

CHALLENGES OR CHANCES

A CHANGING MARKET LANDSCAPE FOR ACTUARY VERSUS DATA SCIENCE

BY **YIRU (EVE) SUN, ROGER YUAN** AND **MARK SPONG**

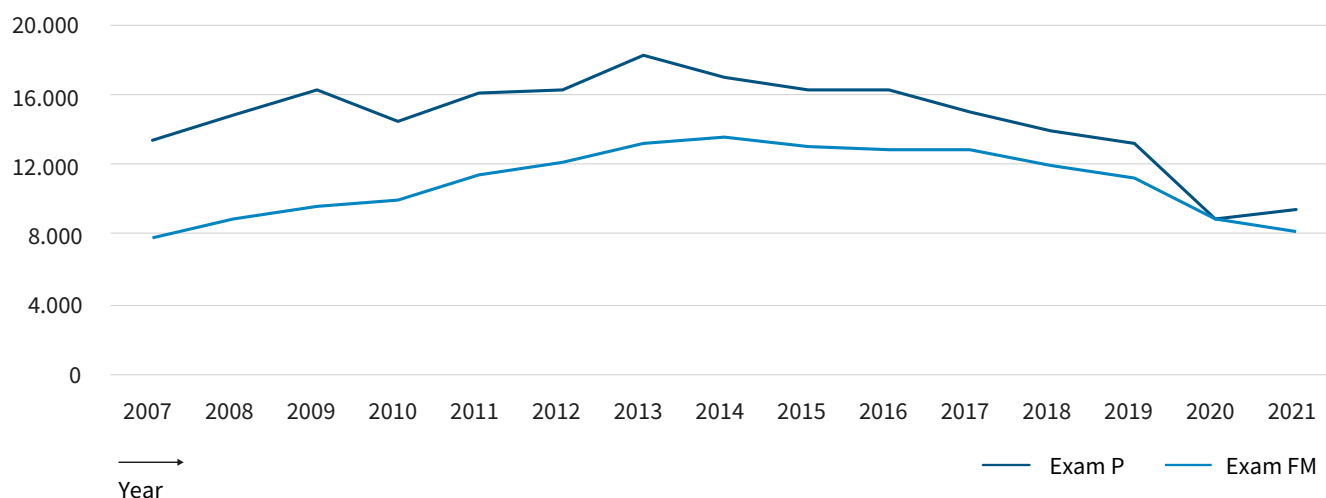


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Few college students are aware of the actuarial profession. Of those that are aware, many are becoming interested in data science and other non-actuarial careers. The offer of more money, absence of professional exams, and potentially more numerous employment opportunities has had a fundamental impact on entry level actuarial recruiting.

We recently engaged with actuarial clubs' leaders, professors, recent graduates of fifteen U.S. universities, scoured observable market data, and tapped into our extensive library of intellectual capital to understand the core challenges faced by actuarial employers today, and identify opportunities to address them. This article contains a summary of this effort.

FIGURE 1: NUMBER OF SITTINGS FOR SOA ENTRY LEVEL ACTUARIAL EXAMS



CHALLENGES IN THE ACTUARIAL RECRUITING MARKET

The number of candidates sitting for U.S. Society of Actuaries (SOA) first two exams Probability (P) and Financial Mathematics (FM) decreased almost 50% over the past eight years (*Figure 1*),^{1,2} with an average decline of 7% per year, although the number of candidates had increased steadily before 2013.

This trend is consistent with the public perception of the actuarial profession which had been consistently ranked top 3 in national job lists for multiple years before 2013, then the rank quickly dropped to 10 or beyond since mid-2010s, which coincides with the timing when the need for data science emerged.³ *Table 1* compares the ranking of actuary, software engineer, and data scientist, out of top 200 jobs from CareerCast over the past decade.⁴ Other sources showed similar trend, i.e., actuary was ranked #1 by CNN⁵ and Wall Street Journal⁶ around 2010, while currently U.S. News ranked actuary #20, behind software developer (#5) and data scientist (#6).⁷ >

TABLE 1: TREND OF JOB RANKINGS OF ACTUARY, SOFTWARE ENGINEER, AND DATA SCIENTIST FROM CAREERCAST⁴

Year	Rank of Actuary	Rank of Software Engineer	Rank of Data Scientist
2009	2	5	Out of rank
2010	1	2	Out of rank
2011	3	1	Out of rank
2012	2	1	Out of rank
2013	1	3	Out of rank
2014	4	7	Out of rank
2015	1	8	6
2016	10	7	1
2017	11	8	5
2018	10	11	7
2019	10	11	1
2021	9	10	1

There is no 2020 job ranking on careercast.com.

