Three Essays on the Economics of Postsecondary Alternative Learning

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at George Mason University

By

John Vandivier
Master of Public Policy
George Mason University, 2015
Bachelor of Science
University of Houston, 2012

Director: Bryan D. Caplan, Professor
Department of Economics

Summer Semester 2021
George Mason University
Fairfax, VA

Dedication

I dedicate this dissertation to the satisfiable skeptic, to the weirdo, to the self-taught, to the career switcher, and to my children, current and future.

I encourage you to distinguish schooling from learning, common wisdom from truth and falsehood, a person from people, and pain from evil.

Test all things; hold fast what is good.

Acknowledgments

I would like to express appreciation for four groups of people that have contributed to my doctoral education. First, I would like to thank my dissertation committee. Thanks to Dr. Caplan for reinvigorating the research on the return to university education. The value of alternative education is interesting largely because it is comparable to such prerequisite work. Thanks to Dr. Hanson for his contribution of big ideas into society and into my writing. Thanks to the late Dr. Williams for his focus on improving the lives of individuals. His focus was demonstrated with clarity of thought and speech inside and outside of the classroom. Thanks to Dr. Klein for his unflinching willingness to join a dissertation-in-progress once Dr. Williams had passed away.

I would also like to thank Christina Vandivier, a wonderful friend of mine from high school, a fantastic mother, and my wife. I expect that I would not have attempted, much less obtained, doctoral education in her absence.

I would like to thank Mary Jackson for significant amelioration of the miscellaneous administrative inconveniences of graduate life.

Finally, I would like to thank my peers at George Mason University. Many peers contributed to my success in and enjoyment of the program. In particular, I would like to thank my regular study group. The group included Rob Cripps, Bryan Cutsinger, Bob Hazel, Josh Ingber, Malhaz Jibladze, Slade Mendenhall, Linan Peng, Patricia Saenz-Armstrong, and Garrett Wood.

Table of Contents

List of Tables

List of Figures

Abstract

THREE ESSAYS ON THE ECONOMICS OF POSTSECONDARY ALTERNATIVE LEARNING

John Vandivier, PhD

George Mason University, 2021

Dissertation Director: Bryan D. Caplan

This dissertation advances the field of education economics by describing the limits of competition between traditional and alternative postsecondary credentials in the United States. The results and conclusions contained in this set of three papers forms a substantive basis for change in policy, research, education provider behavior, and education consumer behavior. Evidence-based solutions that leverage these insights offer a solution to the student debt crisis, better social and private returns to education, education access improvements, and improvements to the quality and pace of learning.

The first essay, *Conformity and Soft Skills as Determinants of Alternatively Credentialed Non-College Graduate Hirability*, compares the skills gaps for college graduate and alternatively credentialed non-college graduate (ACNG) job applicants. I provide evidence that employers perceive a soft skills gap in ACNGs, and I demonstrate that employers see ACNGs as a labor pool with high quality variance, rather than a labor pool of general low quality. This paper provides a skill-level diagnostic that can be used by education providers to improve curricula.

The signaling model of education provides an ideal foundation for the questionnaire design that is utilized in all three essays. Where signaling model theorists have previously suggested that nonconformity creates a stigma for ACNG labor, I show that nonconformity is viewed as a net value add by employers. I propose that productivity variance risk aversion is a better explanation than stigma for the relatively weak average performance of alternative credentials to the traditional degree on the labor market.

The second essay, *Hirability and Educational Prestige*, tests the hypothesis that educational prestige explains hirability better than accreditation. Ordinary least squares and linear mixed model analyses provide evidence that prestige does explain a greater share of variance in hirability compared to accreditation, but the effect of accreditation also remains independently important. This paper identifies rules of thumb that education consumers can use to identify meaningfully high-prestige learning providers. These meaningful categories can also be used for further research into the return on investment in alternative education. Results suggest a need for accreditation reform to allow maximal social surplus in the market for education.

The third paper, *COVID-19 and Alternative Postsecondary Learning*, investigates the impact of the COVID-19 pandemic on social favorability to remote learning and alternative credentials. Results indicate that the pandemic increased favorability to remote learning and alternative credentials. The conclusion provides some reasons to think that high favorability will persist over time.

CHAPTER 1

Conformity and Soft Skills as Determinants of Alternatively Credentialed Non-College Graduate Hirability

1.1 Introduction

A substantial gap exists between the skills expected by employers and those possessed by college graduates[1–4]. Experts view college alternatives, including vocational school, to be useful for technical training, but the traditional college degree retains a wage premium over vocational education. Unemployment, underemployment, and other adverse labor outcomes follow a similar pattern[5]. This paper seeks to resolve the apparent discrepancy between these outcomes while preserving the mainline economic view that employers pay for perceived job candidate skill. To explain the apparent discrepancy, this paper tests the hypothesis that employers expect an offsetting non-technical skill deficit when considering an alternatively credentialed non-college graduate (ACNG). I find evidence that employers and the general population in the United States expect a low level of soft skills from ACNG job candidates.

Alternative credentials refer to credentials other than the undergraduate degree[6]. The category includes, for example, industry certifications, portfolios of work, digital badges, and other records of unaccredited learning and achievement. Consumers of alternative education typically intend to leverage alternative credentials toward better employment. That is, they typically have the same goals as a college student. Many individuals obtain alternative credentials as a supplement to a college degree. Supplemental usage is excluded

from the analysis in this paper. This paper focuses on the use of alternative credentials as a substitute for a college degree. This paper provides a comparative analysis between traditional and alternative credentials at the skill level. Education consumers and learning advisors can use results to inform strategic consumption. Learning providers can use results as a skill-level diagnostic and product improvement resource.

In a noteworthy literature review, Bills identifies seven sociological or economic theories of the relationship between schooling and job assignment[7]. A keyword search in April 2021 indicates that human capital theory, institutional theory, and signaling theory are the three theories mentioned by Bills that are most frequently observed[1]. When applied to the economics of education, the institutional theory holds that an institution improves individual labor prospects by declaring some individuals to be graduates. In this application, institutional theory can be included in a signaling model with institutional effects. In the current study, institutional effects are held constant by using hypothetical questions involving anonymous institutions.

For the purpose of this study, signaling theory provides three advantages over the alternative human capital theory. First, signaling theory can explain labor outcome variance when human capital unobserved[8]. By extension, signaling theory can also explain labor outcome variance when human capital is held constant.

Second, the signaling model empowers a questionnaire research design. In a standard human capital model of wages, human capital is an input to a production function[9]. In a competitive labor market, firms are willing to pay wages equal to the marginal revenue product. The marginal revenue product for an individual is a function of human capital factors, including skills. Establishing a wide array of such skill measures would be complicated and prone to measurement sensitivities, assumptions, and errors of various kinds. In this framework, a questionnaire is a second-best design that provides a proxy for the functional

[1] A Google Scholar search for "institutional theory" yields about 210,000 results. About two million results are found for control theory, but Bills notes that "In its explanatory form, control theory is indistinguishable from human capital theory." In addition, the keyword search results on control theory include disproportionately many results that do not relate to economic analysis. The search for 'human capital theory' yields about 72,000 results. The sum of 'signaling theory' and 'signalling theory' is about 45,000 results. The total search result count for the other four theories is less than twenty-five thousand results.

measure of skill.

Signaling theory takes the reverse approach. According to the signaling model, willingness to pay is a function of perceived quality. The relationship between perceived quality and actual quality is secondary. In this framework, a questionnaire is an ideal measurement tool. The value of this research approach is supported by the broad use of questionnaires to identify willingness to pay within the field of market research[10].

An additional benefit of using a questionnaire is the ability to ask hypothetical questions. Hypothetical questions avoid the problem of unobserved heterogeneity because the analyst has total knowledge over the subject of measurement.

Third, signaling theorists have laid out a testable hypothesis for weak labor outcomes among non-college graduates. Following this model, scholars claim that the college degree signals intelligence, conscientiousness, and conformity[11]. This paper hypothesizes that, in contrast, alternative credentials signal nonconformity and low conscientiousness.

Employer demand for conscientiousness and conformity follows a bliss point pattern. Excess individual conscientiousness can disturb team performance[12]. Conformity can lead to a lack of innovation and suboptimal organizational practices[13]. Conformity selection occurs in part through heuristic cognition or unconscious bias.

