Can Industry Influence the Popularity of College Degrees?

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Background

- Regardless of domain or role, finding qualified candidates to adequately staff a business is a constant endeavor
- Talent acquisition personnel must compete for ideal candidates from a limited pool of job seekers with the right education and experience
- Presumably industry has little influence over the mix of backgrounds in the candidate pool, but what if there was a way?

Background

- Every year the National Association of College and Employers (NACE) surveys its employer members (intended to represent industry at large) for projected starting salaries and demand by degree for the following year
- The results of these surveys are published in a series of annual reports available only to NACE members, but summaries are often posted publicly by NACE and shared further by popular news sites like Forbes, CNBC, etc

Background

- One of the groups that might use this information is prospective college students seeking guidance on what degree to pursue
- The National Center for Education Statistics (NCES), a branch of the Institute for Education Sciences (IES), annually collects and publishes data summarizing the number of degrees conferred by post-secondary institutions
- This information can be used to determine the relative popularity of a given degree or broad field of study for a given year

Objective

- The goal of this study is to attempt answering the question "Can industry influence the popularity of college degrees?" by comparing historical starting salary and demand projections with degree popularity
- A positive correlation would suggest it is worth investing more corporate resources in evaluating future needs and participating in annual surveys
- The end result could be a 'stocked' pool of job seekers with a mix of educational backgrounds proportionate to industry demand

Interested Parties

- Industry at large - which probably desires an 'improved' hiring pool but is currently represented by a very small number business (730 in 2021 survey)
- NACE member employers - whose annual survey response rate is typically under 20% and may need motivation to participate
- NACE and similar organizations - who may be interested in improving the value of their products and increasing membership

Interested Parties

- Post-secondary institutions - who may be interested in understanding trends in industry demands to better shape their academic offerings
- Prospective college students - who may want to better understand job prospects following graduation

Data Sources: NACE

- Projected starting salary was extracted from the annual Winter Salary Surveys
- Demand was extracted from annual Winter Salary Surveys when available, or NACE blog posts

FIGURE 1 / AVERAGE SALARIES BY DISCIPLINE / BACHELOR'S DEGREES

BROAD CATEGORY	2020 SALARY PROJECTION	2019 SALARY PROJECTION	% CHANGE
Engineering	$69,961	$69,188	1.1%
Computer Science	$67,411	$67,539	-0.2%
Math & Sciences	$62,488	$62,177	0.5%
Business	$57,939	$57,657	0.5%
Social Sciences	$57,425	$57,310	0.2%
Communications	$56,484	$52,056	8.5%
Humanities	$53,617	$56,651	-5.4%
Agriculture & Natural Resources	$53,504	$55,750	-4.0%

FIGURE 2: TOP DEGREES IN DEMAND (BACHELOR'S DEGREE LEVEL)

MAJOR	# OF RESPONDENTS THAT WILL HIRE	% OF RESPONDENTS THAT WILL HIRE
Finance	82	66.1%
Accounting	80	64.5%
Business Administration/Mgmt.	76	61.3%
Computer Science	74	59.7%
Logistics/Supply Chain	63	50.8%
Information Sciences & Systems	63	50.8%
Electrical Engineering	60	48.4%
Management Information Systems	58	46.8%
Marketing	58	46.8%
Mechanical Engineering	57	46.0%

BACHELOR'S DEGREE SALARIES BY MAJOR

ACADEMIC MAJOR	MEAN	25TH PERCENTILE	MEDIAN	75TH PERCENTILE	RESPONSES
Plant Science	$51,900	$47,300	$54,800	$56,500	4
BUSINESS MAJORS					
Accounting	$55,264	$50,000	$55,000	$59,000	82
Actuarial Science	$59,400	$52,000	$60,000	$65,000	19
Business Administration/Management	$54,660	$50,000	$54,080	$60,000	72
Economics	$58,103	$53,000	$56,000	$62,000	47
Finance	$56,809	$52,250	$55,620	$60,500	80
Hospitality Management	$53,880	$50,000	$53,560	$60,000	7

