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# Career Preferences of AI Talent

CSET Data Brief



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## Executive Summary

As AI becomes increasingly important to the U.S. economy and national security apparatus, understanding the career preferences of AI talent is critical. AI talent is in high global demand and short supply, and the United States faces increased international competition for top talent.<sup>1</sup> A better understanding of career preferences can offer the United States an advantage in talent recruitment and retention.

To explore the career preferences of AI talent, we surveyed recent PhD graduates from top-ranking AI universities in the United States.<sup>2</sup> The survey was completed by 254 U.S. AI PhD graduates; they were a representative sample in terms of gender, nationality, and current country of employment.<sup>3</sup>

Results indicate that:

- **AI PhDs choose to study in the United States for the high quality of education and future job opportunities.** Quality of education was a top reason to choose a U.S. PhD program for 82 percent of respondents, while 48 percent indicated future job opportunities as a top reason.
- **AI PhDs tend to stay in the United States to work in U.S. academia and industry.** After PhD completion, 80 percent of respondents planned on entering a career in U.S. academia and 60 percent in the U.S. private sector; 76 percent currently hold an academic or private sector job in the United States. In terms of future jobs, 75 percent would consider a job in academia, 68 percent a job with a large company, and 31 percent a job in government.
- **AI PhDs are drawn to careers by the growth opportunities, professional culture, technical challenges, and research ownership they offer—areas where public sector jobs lack appeal.** Between 64 and 70 percent of respondents said these factors were extremely important to them when considering a job. For each of

these factors, respondents rate government jobs as less attractive than academia and the private sector.

- **There are some significant differences between the career preferences of U.S. citizen PhDs and international PhDs.** Location, family and friends, colleagues, and the ability to have a positive social impact are more frequent considerations among U.S. citizen PhDs while salary and immigration concerns are more frequent considerations among international PhDs.\*

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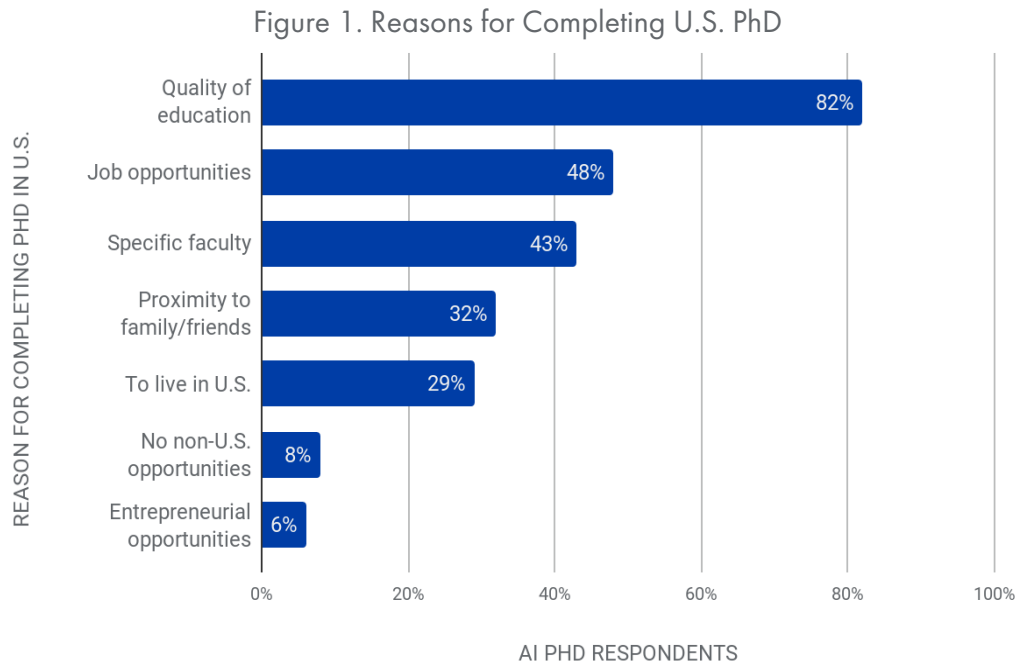
\* All respondents completed their PhD in the United States. U.S. citizen PhDs refers to respondents who are U.S. citizens and completed their PhD in the United States. International PhDs refers to respondents who are not U.S. citizens but completed their PhD in the United States.

## Professional Activities and Preferences

Respondents answered questions related to their education and career choices. These queries ranged from why they chose a doctoral program in the United States and what motivated their job choice after graduation to their views on employment opportunities in various sectors. Taken together, our results provide valuable insight into the career activities and job preferences of top AI talent.<sup>4</sup>

### *Reasons for Completing PhD in the United States*

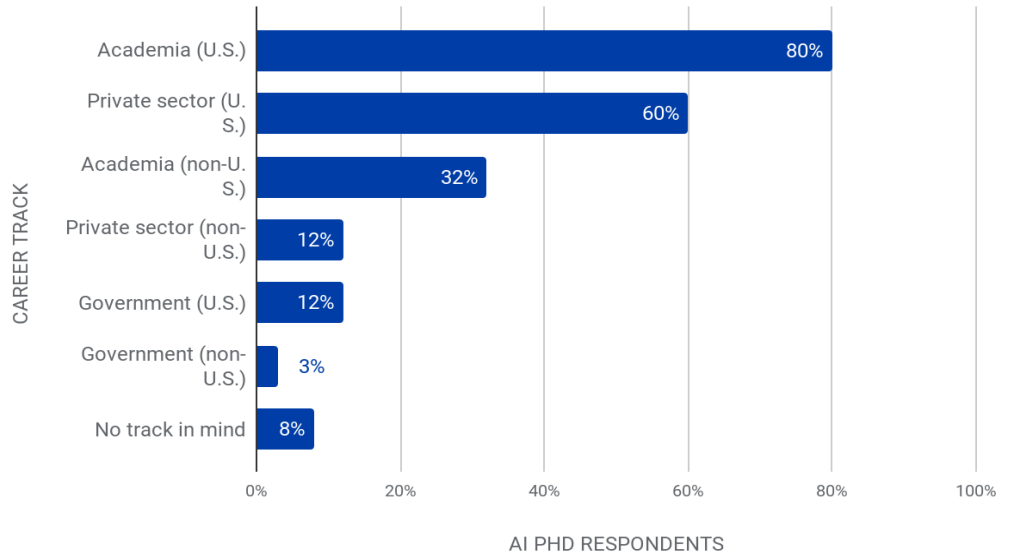
As displayed in Figure 1, the high quality of education in U.S. PhD programs was the most common reason for studying in the United States. Respondents also chose U.S. PhD programs for future job opportunities and the chance to work with specific faculty. A desire to live in the United States or be close to family and friends were less common. Entrepreneurial opportunities in the United States and limited options outside of the United States played a role for only a small minority of respondents.



**Figure 1.** Respondents' selections in response to "Why did you choose to complete your doctorate in the United States?" Respondents could select up to three reasons. Seven percent selected "other" and entered program-specific reasons (e.g. course offerings) or financial reasons (e.g. cost). Source: CSET 2019 AI PhD Survey.