Risk aversion is a distinct explanation for conformity selection. Some employers are not able to evaluate an alternative credential with confidence. Such an employer views ACNG labor as a gamble with some odds of positive or negative outlier value. The employer may not prefer to hire such a candidate due to risk aversion, even if their point estimate for ACNG labor value is higher than their point estimate for a recent college graduate. If firm size effects are positively associated with ACNG hirability, this will add weight to an explanation based on risk aversion.

1.2 Data and Methodology

A simple model of demand for labor provides context for the hypothesis of interest. This model is clarified in Equations 1.1a and 1.1b:

$$S_j = f(H_j) \tag{1.1a}$$

$$w_{ij} = E_i(MRP_j) = f_i(S_j) \tag{1.1b}$$

Job candidate j generates a signal of productivity S_j from unobserved human capital H_j. Employer i, forms an expectation of the marginal revenue product of j on the basis of $f_i(S_j)$, an employer-specific evaluation of S_j. A specific employer is willing to pay a specific job candidate wages of w_{ij}.

This study uses ordinary least squares (OLS) regression analysis to estimate the effect of perceived skill gaps on hirability. An employer is willing to pay more for a relatively hirable individual. The representation of willingness to pay makes hirability a proxy of demand for labor and w_{ij}. This paper hypothesizes that employers preferentially value soft skills in the course of $f_i(S_j)$ to explain the reduced willingness to pay for ACNG labor relative to college graduate labor. If employers do bias toward soft skills in job candidate evaluation, one or more soft skill gap factors should yield a negative coefficient in a regression on hirability.

This paper leverages an original set of online questionnaire responses ($n = 322$). Responses are cross-sectional data obtained in early February of 2021. Respondents are United States citizens at or over the age of eighteen. Qualified respondents participated in the survey through the Amazon Mechanical Turk platform.

The survey includes 65 questions in two sections[2]. The first section captures respondent characteristics, and the second section captures a skill-level evaluation of various hypothetical job candidates. Grouping these variables into three groups simplifies discussion. There

[2]See Appendix A for a full copy of the survey.

is the dependent variable of interest, independent variables of interest, and categorical controls.

In this study, the categorical variables and the control variables are the same set. The independent and dependent variables of interest are Likert-type responses on a 10-point scale [3]. Higher Likert-type values indicate greater agreement with the associated statement. Categorical controls include state of residence, the industry of occupation, employer status, firm size, and a measure called duration.

Duration measures the length of time the respondent believes it takes to obtain an alternative credential. Employer status describes whether an individual makes hiring and firing decisions in the course of their employment. The variable takes one of three values: yes, no, or unemployed. Employer effects refer to the case where an individual states that they do make hiring and firing decisions. State of residence refers to a state within the United States or the District of Columbia.

The dependent variable of interest is called hirability. Hirability measures agreement that, "For many professions, alternative credentials can qualify a person for an entry-level position." The dependent variables of interest include perceived skill gaps and rulebreaker effects.

Rulebreaker effects refer to a collection of three factors that measure respondent agreement with statements about nonconformists, or "People who are willing to break formal or informal rules and norms." The first statement indicates that nonconformists present a risk to a company's reputation, productivity, or value. This statement received the least agreement and greatest response variance among three qualitatively different descriptions of nonconformists ($\mu = 6.29, \sigma = 2.51$).

The second statement indicates that nonconformists are held back by rules, and "could just as easily be high performers as low performers." This statement received the most

[3]It is an accepted practice to treat Likert-type responses as either categorical or continuous for regression analysis. Jaccard and Wan provide support for continuous analysis of Likert-type data. They note that severe departures from the assumptions on cardinality "do not seem to affect Type I and Type II errors dramatically," particularly when the Likert scale is five or more points[14]. This paper uses a 10-point scale and treats these data as continuous.

agreement and least variance among rulebreaker statements ($\mu = 6.93, \sigma = 2.10$). The agreement with this statement provides evidence against the thesis that employers value conformity for its own sake. In turn, this adds weight to the theory that employers value conformity as a risk aversion tactic while knowing that nonconformity signals positive outlier potential. The third rulebreaker effect states that rulebreakers are creative, innovative, and likely to benefit company culture ($\mu = 6.71, \sigma = 2.18$).

Rulebreaker effects and perceived skill gaps are structurally linked. One of the skills that respondents evaluate is nonconformity, or "willingness to break formal or informal rules and norms." Interpreting rulebreaker effects jointly with the conformity gap effect enables better explanatory power and diagnostic utility.

Perceived skill questions in the second section of the survey allow for two ways to calculate perceived skill gaps. Perceived skill gaps are measured separately with and without overqualification effects. Overqualification effects are important in external research[15,16], but skill gap analysis that ignores these effects is also routine[17].

Perceived skill is a Likert-type response reporting agreement stating that a particular candidate has a particular skill. For each of 13 skills, the respondent imagines and reports skill levels for the ideal candidate, the average actual employee, the average recent college graduate, and the average ACNG. As a result, 52 of the 65 questions in the survey are questions on perceived skill about kind of candidate.

The raw skill gap for a candidate is the difference between the perceived skill for that candidate and the ideal candidate. The perceived skill gap with overqualification effects equals the raw perceived skill gap. The perceived skill gap without overqualification is zero if the raw skill gap is negative, and otherwise, it is equal to the raw skill gap.

The concept of skill is intentionally treated loosely in this analysis. The thirteen factors treated as skills include attractiveness, verbal, written, and body language communication skills, conscientiousness, customer service skill, emotional intelligence (EQ), expected salary, teamwork, technical skill, willingness to break formal or informal rules (nonconformity), willingness to work odd hours, and willingness to commute.

Results focus on ACNG skill gap coefficients and also comparative skill gaps between ACNG labor and recent college graduates. Perceived ACNG skill gaps are also called absolute skill gaps. Subtracting the perceived recent college graduate skill gap from the absolute skill gap yields the comparative skill gap.

Models of these variables will support the hypothesis if soft skills are more important than technical skill gaps. Significant rulebreaker effects would provide evidence that conformity is valued differently for different types of employers. A positive relationship between firm size and hirability would support an explanation from risk aversion.

1.3 Results

The median hirability response was eight out of ten. The mean response is about 7.42. Absolute skill gaps and comparative skills gaps are both important explanations of hirability. Soft skills explain hirability better than technical skill does in both absolute and comparative terms. Technical skill is not a contributing factor in any model of interest. Of the thirteen skills investigated, seven skills contribute to the preferred model.

Table 1.1 reports five interesting multiple regressions. Models 1 through 4 maximize adjusted r-squared for a given set of factors. Factors in these models are not constrained using a p-value threshold. Model 4 is the preferred model, and factors in this model have a p-value less than 0.28. Model 5 is a special case designed to answer an analytical question.

Models 1 and 2 maximizes adjusted r-squared using absolute skill gaps. Model 1 includes overqualification effects, and Model 2 excludes these effects. This model is useful to demonstrate which skills are important determinants of ACNG hirability. The key result from these two models is that measuring skill gaps without overqualification is preferred.

Models 3 through 5 also exclude overqualification effects. Model 3 maximizes adjusted r-squared using comparative skill gaps. This model explains hirability by comparing ACNG labor to recent college graduates by skill. Model 4 synthesizes comparative and absolute skill gaps.

Table 1.1: Linear Models with Hireability as Dependent Variable

	1	2	3	4	5
Comparative, Attractiveness	-0.161***		-0.185*		
Comparative, Conscientiousness			-0.140		
Comparative, Customer Service			0.138	0.142*	0.145*
Comparative, EQ			-0.0955		
Comparative, Odd Hours			-0.177*	-0.255***	-0.260***
Comparative, Teamwork			-0.196*	-0.242**	-0.251**
Comparative, Writing			0.128	0.0920	0.0934
Comparative, Rulebreaker					0.0182
Duration	0.666**	0.634**	0.811***	0.744**	0.719**
Duration^2	-0.0884**	-0.0857**	-0.113***	-0.103**	-0.1000**
Employees 1-10					-0.187
Employees 11-50					0.398
Employees 51-200	-0.475*	-0.480**	-0.364	-0.459*	-0.258
Employees 201-500					0.135
Employees 501-1,000					0.420
Employees 1,001-5,000					0.0812
Employees 5,001-10,000					0.0789
Employees 10,000+					0.279
Gap, Attractiveness		-0.367***		-0.350***	-0.358***
Gap, Body Language-IT	0.100	0.132		0.106	0.0874
Gap, Conscientiousness	-0.0657	-0.0845		-0.132**	-0.134**
Gap, EQ	-0.0966	-0.0952			
Gap, Nonconformity					0.0574
Industry Credentials Required	0.706*	0.722**	0.374	0.378	0.375
Industry Credentials Normal	0.932**	0.926**	0.487*	0.436*	0.448*
Industry Credentials Sometimes	0.467	0.475			
Industry Credentials Unknown	0.641*	0.684**			
Industry, Agriculture	1.368	1.619*			
Industry, Energy	-1.277*	-1.190*	-1.200*	-1.442**	-1.448**
Industry, Finance	-0.811***	-0.783***	-0.712***	-0.715***	-0.717***
Industry, Information Technology	0.335	0.264	0.438*	0.306	0.337
Industry, Law	-1.813***	-1.670**	-1.935***	-1.876***	-1.857***
Industry, Transportation	1.512*	1.643**	1.216	1.403*	1.350*

