

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

John Vandivier^a

^a4400 University Dr, Fairfax, VA 22030

Abstract

Despite targeting technical skills, vocational school graduates earn less than college graduates. This paper presents evidence that conformity selection and perceived skill gaps explain differences in hireability. Microdata from the United States reveal a perceived soft skill deficit for alternatively credentialed non-college graduate (ACNG) labor. Conformity is also important, but the direction of effect is heterogenous by employer type. Conformity and perceived skill gaps explain about one-third of hireability variance. Perceived soft skill gaps explain more hireability variance than widely recognized factors like the industry of occupation. Opposite conventional explanation, results suggest that conformity reduces hireability on average. Respondents tend to perceive ACNG candidates as an even mix of high and low performers. Evidence favors employer risk aversion toward labor productivity as a preferred explanation of low ACNG demand. The conclusion incorporates discussion of public misperception on vocational school costs and suggests activities to reduce unconscious bias.

Keywords: education economics, signaling, hireability, conformity, vocational
2010 MSC: I20, I21, J23, J24

Email address: jvandivi@masonlive.gmu.edu (John Vandivier)

1. Introduction

A substantial gap exists between the skills expected by employers and those possessed by college graduates[1, 2, 3, 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. Individuals typically obtain alternative credentials to improve employability. That is, they typically have the same goals as a college student. Many individuals obtain alternative credentials as a supplement to the college degree. Such a situation is Pareto-superior to degree attainment alone and is therefore intentionally excluded from the analysis. This paper focuses on the comparatively interesting case of alternative credentials as a substitute for the college degree. This research is valuable as a diagnostic tool at the skill level. If specific skills explain labor outcome differences, alternative learning providers can improve their products to reduce the outcome gap.

The signaling model has become one of the two standard explanations of the value of the college degree. Signaling theory provides three advantages over human capital theory for the present study. First, signaling theory can explain labor outcome variance when human capital is held constant.

Second, the signaling model empowers a questionnaire research design. In an

idealized human capital model, the measures of human capital would correspond to production process inputs. To establish 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
35 design that provides a proxy for the functional measure of skill.

Signaling theory takes the reverse approach. According to the signaling model, employer perception of candidate quality critically determines willingness to pay. The manner in which employer perception relates to candidate productivity, if at all, is secondary. In this framework, a questionnaire is an
40 ideal measurement tool. An additional benefit of using a questionnaire is the ability to ask hypothetical questions. Real job candidates might vary systematically in ways not observed by an analyst, but hypothetical questions preclude this issue.

Third, signaling theorists have laid out a testable hypothesis for weak labor
45 outcomes among non-college graduates. Following this model, scholars claim that the college degree signals intelligence, conscientiousness, and conformity[7]. In contrast, alternative credentials are hypothesized to signal nonconformity and low conscientiousness.

Research indicates that employer demand for conscientiousness and conformity follows a bliss point pattern. Excess individual conscientiousness can disturb team performance[8]. Conformity can lead to a lack of innovation and sub-optimal organizational practices[9]. Conformity selection occurs in part through heuristic decisionmaking, 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
55 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 hireability, this will add weight to an explanation
60 based on risk aversion.

2. Data and Methodology

A simple model of demand for labor provides context for the hypothesis of interest. This model is clarified in Equations 1a and 1b:

$$S_j = f(H_j) \tag{1a}$$

65

$$w_{ij} = E_i(MRP_j) = f_i(S_j) \tag{1b}$$

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} .

70

This study uses ordinary least squares (OLS) regression analysis to estimate the effect of perceived skill gaps on hireability. An employer is willing to pay more for a relatively hireable individual. The representation of willingness to pay makes hireability 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 hireability.

75

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.

80

The survey includes 65 questions in two sections¹. The first section captures respondent characteristics, and the second section captures a skill-level evaluation of various hypothetical job candidates. These questions can be grouped

85

¹See Appendix A for a full copy of the survey.

into three groups of variables. There is the dependent variable of interest, a set of independent variables of interest, and some categorical controls.

