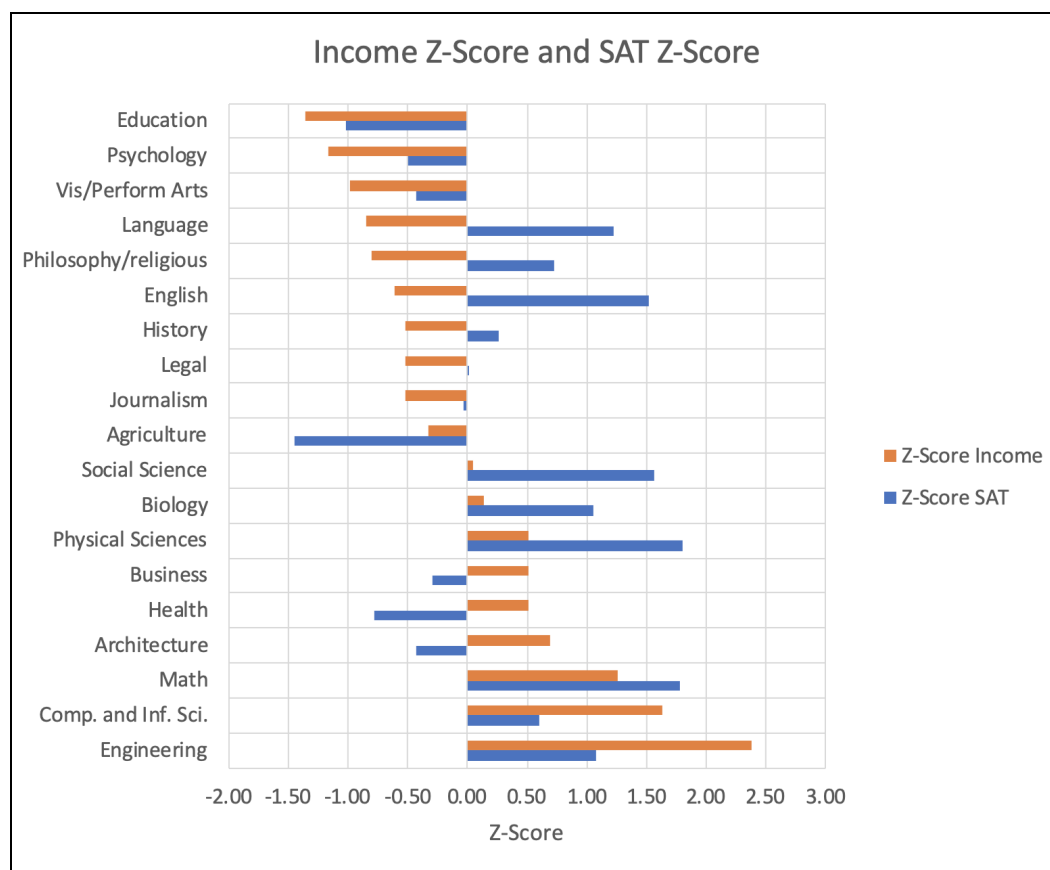# The Relative Competitiveness and Economic Rewards of College Majors

Jesse Murray

In this project, I take data on the SAT score and income of different college majors. I get the SAT score data from the CollegeBoard 2014 College-Bound Seniors Total Group Profile Report and the income data from The Economic Value of College Majors report by Carenvale et al. at Georgetown University. The goal is to compare the competitiveness of the different majors (using SAT score) to the economic value of those majors. The metric of z-score is used, which represents the direction and number of standard deviations from the mean.

Here, we see the basic data for the relative economic value and SAT scores of the different college majors. Note that the income here is for those with a *bachelor's* degree only in these majors, we'll get to graduate degrees later. The data are ordered by income. It's interesting to note that some majors are highly competitive but not very economically rewarding, such as language and english. Whereas some majors are far more economically rewarding than they are competitive, such as health, computer science, and engineering.

