Attitudinal Trends in Alternative Postsecondary Learning [*]

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This paper explores a novel data set (n = 1190) to understand trends in public disposition on alternative postsecondary learning, with a focus on employers. Results indicate that public favorability is positive and will remain flat over the next year. Employer attitudes are not meaningfully different from the general public.
JEL: D12, I21, I22, I24, I25, I26
Keywords: Education economics, alternative education, debt crisis, signaling

I. Introduction

Student loan debt in the United States is the highest ever(**?**), even while accredited postsecondary education is becoming a dynamically worse investment for at least two reasons.

The first reason is the plain fact that college is growing in price while adjusted return remains stagnant. From 1989 to 2012, K-12 student expenditure increased significantly [1], the cost of a year of undergraduate education grew nearly three times more quickly than that [2], and the adjusted average starting salary of a college graduate decreased by about 9 percent [3].

The second reason traditional postsecondary education has become a weaker investment during recent years is the growth of alternatives. This paper fills an empirical gap in scholarly research by supplying systematic and general data about public and employer favorability of alternative credentials. This paper tests the hypothesis that employer favorability is positive toward alternative credentials.

Alternative postsecondary learning activities are diverse and do not exclude attainment of an accredited degree, but may involve strategic delay or acceleration of accredited education when compared to traditional approaches. Delayed

[1] From 1989 to 2012, the average cost of a year of undergraduate education in the US rose 79 percent from \$11,862 to \$21,222 in constant 2016 dollars. This price includes tuition and fees plus room and board for full-time students in degree-granting postsecondary institutions. Data from (**?**).

[2] From 1989 to 2012, per pupil public expenditure for K-12 students increased 27 percent from \$8,654 to \$11,011 in constant 2014 dollars. Data from (**?**).

[3] From 1989 to 2012, a decrease of \$4,385 from \$49,487 to \$45,102 in constant 2016 dollars is observed. (4385/49487) = 0.089. From 1960 to 2012, an increase from \$47,442 to \$50,219 is observed. Data from (**?**).

formal education improves the return to education for individuals who are able to leverage employer funding. Accelerated completion improves the return to education in general. Online education is an alternative approach which reduces the cost of college for most students [4].

II. Data

1190 responses, including partial responses, were obtained for four comparable survey administrations from February 2018 to May 2019. Analysis includes 114 right-hand variables and two left-hand variables. Appendix A details the wording of questions and possible responses. Appendix B identifies factors included in each administration.

Responses were collected mainly through SurveyMonkey and Amazon Mechanical Turk paid response, with a non-trivial number also coming from social media and word of mouth. Each origination channel was grouped using a construct called a collector. Collector effects were insignificant. This is interesting for two reasons. First, the source populations are known to be systematically different. Amazon Mechanical Turk respondents, for example, were guaranteed to be U.S. High School graduates. A second reason the insignificance of collector effects is important is that response prices were significantly different. Amazon Mechanical Turk responses were more than 20 percent cheaper than SurveyMonkey Paid Audience responses on average.

Factor-level sample size ranges from 240 to 1190. Appendix C lists technical variable names in alphabetical order along with summary statistics. Appendix D lists variable names in alphabetical order, and summarizes factor strength across models. Several constructs, such as income, age, and gender, were redundantly operationalized using different measures. For example, age was measured continuously and also by age group. Appendix D makes this factor-to-variable mapping clear.

The variable of interest is entry-level suitability. This variable corresponds to question 2 in Appendix A. It is structured as a favorability question on a scale from 1 to 10. Higher numbers indicates stronger agreement. The wording of the statement to be favored is, "For many professions, alternative credentials can qualify a person for an entry-level position."

A secondary variable of interest explored is called the index of interest. This is a 3-factor index of similar but different favorability questions. This variable was checked to ensure findings are robust to the specic wording of the primary variable of interest. This variable also includes a question on online learning. As a result, findings are more broadly generalizable to alternative education, rather than alternative credentials in particular.

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[4]Mattern and Wyatt(**?**) note that college students live an average distance of 268 miles from home and a median of 94 miles. This indicates that most students could reduce the cost of college by studying remotely from home.

No survey administration allowed for measurement of all variables simultaneously, but within each calender year ordinary least squares modelling identified four key models. Analysis of survey results from 2018 indicated that certain factors were unimportant. As a result, some questions were replaced in 2019.

The 2019 analysis covers the whole data set, not only samples from 2019. Questions in the October 2018 administration are a superset of those in February 2018. Similarly, May 2019 variables are a superset of February 2019. It turns out that the most significant factors identified in the 2019 analysis were also measured in the 2018 administrations, but this may be due to oversampling.