When respondents embarked on a PhD, most planned to enter a career in U.S. academia. A smaller majority sought private sector careers in the United States. Other career tracks were notably less popular, especially government careers, as shown in Figure 2.

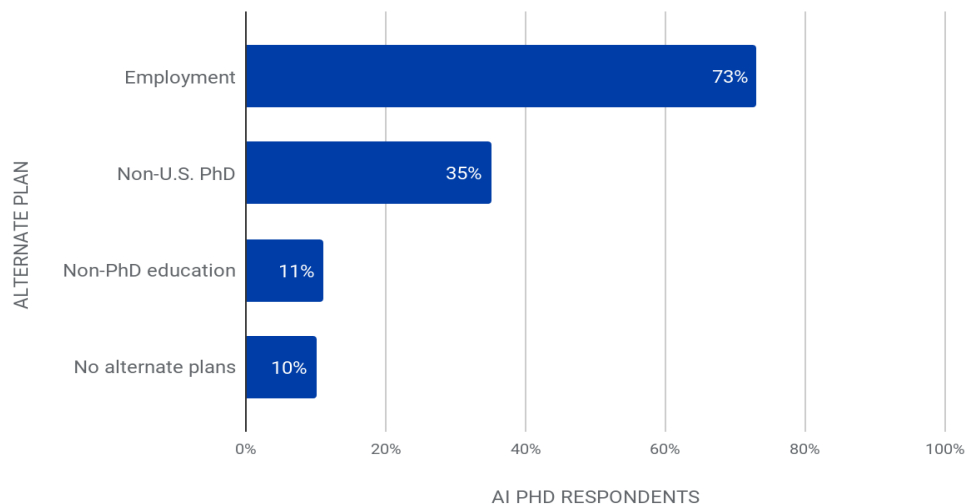
Figure 2. Intended Career Tracks When Started PhD



**Figure 2.** Respondents' selections in response to "When you started your doctorate, which future career tracks interested you the most?" Respondents could select up to three tracks. Source: CSET 2019 AI PhD Survey.

If plans to enroll in a U.S. PhD program fell through, respondents were most likely to consider full-time employment, either in the United States (52 percent), UK (21 percent), or another country (27 percent).<sup>5</sup> As shown in Figure 3, some would have enrolled in a non-U.S. PhD program.

Figure 3. Alternate Plans to U.S. PhD Program

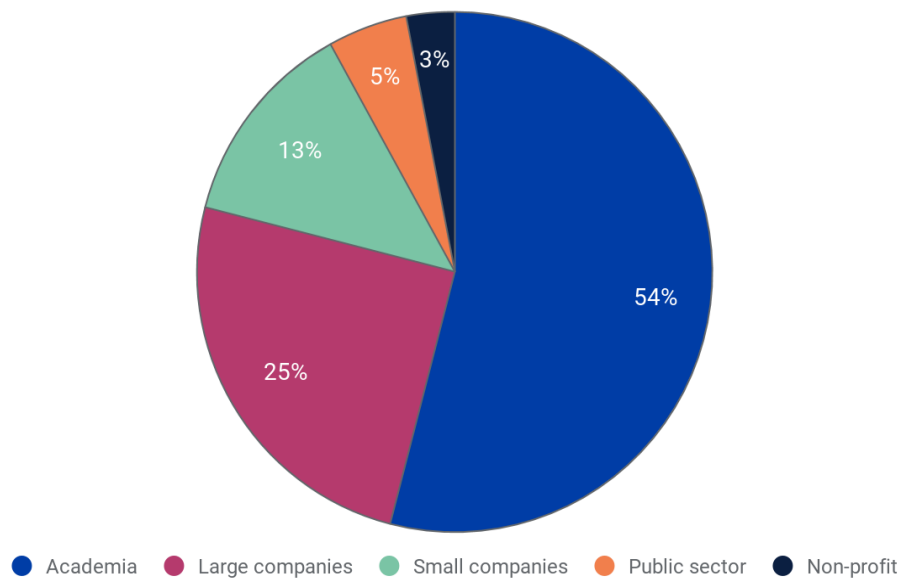


**Figure 3.** Respondents' selections in response to "If you had not enrolled in a doctoral program in the United States, what were your alternate plans?" Respondents could select up to two alternate plans. Three percent selected "other," including pursuing their own company or business. Source: CSET 2019 AI PhD Survey.

### *Current Professional Activities*

Figure 4 displays respondents' current employment sectors. Just over half currently work in academia, while 38 percent work in the private sector. Only 12 percent have dual affiliations; nearly half of those maintain academic and private sector affiliations. Holding two academic affiliations was next most common.<sup>6</sup> Most respondents with dual affiliations spend less than 20 percent of their work time on their secondary position. Respondents work in 22 different countries, although 83 percent work in the United States.<sup>7</sup> Other work locations include the UK, Singapore, Canada, Germany, and France.