We can order the college majors by the largest to smallest difference between competitiveness and income. We see here that the english major is the most competitive relative to its economic rewards, then language, social science, and philosophy/religious majors. On the other hand, engineering and health are the most rewarding relative to their competitiveness. Also consider that we're only looking at those with *only* a bachelor's degree.
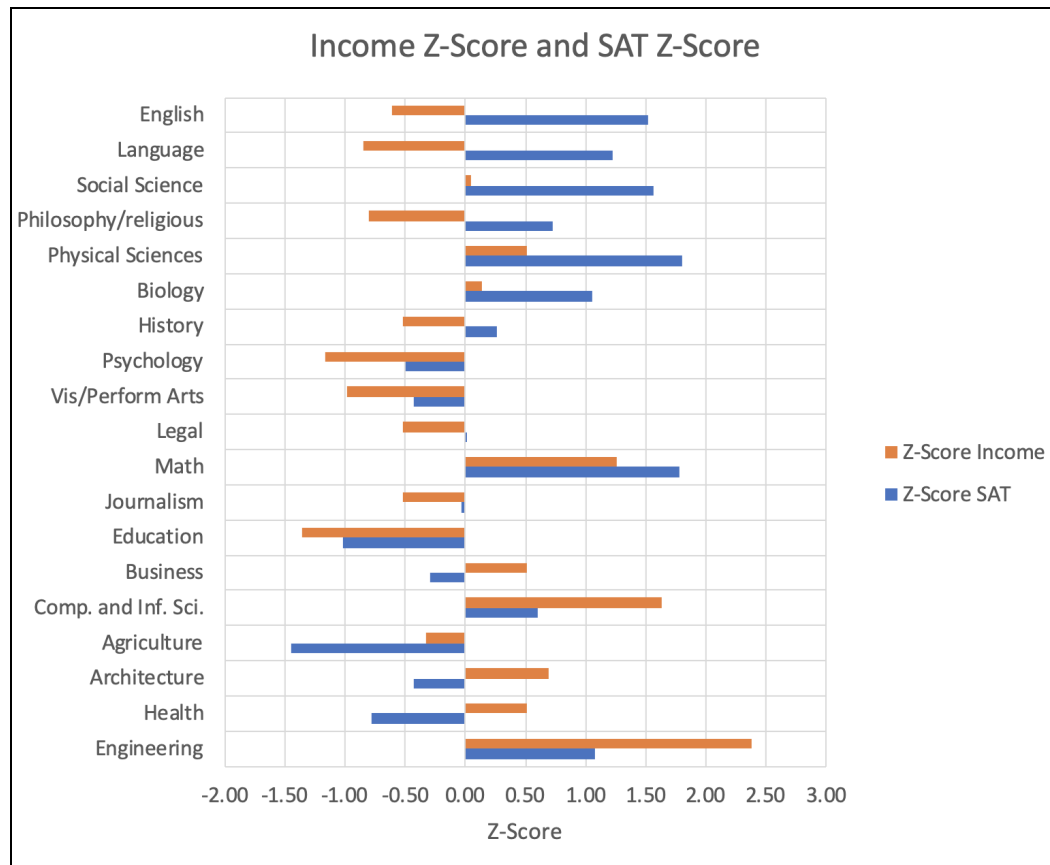
We can also compare the college majors taking into account those students who go on to graduate school. This is done specifically by multiplying the bachelor's only income by the percentage of bachelor's students who only obtain a bachelor's degree, then multiplying the graduate degree income in that major by the percentage of bachelor's degree students who go on to graduate school, then summing the two together. Note that this is not a perfect calculation because it assumes that all bachelor's students who go on to graduate school continue with the same major, but this is often not the case. For example, an english major may continue to law school rather than get an english graduate degree.

This graph shows the results. We can see some big differences from before. Biology previously had a slightly above average relative to all bachelor degree holders and was more competitive than economic rewarding. However, when including biology graduate degree holders, biology becomes rather economic rewarding and slightly more rewarding than competitive. Math and physical sciences have similar boosts in relative income. This might indicate that certain college