Continued on Next Page

Table 1.1 – Continued

	1	2	3	4	5
Is Employed Non-Manager	-0.336	-0.383*	-0.497**	-0.471**	-0.451**
Is STEM Worker	-0.491**	-0.529**	-0.525**	-0.557**	-0.564**
Rule Breakers Risky	0.0732*	0.0715*	0.0880**	0.0747*	0.0762*
Rule Breakers Rockstars	0.133**	0.128**	0.147**	0.141**	0.140**
Rule Breakers Culture Add	0.0905	0.0974*	0.115**	0.112**	0.110**
State, Arizona	-1.157**	-1.048**	-0.755	-0.823*	-0.790
State, Arkansas	-2.690***	-2.817***	-2.489***	-2.664***	-2.770***
State, California	-0.575*	-0.570**	-0.488*	-0.435	-0.446
State, Colorado	-1.446**	-1.423**	-1.463**	-1.521***	-1.508***
State, Connecticut	-1.401	-1.550			
State, Florida	-0.444	-0.454			
State, Hawaii	-3.232***	-3.271***	-2.884***	-2.869***	-2.812***
State, Illinois	-0.637	-0.699*	-0.596	-0.675*	-0.698*
State, Kansas	-3.283**	-3.486**	-2.923*	-3.116**	-3.101*
State, Kentucky	-3.143***	-3.167***	-2.583***	-2.729***	-2.679***
State, Louisiana	-1.455*	-1.255*	-0.915	-0.941	-0.898
State, Maryland	-0.596	-0.642			
State, Nebraska	-2.037*	-2.167*	-1.391	-1.655	-1.596
State, Nevada	-1.406	-1.470	-1.465	-1.434	-1.409
State, New Jersey	-1.145	-1.139	-0.976	-0.936	-0.963
State, New York	-0.692**	-0.640*	-0.617*	-0.595*	-0.590*
State, Ohio	-3.943***	-4.024***	-4.051***	-3.808***	-3.761***
State, Pennsylvania	-0.752	-0.687	-0.608	-0.534	-0.539
State, South Carolina	-1.183	-1.243	-1.361	-1.310	-1.347
State, Tennessee	-1.878**	-1.909**	-1.545*	-1.843**	-1.799**
State, Texas	-0.906**	-0.851**	-0.797**	-0.790**	-0.789**
State, Washington	-0.817	-0.863*	-0.880*	-0.996**	-1.003**
Constant	5.036***	5.356***	4.755***	5.327***	5.343***
Adjusted R-sqr	0.2181	0.2512	0.2331	0.2784	0.2654
R-sqr	0.3253	0.3539	0.3310	0.3706	0.3799
p(F)	0.0000	0.0000	0.0000	0.0000	0.0000

* $p < 0.10$, ** $p < 0.05$, *** $p < .01$

Rulebreaker effects are significant in all models. Nonconformity is insignificant in a multiple regression that includes rulebreaker effects. The insignificance of nonconformity is intuitive because these factors essentially describe the same thing. Rulebreaker effects describe the way a respondent qualitatively views conformity. Excluding overqualification, a conformity skill gap indicates that a respondent views ACNG labor as less conformist than ideal. The way a respondent views conformity substantially implies their ideal level of conformity and how deviations from that ideal will impact willingness to hire. This implication is substantial but imperfect. Because the implication is substantial, a conformity skill gap does not improve adjusted r-squared. Because the implication is imperfect, there is an opportunity to force the conformity skill gap into the model. While the p-value will be unacceptably high, it is still analytically interesting to obtain the direction of the conformity skill gap effect. This is what Model 5 does.

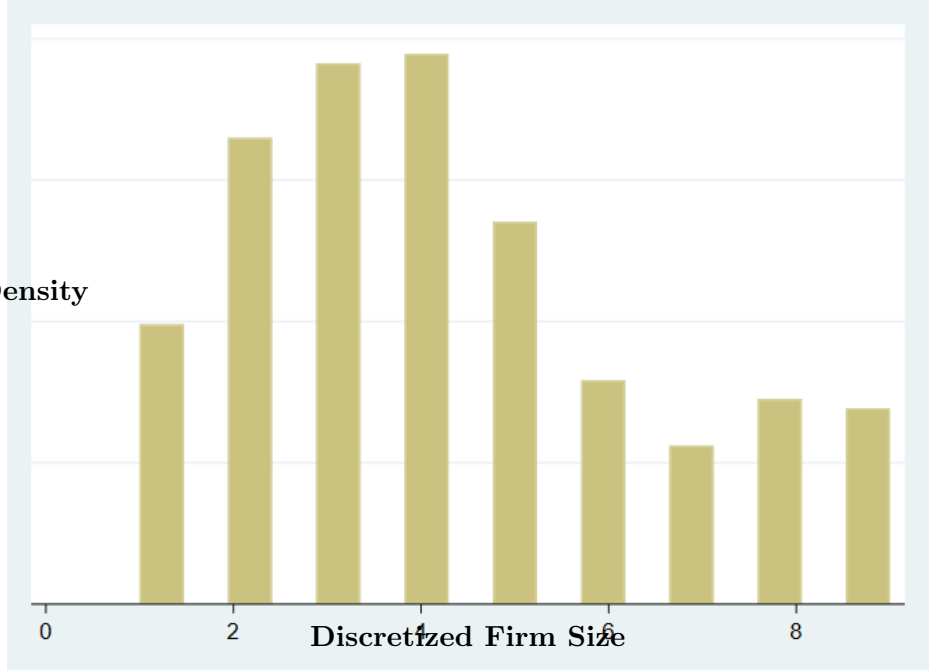
Model 5 takes Model 4 and adds additional factors for employer size, the absolute skill gap for conformity, and the comparative gap for conformity. These factors are insignificant, so the coefficient does not provide a confident estimate of the magnitude of the effect. The signs of the effects do add marginally to the cumulative evidence for conclusions. Rulebreaker effects are robustly positive and significant in all models. Positive rulebreaker effects indicate that nonconformity is positive on hirability. The positive coefficients on nonconformity skill in Model 5 reinforce this result.

Employer size is a categorical variable, so regression technically treats this variable as a series of dummies. One employer size dummy contributes to Model 4, and it has a negative coefficient. The negative coefficient might appear to be evidence against the claim that large employers are more favorable to ACNG labor. However, the dummy in Model 4 represents an employer size that is less than average. The implication is that the model constant contains a positive effect for larger employers. Model 5 reinforces the subtle implication. Model 5 contains positive coefficients for most firm sizes, including firms at or above the median size.

Figure 1.1 adds to the evidence that large firms favor alternative credentials. Firm size is

a categorical variable with nine possible responses. Figure 1.1 plots a numeric transform of the variable along the horizontal axis. The vertical axis represents the frequency of response for a given value. Responses from one through eight represent increasing intervals of firm size. The negative coefficient on employer size in Model 4 corresponds to a response of three in the horizontal axis. A response of nine indicates that the question is not applicable because the respondent is not employed. The ninth response is dropped from Model 5 to prevent multicollinearity. There is no loss of analytical power in Model 5 because the dropped dummy does not represent firms of any size. This figure further illustrates that the negative coefficient pertains to small firms. The high willingness to hire on the part of large employers adds to the explanation of low ACNG labor demand from risk aversion.