In this study, the categorical variables and the control variables are the
90 same set. The independent and dependent variables of interest are Likert-type responses on a 10-point scale². Higher Likert-type values indicate greater agreement with some statement. Categorical controls include state of residence, the industry of occupation, employer status, firm size, and a measure called duration.

95 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
100 decisions. State of residence refers to a state within the United States or the District of Columbia.

The dependent variable of interest is called hireability. Hireability measures agreement that, “For many professions, alternative credentials can qualify a person for an entry-level position.” The dependent variables of interest include
105 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
110 response variance among three qualitatively different descriptions of noncon-

²It 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[10]. This paper uses a 10-point scale and treats these data as continuous.

formists ($\mu = 6.29, \sigma = 2.51$).

The second statement indicates that nonconformists are held back by rules and “could just as easily be high performers as low performers.” This statement
115 received the most 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
120 third description of nonconformists states that they are creative, innovative, and
may benefit company culture ($\mu = 6.71, \sigma = 2.18$).

Perceived skill questions in the second section of the survey allow for two
ways to calculate perceived skill gaps. Perceived skill gaps are measured sepa-
rately with and without overqualification effects. Overqualification effects are
125 important in external research[11, 12], but skill gap analysis that ignores these
effects is also routine[13].

Perceived skill is a Likert-type response reporting agreement with the state-
ment 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
130 actual employee, the average recent college graduate, and the average ACNG.
Raw perceived ACNG skill gaps equal the difference of the perceived skill of an
ideal candidate with the perceived skill of an ACNG. The perceived skill gap
with overqualification effects equals the raw perceived skill gap. The perceived
skill gap without overqualification effects is calculated as the raw skill gap or
135 zero if the raw skill gap value is negative.

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.” Nonconformity interacts with employer
disposition to rulebreaking. For this reason, discussions on the importance of
140 skill gaps include discussion on rulebreaker effects.

These methods allow for the identification of a preferred model that explains
hireability using perceived ACNG skill gaps. The identified model will support

the hypothesis if soft skills are more important than technical skill gaps. The model will support the risk aversion explanation of ACNG hireability over an
145 explanation from conformity selection if large employer size is positively associated with hireability.

The last section of results goes over comparative results between ACNG skill gaps and gaps among recent college graduates. The comparative analysis provides additional confidence in the data by replicating the hireability gap between ACNG labor and recent college graduates reported in external research.
150 Model 6, the initial comparative model, results from an adjustment of Model 5, the preferred noncomparative model of hireability. Each perceived skill gap in Model 5 is replaced with a comparative skill gap variable to generate Model 6. Comparative skill gaps equal the perceived skill gap for the ACNG minus the recent college graduate's perceived skill gap. Multiple regression of these comparison factors on hireability demonstrates which, if any, perceived skill gaps are important distinguishers of the ACNG from the college graduate. Identification of significant differences with a total negative effect on hireability will replicate external data on the lower job market value of ACNG labor and provide a diagnostic that can be used by alternative learning providers to assist in
160 remediating the gap in labor outcomes.

3. Results

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

TODO: skill gap ols, gap of gaps ols

170 TODO: final ols

TODO: consider RLM, GLM, and control variables.

3.1. A Model of Absolute Skill Gaps

Skill gaps are the difference between what an employer desired and what a candidate presents. Results will specifically refer to ACNG Skill Gaps as absolute skill gaps to emphasize their distinction with comparative skill gaps. After
175 identifying which skill gaps are important in their own right, results separately describe which skill gaps are comparatively important. Finally, these results are synthesized into a single preferred multiple regression that includes both kinds of skill gaps.

180 Results confirm that employers and the general population associate a soft skill deficit with ACNG candidates. Employer status was associated with an insignificant positive coefficient on hireability. Hireability was generally positive ($\mu = 7.57, \sigma = 1.80$) and depends critically on rulebreaker effects. Rulebreaker effects have more explanatory power than perceived skill gaps, and perceived
185 skill gaps have more explanatory power than widely recognized factors like state of residence and industry. Duration effects, positive nonconformity selection, and the lack of important differences in conformity between ACNG and college graduate labor provide support for an explanation of ACNG hireability based on risk aversion rather than positive conformity selection.