majors are economically rewarding, but only when a graduate degree is obtained. Interestingly, not much change in income is observed for computer science and engineering. This might indicate that for basic science majors such as biology, math, and physical sciences, a graduate degree makes a big difference in income. However, for applied science majors such as computer science and engineering, a graduate degree makes a smaller difference in income.
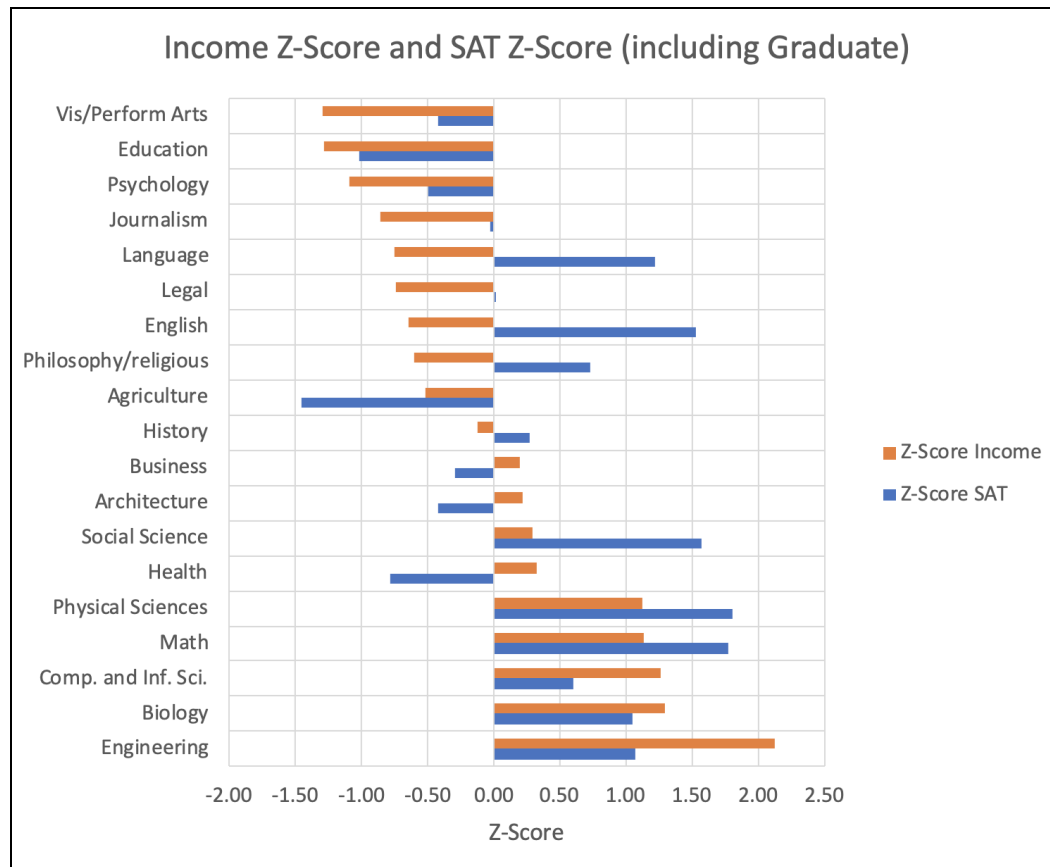

The english and language majors remain both highly competitive and economically unrewarding, however we may be underestimating their economic rewards because of only including those who go on to english and language degrees, respectively.

One might also observe the general trend that humanities majors tend to have lower economic rewards and, in some but not all cases, lower competitiveness than STEM majors.