Figure 1.1: Distribution of Firm Size



Models are specified using ordinary least squares (OLS). A robust linear model (RLM) and a generalized linear model (GLM) verify OLS results. RLM and GLM specification alters factor significance but does not alter the coefficient value. RLM and GLM models account for abnormal factor distribution. In the OLS specification of Model 4, the preferred

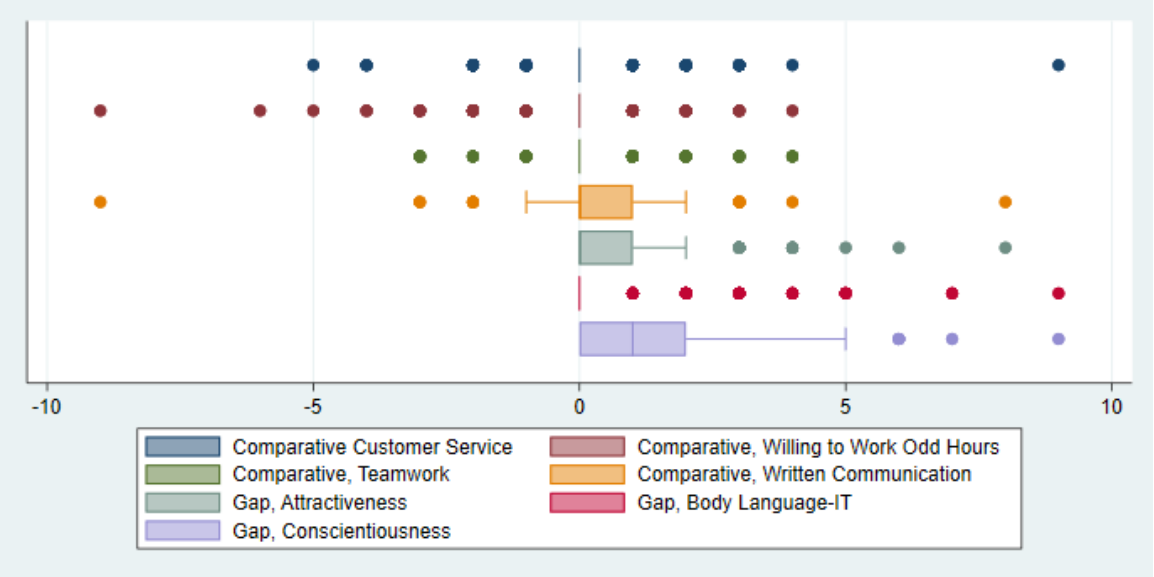
model, p-values did not exceed 0.28. In RLM specification, p-values did not exceed 0.41. In GLM specification, p-values did not exceed 0.38. Overall, OLS seems slightly overfit, and RLM seems slightly underfit compared to GLM. This analysis is mainly concerned with the direction of factor effects rather than a precise estimate of coefficient magnitudes. The important result from robustness testing is that coefficients did not change, and the direction for each factor is plausible ($p < 0.5 < p'$).

Model 4 identifies seven skill gaps as important explanatory factors. Four important skill gaps are comparative, and three are absolute gaps for ACNG candidates. Figure 1.2 illustrates the distribution for each important skill gap. Reflecting on this figure helps inform a diagnostic analysis for use by alternative learning providers. ACNG candidates can also supplement their learning to address these gaps. A simple remedy does not seem to apply for attractiveness and willingness to work odd hours. Conscientiousness is difficult to train, but analysis suggests perception management as a remedy. Perceived conscientiousness has a slight correlation duration (Pearson's $r = 0.21$). Spending additional time to obtain a credential is a way to improve perceived conscientiousness. ACNG supplementation of a credential with additional self-study time may also improve perceived conscientiousness.

The important body language communication gap is an interaction with the information technology industry variable. The interaction indicates a reduced penalty for lack of body language communication skills in the information technology industry. A reduced penalty for soft skill deficit helps explain the particular flourishing of alternative credentials in the information technology industry. The reduced penalty in this particular industry might be related to its relative lack of regulation. Another hypothetical explanation is that the reduced penalty is related to cultural norms in the industry. Suppose that there is a diminished technical need for social skills in programming. In that case, introverts obtain a comparative advantage in this field. Further study that includes personality data is encouraged to test this hypothesis. The interacted body language skill gap and the customer service skill gap are interesting for niche learning providers.

The gaps in teamwork and written communication skill seem to be the best candidates

Figure 1.2: Distribution of Important Gaps



for feasible remedy with broad learning provider applicability. Written communication skill is uniquely amenable to online learning. Written communication skill is also unique in the response distribution. The written communication skill gap is a comparative gap where the interquartile range favors ACNG labor. This indicates the perception that ACNG providers are generally capable of providing this skill. The distribution reflects positive and negative outliers. Positive outliers indicate that the typical provider can improve by emulating market leaders. Negative outliers indicate that some learning providers are particularly poor at training this skill. If learning providers are generally effective in training this skill, improvement for ineffective providers is likely to be feasible.

Alternative learning providers can use project-based learning and social learning techniques to facilitate teamwork skill development. These are not the most common pedagogies, but they are an established and effective pattern. An online environment can implement courses with project-based learning and social learning. The distribution of responses indicates that improving teamwork skill has neither the maximum penalty nor the maximum return potential compared to improving written communication. Model results preclude decisive prioritization of written communication skills. Model 4 indicates that the effect

Table 1.2: Factor Group Explanatory Power in a Simple Regression with Hirability as Dependent Variable

Effect Group	Adj R-Sqr	R-Sqr	Max p-value
Absolute Gap	0.0615	0.0703	0.097
Comparative Gap	0.0176	0.0298	0.687
Industry	0.0303	0.0454	0.958
Other Factors	0.0072	0.0288	0.537
Rulebreaker	0.0783	0.0869	0.127
State	0.0469	0.1033	0.772

of teamwork skill on hirability is more reliable and larger in magnitude compared to the coefficient on written communication skill. Targeting both of these two skills is feasible and beneficial to educational quality.

The preferred model explains about one-third of hirability variance, but how much of the explanatory power is attributable to skill gaps? Table 1.2 provides evidence on the importance of perceived skill gaps and rulebreaker effects relative to other factor groups. Model 4 is composed of factor groups. Table 1.2 summarizes results for simple regressions of each factor group on hirability. Industry and state effects are factor groups regarded in external literature as important for models in the labor market.

Table 1.2 shows that perceived skill gaps and rulebreaker effects explain more variance in hirability compared to the state, industry, and other effects. Industry and state effects are also less stable. A simple model of industry effects on hirability results in some industry effects approaching a p-value of 1. In contrast, the least significant absolute skill gaps are statistically significant in a simple regression ($p < 0.1$). These findings collectively provide evidence that perceived skill gaps and rulebreaker effects are factors of high importance for models of hirability.

1.4 Conclusion

This study provides evidence that the general population is favorable to alternative credentials. Hiring managers have higher hirability than employees that are not managers. Alternative credentials signal a qualitatively different basket of skills compared to recent college graduates. Americans perceive ACNG labor as weak in soft skills, but learning providers can make changes to mitigate this issue. Alternative credentials signal low conformity, but this results in added hirability on average.

Alternative credentials also signal that a candidate is risky. An explanation of low ACNG demand from employer risk aversion better explains the results compared to an explanation of selection for conformity. In addition to a direct response indicating risk perception, firm size effects support an explanation from risk aversion. Large employers face a lower risk premium for various reasons. For instance, large employers can spread risk across many hires. Risk premiums are also lower for large employers because they have access to better hiring data.

The classic signaling model explanation for employer preference of college graduate labor over ACNG labor is that the college degree provides a comparative signal of conscientiousness and conformity. This paper replicates the importance of conscientiousness. Gaps in perceived conscientiousness are important, but conscientiousness is not an important differentiator between college graduates and ACNG candidates.

While hirability is negatively associated with conformity on average, this varies importantly by the employer. Descriptions of employer preferences better explain the willingness to hire ACNG candidates than skill gaps. Industry effects are also important, but effects at the employer level are significantly more reliable than industry effects. Scholars, industry members, and others consider state effects and industry effects to be important explanations of the willingness to hire based on an alternative credential. Skill gaps better explain hirability compared to industry and state effects.

Risk aversion and conformity selection are both partially unconscious biases that lead to an inefficient organizational operation. A practical recommendation is for organizations

to implement bias control processes concerning ACNG evaluation. An example of a process improvement would be for a human resources department to maintain a list of specific credentials valued for particular job families.

Another action item is for educational institutions, policymakers, and the general public to invest further in correcting alternative education misinformation. A survey on trade schooling taken in 2019 provides evidence on the role of this kind of misinformation[18]. Only 27 percent of respondents correctly responded that lower debt is an advantage of enrolling in trade school relative to college. Additionally, over 75 percent of respondents failed to notice that trade school graduates receive industry employment sooner and receive specialized training when compared to a four-year college.