190 Table 1 reports statistics for five multiple regressions. The table displays selected coefficients for brevity. Selected variables include rulebreaker effects and any perceived skill gap that is important in any specification. In these models, an important factor is one that improves the adjusted explanatory power of the model when included. These factors are not constrained to have a p-value of
195 less than 0.1, but as a rule of thumb, they generally have a p-value of less than 0.3. Of the thirteen perceived skill gaps tested, eight were important in at least one specification. Seven skill gaps were important in Model 5, the preferred model. Evidence is found for an important interaction between the information technology industry and perceived body language communication skills.

200 Model 1 allows for overqualification. Model 2 uses the perceived skill gap measures that exclude overqualification effects. Models 3 and 4 are equivalent to models 1 and 2, respectively, after normalizing for industry, state, and firm size

Table 1: Table of Coefficients for Multiple Regressions on hireability, Selected Variables

	Model 1	Model 2	Model 3	Model 4	Model 5
Gap, Body Language	-2.240e-01* (8.314e-02)	-3.831e-01** (1.124e-01)	-1.507e-01+ (8.980e-02)	-3.155e-01* (1.173e-01)	-3.060e-01* (1.145e-01)
Gap, Body Language-IT	2.199e-01+ (1.269e-01)	2.298e-01 (1.656e-01)	1.837e-01 (1.334e-01)	2.791e-01 (1.707e-01)	2.771e-01+ (1.665e-01)
Gap, Commute		-2.320e-01++ (9.720e-02)	-4.953e-02 (6.862e-02)	-1.197e-01 (1.023e-01)	-1.582e-01 (1.010e-01)
Gap, Conscientiousness	2.416e-01* (8.000e-02)	3.223e-01* (1.045e-01)	1.387e-01 (8.483e-02)	2.174e-01+ (1.129e-01)	2.175e-01++ (1.093e-01)
Gap, Customer Service	-1.259e-01+ (6.389e-02)	-1.512e-01 (9.599e-02)	-1.253e-01+ (7.162e-02)	-1.276e-01 (1.037e-01)	-1.323e-01 (1.009e-01)
Gap, Nonconformity		-6.336e-02 (1.028e-01)	-3.896e-02 (6.054e-02)	-8.535e-02 (1.082e-01)	-1.034e-01 (1.036e-01)
Gap, Salary		-1.135e-01 (8.284e-02)	3.873e-02 (6.597e-02)	-6.250e-03 (8.575e-02)	
Gap, Teamwork		1.227e-01 (9.179e-02)	6.812e-02 (6.963e-02)	1.287e-01 (9.697e-02)	1.131e-01 (9.505e-02)
Gap, Technical	-1.274e-01+ (7.443e-02)		-9.408e-02 (7.702e-02)	-1.010e-01 (1.023e-01)	-9.806e-02 (1.001e-01)
Rulebreaker, Culture Add	2.612e-01** (7.057e-02)	2.829e-01** (7.015e-02)	2.114e-01* (7.187e-02)	2.279e-01* (7.190e-02)	2.235e-01* (7.036e-02)
Rulebreaker, Risky	1.688e-01** (4.993e-02)	1.758e-01** (4.813e-02)	1.517e-01* (5.160e-02)	1.472e-01* (5.063e-02)	1.686e-01** (5.006e-02)
Rulebreaker, Rockstars	1.406e-01+ (7.646e-02)	1.748e-01++ (7.245e-02)	1.669e-01++ (7.851e-02)	1.546e-01++ (7.754e-02)	1.655e-01++ (7.599e-02)
Adj R-sqr	0.3100	0.3491	0.2317	0.2554	0.2866
R-sqr	0.4408	0.4663	0.3409	0.3613	0.3880

Standard errors in parentheses. + $p < 0.10$, ++ $p < 0.05$, * $p < .01$, ** $p < .001$