Data Sources: NACE Challenges

- These reports are only accessible to members, but college career center members are freely permitted to share this data with alums
- NACE has salary projection and demand data for the last few decades, however, only have reports from 2015-present hosted in their member portal
- UNH was able to provide the recent reports on Friday but previous are still pending - analysis to be updated when possible

Data Sources: NCES

- Table 322.10 and Table 313 provide number of degrees conferred for broad categories
- Table 318.30 provides number of degrees conferred by title
- Table 325.47 provides number of degrees conferred for a selection of engineering disciplines

Table 322.10. Bachelor's degrees conferred by postsecondary institutions, by field of study: Selected years

Field of study	1970-71	1975-76	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2009-10	2010-11	201
1	2	3	4	5	6	7	8	9	10	11	
Total	**839,730**	**925,746**	**935,140**	**987,823**	**1,094,538**	**1,164,792**	**1,244,171**	**1,485,104**	**1,649,919**	**1,716,053**	**1,792**
Agriculture and natural resources[1]	12,672	19,402	21,886	16,823	13,124	21,425	23,370	23,052	26,343	28,630	30
Architecture and related services	5,570	9,146	9,455	9,119	9,781	8,352	8,480	9,515	10,051	9,831	9
Area, ethnic, cultural, gender, and group studies	2,579	3,577	2,887	3,021	4,776	5,633	6,160	7,878	8,620	8,955	9
Biological and biomedical sciences	35,705	54,154	43,078	38,395	39,482	61,014	60,576	70,602	86,391	89,984	95
Business[2]	115,396	143,171	200,521	236,700	249,165	226,623	263,515	318,043	358,119	365,133	367
Communication, journalism, and related programs	10,324	20,045	29,428	41,666	51,650	47,320	58,013	73,658	81,280	83,231	83
Communications technologies	478	1,237	1,854	1,479	1,397	853	1,178	2,987	4,782	4,858	4
Computer and information sciences	2,388	5,652	15,121	42,337	25,159	24,506	44,142	47,702	39,593	43,066	47
Education	176,307	154,437	108,074	87,147	110,807	105,384	105,458	107,235	101,287	104,008	105
Engineering	45,034	38,733	63,642	77,391	62,448	62,168	58,209	66,841	72,657	76,356	81
Engineering technologies[3]											

Table 318.30. Bachelor's, master's, and doctor's degrees conferred by postsecondary institutions, by sex of student and discipline division: 2014-15

Discipline division	Bachelor's degrees			Master's degrees			Doctor's degrees[1]		
	Total	Males	Females	Total	Males	Females	Total	Males	Females
1	2	3	4	5	6	7	8	9	10
All fields, total	**1,894,934**	**812,669**	**1,082,265**	**758,708**	**306,590**	**452,118**	**178,547**	**84,921**	**93,626**
Agriculture and natural resources	36,277	17,585	18,692	6,426	2,904	3,522	1,561	811	750
Agriculture, agriculture operations, and related sciences	19,120	8,954	10,166	2,683	1,179	1,504	879	449	430
Agriculture, general	1,849	970	879	246	97	149	20	9	11
Agricultural business and management, general	1,019	672	347	86	50	36	0	0	0
Agribusiness/agricultural business operations	1,993	1,279	714	34	16	18	0	0	0
Agricultural economics	1,618	1,152	466	434	226	208	155	82	73
Farm/farm and ranch management	150	118	32	10	9	1	0	0	0
Agricultural/farm supplies retailing and wholesaling	65	28	37	0	0	0	0	0	0
Agricultural business technology	31	24	7	0	0	0	0	0	0

Table 325.47. Degrees in chemical, civil, electrical, and mechanical engineering conferred by postsecondary institutions, by level of degree: 1959-60 through 2018-19