The first key model is a long model using all available right hand variables. Factors are eliminated one at a time until a subsequent key model is obtained. The second key model is the weak model. This model includes factors with a p-value of less than .5. The third model is an adjusted r-squared maximizing model, and the fourth model is a strong model involving factors with a p-value less than .1.

III.   Empirical analysis and results

Factors of the index of interest the two factors are strongly intercorrelated. Results for the index of interest were in line with results for the variable of interest, indicating robustness of results to the wording of the question used to measure the variable of interest. A second key result is that the 2019 long model explains the majority of data observed, with an r-squared of .5635. Table 3 reports selected models. Factor strength across all models is reported in Appendix D.

Profile gender variables are a binary response by a respondent at the time the sign up for a Survey Monkey account. The survey presents male, female, and nonbinary gender response. In several cases a person responded with a gender other than their profile gender. Male respnse is true when profile gender is male or survey response on gender is male.

Overall, the 2019 medium model is preferred. This model obtains high explanatory power while maintaining relatively low complexity. The medium model in 2018 obtains even higher adjusted explanatory power. Investigation of the 2018 results initially indicated weak effects for religiosity and STEM identification, but reanalysis with added 2019 data suggests that inclusion of these variables may add importantly to adjusted explanatory power.

There were 168 observations in the 2018 long model. Model hardening from the long model to the weak model for 2018 resulted in a reduction from 69 to 39 variables. The 69 variables were associated with 15 questions, and the surviving 39 variables in the weak model were associated with 14 questions. Surprisingly, the question which was filtered out was the question on employment status, which is typically regarded important.

Employment status includes whether an individual makes hiring and firing decisions. 2018 model results indicate that employers favor alternative credentials no differently than average, which is to say have they obtain moderately positive

favorability.

The mean of the variable of interest is about 6.614. Table 2 disaggregates average response by year. The average response on entry-level suitability in the 2018 sample took a value of 6.531, but this is not significantly different from the average of about 6.6.

Tabulation by year hints at a positive trend, but ordinary least squares models yield no significant results. The adjusted r-squared maximizing model eliminates Christian identification as an important variable, in comparative favor of non-specific religiosity. Religiosity is typically associated with political conservatism, and conservatism is thought to move with status quo bias(?). The present article gives mixed confirmation of a positive relation between religiosity and anti-innovation bias, but innovation in education appears to be an important exception.

Innovation proxy variables include favorability to artificial intelligence, cryptocurrency, and online education. These variables are cross-correlated with one another with a p-value of less than .001. Religiosity is negatively related to artificial intelligence, and artificial intelligence is identified as a strong factor.

Conservatism is characterized by religiosity and free enterprise favorability. Regulatory favorability is positively associated with all proxies of innovation. This amounts to replication of a negative relation between innovation and conservatism, but the replication comes with two apparent paradoxes. First, the market is considered an effective tool of innovation(?), so individuals seeking to maintain the status quo ought to disfavor it rather than favor it. Second, traditional education is regulated education, and alternative credentials aren't mainly regulated by polcy, so individuals committed to high levels of regulation ought to disfavor alternative credentials. One explanation to these apparent paradoxes is based in personality and cognitive bias. In Kahneman's language(?), survey respondents may be thinking fast. The preference of some conservatives for the status quo in education becomes explained by decisionmaking which is driven preferentially by risk aversion, loss aversion, lack of openness, and related factors. It may be the case that many of these same individuals would favor alternative credentials when a logical mode of thought is activated over fast thinking or intuition.

Weak industrial effects were common in the 2018 data, but no strong effects were identified. The most significant industrial effect was the factor for other industries. Information technology was the second most significant industry. Two regions have significant effects in the strong model. The mid-atlantic region, including much of Washington DC, is associated with a positive effect. The west south central region is associated with a large negative effect. This region consists of Arkansas, Louisiana, Oklahoma, and Texas(?). Gender, age, and income were significant.

2019 data identifies gender, innovation bias, expected conventionalism, online education favorability, and regulatory favorability as the strongest factors. Effects

move in their expected directions, with the exception of regulatory favorability. This factor related positively to the variable of interest, replicating an unexpected 2018 finding which was earlier discussed.

Strong positive quadratic and negative cubic effects are identified for the question about whether alternative credentials will be conventional soon. Figure 1 illustrates this result. Notice that the effect of expected conventionality on entry-level suitability follows an s-curve. Expected conventionality, in turn, is related to time. Simple regression of time on suitability revealed an insignificant direct relation, but the indirect relation through dynamic expected conventionality motivates further exploration into alternatives to the least squares model.