For each model, the probability of a greater F-statistic is less than 0.0001 and the sample size is 212.

effects. Effect normalization involves retaining those factors which are robust across both models 1 and 2. For example, Alabama has a significant effect when
205 overqualification is allowed in Model 1. The effect for respondent residence in Alabama is insignificant Model 2, which excludes overqualification. Because Alabama is sensitive to this specification change, it is considered nonrobust and excluded after normalization. Employer status was positive in all models, but it was only significant in models 1 and 2. Significance loss on employer status
210 during normalization suggests that the effect of employer status on hireability critically interacts with the industry, state of residence, and firm size effects, which are the normalized effects.

Making two adjustments to Model 4 yields Model 5. Model 5 drops the factor for salary. The salary factor improved adjusted explanatory power in
215 Model 2, but it did not provide that benefit in other models. Moreover, the p-value of this factor was unacceptably low in Model 4 ($p > 0.9$). The second adjustment is to insert a variable for duration³. The belief that it takes more than a year to obtain an alternative credential is positively correlated with hireability ($\beta = 0.875, p < 0.01$).

220 The preferred model explains roughly one-third of the variance in hireability. Rulebreaker effects are significant invariant to specification. Six of the seven perceived skill gaps in the preferred model are measures of soft skill. The perceived technical skill gap coefficient is insignificant, but it does possess an intuitive negative sign that is robust to specification. The dominant effect of
225 soft skills in the preferred regression supports the main hypothesis.

In the classic signaling explanation of low ACNG demand, the ACNG signals an abnormal lack of conscientiousness and conformity. Regression analysis raises three problems for the conformity component of the classic explanation. These

³Duration is a categorical variable that was important in both Models 1 and 2. As a categorical variable, it decomposes into a boolean series for factor analysis. Models 1 and 2 retained one or more duration boolean factors, but none overlapped. As a result, models 3 and 4 drop the duration variable.

problems are robust to the specification and operationalization of conformity.

230 First, rulebreaker effects are positively related to hireability. Secondly, a gap in perceived nonconformity yields a negative coefficient on hireability. This gap effect is equivalent to an association of low hireability and high conformity.

Overqualification is ignored in Model 5, so a positive gap indicates that the job candidate has less skill than an ideal candidate. In this model, an
235 increase in gap size is a reduction in the perceived level of skill possessed by a job candidate. Therefore, the negative coefficient for the nonconformity gap factor indicates that a low level of nonconformity is associated with reduced hireability. Similarly, a high level of perceived nonconformity has a positive effect on hireability. A summary statistic reinforces the point that conformity
240 is not generally in demand: The average actual employee has more perceived nonconformity than either the ACNG or the recent college graduate.

The third reason that an ACNG nonconformity signal does not explain reduced hireability is that ACNG and recent college graduate labor does not significantly differ in perceived levels of conformity. Here, summary statistics
245 demonstrate this. Later, Table 3 reiterates the point from another perspective. That table presents models in which comparative skill gaps between ACNG and recent college graduate labor explain ACNG hireability, but conformity is not an important factor in any such model.

The average level of perceived nonconformity for the ACNG is 6.43, with a
250 standard deviation of 2.25. The average for a recent college graduate is 6.29, with a standard deviation of 2.36. Informally, a lack of significant difference is apparent in that the means differ by less than one-quarter of a standard deviation. Formally, the F-statistic from an analysis of variance ($F = 19.25$) and Pearson's chi-squared test ($\chi = 298.80$) each indicate a probability of independence which is less than 0.0001.
255

The coefficient on conscientiousness is significant and positive across specifications. Intuition would dictate that a large gap in conscientiousness would be associated with reduced hireability. Regression of the perceived gap in conscientiousness alone on hireability does produce the expected negative coef-

260 ficient. Attenuation between the direct measure of conscientiousness and its
cross-correlates explains the sign change. Conscientiousness is cross-correlated
with several factors in each model from Table 1. It could be the case that
these cross-correlated effects have partialled from negative variation in con-
scientiousness. Removing factors for skill gaps and rulebreaker effects from
265 Model 5 tests this hypothesis. Model 5 retains the other factors for state, in-
dustry, duration, and employer status. When specified as such, the factor for
the perceived conscientiousness skill gap yields the expected negative coefficient
($\beta = -0.084, p < 0.31$).

