharam
 - Company: PAXAFE – AI-enabled cargo insurance
 - Capital acquired: \$915K since inception, including \$615K since GEIR visa began
 - Jobs created: 5 in Michigan
- **Logistics:**
 - Each university runs their own HR & legal process to sponsor the visa

5. Next Steps

Next Steps

- **2020**
 - Reach buy-in from universities and community partners
- **2021**
 - Develop the program's business model and attract funding
 - Officially kick off the program and begin identifying the pool of entrepreneur candidates



Image: CMU Swartz Center

Thank you.

Scott Andes, CMU Block Center for Technology & Society
Grace Klein, CMU Block Center for Technology & Society
David Mawhinney, CMU Swartz Center for Entrepreneurship
Tom Link, URA
Charles Hudson, URA
Sean Luther, InnovatePGH

6. Appendix: Program Details

Planning Details

- Each year the university awards 1-3 Fellowships to graduating students that either have started a business or non-profit while in school or have a compelling business plan to do so
- Fellows are temporary employees of the university for a duration of 1-2 years. Level of stipend TBD
- Fellows are often, but not exclusively, foreign-born students who could not build their projects locally without becoming an employee of the university
- CMU prides itself on providing a flexible, revolving door for faculty to move between the university and building companies. The STARS Fellowship provides similar opportunities to our best students

STARS Fellowship Details

Program Cost: Variable, depending on structure, \$50,000 - \$1,000,000

Duration: 1-2 years for each fellow

Visa process: If the fellow is an international student, CMU sponsors H-1B; once approved entrepreneur immediately files for concurrent visa

Technology Transfer issues: Goal is for any Fellow's IP to stay below the university's substantial use policy

Employment at CMU : Part-time position (10-20 hours) completely separate from startup activities

Example Pathway:

Step 1: CMU graduating student— has entrepreneurial idea

Step 2: While on OPT— builds prototype at Innovation Works

Step 3: Chosen for STARS Fellowship— TAs part-time at CMU, raises seed funding for startup

Step 4: Concurrent visa approved (if international student)— TAs part-time at CMU, ramps up business activities

Step 5: STAR Fellowship ends— Startup grows and hires employees in Pittsburgh