¹ [Actuarial-lookup: exam p](#)

² [Actuarial-lookup: exam fm](#)

³ [CareerCast: Ranking 200 Jobs](#)

⁴ [CareerCast: jobs-rated](#)

⁵ [Ten jobs that pay \\$80,000 a year](#)

⁶ [WSJ: The Best and Worst Jobs](#)

⁷ [100 Best Jobs](#)

One hypothesis is that data scientists and similar job openings are drawing potential actuaries away from the profession. We queried fifteen colleges, actuarial clubs, and their recent graduates to see if this trend was noticeable.

Table 2 illustrates the distribution percentages of actuarial graduates moving to various career paths that we collected through interviews or other communication channels. Several other schools that could not share the distribution percentages with us also provided their qualitative observations. Some key learnings summarized below:



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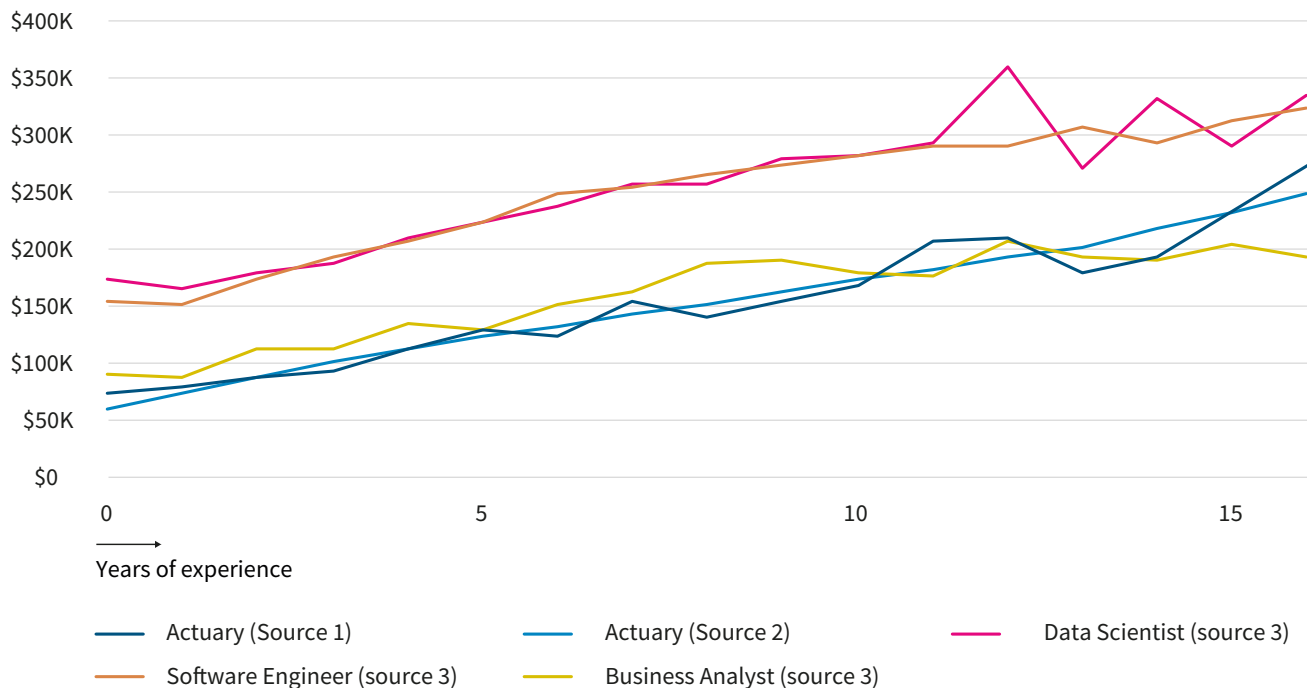
- Candidates at schools with SOA’s Centers of Actuarial Excellence (CAE) recognition are more than twice as likely to remain on the actuarial career path, than schools that SOA recognized as Universities and Colleges with Actuarial Programs - Advanced Curriculum (UCAP-AC) or Universities and Colleges with Actuarial Programs - Introductory Curriculum (UCAP-IC). Further, the strongest programs appear to attract other majors due to the top-tier program and resources.
- Recently established data science majors are pulling some students away from actuarial science. Although the percentage of such change has been low so far, quite a few interviewees perceived that the popularity of the actuarial science program is declining.
- For international students in U.S., there is a general perception that it is harder to get an actuarial job that provides working visa sponsorship, while most data science jobs still provide sponsorship. >

TABLE 2: DISTRIBUTION OF ACTUARIAL STUDENTS TO VARIOUS CAREER PATHS IN RECENT YEARS

School	SOA Recognition Tier	Region	Actuarial function	Data science	Financial/bank	Other or unknown	Master program
A	CAE	Northeast	70%	5%	15%	0%	10%
B	CAE	Northeast	77%	0%	0%	19%	4%
C	CAE	Midwest	84%	0%	5%	7%	5%
D	CAE	Midwest	60%	2%	5%	26%	7%
E	UCAP-AC	Northeast	50%	30%	10%	10%	0%
F	UCAP-IC	Midwest	30%	0%	50%	20%	0%
G	UCAP-IC	South Atlantic	20%	5%	40%	15%	20%

Sources: Data were obtained from interviews with schools’ actuarial clubs, or professors, or recent graduates.