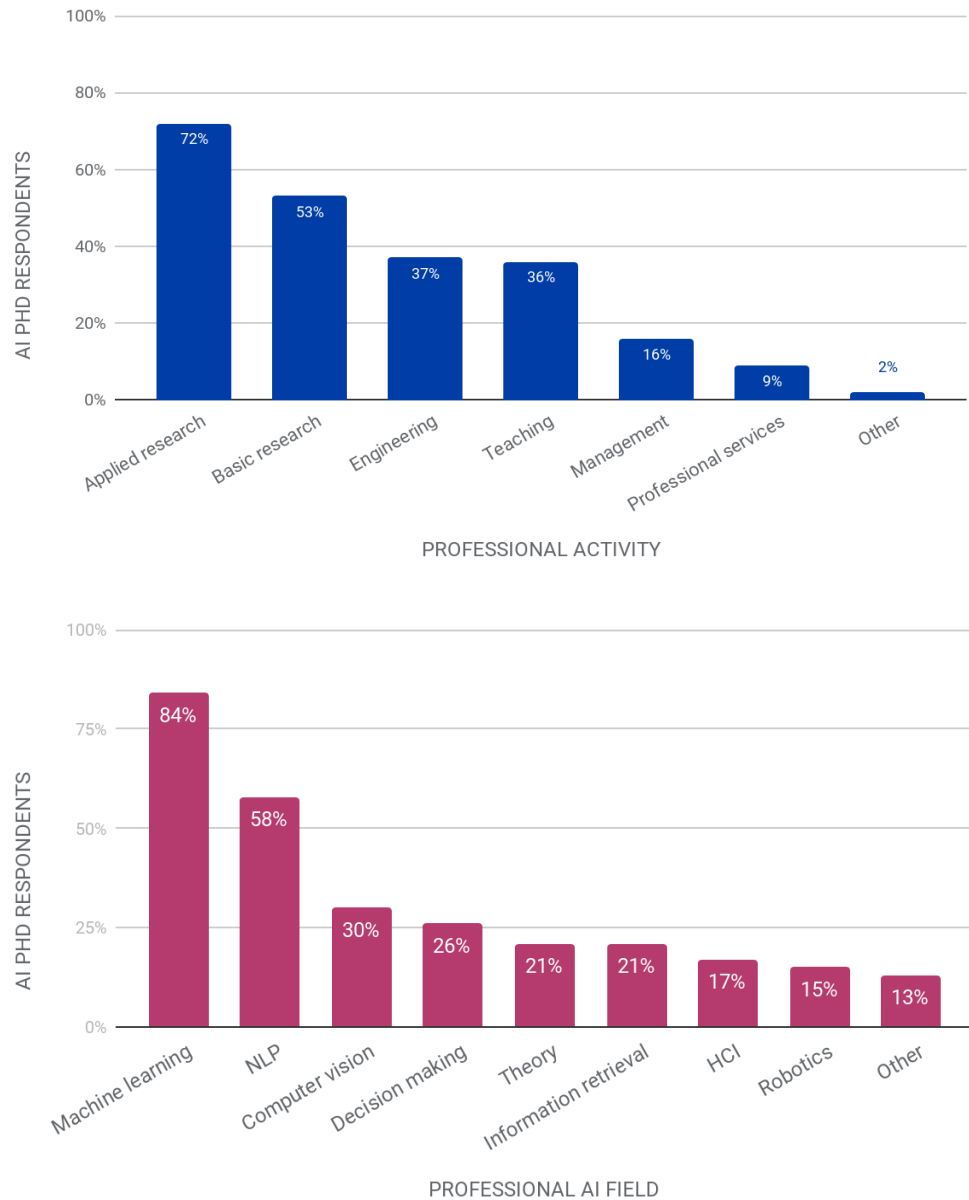
Figure 4. AI PhD Employment Sector



**Figure 4.** Respondents' current employment sectors. Source: CSET 2019 AI PhD Survey.

Figure 5 shows respondents' primary professional activities and AI-related fields. Basic and applied research are the most common professional tasks, while machine learning and natural language processing are the most relevant AI-related fields in PhDs' current professional positions.

Figure 5. AI PhD Professional Activities and AI Fields

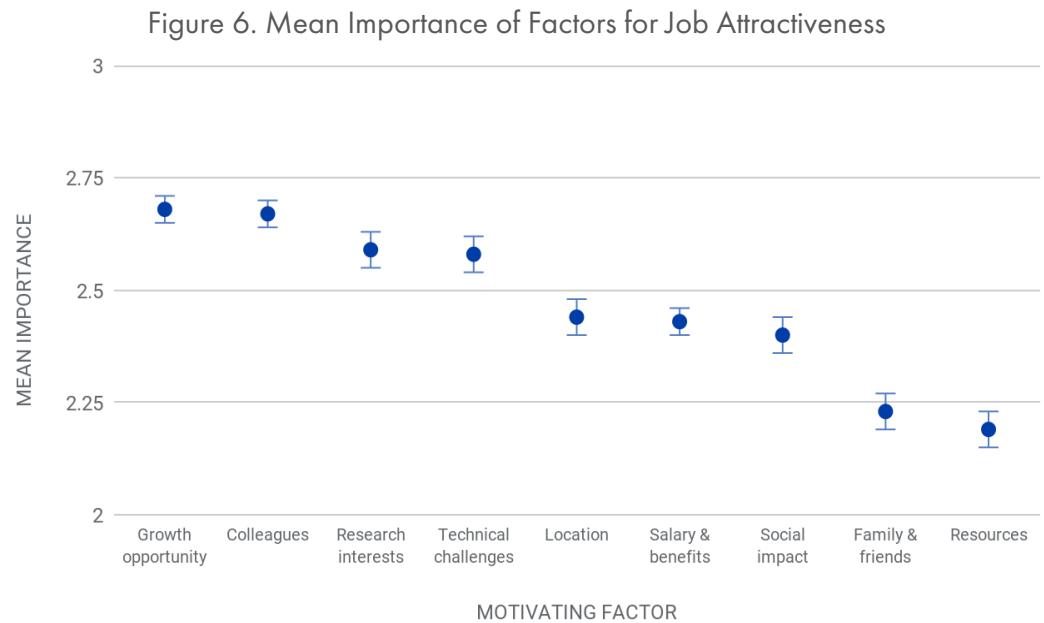


**Figure 5.** Respondents’ professional activities and AI-related fields, selected from a provided list of activities and fields. Three percent reported integrated circuits as a field. Other activities include student advising, sales, and management. Other AI-related fields include ethics, cognitive science, modeling, computing and computer systems, mathematics, and data visualization. Respondents could select up to three activities and as many fields as applied. Source: CSET 2019 AI PhD Survey.

### *Factors Motivating Career Decisions*

To capture the motives behind career decisions, we asked respondents how important various factors were in a past job choice and then to rank the same

factors by their importance in making a future job attractive.<sup>†</sup> Our findings suggest roughly three tiers of motivators, displayed in Figure 6. Most important are growth opportunities, colleagues and professional culture, the ability to pursue research interests, and interesting technical challenges. These top-tier motivating factors are followed closely by location and salary. The ability to have a positive social impact, family considerations, and access to compute and data resources appear least important, though still relevant.



**Figure 6.** Mean importance of job motivating factors. 3 = extremely important, 2 = somewhat important, 1 = not at all important. Error bars provide a confidence interval for our mean estimates. Source: CSET 2019 AI PhD Survey.

Figure 7 compares respondents’ rankings of the factors that impact future job attractiveness. A majority consider growth opportunities, colleagues and professional culture, the ability to pursue research interests, and interesting technical challenges as extremely important.<sup>8</sup> About half consider location, salary, and social impact to be extremely important. Family considerations and access to computing resources and data were less frequently selected as extremely important. Note that a majority consider all factors at least somewhat important.

<sup>†</sup> We asked respondents to rank the same motivating factors in terms of 1) their importance in deciding where to work after PhD and 2) their importance in making a job attractive. The goal was to capture the importance of these specified factors in an actual decision the respondent made in the past, as well as in a hypothetical scenario where the respondent was imaging an attractive or ideal job in the future. Additionally, we asked respondents to rank a typical job in various employment sectors in terms of each factor.