Year	Chemical engineering			Civil engineering			Electrical, electronics, and communications engineering			Mechanical engineering		
	Bachelor's	Master's	Doctor's	Bachelor's	Master's	Doctor's	Bachelor's	Master's	Doctor's	Bachelor's	Master's	Doctor's
1	2	3	4	5	6	7	8	9	10	11	12	13
1959-60	2,959	617	170	5,229	1,024	73	10,617	1,993	203	9,566	1,179	107
1960-61	2,857	650	171	5,272	1,220	117	10,153	2,414	250	8,618	1,401	106
1961-62	---	---	---	---	---	---	---	---	---	---	---	---
1962-63	2,714	711	238	4,734	1,392	142	10,358	2,816	386	7,649	1,664	164
1963-64	2,973	762	262	4,995	1,567	217	11,225	3,163	460	7,653	1,886	200
1964-65	3,059	806	364	5,114	1,686	252	11,697	3,505	511	7,984	2,036	265
1965-66	2,830	994	354	5,260	2,007	283	10,963	3,872	569	7,773	2,154	289
1966-67	2,858	949	305	5,050	2,019	296	10,786	3,953	668	7,843	2,176	354
1967-68	3,196	1,156	367	5,408	2,136	376	10,674	4,226	723	7,882	2,136	395

Data Sources: NCES Challenges

- NCES reports lag by ~2 years - the most recent data is for 2019 grads
- Detailed reporting for every degree (Table 318.30) only started in 2013, prior historical data only exists for select degrees or broad categories
- There were significant irregularities and inconsistencies in data/table formatting and html page structure between year to year reports, which made scraping and cleaning using python impractical
- Most of data preparation work was done in excel prior to exporting to CSV

Data Sources: Summary

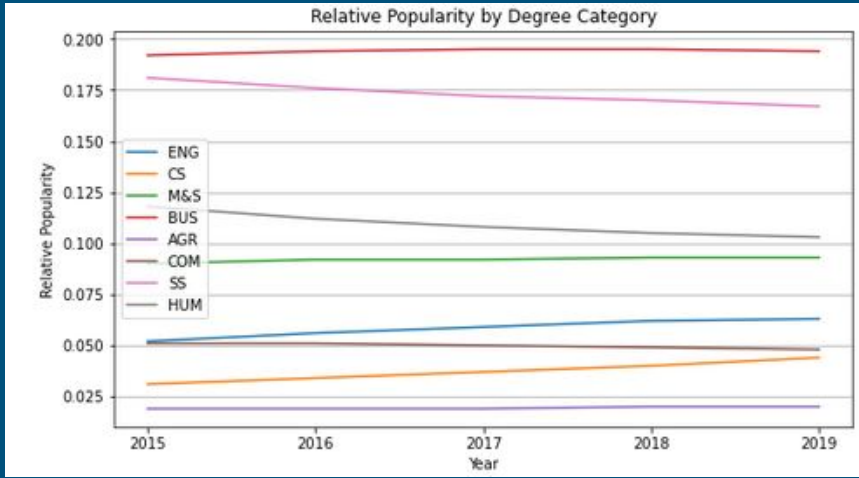
- Due to limitations on data availability from NACE and reporting lag from NCES, only data from 2015-2019 could be analyzed
- A secondary analysis was performed comparing popularity of select degrees that have decades of historical data with google search trends