FIGURE 2: COMPARISON OF AVERAGE TOTAL COMPENSATION BY YEARS OF EXPERIENCE



The mixed results between the first two findings suggest that the strongest college actuarial programs are becoming stronger while schools with fledgling or small programs may be struggling. For example, actuarial career fairs tend to be successful only after achieving a level of scale so that they are well attended by both prospective hires and recruiters.

In addition to qualitative interviews and historical sitting numbers, we also investigated average compensation and location. These two factors can be benchmarked explicitly and can provide some insight into

the perceived *attractiveness* and *ease of entry* of the two career paths.

We compared the trends of total compensation (base salary plus bonus) among actuaries, data scientists and its related careers in *Figure 2*.^{8,9,10} The actuaries' average incomes are lower at both entry level and experienced management levels.

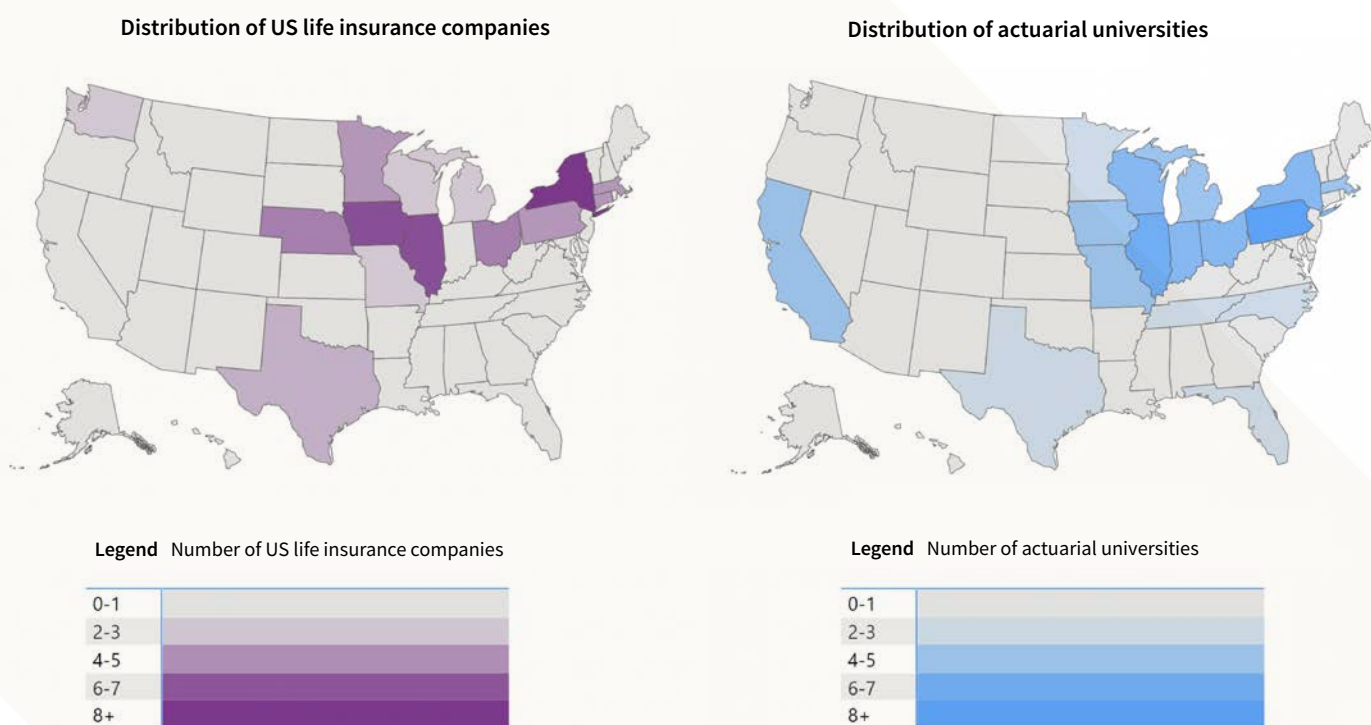
Regardless of accuracy or bias in these figures, they are still important to review because they shape public perception and influence candidate decisions. >