Employer size is an important factor in the preferred model. The largest
270 categorical value for employer size is positively associated with hireability. This
value represents employers with 10,000 or more employees. This finding sup-
ports the explanation of hireability from risk aversion over positive conformity
selection.

Some state and industry effects are important in the preferred model. Re-
275 garding industry effects, an interesting interaction between body language com-
munication skills and employment in the information technology industry yields
a significant and positive coefficient on hireability. Body language skill gaps are
independently associated with reduced hireability. The interaction indicates a
reduced penalty for lack of body language communication skills in the informa-
280 tion technology industry.

A reduced penalty for soft skill deficit helps explain the particular flour-
ishing 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
285 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.

Table 2: Factor Group Explanatory Power in a Simple Regression

Effect Group Name	Adj R-Sqr	R-Sqr	Max p-value
Industry	0.0185	0.0510	0.288
Rulebreaker	0.1432	0.1554	0.053
Skill Gaps with Overqualification	0.0558	0.0737	0.106
Skill Gaps without Overqualification	0.0758	0.0933	0.115
State, Robust	0.0177	0.0503	0.227
State, Semi-Robust	0.0034	0.0648	0.831

3.2. Explanatory Share of Perceived Gaps

290 The preferred model explains about one-third of hireability variance, but how much of the explanatory power is attributable to perceived skill gaps? Table 2 provides evidence on the importance of perceived skill gaps and rulebreaker effects relative to other factor groups. Industry and state effects are factor groups regarded in external literature as important for models in the labor market. Table 2 shows that perceived skill gaps and rulebreaker effects explain 295 more variance in hireability than do the widely utilized variables for industry and state. Rulebreaker effects collectively explain more than three times as much response variance as do industrial or state effects.

Comparing simple regressions of perceived skill gaps on hireability repro- 300 duces the finding from multiple regression analysis that overqualification effects reduce explanatory power. Overqualification effects are heterogeneously signed and curved by skill. As a result, nonlinear analysis is likely to improve explanatory power. Isolating overqualification effects into distinct factors may also improve model performance. Such an analysis would also require a larger

305 sample to compensate for the loss of degrees of freedom.

Semi-robust state effects are state effects which are significant in any multiple regression described in Table 1. Robust state effects are the significant factors in a simple regression of semi-robust state effects on hireability. Illinois is an example of a state effect that appears in models 1 and 2 from Table 1 but is not
310 significant in a simple regression of semi-robust state effects on hireability.

The r-squared associated with a simple regression of semi-robust state effects is greater than the r-squared associated with robust state effects. Analysis has shown that perceived skill gaps that include overqualification effects are comparatively weak representations of perceived skill gaps for models of hireability.
315 These two measures allow the computation of a conservative lower-bound on the explanatory ratio of perceived skill gaps to state effects. Perceived skill gaps conservatively explain about 14 percent more variance in hireability than do state effects⁴.

With overqualification, perceived skill gaps explain about fifty percent more
320 of the variance in hireability than industry or robust state effects. Without overqualification, the adjusted explanatory power of perceived skill gaps is about three times the adjusted explanatory power of industry or state effects. Rule-breaker effects are about twice as important as perceived skill gaps. These findings collectively provide evidence that perceived skill gaps and rulebreaker
325 effects are factors of high importance for models of hireability.

3.3. Perceived Gaps Compared to the Recent College Graduate

Table 3 provides two models of hireability where comparative skill gaps are independent factors. Replacing perceived skill gap factors in Model 5 with comparative perceived skill gap factors, then dropping other factors, results in
330 Model 6. Eliminating insignificant factors to maximize adjusted explanatory power in Model 6 yields Model 7. In total, Model 6 drops four factors from Model 7. These four factors each had a p-value greater than 0.55. The maximum

⁴This is computed as $(0.0737/0.0648) - 1 = .1373$ and rounded to 0.14.

p-value in Model 7 is less than 0.16. The maximum p-value in Model 7 is less than 0.16.