In this graph, we just see the difference between the income and competitiveness for those with *only* a bachelor's degree in the college major. We can see that the english major is about 2 standard deviations more competitive than economically rewarding, while the engineering major is about 1 standard deviation more economically rewarding than competitive.
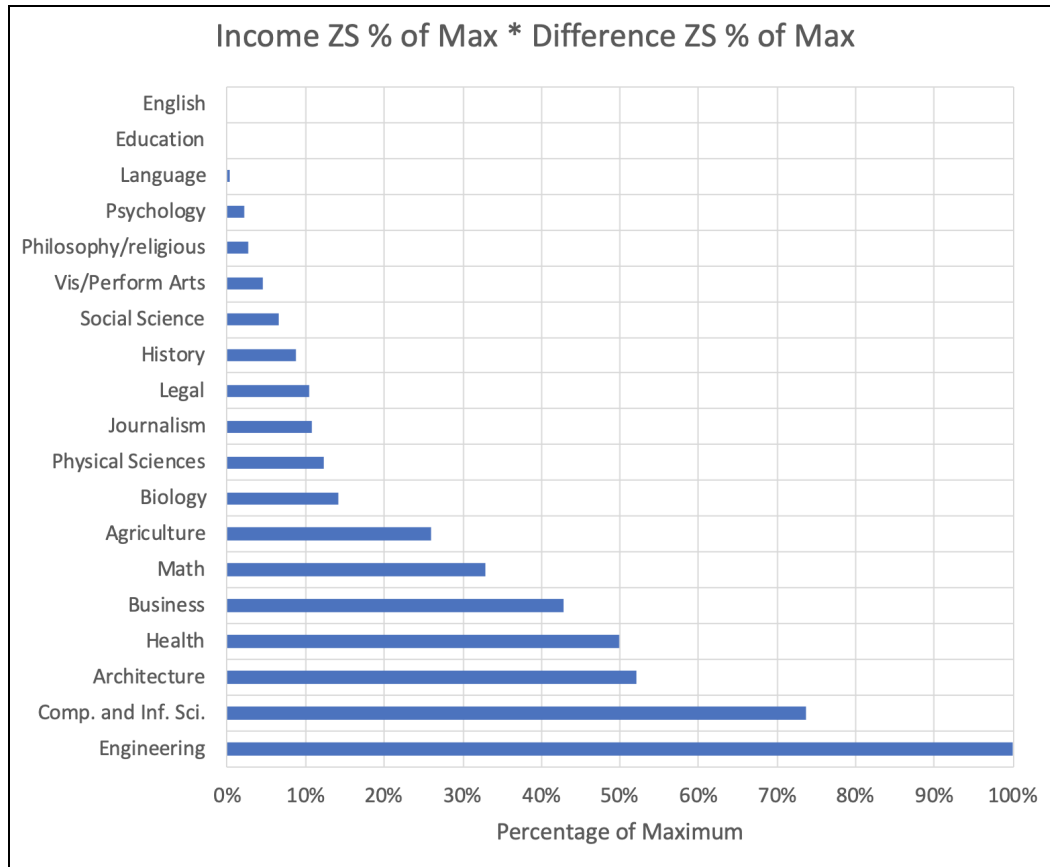
Difference btw. Income Z-Score from SAT Z-Score
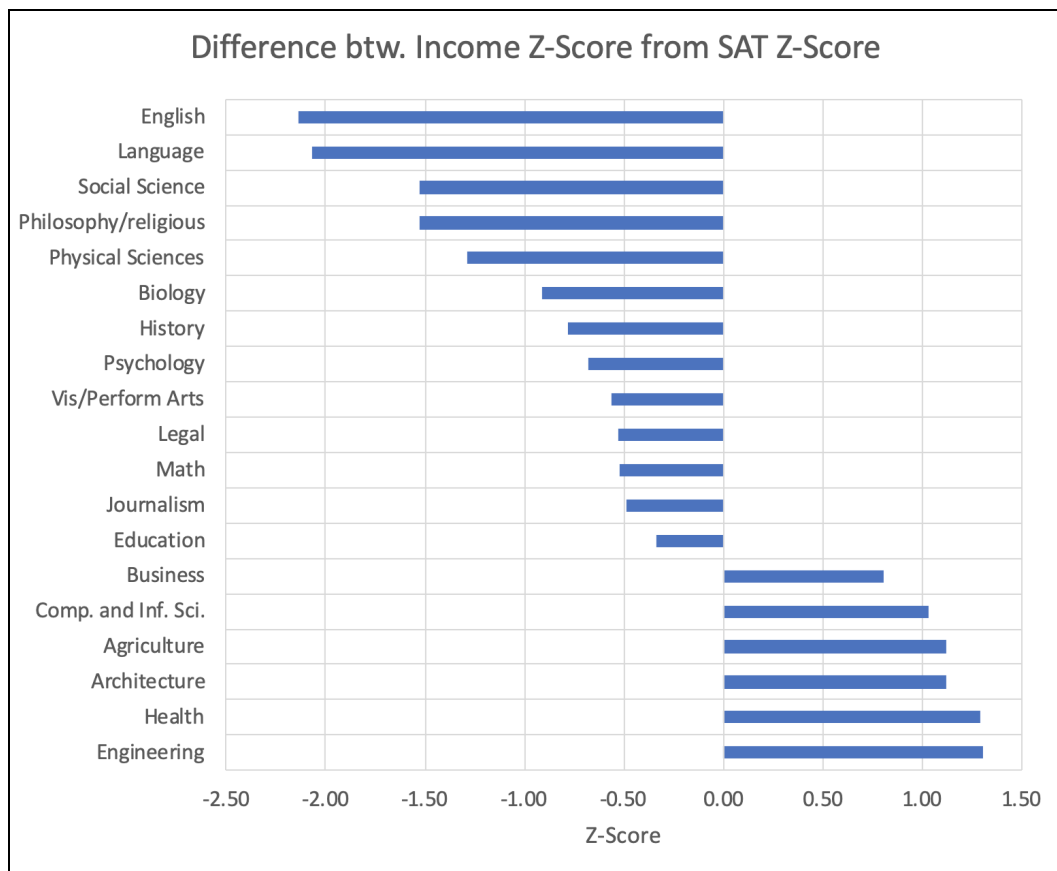
This is the same graph as before but including graduate degree holders in the method described earlier.