FIGURE 1. SUITABILITY BY EXPECTED CONVENTIONALITY
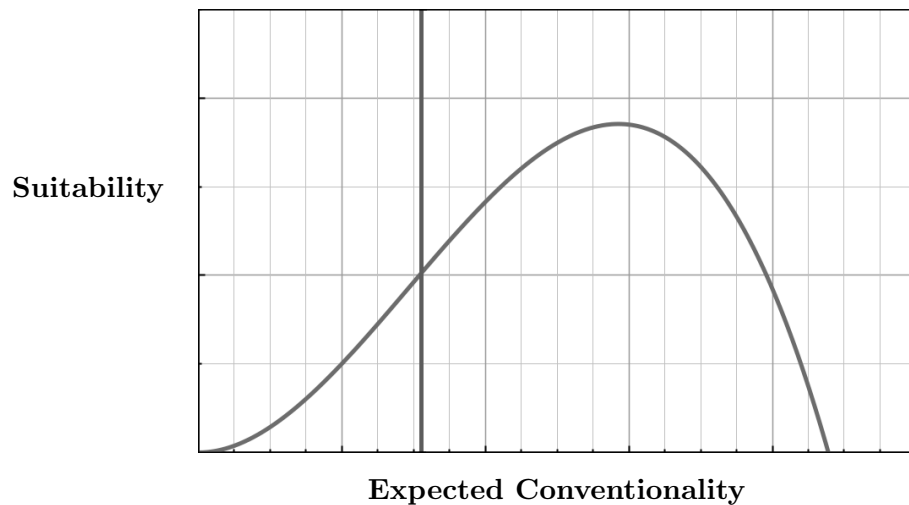
The vertical line in Figure 1 occurs at the mean value of expected conventionality, or about 6.1. Alternative credentials are past the lagged phase of adoption and recently past the point of inflection. Because expected conventionality cannot exceed a value of 10 by construction, the relation is isomorphic to a sigmoid over the range of actual values. Log-log regression of conventionalism on time obtains a p-value of .004. Expected conventionality is not binary, but a transformed variable was utilized for sigmoid modelling with logistic regression (**?**), Logistic regression obtained additional significance.

Log-log, s-curve, and sigmoid relations are standard models for a variety of structurally important relationships. Social learning, experience, social influence, and contagion effects are some of the indicated structural relations(**?**). Further identification of optimal fit may indicate effective accelerators of normalization.

While the relationship between conventionality and time was strong, this is indirect to the variable of interest. Direct modelling of suitability on time was

insignificant using logarithmic and logistic analysis, but a two-factor exponential expansion was discovered which forms a useful dynamic model:

$$(1) \qquad\qquad\qquad f(x) = b_1 b_2^t$$

This nonlinear model obtained an r-squared of .8691 and b_2 had a p-value less than .001. The estimate of b2 was less than 1, indicating exponential decay rather than exponential growth. The data indicates a short-run reduction in entry-level suitability, with comparatively weak evidence for a reversal over time.

When conventionality is interacted with time, a multiple regression suitability on time, conventionality, and the interaction reveals a positive relation between the interacted variable and suitability. This may point to long run normalization of alternative credentials as a mechanism toward eventual improvement in entry-level suitability.

While employment status was super weak in 2018 models, employer effects survived to the preferred 2019 model. Employer effects are negative in this model, with a coefficient of about -.47 and a p-value of .215.

A simple interpretation is that employers are more pessimistic than others on alternative credentials. Another interesting possibility is that employer attitude is a leading indicator of population attitude. Nonlinear regression on time indicates a short-term decline in population favorability, which is consistent with employer-lead favorability, given that employers are more pessimistic than average in 2019 data.

Exploring this notion, an interesting finding is identified using a multiple regression with interacted time and employer status. This regression of four parameters on the variable of interest is depicted in Figure 2, which illustrates a hypothetical reversal in entry-level suitability. The figure is conceptual and not to scale. The population trend is illustrated at II, and employer views are represented at III. At II, time effects are linearly negative and marginally positive. Linear employer-time effects are positive, but marginal employer-time effects are negative. The plausibility of a reversal story is enhanced when noting that the coefficient of interacted manager-time is positive and large in magnitude compared to ordinary time effects.

Age group had a more robust effect compared to exact age, which may indicate something like a cohort effect. Ethnic effects were moderately significant, and regional effects continued to be significant after the introduction of the ethnicity question in 2019, supporting the thesis that policy differences are important in this regard.