Figure 7. Importance of Factors for Job Attractiveness

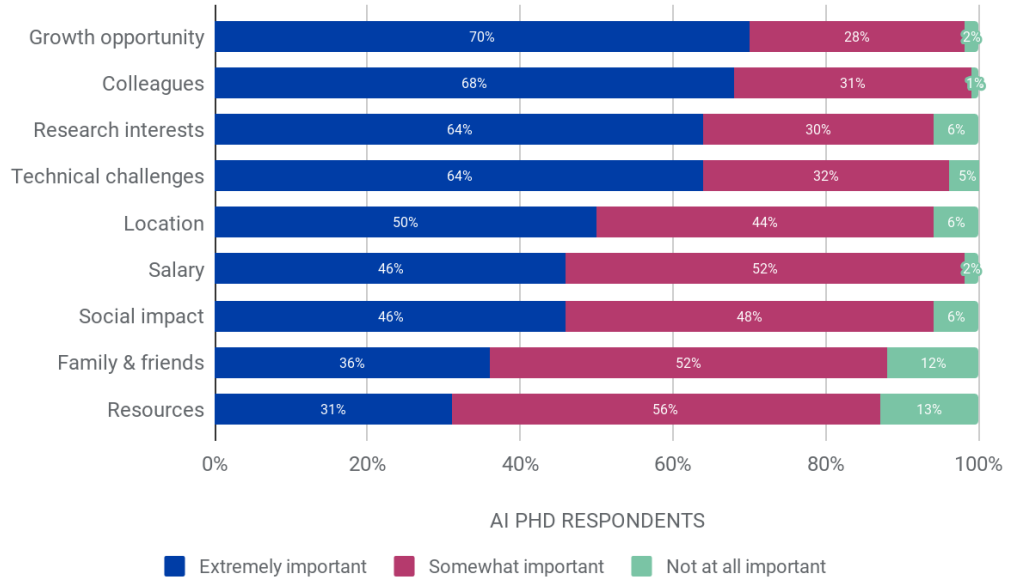


Figure 7. Respondents' selections in response to "When you think about what makes a job attractive, how important are the following factors to you?" Source: CSET 2019 AI PhD Survey.

Figure 8 displays respondents' selections of the factors that were most important in deciding where to work after PhD completion. Again, we see top-tier motivating factors (the ability to pursue research interests, colleagues and professional culture, interesting technical challenges, and growth opportunities) were important to half or more of respondents.

Figure 8. Factors That Motivated Post-PhD Job Decision

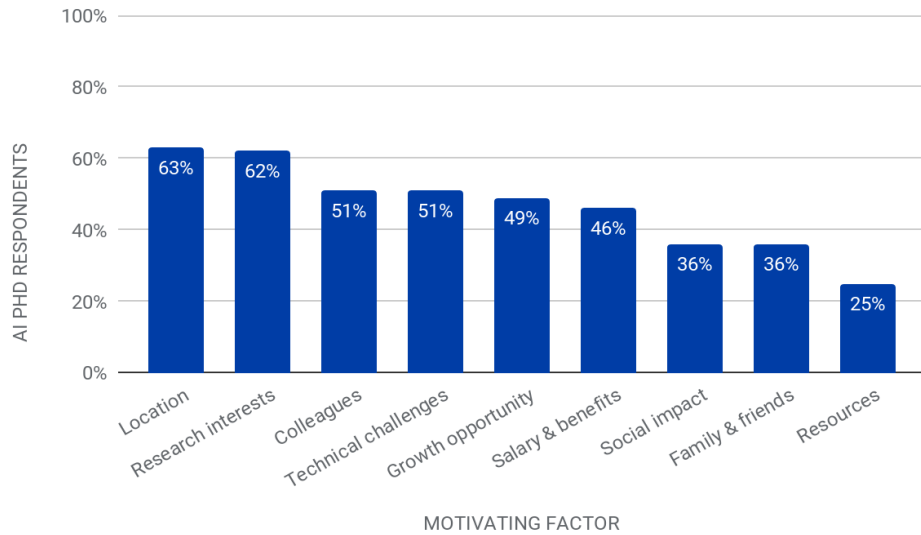


Figure 8. Respondents' selections in response to "When deciding where to work after completing your PhD, what were the most important considerations?" Respondents could select up to five factors. Source: CSET 2019 AI PhD Survey.

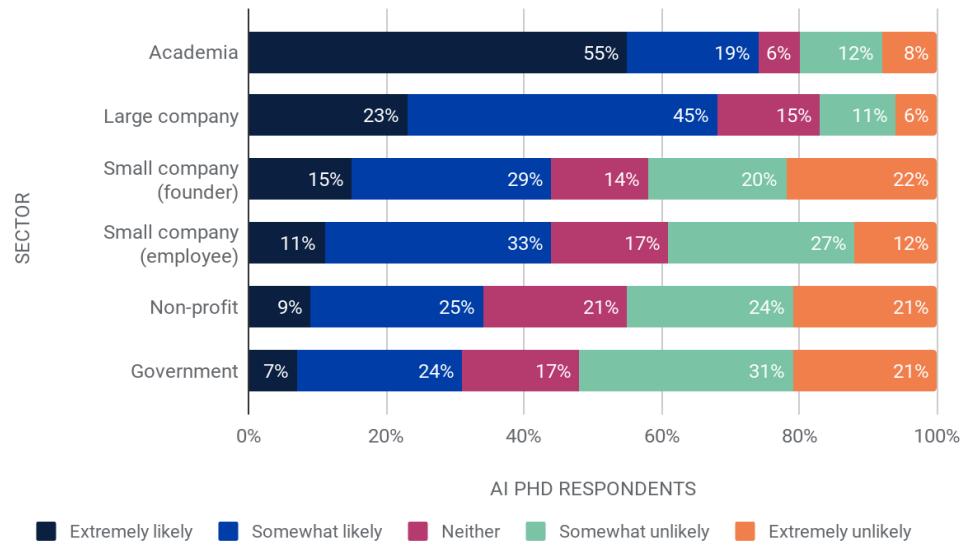
In addition to the top tier factors that make a future job attractive, 63 percent selected location as important in their past decision of where to work after their PhD. This suggests that while location may not be a primary driver of job attractiveness, it was an important consideration in job choice after degree completion, and potentially in actual job decisions down the road. Salary again appears as a secondary but important consideration. The desire to have a social impact appears less relevant in past decisions compared to future job attractiveness.

*Perceptions of Employment Sectors*

Beyond the factors motivating past and future job choice, we asked for AI PhDs’ views of different employment sectors. As shown in Figure 9, respondents are most likely to consider future jobs in academia (75 percent) or with a large company (68 percent). Forty-four percent are at least somewhat likely to consider a job at a small company. Respondents are least likely to consider a job with a non-profit organization (34 percent) or in government (31 percent).

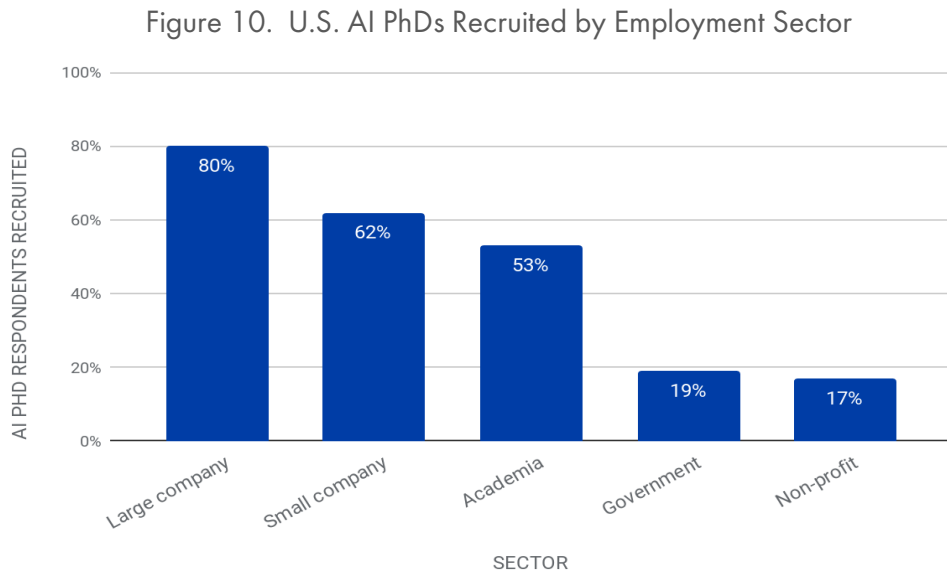
Overall, respondents are most likely to consider a job in their current employment sector, suggesting talent is hesitant to pursue careers outside their current sector.