Difference btw. Income Z-Score from SAT Z-Score (including Graduate)
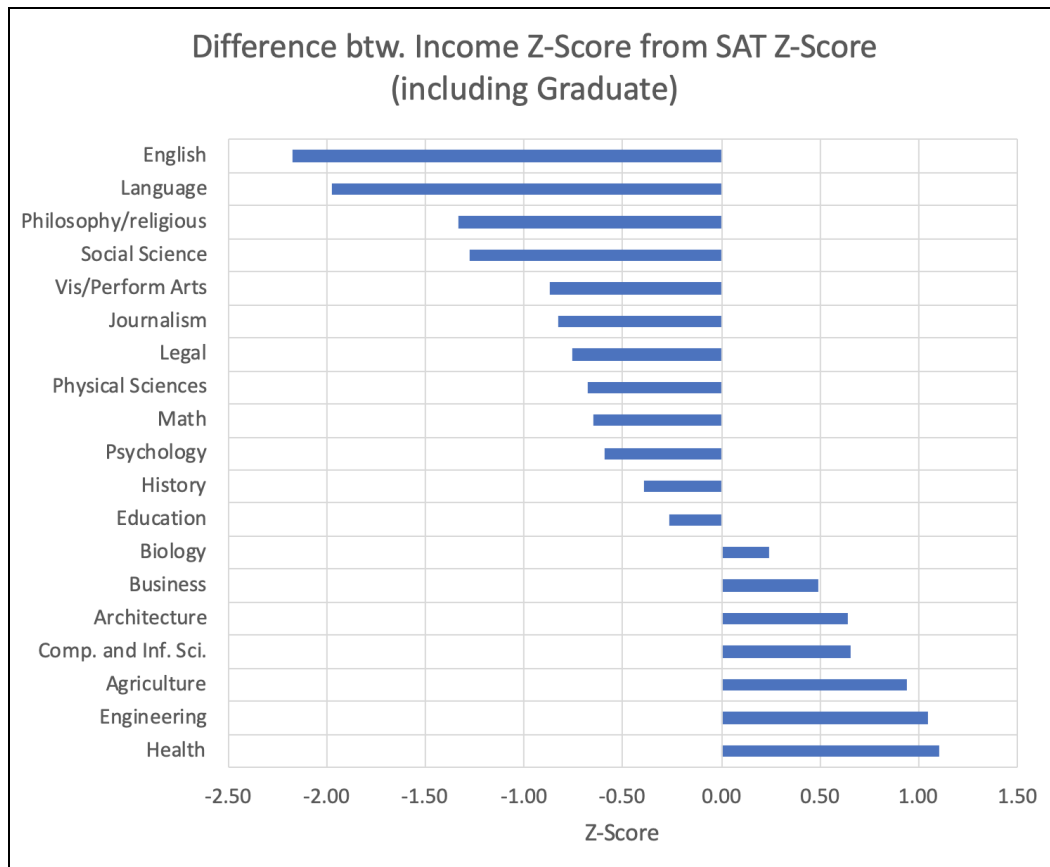
Finally, we can ask the question, if one had to choose a college major to *only* obtain a bachelor's degree in. Which should one choose? Presumably, one would like to choose a college major that is economically rewarding, so that should be a factor. But also, one would like to choose a college major that is much more economically rewarding than competitive. The log here is that one wants to choose an economically rewarding college major, but also realize that one might be able to do better when the field overall is not very competitive than when the field is highly competitive.

We take into account these two factors by getting the income z-score as a percentage of the maximum income z-score (minus the least) and doing the same for the difference between the income and SAT z-score. Then, multiplying the two percentages together and dividing the maximum. With this method, we can see that engineering is the 'best' college major and english is the 'worst'. (Remember this is for if you are *only* obtaining a bachelor's degree.)

Income ZS % of Max * Difference ZS % of Max

(Horizontal bar chart, x-axis: Percentage of Maximum, from 0% to 100%)

Major	Approx. %
English	~0%
Education	~0%
Language	~1%
Psychology	~2%
Philosophy/religious	~3%
Vis/Perform Arts	~5%
Social Science	~7%
History	~9%
Legal	~10%
Journalism	~11%
Physical Sciences	~12%
Biology	~14%
Agriculture	~26%
Math	~33%
Business	~43%
Health	~50%
Architecture	~52%
Comp. and Inf. Sci.	~73%
Engineering	100%

Concluding Thoughts

It seems that certain college majors may be better than others, and so one might ask why everyone doesn't just major in the fields at the bottom of the last graph. The reason may be that we haven't included one important variable which is interest. Many people may love the visual/performing arts, english literature, and have very little interest in health, architecture, computer science, and engineering. Another somewhat speculative explanation is what I think of as the 'superstar' effect. When entering a college major or a career, there is always a small possibility of superstar success. And, looking at the latest graph, it seems that becoming a superstar in one of the majors towards the top may be more rewarding than becoming a superstar in one of the majors towards the bottom. That is, becoming a superstar novelist (english major) or actor/musician (visual/performing arts) may seem to many to be more 'awesome' than becoming a superstar engineer or computer scientist. People may flock to those otherwise unrewarding college majors in the hopes of obtaining superstar status in the field.