Educational attainment obtained an important effect which was more significant than either age or income effects. In addition to level of education, a dummy variable for whether education was at or greater than obtaining a college degree was found to be significant. Increased education, whther traditional or non-traditional, appears to be associated with increased support for alternative

FIGURE 2. EMPLOYER DRIVEN FAVORABILITY
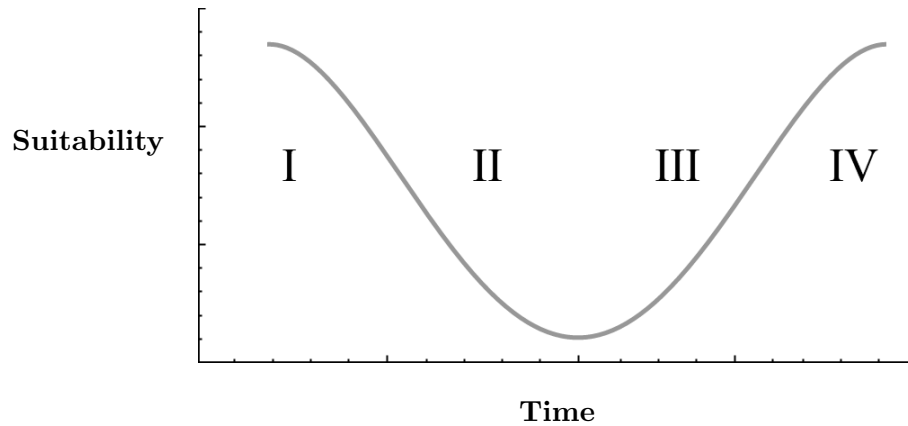
IV.   Other Interesting Results

Prior research finds student indifference toward debt(**?**). The present paper replicates and extends such findings to identify youth antagonism to alternative credentials. Prior research often measures debt attitudes among college students, but such evidence is susceptible to selection bias because debt-tolerant individuals might have a propensity to consume higher education. In contrast, the present paper identifies generalized youth antagonism to alternative credentials.

In a simple regression, age has a small negative coefficient. Table 3 tells a more complex story. The most positive group is not the youngest group, but the age group actively attending or having just graduated college.

Minors are the only age group which is unfavorable toward alternative credentials on average. Minors have the largest share of minimum-favorability responses. Minors are also the least sampled group in this data set.

In the preferred model and several others, educational effects are important, including a dummy variable for having received a college-level or better education. One explanation is that participation in the traditional higher education drives support for alternative credentials, and the relationship with age is a side effect.

An interesting, tangential result is the effect of nonbinary gender identification. Nonbinary gender identification, obtained for 16 respondents, was included in order to reduce noise on gender effects, but it turned out to have a significant independent effect.

Simple regression of nonbinary gender identification on the variable of interest reveals a coefficient of about -1.3 with a p-value less than .05. Substituting nonbinary identification in for other gender variables in the strong model maintains the negative direction of effect, but the effect is attenuated to a coefficient of -.48

and a p-value of .374.

V. Conclusions

Suppose that the average alternative learning program and the average traditional program provide equal benefit to a consumer, but suppose that alternative processes experience higher variance in consumer benefit. In this simple model we can see that the best programs would be alternative programs. Such a model can robustly predict that top programs are alternative, even when the alternative distrobution is modified such that the average alternative program is substantially worse than the average accredtied program.

The extent of preference for alternative learning improves from occassional to usual once the simple model is extended to reflect the lower price and accelerated completion of alternative learning programs. For example, the price of a CLEP test is $89 in 2019 dollars(**?**), while the average cost per credit hour at an accredited college is $594 in 2018 dollars(**?**). A CLEP test may substitute for a 4-credit course[5]. This means credit by examination is approximately 15 percent of the price of credit by credit hour. Alternative learning programs may provide flexible financing options and greater earnings potential compared to a traditional program.

General Assembly offers bootcamp-style education in several specific occupations. General Assembly charges $14,950 for its priciest immersive course, but students can finance in creative ways. One option is to pay nothing upfront and utilize an income sharing agreement, so the student need not pay until employed full-time(**?**). The immersive lasts about 3 months. For General Assembly full-time programs ending between July 1, 2014 and June 30, 2015, 88 percent of students found full-time work within 90 days of graduation, and 99 percent found full-time work within 180 days(**?**). This is in notable contrast to the traditional degree, where 54 percent of the class of 2015 had found a standard, full-time job 6 months after graduation(**?**).

Bootcamps can sometimes be used as a college substitute, but they can also be used after college graduation to differentiate a job candidate from competitors, or to switch careers or brush up on recent changes mid-career. Finally, many traditional universities now offer through prior learning assessments or credit by portfolio, so that bootcamps can result in college credit even without officially partnering with a university(**?**).