Figure 9. Likelihood of Considering a Job by Employment Sector



**Figure 9.** Respondents' likelihood of considering a job in each sector. The question asked "How likely are you to consider a job in the following sectors?" Respondents provided likelihood for each sector. Source: CSET 2019 AI PhD Survey.

Most respondents have been approached by a recruiter for a position with a company and/or in academia, as seen in Figure 10. Meanwhile, fewer than one in five have been approached by a recruiter for a government or non-profit job.



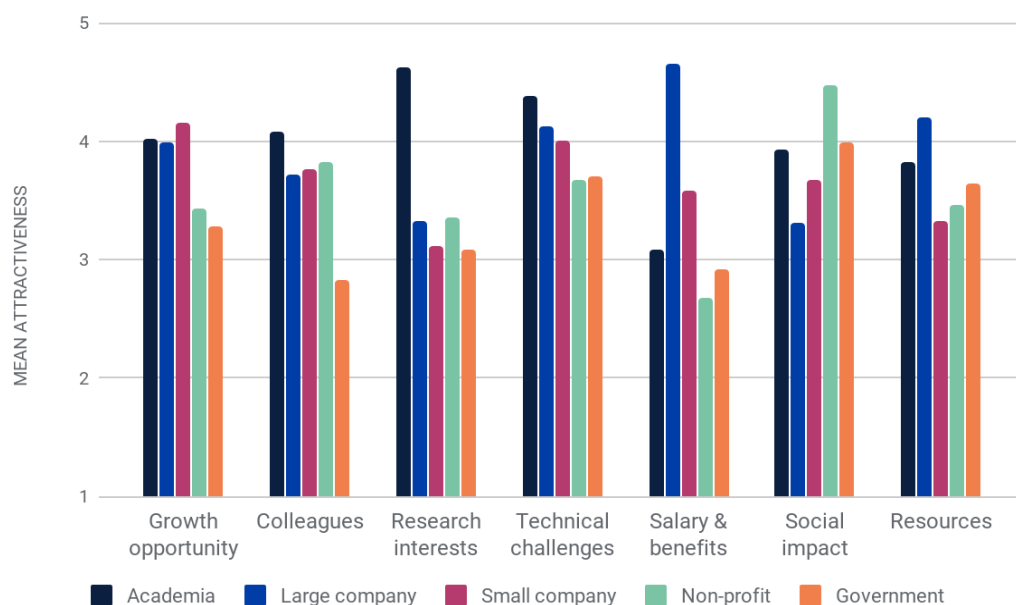
**Figure 10.** Percentage of respondents indicating yes to “Have you ever been approached by someone (e.g. a recruiter) about a job in [sector]?” Source: CSET 2019 AI PhD Survey.

It could be that government agencies and non-profits recruit at lower rates because there are fewer jobs in those sectors or because they view recruitment as ineffective. Alternatively, it could be that they have not invested in recruiting. Whether increased recruitment in these sectors would lead to a greater likelihood of AI PhDs considering such jobs is unclear. What our findings do show is the likelihood of considering a job in each sector reflects variability in recruitment among these sectors.

While AI PhDs are most likely to consider a career in academia or with a large company, this obscures variation in the appeal of jobs in each sector across a range of factors. To get at this nuance, we asked respondents to rate the attractiveness of a typical job in terms of specific motivating factors.<sup>9</sup> Results are displayed in Figure 11.

Averaging across all motivating factors, academia remains the most attractive employment sector among AI PhDs, followed closely by large companies. Government and non-profit jobs remain least attractive.<sup>10</sup>

Figure 11. Attractiveness of Typical Sector Job by Motivating Factor



**Figure 11.** Average attractiveness of career motivating factors by employment sector (1 = extremely unattractive, 2 = somewhat unattractive, 3 = neither attractive nor unattractive, 4 = somewhat attractive, 5 = extremely attractive). Motivating factors are listed in order of importance as reported by respondents. Source: CSET 2019 AI PhD Survey.

### Academia

Respondents consider academic positions most attractive in terms of colleagues and professional culture, interesting technical challenges, and the ability to pursue research interests. Notably, these factors were rated as most important in career preferences and decisions, indicating a preference among this sample for academic positions based on their attractiveness along these dimensions. Respondents also find academic jobs relatively appealing in terms of having a positive social impact and providing growth opportunities. The only factor in which academia is considered unattractive is salary and benefits, though it still ranks higher here than government or non-profit jobs.

### Large Companies

Comparing typical jobs in academia to those with large companies, AI PhDs find large company positions most attractive in terms of salary and benefits and access to compute and data resources. Jobs with large companies are

also appealing to AI PhDs in terms of interesting technical challenges and growth opportunities.

### Small Companies

AI PhDs consider jobs with small companies most attractive in terms of growth opportunities. Jobs with small companies are also considered attractive in terms of salary and benefits, though not quite matching the appeal of large companies.

### Non-Profits

AI PhDs consider jobs with non-profit organizations most attractive in terms of social impact. Non-profit jobs also rank highly in terms of colleagues and professional culture. Respondents find non-profit jobs to be unattractive in terms of salary and benefits.