Obtaining a college degree after obtaining some work experience will allow students to leverage employer tuition benefits. Because ACNG hirability varies importantly by the particular employer, ACNG job candidates can reduce the risk of a lengthy job search by applying to many employers at the outset of the job search. Social networking, online research into firm policy, and consulting with recruiters or other industry specialists are tactics to apprehend whether a particular employer is a likely member of the set that is favorable to ACNG labor.

The preferred model explains about one-third of hirability. Perceived skill gaps and rulebreaker effects account for most of the explanatory power in the model. There are several means of extending this research to provide improved explanatory power. A longitudinal study would allow for causal analysis and improve forecasting of ACNG hirability in the future.

Firms often adopt best practices and new technologies that industry leaders first adopt. The result that large employers and employers in the information technology industry may indicate a future of general high support for alternative credentials. Google has not required a college degree since before 2013[19]. Laszlo Bock, then Senior Vice President of People Operations at Google, stated the following in 2013: “After two or three years, your ability to perform at Google is completely unrelated to how you performed when you were in

school, because the skills you required in college are very different." In 2020, Google added three new certificate programs to an existing set and declared that all of its certificates are equivalent to an undergraduate degree for their hiring purposes[20].

If perceived skill represents actual skill, this study provides evidence that employers should be more willing to hire an ACNG. At the same time, this paper provides evidence that perceived and actual skill levels sometimes do not align. For example, the average recent college graduate in the sample has more perceived technical skills than the average ACNG. The perceived technical deficiency among ACNG labor is surprising because last-mile training, a kind of alternative education, has been specifically recommended in popular literature to remedy the technical skill gaps among recent college graduates. Further study of the differences between perceived and actual skills is encouraged.

In many cases, employer-perceived skill gaps are not statistically different when comparing recent college graduates with ACNG candidates. Employers are already favorable to individuals with alternative credentials, but specific steps will prevent the loss of this favorable status. Results suggested curriculum improvements that target specific skills. In addition, public education on alternative education, the creation of new programs in underserved industries, and public policies that give fair treatment to unaccredited education can do much to improve public support for alternative credentials.

CHAPTER 2

COVID-19 and Alternative Postsecondary Learning

2.1 Introduction

Has COVID-19 pushed technology forward in education? Online learning has become increasingly utilized since the turn of the century, but have forced social distancing measures sparked a new disdain for remote learning? Scholars have recently uncovered impacts in the American K-12 space and the university system, but this paper adds much-needed attention to the question of alternative credentials and unaccredited postsecondary education.

This study is concerned with alternative postsecondary credentials. This category includes professional certifications, coding bootcamps, work portfolios, and other proof of education other than traditional credentials. In this study, traditional credentials mainly refer to the accredited college degree. Remote learning was an alternative approach to education from inception, and it continues to be deeply involved in alternative learning. This study hypothesizes that the impact of coronavirus is positive on favorability to alternative credentials. Results favor the hypothesis, with evidence that exposure to remote learning is a critical mechanism.

There are three theoretical reasons to suppose that a pandemic would make alternative postsecondary credentials more attractive. The first is that the pandemic response has resulted in exposure to remote activity, and exposure effects are often positive on favorability. Second, alternative learning providers face different incentives compared to traditional providers. Differing incentives may provide an adaptive advantage in the face of rapid

social change. A recent paper on organizational agility in higher education points to regulatory challenges and deep, centralized, hierarchical organizational structure as notable disadvantages[21].

The third theory is that a pandemic is a time when normal strangeness increases across society. When the normal level of strangeness increases, things that were already finitely strange become relatively less strange. Alternative credentials are strange in some sense by construction, but the relative stigma associated with these credentials might decrease in a time like that of the present pandemic, where all sorts of previously strange behaviors have become a new normal.

While exposure to some stigma generally increases favorability, there are several special cases where it declines instead. Coronavirus-induced exposure could be such a case of negative exposure for a few reasons. Direct exposure to disease is generally harmful, unwanted, and forced. Disease-induced activities are not strictly involuntary, but they might be perceived disfavorably by association. The mere exposure effect[22] and familiarity bias[23] are generally positive on favorability to some stimulus, but these exposures are often voluntary. Unwanted exposure that involves harm tends to reduce favorability. Backfire, boomerang, and blowback effects are examples of a negative response to exposure [24–26]. One study relates closely to the COVID-19 pandemic in finding a backfire effect in efforts to market flu vaccine usage [27]. Interestingly, repeated negative exposure can lead to positive favorability, as documented in work on Stockholm syndrome[28].

The exposure effect of coronavirus and related social changes might reflect a combination of the above effects. As a result, the direction of effect is not apparent without empirical study. Individual favorability to alternative credentials is also like to vary for various personal reasons unrelated to the pandemic. This paper uses multiple regression to hold these sources of variation constant.

There are already several papers examining the impact of coronavirus on the education system. These papers focus on education from kindergarten through high school, but they inspire the hypothesis of a similar situation in higher education. One paper in the Journal

of School Choice examined the educational experiences of families under COVID-19[29]. The study found that 57 percent of parents found remote learning worked better than they expected.

2.2 Description of Data and Methodology

This paper leverages an original set of online questionnaire responses ($n = 350$). Responses are cross-sectional data obtained in early February of 2021, about one year after a public health emergency due to the coronavirus outbreak was declared in the United States[30]. Respondents are United States citizens at or over the age of eighteen. Qualified respondents participated in the survey through the Amazon Mechanical Turk platform.

This study uses multiple regression of linear and curvilinear factors to generate results [1]. Each model in this study follows an ordinary linear model or a robust linear model (RLM) specification. Ordinary linear models compute factor coefficients using ordinary least squares (OLS), and robust linear models use iteratively reweighted least squares (IRLS). Factor coefficients across these models are comparable, but RLM does not generate a useful R-squared statistic for model-level comparison. Robust linear models are useful to improve estimation when outliers exist[31] and 11 outliers exist in the sample.

Appendix A contains the exact wording and response options for each question. Appendix A also contains the wording for a priming message presented at the start of the survey. The priming message lays out the definition of alternative credentials for the purposes of the study. The message also provides several concrete examples of alternative credentials, including "a Certified Project Manager certification, a portfolio of work, a Khan Academy profile, or a Nanodegree from Udacity."

The questionnaire is composed of fourteen questions. Favorability is the dependent variable of interest. Coronavirus impact is the independent variable of interest. There are also ten control factors and two questions on causality.

[1] While the data for this analysis is not public, the analytical code is open-source. See `https://github.com/Vandivier/research-dissertation-case-for-alt-ed/tree/master/papers/alt-ed-covid-2/data`

Eight of the ten control factors are common controls in the literature. These eight controls are categorical measures for age, gender, ethnicity, income, level of education, employment status, the industry of occupation, and state of residence.

The two remaining controls are unique to this study. Expected conventionality is the first unique control. Expected conventionality is the term used to describe the response to question three in the appendix. Expected conventionality explains the effect on favorability that is attributable to the future social acceptability of alternative credentials. Correcting for social acceptability allows the remaining effects to be interpreted more accurately as an individual preference.

The second unique control is support for online education. Online education is the response to question four in the appendix. This control allows an analyst to hold constant the mode of instruction when interpreting favorability to alternative credentials.

The primary interest of this study is to identify the effect of coronavirus on favorability. If the effect of coronavirus is significant, a description of the origin of that effect improves the value of the results. The two unique controls and the two questions about causality support investigation into exposure to remote activity as an explanation.

The variables of interest, causality questions, and the two unique controls obtain Likert-type responses. The impact of coronavirus and the causality questions use a 4-point scale. Favorability and the unique controls use a 10-point scale. Continuous treatment of items on the 10-point scale permits curvilinear analysis, allowing investigation of marginal effects [2].