Results have key applications for employers, students, and policy. Age results indicate an alternative credential marketing strategy targeted at current college students, recent graduates, and parents, rather than high school students.

Employers tend to adopt practices supported by leaders in their own industry. This paper suggests that employers may be a leading indicator of broader at-

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[5]Credit may vary and is generally decided by the awarding institution rather than the exam provider. Other well-known credit by examination assessments include AP, Cambridge International, DSST, Excelsior College, and TECEP exams.

tidudes. Given these two facts, a strategy for social adoption would be to target industry leaders. At the same time, we already see industry leaders disavowing the need for formal education. Glassdoor notes 15 leading companies, including Google, which no longer required a degree(**?**). Glassdoor states, "Increasingly, there are many companies offering well-paying jobs to those with non-traditional education or a high-school diploma."

In 2013, Laszlo Bock, Senior Vice President at Google, stated that Google's data at that time indicated that on the job performance was insignificantly related to GPA or test scores after 2-3 years, and the proportion of people without any college education at Google was increased over time(**?**).

For the corporate intrapreneur, direct appeal to industry leaders is one strategy. Another strategy is simply continued socialization of the topic within the organization. Results indicate that people are receptive to alternative education even if they aren't familiar with the topic, and they become more favorable as they learn more[6]. A third strategy is to appeal to the underlying costs and benefits of an alternatively educated labor force. Alternatively educated students tend to be more diverse(**?**), and improving diversity is often a corporate goal in itself. Alternatively educated students are also often willing to take a lower starting salary during the junior phase of their career, while providing similar or superior technical output.

Students should consider conducting learning online, learning with non-elite providers, and leveraging credit by examination. For roles where a degree is inessential to junior placement, students should consider deferring college education until after industry employment is obtained. Once a student obtains employment in the industry, employers are often willing to pay the majority of a reasonably priced degree. This deferred degree strategy is a key way for a student to obtain a much better return on investment to their education than they otherwise would. Finally, students should consider leveraging digitial portfolios as a compliment to their degree, as a means of earning college credit through a prior learning assessment, and even as a substitute for the degree with respect to particular roles.

Results for policymakers indicate redirecting or limiting federal grant and loan programs. Licenses which require formal education should be amended to support evidence-based competency in lieu of accredited education. Internship rules should be relaxed and the minimum wage should be frozen or reduced, to support better employment of young and concurrently learning individuals. Finally, tax write-offs and tax-privileged investment vehicles targeted at accredited education should be liberalized to support alternative education.

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[6]In a simple regression, respondents that know none of the available learning providers have predicted suitability at the model constant value of 6.4. Suitability moves positively with knowledge of additional alternative learning providers. Prima facie, this indicates that informing a person about alternative learning providers are expected to improve predicted suitability.

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Table 1—Medium and Strong Models, Selected Variables

Factor	2018 Medium	2018 Strong	2019 Medium	2019 Strong
Profile Female	1.091**	0.955**		
Profile Male			2.162*	
Male			-2.458*	-0.422**
Not STEM	-1.269*			
Pro AI	0.700*	0.776**		
Quadratic Pro AI	-0.065*	-0.069**		
Cubic Pro AI			0.001	0.000*
Quadratic Pro American	0.011*	0.011*		
Quadratic Expect Convention			0.113**	0.081**
Cubic Expect Convention	0.003**	0.003**	-0.007*	-0.005***
Quadratic Pro Online Learning	0.067	0.016*	0.240	0.013***
Pro Regulation	1.161	0.110*	0.268***	0.110***
Religiosity	0.120*	0.105*		
Income	0.770**	0.192*		
Quadratic Income	-0.056*		0.046	
Cubic Time	-0.000		0.000*	
Unemployed			1.118*	
Other Ethnicity			1.682*	
X_0	1105.125	.106	-12345.347*	3.289***
R-Squared	.597	.504	.526	.319

Note: * $p < .05$ ** $p < .01$ *** $p < .001$ Industrial and regional effects are also excluded for brevity. Selected variables include all other variables which are significant at one of the noted levels in at least one model presented in this table. See the online appendix for coefficient data for further information.

Table 2—Average Response by Year

Response Year	Mean	SD	Frequency
2018	6.658	2.557	1022
2019	6.351	2.624	168
Total	6.614	2.568	1190

TABLE 3—PARTIAL CROSSTAB OF AGE GROUP ON SUITABILITY

Suitability	<18	18-29	30-44	45-60	60<	Total
1	3	9	11	13	4	40
5	1	28	31	27	9	96
10	1	46	39	36	19	141
Total	10	227	250	245	77	809
Average	4.60	6.93	6.62	6.40	6.34	6.59