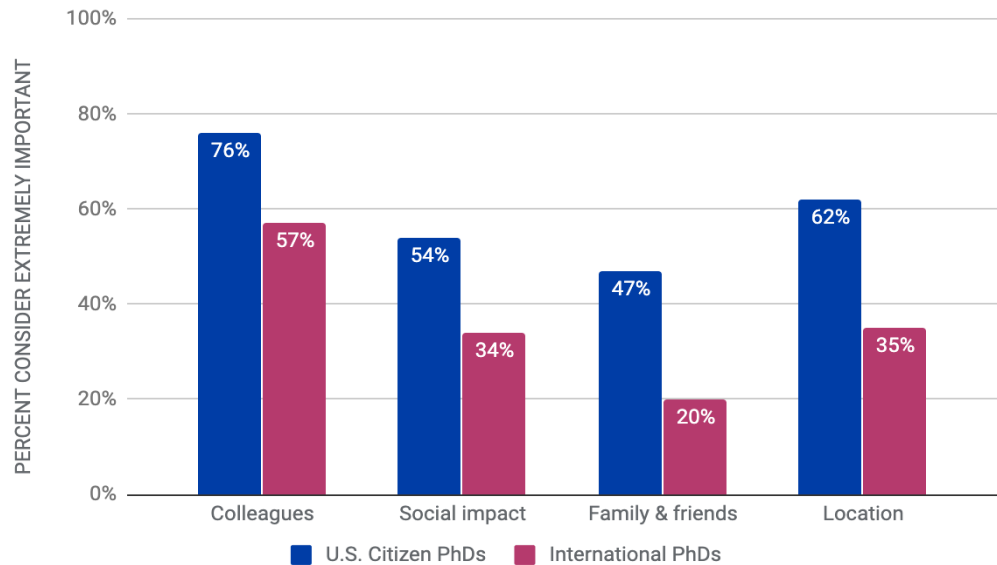
### Government

AI PhDs consider government jobs somewhat attractive in terms of social impact. Beyond social impact, respondents consider government jobs less attractive than academic and large company jobs along every dimension. Government jobs rank higher than small company and non-profit jobs in terms of access to computing and data resources. They rank lowest in terms of growth opportunities, colleagues and professional culture, and the ability to pursue research interests—three highly motivating factors among AI PhDs. AI PhDs also consider government jobs unattractive in terms of salary and benefits, although more attractive than non-profit jobs.

### *Differences Between U.S. and International PhDs*

Some significant differences exist between the career preferences of U.S. citizens and international AI PhDs. In terms of the factors that motivated post-PhD job decisions and drive future job attractiveness, U.S. citizen PhDs more frequently consider the ability to have a positive social impact and be close to family and friends, compared to international PhDs. Figure 12 shows that U.S. citizen PhDs also ranked colleagues and location as more important considerations for job attractiveness.<sup>11</sup>

Figure 12. Importance of Factors for Job Attractiveness Among International and U.S. PhDs

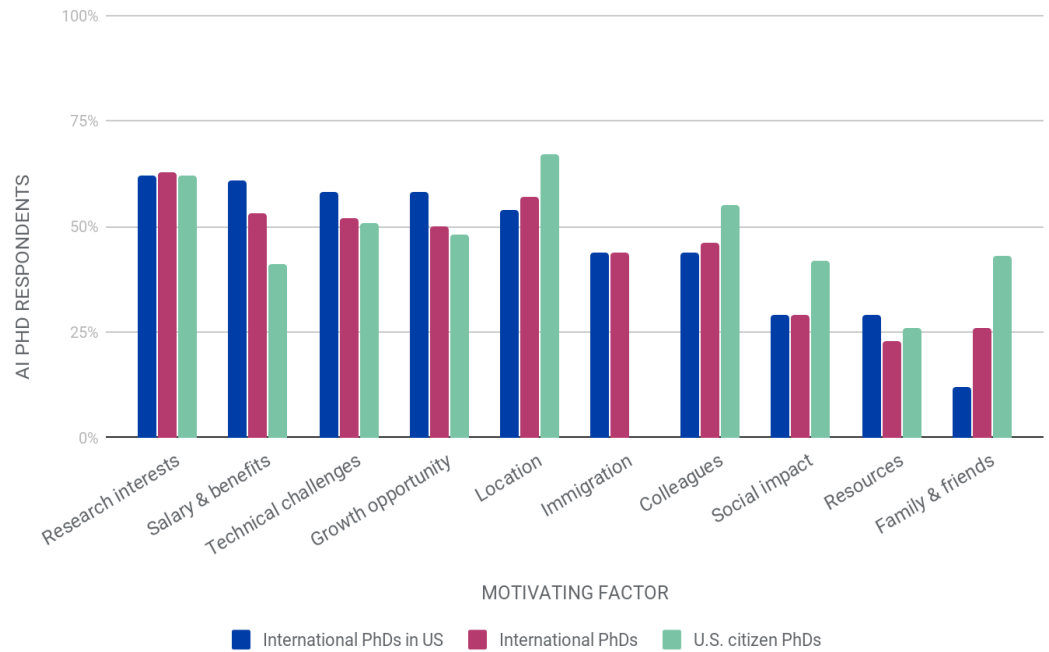


**Figure 12.** Percentage of U.S. citizen PhDs and international PhDs who selected extremely important for the listed factors. Question asked “when you think about what makes a job attractive, how important are the following factors to you?” Differences in proportions are significant at the 99 percent confidence level ( $p < .01$ ). Factors not shown had no significant difference between the groups. U.S. citizen PhDs  $n=146$  and international PhDs  $n=108$ . Source: CSET 2019 AI PhD Survey.

Figure 13 displays the proportion of U.S. citizens, international PhDs, and international PhDs working in the United States who selected each motivating factor as a top five most important consideration in their post-PhD job decision.

Again, we see social impact and proximity to family and friends were more frequently cited as important among U.S. citizen PhDs; 42 percent and 43 percent respectively. In comparison, only 12 percent of international PhDs who work in the United States selected proximity to family and friends as an important consideration in their decision.

Figure 13. Factors That Motivated Post-PhD Job Decision for International and U.S. PhDs



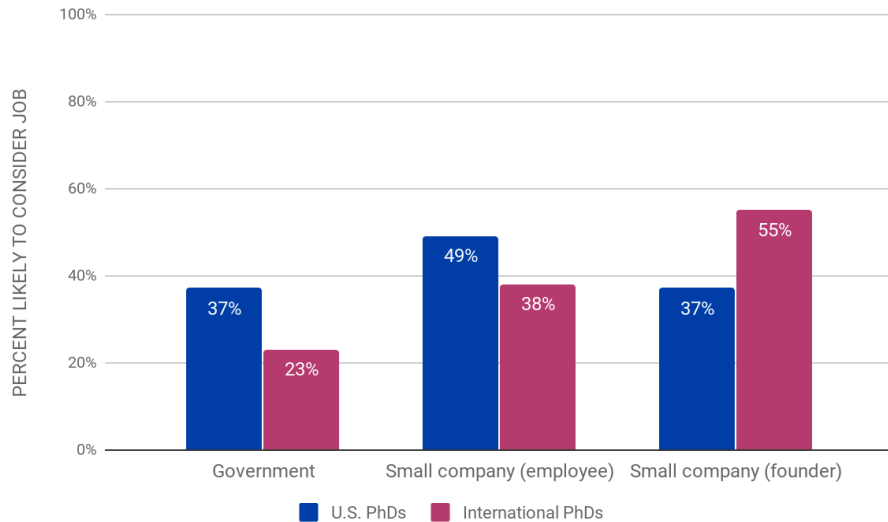
**Figure 13.** Respondents' selections in response to “when deciding where to work after completing your PhD, what were the most important considerations?” Respondents could select up to five factors. Factors listed along x-axis in order of selection frequency among international PhDs working in the United States. Differences in proportions for salary & benefits, immigration, social impact, and family & friends are significant at the 95 percent confidence level ( $p < .05$ ). Differences in proportions for growth opportunity and location are significant at the 90 percent confidence level ( $p < 0.1$ ). Other factors had no significant difference between the groups. International AI PhDs working in United States  $n=69$ , international PhDs  $n=108$ , and U.S. citizen PhDs  $n=146$ . Proportions among all respondents are reported in Figure 8. Source: CSET 2019 AI PhD Survey.