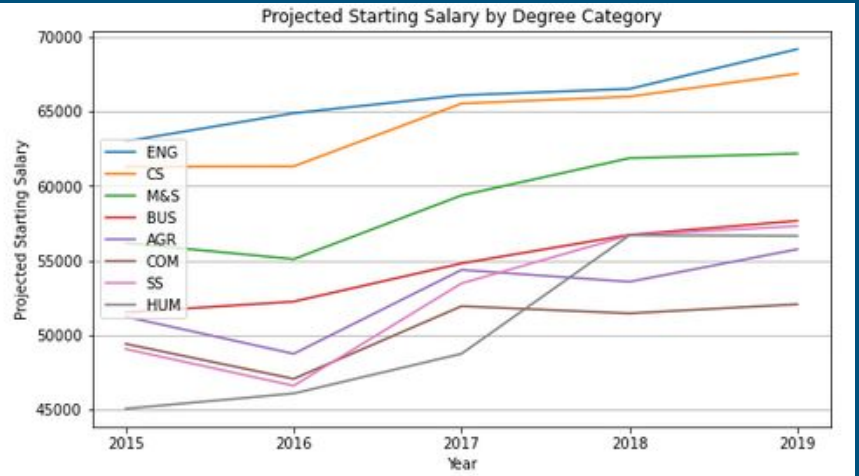
Data Sources: Summary

- Due to limitations on data availability from NACE and reporting lag from NCES, only data from 2015-2019 could be analyzed

Analysis: Salary Proj. by Cat vs Popularity

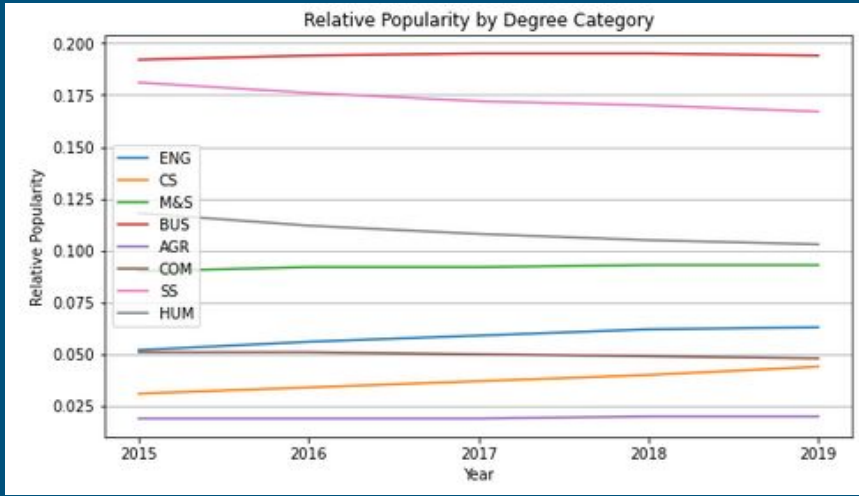
- Insufficient data for analysis or no correlation
- Drops in starting salary do not correlate to changes in relative popularity

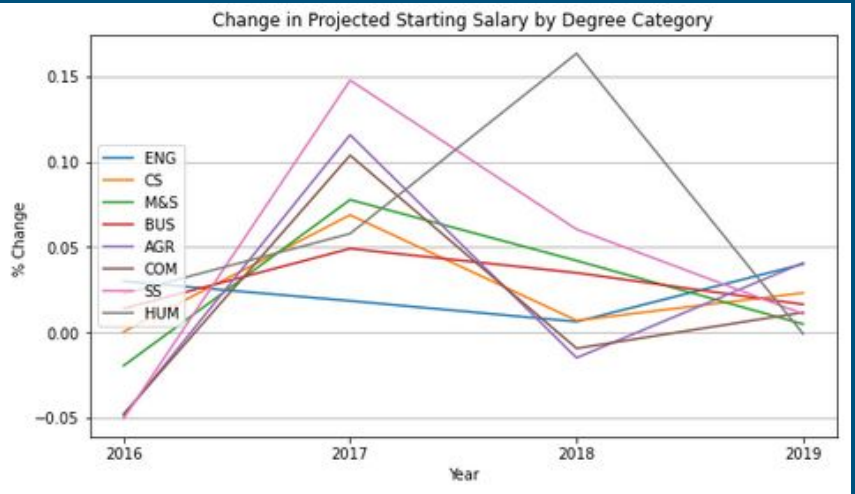




Analysis: Salary Proj. by Cat vs Popularity

- No obvious trends with change in projected salary
- Highest % increase suffered greatest drop in popularity