335 Models 6 and 7 demonstrate that a few soft skills do constitute a significant difference between groups. The main differentiator between ACNG labor and the recent college graduate is body language communication skill. Respondents perceive ACNG labor to be deficient in this skill relative to recent college graduates. This comparative disadvantage comes at the price of reduced ACNG
340 hireability.

Conscientiousness and willingness to commute are the other two comparative skill gaps in Model 7. These two factors are positively signed, smaller in magnitude, and of lower significance than the factor for body language communication skills.^z Model 7 plus summary statistics on the average value for
345 each independent variable demonstrates that the average total effect of comparative skill gaps on hireability is negative⁵. This total negative effect replicates external research that shows lower demand for ACNG labor.

The average effect of an increased comparative gap in willingness to commute is positive on hireability. The fact that respondents perceive ACNG candidates
350 as more willing to commute than recent college graduates explains the positive coefficient. The reverse is true for body language communication skills. The recent college graduate has a larger level of perceived skill on average for body language communication skills. Because the average case favors the recent college graduate, linear optimization provides an average effect for this comparative
355 gap, which negatively affects hireability.

Conscientiousness has a more complicated result. The college graduate has an advantage on average, but the coefficient remains positive. This positive coefficient seems to indicate that the ACNG maximizes hireability by minimizing

⁵The respective mean values for the comparative gaps in perceived body language skill, willingness to commute, and conscientiousness are -0.1415, 0.0943, and 0.0330. The average total effect on hireability attributable to these effects is computed as: $-0.0579 = -0.3395 * 0.1415 - 0.1574 * 0.0943 + 0.1508 * 0.0330$.

Table 3: Multiple Regression of Comparative Skill Gap on Hireability

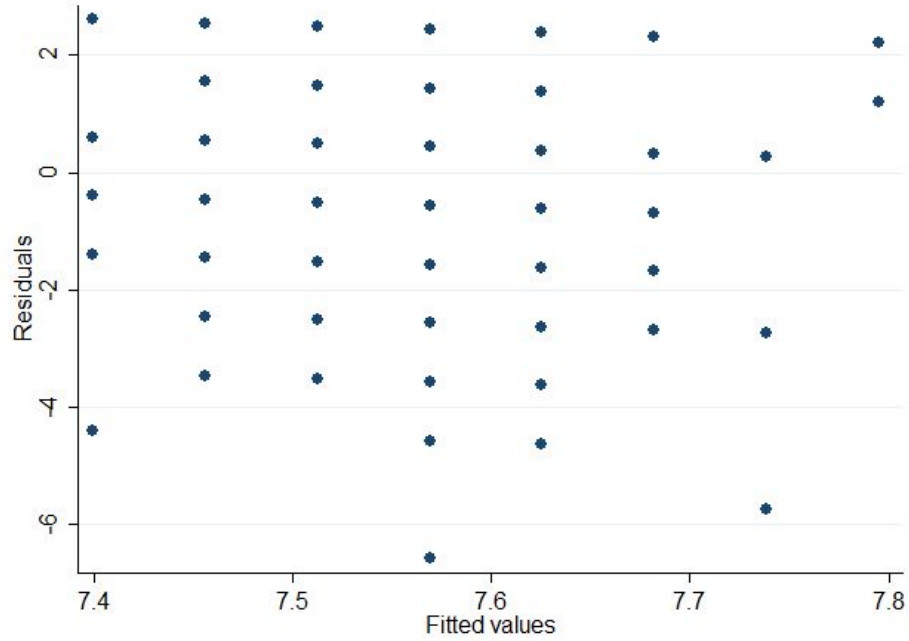
	Model 6	Model 7	Model 8
Body Language	-3.295e-01*	-3.395e-01*	-1.444e-01
Commute	1.498e-01	1.574e-01	8.030e-02
Conscientiousness	1.416e-01	1.508e-01	-5.239e-02
Customer Service	-1.493e-02		
Technical	4.955e-02		
Teamwork	1.552e-02		
Nonconformity	-5.822e-02		
Body Language ²			3.400e-02
Body Language ³			-1.938e-02
Commute ²			-1.124e-02
Commute ³			2.334e-03
Conscientiousness ²			-4.646e-02
Conscientiousness ³			3.801e-02
Constant	7.613**	7.629**	7.671**
Adj R-sqr	0.0311	0.0474	0.0571
R-sqr	0.0633	0.0609	0.0973
p(F)	0.0610	0.0044	0.0125