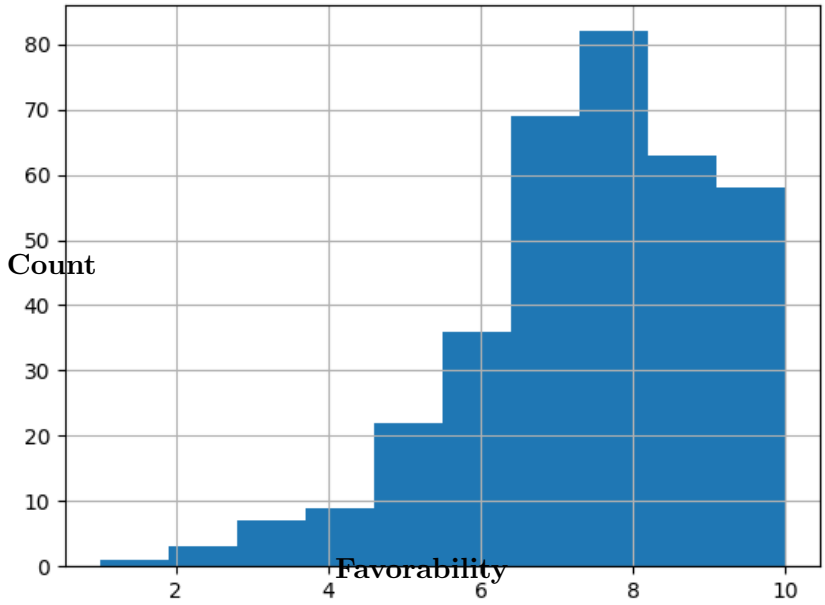
2.3 Results

The median favorability response was eight out of ten. Figure 2.1 visualizes the distribution of responses. Of 350 responses, 11 responses indicate a favorability of less than four out

[2]It is an accepted practice to treat Likert-type responses as either categorical or continuous for regression analysis. Jaccard and Wan provide support for continuous analysis of Likert-type data. They note that severe departures from the assumptions on cardinality "do not seem to affect Type I and Type II errors dramatically," particularly when the Likert scale is five or more points[14]. This paper treats responses on a 10-point scale as continuous. This paper treats responses on a 4-point scale as categorical.

of ten. Regression analysis indicates a significant and positive coronavirus impact effect. Analysis with and without outliers does not show a meaningful difference in the effect.

Figure 2.1: Distribution of Favorability to Alternative Credentials



The average response was 7.65 on a 10-point scale. Excluding outliers, over 96 percent of responses fall into the normal range. The average response in the normal range was about 7.81. Table 2.1 summarizes statistics about favorability and the direct measure of coronavirus impact. The table also includes summary results for the two causality questions.

Table 2.1 reports statistics across the total population and also for three subpopulations. The subpopulations include the normal range, the outlier population, and the Tens. Because factors in Table 2.1 dummy variables, with an exception for favorability, the mean values for each variable can be interpreted as the proportion of the population that affirms the response.

The Tens are those individuals that responded with a favorability of 10 to alternative credentials. The Tens are not an outlier group, but inspection of this group assists in understanding the response distribution. The Tens report a large perceived impact at a disproportionately high rate. In contrast, no member of the negative outlier group also reports a large perceived impact of coronavirus.

Table 2.1: Summary Statistics for Factors of Interest

	Total Range	Normal Range	Outliers	Tens
N	350	339	11	58
Favorability	7.65	7.81	2.55	10
Small COVID Impact	0.526	0.534	0.272	0.534
Medium COVID Impact	0.294	0.286	0.545	0.224
Large COVID Impact	0.094	0.097	0	0.138
Small Change to Remote Activity	0.323	0.324	0.273	0.190
Medium Change to Remote Activity	0.274	0.277	0.182	0.190
Large Change to Remote Activity	0.271	0.268	0.364	0.414
Small Increase to Remote Favorability	0.311	0.319	0.091	0.241
Medium Increase to Remote Favorability	0.360	0.360	0.364	0.276
Large Increase to Remote Favorability	0.160	0.156	0.273	0.224

This data is consistent with external reporting that COVID-19 impacts most Americans[32], but it adds the wrinkle that most Americans consider the impact to be minor. Perceived COVID-19 impact is another case where outliers and Tens importantly differ from the average. The Tens report higher coronavirus impact while the outliers cluster around a medium impact response.

Table 2.2 provides factor coefficients for four interesting OLS models. Model 1 is the adjusted R-squared maximizing model. Model 4 is composed only of significant factors. Model 2 is Model 4 plus a dummy for a large coronavirus impact. Model 3 follows the same specification as Model 2, but Model 3 excludes outliers.

The direct effect of coronavirus appears to be positive and also insignificant. The response indicating that a person has perceived a large impact from coronavirus is the only dummy within this categorical variable to appear in any of these models of interest. Notice that the large impact factor is invariant to the outlier subpopulation because no negative outlier reported a large impact.

In a simple regression of the large coronavirus impact dummy on favorability, the variable becomes more significant and important ($\beta = 0.46, p < 0.15$). The two questions on causality[3] partial out the explanation from the direct measure. This is evidence that a coronavirus-induced remote activity exposure accounts for most of the effect attributable to coronavirus.

[3]These include questions thirteen and fourteen in Appendix A.

Table 2.2: Table of Multiple Regressions with Favorability as Dependent Variable

	Model 1	Model 2	Model 3	Model 4
Favor Online Education[2]	0.11***	0.10***	0.10***	0.10***
Expected Conventionality	0.44***	0.45***	0.38***	0.45***
Large Change to Remote Activity	0.55***	0.51**	0.58***	0.56***
Large COVID Impact	0.32	0.32	0.07	
Small Increase to Remote Favorability	-0.64**	-0.52**	-0.66***	-0.53**
Medium Increase to Remote Favorability	-0.75***	-0.65***	-0.70***	-0.66***
Large Increase to Remote Favorability	-1.00***	-0.85***	-0.71**	-0.80***
Is a Manager	0.32*			
Ethnicity, Caucasian	0.48***	0.43**	0.38**	0.44**
Ethnicity, Hispanic	0.80*	0.77*	0.59	0.76*
Ethnicity, Other	1.51*	1.58**	1.39**	1.52*
Income, 10,000 - 24,999	0.43			
Income, 100,000 - 124,999	0.45			
Income, 125,000 - 149,999	1.15			
Industry, Health	0.56*	0.52*	0.62**	0.55*
Industry, Information Technology	0.35*	0.34*	0.36**	0.34*
Industry, Manufacturing	0.57*	0.66**	0.73***	0.68**
Industry, Real Estate	1.06*	1.13*	0.87	1.14*
State, Florida	-0.38			
State, Georgia	1.21**	1.18**	1.08**	1.22**
State, Idaho	-0.89			
State, Iowa	-2.48***	-2.63***	-0.87	-2.66***
State, Kentucky	-1.28*	-1.22*	-0.33	-1.24*
State, North Carolina	0.73			
State, Ohio	-1.46**	-1.35**	-1.59***	-1.34**
State, Pennsylvania	-1.02**	-1.04**	-0.71	-0.99**
State, Tennessee	-1.75			
Intercept	3.29***	3.48***	4.13***	3.48***
N	350	350	339	350
R-squared	0.39	0.36	0.35	0.35
R-squared Adj.	0.33	0.32	0.31	0.32

* $p < 0.10$, ** $p < 0.05$, *** $p < .01$

The two causality questions are significant across models. The coefficients range from half a point to a point, which indicates moderate importance. The first causality question asks whether coronavirus caused an increased degree of remote activity for the respondent. The coefficient on the dummy variable indicating a large coronavirus-induced increase to remote activity is positive. This is consistent with the hypothesis of a positive exposure effect.

The second question on causality asks whether coronavirus-induced remote activities cause an increase to favorability about remote learning. The exact wording is: "To what degree has coronavirus-induced remote activity improved your favorability to remote learning (either for yourself or for other people)?" Referring back to Table 2.1, about 83.1 percent of the full population of Americans indicate a small, medium, or large increase in favorability of remote learning caused by coronavirus-induced remote activity. This study separately demonstrates a positive relationship between favorability to remote learning and favorability to alternative credentials. Taken together, these two factors provide positive evidence toward the hypothesis that coronavirus-induced exposure to remote learning results in an increase in favorability to alternative credentials.

The observation of nonzero responses to the factor for coronavirus-induced remote learning favorability is causal evidence. The fact that these nonzero responses are negatively related to favorability is a non-causal association. This association indicates that those who gained the most favorability also ended with less than average favorability, while those with prior high favorability did not move much higher. This interpretation is reinforced by referring back to the summary statistics in Table 2.1. Notice that the negative outlier group has the highest affirmative response for both a medium increase in remote favorability and also to a large increase in remote favorability. On the other hand, the normal range has the highest response rate for a small increase to remote favorability. A relatively small improvement for most respondents makes sense, given that the median response is already near the maximum response.

Coronavirus-induced favorability to online education is distinct from a plain measure of

favorability to online education. The latter is labeled Favor Online Education within Table 2.2, and it is one of the two unique controls discussed in the Methodology. This factor was most significant when modeled as a quadratic term. A quadratic term captures marginal effects. The coefficient for this term is positive, indicating a positive marginal effect. Favorability to online education and coronavirus-induced favorability to online education are moderately correlated (Pearson's $r = 0.303$). This demonstrates internal consistency among responses, and it also adds weight to the explanation from exposure.