International PhDs, especially those working in the United States, more frequently selected salary and immigration considerations as important in their post-PhD decision. Salary and benefits were selected by 61 percent and immigration concerns were selected by 44 percent of international PhDs currently working in the United States. In comparison, 41 percent of U.S. citizen PhDs selected salary and benefits while none selected immigration concerns.<sup>‡12</sup>

<sup>‡</sup> Immigration concerns were included when asking what factors were important in post-PhD job choice. We added it because we were interested in knowing whether respondents who left the United States after their PhD were motivated by immigration concerns. We did not ask respondents to rate the importance of immigration concerns in making a future job attractive, because current employment countries vary within the sample.

Figure 14 compares perceptions of different employment sectors among U.S. citizens and international AI PhDs. U.S. citizen PhDs are more likely to consider a job in government or with a small company as an employee. International PhDs are more likely to consider founding a small company.<sup>13</sup>

Figure 14. U.S. and International PhDs Likely to Consider a Typical Sector Job



**Figure 14.** Percentage of respondents extremely or somewhat likely to consider a job in each sector. Differences in likelihood between the two groups are statistically significant at 95 percent confidence level ( $p < .05$ ). No statistically significant difference was found for likelihood of considering a job in sectors not shown. Source: CSET 2019 AI PhD Survey.

## Conclusion

Our findings suggest that top AI talent prioritizes careers in academia and the private sector, particularly with large companies and in the United States. The career choices of U.S. AI PhDs are motivated by growth opportunities, colleagues and professional culture, the ability to pursue research interests, and the chance to work on interesting technical challenges—areas where academia and the private sector are more appealing than government and non-profit careers. Location also plays an important role in actual job decisions. Social and family considerations appear more important among AI PhDs who are U.S. citizens, while salary and immigration concerns are more frequent considerations for international PhDs who chose to study and work in the United States.

More research should be done to tease out the relationship between immigration status, country of employment, sector of employment, and career preferences. Some such research is already underway at CSET. A forthcoming report digs into findings from this survey relating to immigration



status and career trajectories.<sup>14</sup> Early-stage work at CSET is also widening the scope of AI talent by analyzing career histories of PhDs outside the United States and U.S. master's students in AI-relevant fields. Once completed, this effort will allow us to expand our survey research to those populations and test if our findings hold.

## Acknowledgments

For research assistance, we thank Tianwei Liu, Kiren Chaudry, Christina Huntzinger, Santiago Mutis, Daniel Zhang, and Kathy Zhuo. For feedback on the survey instrument, we thank Zachary Arnold. For feedback on this report, we thank Allie Vreeman, Ben Buchanan, and Teddy Collins. For research guidance and support, we thank Dewey Murdick and Igor Mikolic-Torreira.

## Appendix

### *Survey Methodology*

For survey recruitment we identified nearly 3,500 PhDs based on their authorship of an AI-relevant dissertation between 2014–2018 at a top-ranked U.S. AI program.<sup>15</sup> Using public profiles accessible online, we manually identified emails for 2,325 PhDs. The survey was distributed online over three waves from November 2019 to January 2020 and completed by 254 U.S. AI PhDs, an 11 percent response rate.

The survey included 40-45 open- and closed-ended questions, depending on respondents' employment location and immigration status, and took an average of 18 minutes to complete. The survey asked for respondents' past education choices, current professional activities, career preferences, immigration and location preferences, and assessments of the AI workforce. We are happy to share the full survey questionnaire upon request. Key findings related to location and immigration preferences are reported in a forthcoming CSET paper.<sup>16</sup>

A pilot version of the survey was sent to a random sample of 150 U.S. AI PhDs from our full dataset of U.S. AI PhDs in November 2019. The pilot returned a seven percent response rate and led to the removal of two follow-up questions from the survey. Primary survey distribution occurred in December 2019 and elicited an 11 percent response rate. We conducted a final follow-up distribution in January 2020 to 109 PhDs who did not receive the survey in previous distributions due to invalid emails. We manually identified alternate emails for those individuals and sent them the survey. The follow up distribution had a 14 percent response rate. Responses from the

pilot and follow up distributions are included in the analysis. We also collected 39 partial responses, which are not reported here. We ran all analyses with partial responses included; it did not alter any results reported here.

### *Sample Representativeness*

Assessing the representativeness of our sample is difficult due to a lack of authoritative empirics on the demographic breakdown of AI talent. In terms of gender, respondents were predominantly male (74 percent), a proportion considered representative of the field.<sup>17</sup> In terms of nationality, we asked country of birth, country where completed undergraduate education, country where currently employed, and immigration status in country where currently employed. Of total respondents, 52 percent were born in the United States, 62 percent completed their undergraduate education in the United States, 83 percent currently work in the United States, and 53 percent are U.S. citizens working in the United States. In total, 58 percent of respondents are U.S. citizens. The next most common countries of birth were China (eight percent) and India (seven percent). This is in line with recent CSET research that finds 55 percent of STEM U.S. PhDs are U.S. citizens, while Chinese and Indian nationals make up 16 percent and six percent respectively, and that between 82–92 percent of U.S. AI PhDs stay in the United States to work in the first five years after degree completion.<sup>18</sup> As an additional test of representativeness, we compared our sample to CSET’s full dataset of U.S. AI PhDs from top-ranked programs. In terms of country of undergraduate education, country of current employment, and year of PhD completion, the survey sample appears representative of the target population.

One area where our sample may be unrepresentative is respondents’ current sector of employment, with AI talent working in academia overrepresented in the sample. Fifty-four percent of respondents work in academia, compared to 38 percent in the private sector. Recent CSET research analyzing the career paths of U.S. AI PhD graduates from top-ranked programs between 2014–2018 based on CV coding found 34 percent work in academia and 60 percent work in the private sector.<sup>19</sup> The prevalence of academics in this sample may be the result of a greater willingness among academics to complete the survey and/or the product of the relative ease of email access to talent working in academia as opposed to the private sector (e.g., valid, identifiable emails listed on university websites, fewer email blockers or restrictions around study participation). While our sample appropriately reflects the predominance of academia and industry in attracting top AI talent, the potential overrepresentation of academia may skew our results toward the preferences of a subset of AI talent.