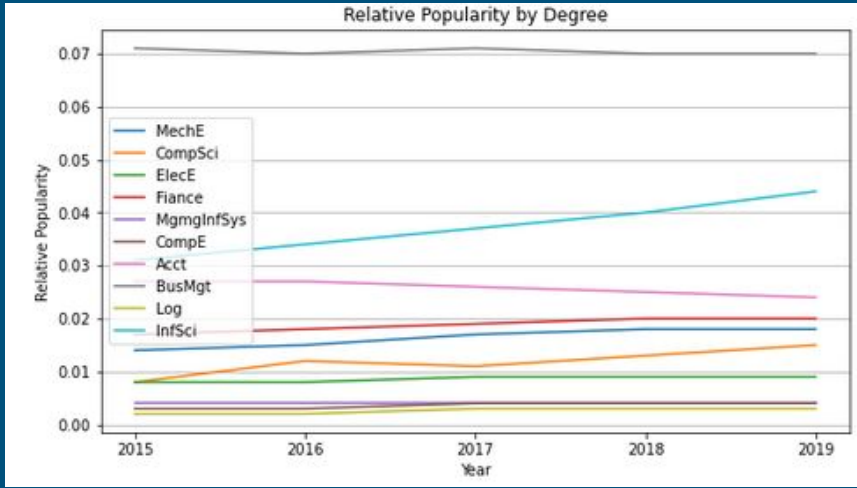
Analysis: Salary Proj. by Degree vs Popularity

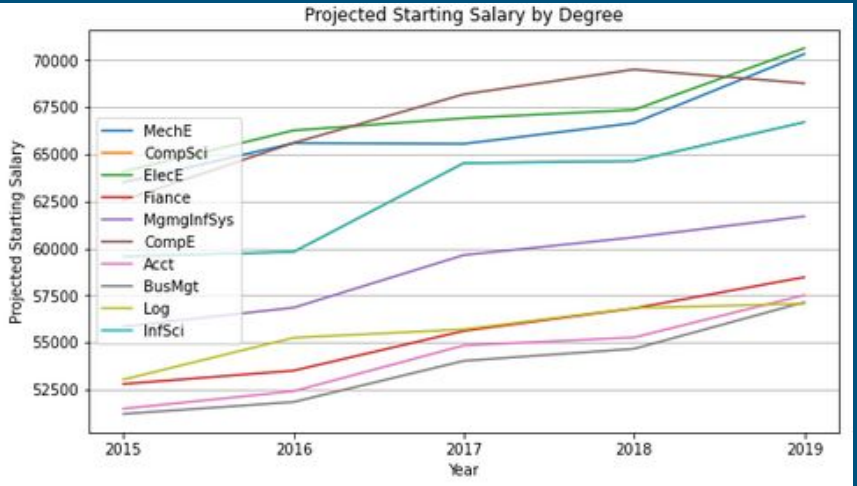
- The top degrees in demand for each year was extracted from NACE reports for years available
- The top 10 degrees by total number of appearances were selected for analysis

	Demand								
Degree	Total	2015	2016	2017	2018	2019	2020	2021	2022
Mechanical Engineering	6	1	1		1	1		1	1
Computer Science	6	1	1		1	1		1	1
Electrical Engineering	5	1	1		1	1		1	
Finance	5		1		1	1		1	1
Management Information Systems	5		1		1	1		1	1
Computer Engineering	4	1			1	1		1	
Accounting	4				1	1		1	1
Business Administration/Mgmt.	4				1	1		1	1
Logistics/Supply Chain	4				1	1		1	1
Information Sciences & Systems	4				1	1		1	1
Chemical Engineering	1	1							
Physics	1	1							
Materials Engineering/Science	1	1							
Math/Stats	1	1							
Aerospace/Aeronautical Engineering	1	1							
Information Sciences & Systems	1		1						
M.B.A	1		1						
Software Applications	1		1						
Computer Engineering	1		1						
Marketing	1								1