The other unique control is expected conventionality. This factor is also significant, robust to specification, and important. Expected conventionality and favorability to online education correlate moderately (Pearson's $r = 0.445$). Expected conventionality is uncorrelated to coronavirus-induced favorability to online education. Respondents do not form an expectation that alternative credentials will be conventional in the future after being exposed to coronavirus-induced remote activities.

Table 2.3 is a table of factors for a robust linear model (RLM). Robust regression is useful in addressing samples in which outliers exist, so the robust model includes the whole sample. Because RLM treats factors linearly, the coefficients are comparable to OLS coefficients. This makes the model in Table 2.3 useful for factor analysis as well. Specifically, the model in this table is a simple respecification of Model 4 from Table 2.2 into RLM. The main result in this table is that none of the effects of interest are importantly different between RLM and OLS specification.

The other control variables also exhibit some interesting effects. Caucasians disproportionately attend and graduate from college, leading some scholars to argue that higher education is an instrument of white supremacy[33, 34]. Other scholars note that alternative learning providers support a higher rate of minority graduation. As a result, support for alternative credentials is considered a workforce diversity strategy[6, 35, 36]. Given such prior research, it is intuitive to expect a negative association between caucasian ethnicity and support for alternative credentials. Opposite expectation, caucasian ethnic identification presents a significant positive coefficient in this study.

Table 2.3: Table of Robust Linear Model with Favorability as Dependent Variable

	coef	std err	z	P> |z|	[0.025	0.975]
Favor Online Education[2]	0.1083	0.033	3.289	0.001	0.044	0.173
Expected Conventionality	0.4566	0.042	10.855	0.000	0.374	0.539
Large Change to Remote Activity	0.6981	0.192	3.637	0.000	0.322	1.074
Small Increase to Remote Favorability	-0.6117	0.236	-2.595	0.009	-1.074	-0.150
Medium Increase to Remote Favorability	-0.7676	0.228	-3.362	0.001	-1.215	-0.320
Large Increase to Remote Favorability	-0.8345	0.290	-2.874	0.004	-1.404	-0.265
Industry, Health	0.5969	0.271	2.205	0.027	0.066	1.128
Industry, Information Technology	0.4016	0.180	2.237	0.025	0.050	0.754
Industry, Manufacturing	0.7399	0.277	2.672	0.008	0.197	1.282
Ethnicity, Caucasian	0.3168	0.161	1.963	0.050	0.001	0.633
Ethnicity, Other	1.7074	0.724	2.359	0.018	0.289	3.126
State, Georgia	1.0604	0.479	2.212	0.027	0.121	2.000
State, Ohio	-1.0150	0.601	-1.690	0.091	-2.192	0.162
State, Pennsylvania	-0.8238	0.441	-1.867	0.062	-1.688	0.041
Intercept	3.5185	0.401	8.785	0.000	2.734	4.303
N	350					

Information technology is a well-known stronghold of support for alternative education, including coding bootcamps. Key skills in information technology are easily digitized and taught over the web. This industry demands flexible instruction because it is associated with a uniquely high rate of technical obsolescence. It is not surprising that it is positively associated with favorability. It is surprising that it comes in third place among four industries with positive and significant favorability.

Health is an industry that has been historically difficult to digitize. Shimizu et al. describe improvements to remote medical education from 2003 to 2013[37]. They show, for example, that improvements to video quality over time were an important technological driver of success for instruction on surgical techniques. The historical difficulty of remote medical education and service delivery seems at tension with the present study. The present study shows an important positive effect of the health industry on favorability.

The tension is resolved by a recognition of the recent flourishing of remote health technology. Health education was enhanced, for example, through the application of virtual reality to simulation-based learning. The Oculus Rift is a hardware device that improved virtual reality simulation quality after the year 2010[38]. Three meta-analyses from the

Digital Health Education Collaboration in 2019 confirm that modern virtual reality, mobile digital education, and digital problem-based learning methods are as effective or more effective than traditional learning methods[39–41].

There are various political and cultural reasons for which favorability might vary by state, but the current analysis does not provide strong evidence toward any particular explanation. Employment status was largely insignificant, but Model 1 hints at a weak positive effect among hiring managers. Other controls are notably insignificant. Gender, age, and level of education had no bearing on favorability. The insignificance of age and education level provides weak evidence against the hypotheses that older individuals or individuals who do have traditional degrees have a disproportionate opposition to alternative credentials.

2.4 Conclusions

Results indicate that coronavirus as a historical event has significantly improved American favorability to alternative credentials. The effect is not well-explained by the direct impact of coronavirus on an individual. The effect is well-explained as a positive exposure effect that results from coronavirus-induced remote activities. The largest gains in favorability accrue to individuals that began and ended with less than average favorability.

The introduction provided three explanations for improved favorability, but this study most directly examined an explanation from exposure. If the exposure effect had been weak and favorability improved anyway, the other hypotheses would have become more important. Given the effectiveness of the exposure-based explanation, the other two explanations are not considered independently important. Arguments from organizational agility and normal strangeness may remain endogenously important. For example, exposure to certain services might improve consumer favorability precisely because organizational agility has enabled the development of quality products.

As is a cross-sectional analysis, this study provides little ability to make confident forecasts about whether the favorability increase is transient or permanent. With that caveat,

there are three reasons to expect average favorability to remain near a score of eight out of ten. The first reason is that this was the average score found in the analysis. Barring contrary evidence, this point-estimate remains preferred.

The second reason is that there are reasons to expect favorability to increase and to decrease. Without evidence on a significant difference in the magnitudes of effects in either direction, a net expectation of stability results. Mean regression is a reason to expect a favorability decrease. Continuity of trend is a reason to expect an increase.

The third and strongest reason to expect favorability to remain near the present level is that society has shifted and developed new norms in response to the pandemic. Once society establishes new norms, there are numerous ways in which those norms reinforce themselves. Status-quo bias and anchoring bias are relevant psychological forces. Economic effects include the endowment effect and ordinary switching costs. For example, an endowment effect might apply to a worker who is now remote and prefers not to return to a physical office.

This study indicates that the population supports alternative credentials. Policy recommendations that facilitate this preference include improvements to federal recognition and social access. Much of this work is already underway. Many colleges now award credit for professional experience or nontraditional education. Institutions like the American Council on Education (ACE) have facilitated this effort through programs like the current ACE Apprenticeship Pathways project and the now-defunct Alternative Credit Project (ACP)[42]. Renewal of the ACP is an example of a public-private partnership that is feasible and would improve recognition of alternative credentials.

In 2012, The Heritage Foundation called for certain radical policy changes that would level the playing field between traditional and alternative educators. While they did not go as far as to suggest eliminating accreditation, they did advocate for removing accreditation agencies. Heritage suggested the government should directly accredit courses rather than organizations[43]. They also called for a decoupling of accreditation and federal funding.

Congress has yet to take Heritage up on the idea, but rule changes from the Department

of Education that took effect in July of 2020 have made accreditation easier[44]. Further accreditation reform can incentivize competition in the university space, essentially causing universities to compete with alternative providers on price and quality to a greater extent. This would not drive support for alternative credentials directly, but improving competition and removing barriers to entry in higher education seems beneficial for the market as a whole.

Removal of federal subsidies for higher education would reduce college prices and combat student debt, but this is another unpopular reform. A second-best solution would be to open the subsidy to alternative providers. Section 127 of the Internal Revenue Code allows for employer educational assistance. Previously, such assistance consisted of paying for new accredited education. The CARES Act expanded Section 127 employer assistance to include paying down student loans that currently exist from accredited prior education[45]. One small move that would improve access to alternative education would be to modify the definition of educational assistance to include unaccredited learning.

In addition to public policy changes, industry and firm policy changes can facilitate the adoption of alternative credentials. Several high-value corporations have dropped the requirement of a college degree[46]. Other companies allow particular unaccredited credentials to fulfill a college degree requirement. Alternative education providers have also begun providing a payment option using an income sharing agreement (ISA) rather than loans. The income sharing agreement improves access by eliminating the need for student payment until a student obtains employment involving a designated minimum salary.

Bibliography

Bibliography

[1] K. B. McGarry, An examination of perceived employability skills between employers and college graduates, Northeastern University, 2016.

[2] G. Malik, A. Venkatraman, "the great divide": skill gap between the employer's expectations and skills possessed by employees, Industrial and Commercial Training (2017).