* $p < .01$, ** $p < .001$

conscientiousness. The reason is that Model 7 omits important nonlinear effects.

360 Figure 1 is a scatterplot of residuals from a simple regression of comparative conscientiousness on hireability. The plot indicates a residual trend down and to the right with some heteroscedasticity. Looking along the bottom of the graph shows an m-shape, which is consistent with cubic effects.

Figure 1: Scatterplot of Residual and Fitted Values for Comparative Gap in Conscientiousness



Model 8 captures this curvilinear relationship by expanding Model 7 with
 365 quadratic and cubic factors. The coefficients in this model are not significant, but the directions of effect are as expected. In this model, the average total effect of the comparative conscientiousness gap on hireability is negative⁶. The average total effect for Model 8 as a whole is also negative⁷. When the comparative

⁶Computed as: $-0.0018 = -0.0524 * 0.0330 - 0.0465 * 0.0330^2 + 0.0380 * 0.0330^3$

⁷Computed as: $-0.0293 = -0.1444 * 0.1415 + 0.0340 * 0.1415^2 - 0.0194 * 0.1415^3 - 0.0803 * 0.0943 - 0.0112 * 0.0943^2 - 0.0023 * 0.0943^3 - 0.0524 * 0.0330 - 0.0465 * 0.0330^2 + 0.0380 * 0.0330^3$

gap in conscientiousness increases above the average of 0.33, the linear effect
370 is negative and the marginal effect is also negative, but the marginal effect is
becoming less negative as conscientiousness increases.

Models 7 and 8 provide a skill-level diagnostic in service of closing the de-
mand gap for ACNG labor. Alternative learning providers can implement body
language communication training in their products, or ACNG candidates can
375 obtain additional training and credentials that target this skill a la cart. ACNG
job candidates can offset perceived conscientiousness deficit by provisioning work
history or results of a personality test. External research indicates that psy-
chological therapy and other interventions can boost conscientiousness in some
cases[14].

380 4. Conclusion

This study provides evidence that skill signals are an important factor of
hireability and are unique for the ACNG. Perceived skill gaps do a better job
of explaining hireability than other widely recognized effects like industry and
state effects. Employer factors better explain candidate hireability than do
385 the perceived skill gaps themselves. Technical skill gaps explain less about
hireability than soft skill gaps for ACNG job candidates.

The classic signaling model explanation for employer preference of college
graduate labor over ACNG labor is that the college degree provides a compara-
tive signal of conscientiousness and conformity. The present paper finds evidence
390 that conscientiousness is an important comparative difference contributing to
weak ACNG demand, but conformity does not have such a general effect. This
paper finds that employers of different types have qualitatively different views
about conformity. Some employers demand conformity, but many demand non-
conformity.

395 This paper provides evidence that some employers engage in conformity
selection to avoid risk to the reputation, productivity, or value of a company.
Ironically, such employers fail to conform to normal behavior. Respondents

most often preferred to describe nonconformists as individuals who could just as easily be high performers as low performers. An explanation from risk aversion
400 is preferred because it explains low ACNG labor demand from an employer given either of the above responses. Positive conformity selection is only able to explain the former case.