Analysis: Salary Proj. by Degree vs Popularity

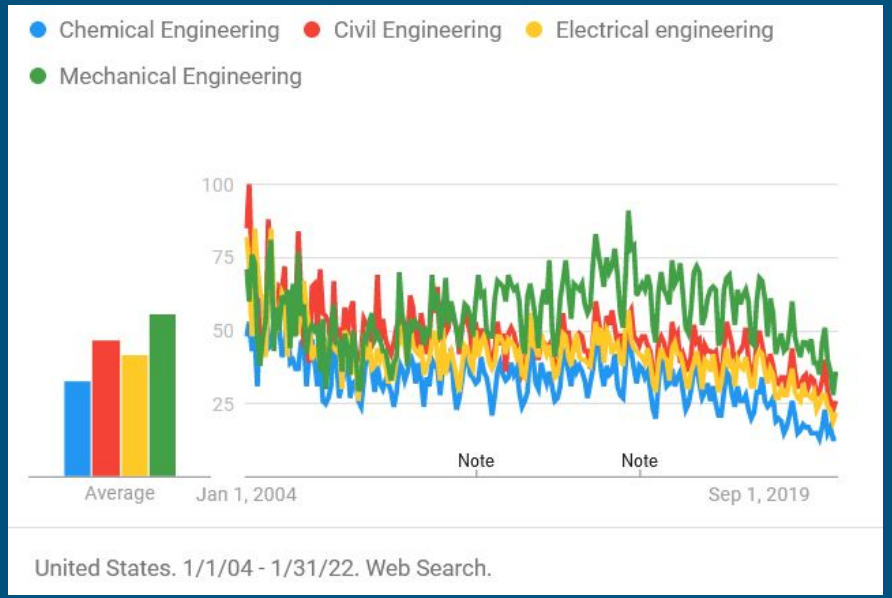
- Insufficient data for analysis or no correlation
- Degrees with drops in popularity still experienced increase in salary





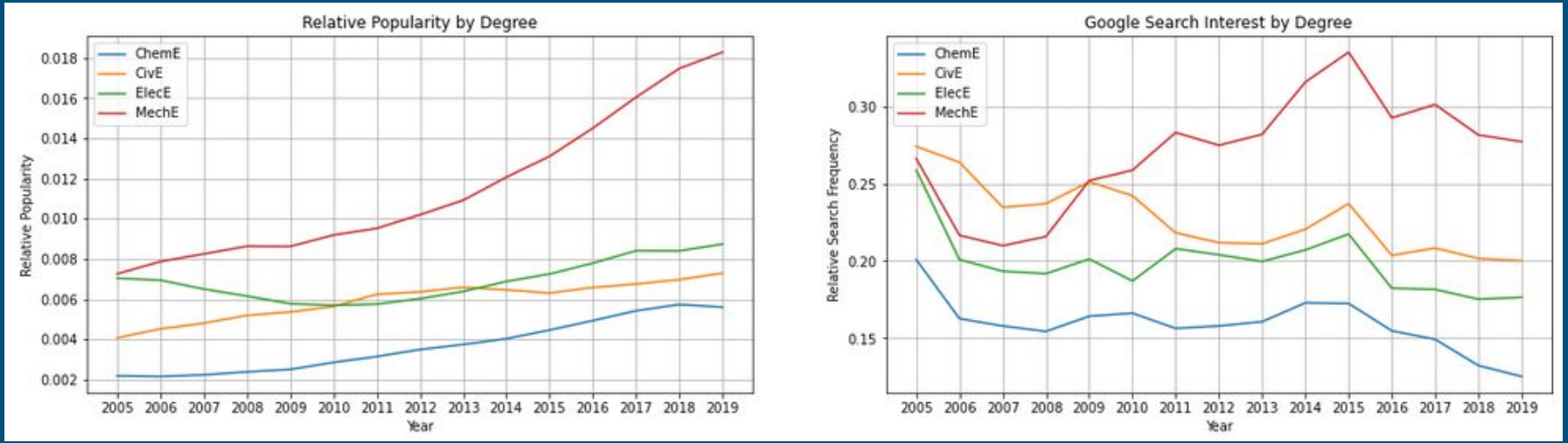
Analysis: Degree Popularity vs Search Freq