[3] F. K. Abbasi, A. Ali, N. Bibi, Analysis of skill gap for business graduates: managerial perspective from banking industry, Education+ Training (2018).

[4] Y. Gingras, R. Roy, Is there a skill gap in canada?, Canadian Public Policy/Analyse de politiques (2000) S159–S174.

[5] M. Smith, Spotlight on research: The distributional impact of unemployment (2011). URL `https://www.philadelphiafed.org/community-development/publications/cascade/77/07_distributional-impact-of-unemployment`

[6] J. Brown, M. Kurzweil, The complex universe of alternative postsecondary credentials and pathways, American Academy of Arts and Sciences Cambridge, MA, 2017.

[7] D. B. Bills, Credentials, signals, and screens: Explaining the relationship between schooling and job assignment, Review of educational research 73 (4) (2003) 441–469.

[8] A. Weiss, Human capital vs. signalling explanations of wages, Journal of Economic perspectives 9 (4) (1995) 133–154.

[9] J. K. Hellerstein, D. Neumark, Production function and wage equation estimation with heterogeneous labor: Evidence from a new matched employer-employee data set, in: Hard-to-measure goods and services: Essays in honor of Zvi Griliches, University of Chicago Press, 2007, pp. 31–71.

[10] P. T. Ingenbleek, R. T. Frambach, T. M. Verhallen, Best practices for new product pricing: Impact on market performance and price level under different conditions, Journal of Product Innovation Management 30 (3) (2013) 560–573.

[11] B. Caplan, The case against education: Why the education system is a waste of time and money, Princeton University Press, 2018.

[12] P. L. Curşeu, R. Ilies, D. Vîrgă, L. Maricuţoiu, F. A. Sava, Personality characteristics that are valued in teams: Not always "more is better"?, International Journal of Psychology 54 (5) (2019) 638–649.

[13] G. Symon, C. Cassell, Neglected perspectives in work and organizational psychology, Journal of Occupational and Organizational Psychology 79 (3) (2006) 307–314.

[14] J. Jaccard, C. K. Wan, J. Jaccard, LISREL approaches to interaction effects in multiple regression, no. 114, sage, 1996.

[15] F. Green, S. McIntosh, Is there a genuine under-utilization of skills amongst the over-qualified?, Applied Economics 39 (4) (2007) 427–439.

[16] M. Raybould, H. Wilkins, Over qualified and under experienced, International journal of contemporary hospitality management (2005).

[17] D. Blake, Skills quotient: The solution to the ceo's biggest problem (Oct 2018).
URL https://blog.degreed.com/skills-quotient-solution-ceos-biggest-problem/

[18] J. Arabia, Survey: What do young americans really think about trade school? (Feb 2019).
URL https://www.bigrentz.com/blog/trade-school-survey

[19] A. Bryant, In head-hunting, big data may not be such a big deal, The New York Times 20 (2013).

[20] A. Hess, Google announces 100,000 scholarships for online certificates in data analytics, project management and ux (Jul 2020).
URL https://www.cnbc.com/2020/07/13/google-announces-certificates-in-data-project-m
html

[21] S. Menon, M. Suresh, Factors influencing organizational agility in higher education, Benchmarking: An International Journal (2020).

[22] B. M. Robinson, L. J. Elias, Novel stimuli are negative stimuli: Evidence that negative affect is reduced in the mere exposure effect, Perceptual and Motor Skills 100 (2) (2005) 365–372.

[23] H. H. Cao, B. Han, D. Hirshleifer, H. H. Zhang, Fear of the unknown: Familiarity and economic decisions, Review of finance 15 (1) (2011) 173–206.

[24] B. Swire-Thompson, J. DeGutis, D. Lazer, Searching for the backfire effect: Measurement and design considerations, Journal of Applied Research in Memory and Cognition (2020).

[25] S. Byrne, P. S. Hart, The boomerang effect a synthesis of findings and a preliminary theoretical framework, Annals of the International Communication Association 33 (1) (2009) 3–37.

[26] R. L. Campagna, A. A. Mislin, D. T. Kong, W. P. Bottom, Strategic consequences of emotional misrepresentation in negotiation: The blowback effect., Journal of Applied Psychology 101 (5) (2016) 605.

[27] B. Nyhan, J. Reifler, Does correcting myths about the flu vaccine work? an experimental evaluation of the effects of corrective information, Vaccine 33 (3) (2015) 459–464.

[28] S. Jülich, Stockholm syndrome and child sexual abuse, Journal of child sexual abuse 14 (3) (2005) 107–129.

[29] D. Carpenter, J. Dunn, We're all teachers now: Remote learning during covid-19, Journal of School Choice 14 (4) (2020) 567–594.

[30] A. Staff, A timeline of covid-19 developments in 2020 (Jan 2021).
URL https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020

[31] G. L. Sievers, A. Abebe, Rank estimation of regression coefficients using iterated reweighted least squares, Journal of Statistical Computation and Simulation 74 (11) (2004) 821–831.

[32] Pew, Most americans say coronavirus outbreak has impacted their lives (Sep 2020).
URL https://www.pewresearch.org/social-trends/2020/03/30/most-americans-say-coronavirus-outbreak-has-impacted-their-lives/

[33] A. Hikido, S. B. Murray, Whitened rainbows: How white college students protect whiteness through diversity discourses, Race Ethnicity and Education 19 (2) (2016) 389–411.

[34] M. Dennis, The skillful use of higher education to protect white supremacy, The Journal of Blacks in Higher Education (32) (2001) 115–123.

[35] J. Jones-Schenk, et al., Alternative credentials for workforce development, The Journal of Continuing Education in Nursing 49 (10) (2018) 449–450.

[36] D. Rossiter, B. Tynan, Designing and implementing micro-credentials: A guide for practitioners (2019).

[37] S. Shimizu, K. Kudo, Y. Antoku, M. Hu, K. Okamura, N. Nakashima, Ten-year experience of remote medical education in asia, Telemedicine and e-Health 20 (11) (2014) 1021–1026.

[38] R. Giuseppe, B. K. Wiederhold, The new dawn of virtual reality in health care: medical simulation and experiential interface, Stud. Health Technol. Inform 219 (2015) 3–6.

[39] B. M. Kyaw, N. Saxena, P. Posadzki, J. Vseteckova, C. K. Nikolaou, P. P. George, U. Divakar, I. Masiello, A. A. Kononowicz, N. Zary, et al., Virtual reality for health professions education: systematic review and meta-analysis by the digital health education collaboration, Journal of medical Internet research 21 (1) (2019) e12959.

[40] G. Dunleavy, C. K. Nikolaou, S. Nifakos, R. Atun, G. C. Y. Law, L. T. Car, Mobile digital education for health professions: systematic review and meta-analysis by the digital health education collaboration, Journal of medical Internet research 21 (2) (2019) e12937.

[41] L. T. Car, B. M. Kyaw, G. Dunleavy, N. A. Smart, M. Semwal, J. I. Rotgans, N. Low-Beer, J. Campbell, Digital problem-based learning in health professions: systematic review and meta-analysis by the digital health education collaboration, Journal of medical Internet research (2019).

[42] A. C. o. Education, Ace credit-accepting institutions (Mar 2021).
URL https://www.acenet.edu/Programs-Services/Pages/Credit-Transcripts/Credit-Accepting-Institutions.aspx

[43] L. M. Burke, S. M. Butler, Accreditation: Removing the barrier to higher education reform. backgrounder. no. 2728. executive summary., Heritage Foundation (2012).

[44] S. Weissman, Education secretary betsy devos loosens accreditor and state oversight (Nov 2019).
URL https://diverseeducation.com/article/158738/

[45] S. Miller, Legislation extends student loan repayment benefits for 5 years (Jan 2021).
URL https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/legislation-extends-student-loan-repayment-benefits-for-5-years.aspx

[46] G. Team, 15 more companies that no longer require a degree (Jan 2020).
URL https://www.glassdoor.com/blog/no-degree-required/

Curriculum Vitae

John Vandivier received his Ph.D. in Economics from George Mason University (GMU) in 2021. John specialized in the fields of Austrian Economics and Public Choice Economics during his doctoral studies. His dissertation includes a focus on applied microeconomic analysis, education economics, statistical analysis, and light experimental analysis. In 2015, John earned a Master of Public Policy (MPP) with an emphasis in Fiscal Policy from George Mason University. John received a Bachelor of Science (BS) with a double major in Economics in Political Science from the University of Houston in 2012. John is currently employed as a Principal Software Developer affiliated with Blue Cross Blue Shield of North Carolina.