⁸ **Compensation source 1**
Average total compensation for actuaries in Life and Annuities specialization

⁹ **Compensation source 2**
Individual salaries plus bonuses from a survey organized by actuaries on Reddit

¹⁰ **Compensation source 3**
Levels.fyi was used to track total compensations for data scientists, software engineers, and business analysts in technology companies

FIGURE 3: DISTRIBUTION OF U.S. LIFE INSURANCE COMPANIES AND U.S. ACTUARIAL UNIVERSITIES



These two heatmaps plot the geographic distribution of 79 life insurance companies' headquarters in U.S., and all 77 universities and colleges that have actuarial programs with SOA recognition of CAE or UCAP-AC in U.S.

In addition to compensation, location is also one of the fundamental factors that influence candidate decisions.

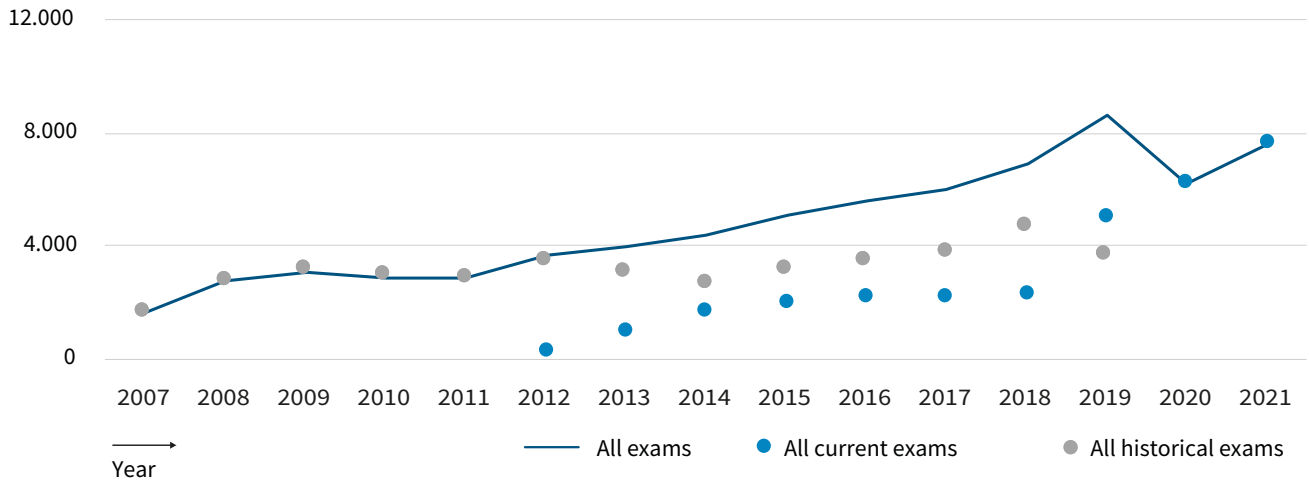
Figure 3 plots the distribution of 79 life insurance companies' headquarters in U.S., and all 77 U.S. universities and colleges that have actuarial programs recognized by SOA as CAE or UCAP-AC. The distribution highly overlaps with each other. Both life insurance companies' headquarters and actuarial schools

concentrate in the Midwest and Northeast states. It is notable that not all actuarial functions located in the same state as the company quarters, however the maps still tell a meaningful story.

For states with high population like Texas, California, and Florida, there may be only one to three life insurance companies, while a great many companies hire data scientists and/or software engineers across most states.

The maps highlight another key factor that, for states with fewer actuarial employment opportunities, the lack of a professional network or role models may effectively act as a barrier to build the awareness of actuarial profession among students and professors. This may explain why high percentage of potential candidates never fully explore actuarial opportunities. >

FIGURE 4: NUMBER OF SITTINGS FOR SOA ACTUARIAL FELLOWSHIP EXAMS (INCLUDING ALL 6 TRACKS)



On the bright side, although the number of candidates sitting SOA entry-level exams decreased considerably, the total number of sittings for high-level exams aiming toward Fellowship of Society of Actuaries (FSA) continues to increase (Figure 4).¹¹

This indicates that the broad horizon of actuarial career still attracts and engages a lot of talented actuarial students to explore the depth of it.

With forward looking talent management, insurance companies can better shape recruiting, retention, and the future of their organization. Recruiters may not perceive a shortage of entry level actuarial candidates (yet), but there are still plenty of opportunities to enhance actuarial programs to tailor to the diverse background and interests of the candidates. <

¹¹ Actuarial-lookup: SOA



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