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## Endnotes

<sup>1</sup> See Remco Zwetsloot, Roxanne Heston, and Zachary Arnold, “Strengthening the U.S. AI Workforce” (Center for Security and Emerging Technology, September 2019), [https://cset.georgetown.edu/wp-content/uploads/CSET\\_U.S.\\_AI\\_Workforce.pdf](https://cset.georgetown.edu/wp-content/uploads/CSET_U.S._AI_Workforce.pdf); Remco Zwetsloot, James Dunham, Zachary Arnold and Tina Huang, “Keeping Top AI Talent in the United States” (Center for Security and Emerging Technology, December 2019), <https://cset.georgetown.edu/wp-content/uploads/Keeping-Top-AI-Talent-in-the-United-States.pdf>; Zachary Arnold, Roxanne Heston, Remco Zwetsloot, and Tina Huang, “Immigration Policy and the U.S. AI Sector” (Center for Security and Emerging Technology, September 2019), [https://cset.georgetown.edu/wp-content/uploads/CSET\\_Immigration\\_Policy\\_and\\_AI.pdf](https://cset.georgetown.edu/wp-content/uploads/CSET_Immigration_Policy_and_AI.pdf).

<sup>2</sup> We identified the top 20 U.S. AI universities using U.S. News & World Report’s “Best Artificial Intelligence Programs”, see <https://www.usnews.com/best-graduate-schools/top-science-schools/artificial-intelligence-rankings>. For additional information on the survey methodology, see Appendix.

<sup>3</sup> This is an 11 percent response rate, calculated according to American Association for Public Opinion Research’s minimum response rate (RR1): the number of completed surveys divided by the number of eligible units in the sample, including cases of unknown eligibility (AAPOR *Standard Definitions* 2016). Accounting for instances of known invalid emails, the response rate increases to 12 percent. Sample representativeness is based on comparisons with CSET data on U.S. AI PhDs and recent research on AI talent. For more discussion of sample representativeness, see Appendix.

<sup>4</sup> We acknowledge that AI PhDs who studied in the United States represent only one subset of the AI talent pool. We focus on this population due to 1) our interest in understanding educational and career decisions and 2) scoping limitations.

<sup>5</sup> 80 percent who considered the United States for their alternate plans are from the United States. The UK was not the home country for any respondents who considered the UK. Around 10 percent considered other countries that were not their home countries. The only exception was China, which was the home country for all respondents who considered alternate plans there. For discussion of the countries considered by respondents, see Catherine Aiken, James Dunham, and Remco Zwetsloot, “AI Talent Immigration Paths” (Center for Security and Emerging Technology, forthcoming).

<sup>6</sup> For example, being an associate professor at a university with a secondary professional position as a research associate at another university. A secondary affiliation in the non-profit sector accounted for 17 percent of dual affiliations. No public sector respondents indicated a secondary affiliation and only one respondent reported a public sector secondary affiliation.

<sup>7</sup> This finding is similar to previous research that found in the five years after PhD completion, 82-92 percent of U.S. PhDs stay in the United States; see Remco Zwetsloot et al., "Keeping Top AI Talent in the United States." Among respondents working in the United States (n=211), 64 percent are U.S. citizens. For more discussion on the immigration status and preferences of AI talent, Catherine Aiken et al., "AI Talent Immigration Paths."

<sup>8</sup> A recent survey of AI researchers similarly found that professional environment and opportunities was the most important factor driving respondents' considerations about moving to work in another country; see Remco Zwetsloot et al., "The Immigration Preferences of Top AI Researchers: New Survey Evidence," (Center for Security and Emerging Technology, forthcoming).

<sup>9</sup> Respondents were randomly assigned to two of six sectors: academia (n=102), government (n=101), non-profit (n=103), large company (n=101), small company (n=101).

<sup>10</sup> We tried to mitigate bias in attractiveness ratings stemming from respondents' current sector of employment by randomly assigning respondents to two of six sectors. We still find a slight correlation between current employment sector and attractiveness ratings.

<sup>11</sup> Differences between group rankings for these factors are statistically significant at the 99 percent confidence level ( $p < .01$ ). We found a difference between the two groups' ranking of access to compute and data resources, but it is only significant at the 90 percent confidence level. We found no statistically significant difference in importance ranking for salary and benefits, interesting technical challenges, growth opportunity, or ability to pursue research interests.

<sup>12</sup> For additional discussion of survey results related to immigration see Catherine Aiken et al., "AI Talent Immigration Paths."

<sup>13</sup> Recent research has also found that foreign STEM PhD students are more likely to express intentions to found a startup, compared to native STEM PhD students in the United States. See Michael Roach, Henry Sauermann, John Skrentny, "Are Foreign Stem PhDs More Entrepreneurial? Entrepreneurial Characteristics, Preferences and Employment Outcomes of Native and Foreign Science & Engineering PhD Students," *National Bureau of Economic Research*, Working Paper no. 26225 (September 2019): <https://www.nber.org/papers/w26225>.

<sup>14</sup> Catherine Aiken et al., "AI Talent Immigration Paths."

<sup>15</sup> We collected dissertations that contained any of 100 keywords likely to appear in research or applications of AI and machine learning. We performed a manual review of dissertation metadata to exclude false positives. Additional collection of dissertations written in 2019 or before 2014 resulted in identification of more than 6,000 U.S. AI PhDs. If valid emails were found before survey distribution began, they were included in the email count. In

total, less than 20 percent of respondents were 2019 or pre-2014 graduates. For additional discussion, see Appendix in Remco Zwetsloot et al., “Keeping Top AI Talent in the United States.” To define top-ranked AI universities we used U.S. News & World Report’s 2018 ranking, which included the following universities: Carnegie Mellon University, Massachusetts Institute of Technology, Stanford University, University of California Berkeley, University of Washington, Cornell University, Georgia Institute of Technology, University of Illinois-Urbana Champaign, University of Texas-Austin, University of Michigan, University of Massachusetts-Amherst, Columbia University, University of Pennsylvania, University of California Los Angeles, University of Southern California, University of Maryland-College Park, Princeton University, Harvard University, California Institute of Technology, and University of Wisconsin-Madison.

<sup>16</sup> Catherine Aiken et al., “AI Talent Immigration Paths.”

<sup>17</sup> See Jean-Francois Gagne, Grace Kiser and Yoan Mantha, “Global AI Talent Report 2019,” (Element AI, 2019), <https://jfgagne.ai/talent-2019/>; P. M. Krafft, Meg Young, Michael Katell, Karen Huang, and Ghislain Bugingo, “Defining AI in Policy versus Practice,” (2020 AAAI/ACM Conference on AI, Ethics, and Society, February 2020), <https://dl.acm.org/doi/10.1145/3375627.3375835>; Sarah Myers West, Meredith Whittaker, and Kate Crawford. “Discriminating Systems: Gender, Race, and Power in AI,” (AI Now Institute, April 2019), <https://ainowinstitute.org/discriminatingystems.pdf>.

<sup>18</sup> Remco Zwetsloot et al., “Keeping Top AI Talent in the United States”; Remco Zwetsloot, Jacob Feldgoise, and James Dunham, “Trends in U.S. Intention-to-Stay Rates of International Ph.D. Graduates Across Nationality and STEM Fields,” (Center for Security and Emerging Technology, April 2020), <https://cset.georgetown.edu/wp-content/uploads/CSET-Trends-in-U.S.-Intention-to-Stay-Rates.pdf>.

<sup>19</sup> Remco Zwetsloot et al., “Keeping Top AI Talent in the United States.”