Risk aversion and conformity selection are both partially unconscious biases that lead to an inefficient organizational operation. A practical recommendation
405 is for organizations to implement bias controls concerning ACNG evaluation. An example control would be to provide human resource procedures for formal evaluation of particular credentials relevant to specified job families. These procedures provide immediate operational benefits regarding known credentials and job families. These procedures should also be retained for ongoing application
410 as new credentials are developed and encountered over time.

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[15]. Only 27 percent of respondents correctly re-
415 sponded 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
420 students to leverage employer tuition benefits. Because ACNG hireability 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
425 a particular employer is a likely member of the set that is favorable to ACNG labor.

The preferred model explains about one-third of hireability. 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
430 explanatory power. A longitudinal study would allow for causal analysis and
improve forecasting of ACNG hireability in the future. Other research has
conducted some dynamic analysis of the same dependent variable with different
regressors[16]. Analysis that includes overqualification effects and heterogeneous
nonlinear relations between skill gaps and hireability would improve estimates
435 of hireability for a candidate of a particular skill profile.

This paper noted that large employers and the information technology in-
dustry have a peculiar susceptibility to alternative credentials, so recent changes
implemented by Google may indicate future trends. Google has not required a
college degree since before 2013[17]. Laszlo Bock, then Senior Vice President
440 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 col-
lege 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
445 undergraduate degree for their hiring purposes[18].

If perceived skill represents actual skill, then 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
450 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.

455 Employers seem to be favorable to individuals with alternative credentials.
In many cases, employer-perceived skill gaps are not statistically different when
comparing recent college graduates with ACNG candidates. Instead of looking
to actual or perceived skill differences, the college degree’s social status may be
better explained by public ignorance about appropriate alternative programs,

460 a lack of appropriate programs for certain occupations, and government policy
that gives preference to accredited education.

References

- [1] K. B. McGarry, An examination of perceived employability skills between employers and college graduates, Northeastern University, 2016.
- 465 [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
470 (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).
475 URL [https://www.philadelphiafed.org/
community-development/publications/cascade/77/07_
distributional-impact-of-unemployment](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,
480 MA, 2017.
- [7] B. Caplan, The case against education: Why the education system is a waste of time and money, Princeton University Press, 2018.
- [8] P. L. Curşeu, R. Ilies, D. Vîrgă, L. Maricuţoiu, F. A. Sava, Personality characteristics that are valued in teams: Not always “more is better”?,
485 International Journal of Psychology 54 (5) (2019) 638–649.

- [9] G. Symon, C. Cassell, Neglected perspectives in work and organizational psychology, *Journal of Occupational and Organizational Psychology* 79 (3) (2006) 307–314.
- [10] J. Jaccard, C. K. Wan, J. Jaccard, LISREL approaches to interaction effects
490 in multiple regression, no. 114, sage, 1996.
- [11] F. Green, S. McIntosh, Is there a genuine under-utilization of skills amongst the over-qualified?, *Applied Economics* 39 (4) (2007) 427–439.
- [12] M. Raybould, H. Wilkins, Over qualified and under experienced, *International journal of contemporary hospitality management* (2005).
- [13] D. Blake, Skills quotient: The solution to the ceo’s biggest problem (Oct
495 2018).
URL <https://blog.degreed.com/skills-quotient-solution-ceos-biggest-problem/>
- [14] M. Kilduff, S. Tasselli, B. Landis, Becoming more conscientious (Mar 2018).
URL <https://hbr.org/2018/03/becoming-more-conscientious>
- [15] J. Arabia, Survey: What do young americans really think about trade
500 school? (Feb 2019).
URL <https://www.bigrentz.com/blog/trade-school-survey>
- [16] J. Vandivier, Preliminary attitudinal trends in alternative postsecondary learning, *Applied Economics Letters* (2020) 1–4.
- [17] A. Bryant, In head-hunting, big data may not be such a big deal, *The New
505 York Times* 20 (2013).
- [18] 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/
510 google-announces-certificates-in-data-project-management-and-ux.
html](https://www.cnbc.com/2020/07/13/google-announces-certificates-in-data-project-management-and-ux.html)