- This analysis looks at the correlation between four engineering disciplines and google search frequencies
- These degrees were selected because they several decades of NCES reporting history (most individual degrees do not have reports prior to 2013)



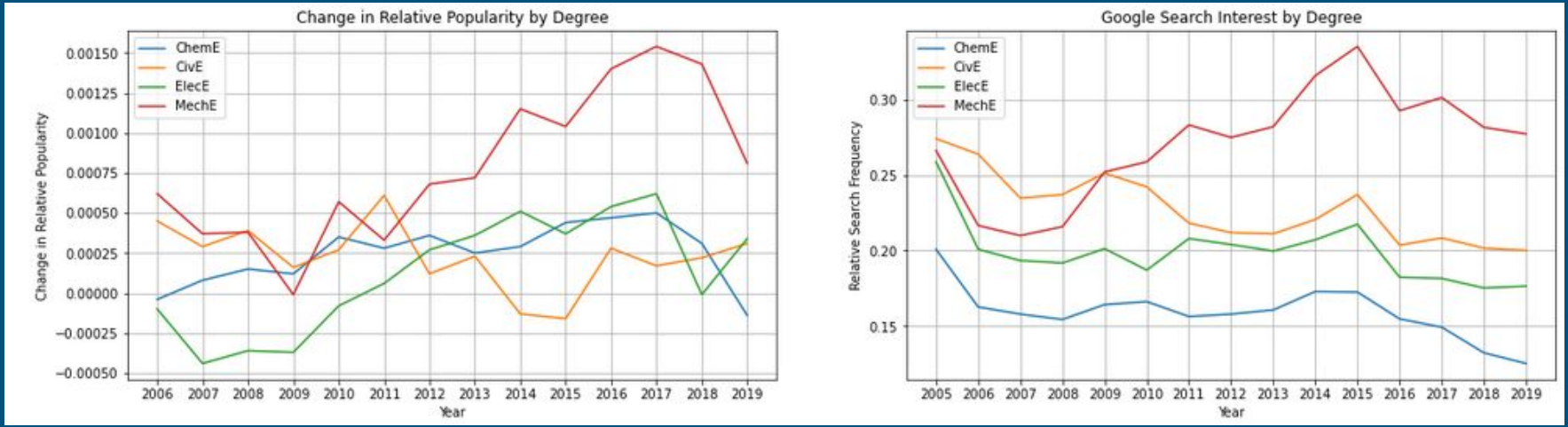
Analysis: Degree Popularity vs Search Freq

- Plotting suggests there may be correlation but cannot determine causation without knowing what drives search interest



Analysis: Degree Popularity vs Search Freq

- Relative change in popularity appears more interesting but also of limited value



Conclusion

- Unfortunately, this analysis was not able to provide a satisfactory answer to the question "Can industry influence the popularity of college degrees?"
- It is not clear if there is truly no correlation or if there was not sufficient data (5 years) to capture long term trends
- This becomes particularly apparent when recognizing there is an expected lag time of 4-5 years between when prospective students would be reviewing salary/demand projections and receiving degrees

Next Steps & Recommendations

- Complete full analysis when historical NACE data is received
- If that suggest a correlation between the popularity of degrees or broad category of study and salary or demand data, NACE and member employers should work towards growing overall membership and improving survey participation (currently <20%).
- Lesson Learned: Do not make assumptions about data availability or completeness - confirm fully before committing to a deadline =|