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The "Good Job" Trap: Opportunity Cost as a Deterrent to Immediate Venture Creation

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Abstract. This paper explores the relationship between opportunity costs and the decision to pursue entrepreneurship among undergraduates as their first career choice. Our hypothesis is that undergraduate students from highly ranked universities have strong financial incentives (the "good job" trap) that lead them to pursue traditional, corporate careers *immediately upon graduation*. Analysis of 235 recent graduates from an Ivy League university and a Big Ten university, adjusted for monetary costs, parental preferences and individual ability, shows that the Ivy League graduates are less likely to become entrepreneurs immediately upon graduation due to opportunity cost considerations. Students are also less likely to pursue an entrepreneurial career if they have multiple job offers and conversely, lack of quality job offers is a strong motivator for self-employment. We argue that it is in fact the sensible choice for students to choose salaried employment rather than venture creation immediately upon graduation, even when they harbor entrepreneurial plans for the future. These findings have implications for programmatic and resource allocation decisions at the university level.

Keywords: opportunity cost, venture creation, student ventures, entrepreneurship.

1. Background

Entrepreneurship education has seen substantial growth over the past several decades. According to the Kauffman Foundation, the largest foundation in the U.S. with a focus on entrepreneurship, there are currently more than 5,000 entrepreneurship programs in the U.S., up from approximately 250 programs in 1985. To date, the Kauffman Foundation has given more than $50 million to colleges and universities to promote university-wide entrepreneurship. Private donors have jumped on board as well and are actively supporting university entrepreneurship programs, incubators and professorships. Using results reported by participants in the 1999-2000 National Survey of Entrepreneurship Education, Solomon et al. found "evidence that institutions are receiving major endowments for entrepreneurship education in the form of chairs, professorships and centers".

Many of the recipient schools highlight venture creation as a goal of their entrepreneurship programs. For example, a recent study on university wide trends in entrepreneurship found that approximately 44% of the top 160 programs specifically list venture creation as a programmatic goal in their mission

statements. The focus on student startups has been encouraged by specific grants the National Science Foundation (NSF) and The National Collegiate Inventors and Innovators Alliance (NCIIA) are awarding to foster the creation of new companies based on student innovations. Furthermore, media outlets such as *BusinessWeek* and *Entrepreneur* have started to publish lists of the "best entrepreneurship programs" that are based on various ranking systems that may vary in terms of approach but share one common metric: student venture creation.

The focus on promoting and quantifying student ventures begs the question – when is starting a venture the "best choice" upon graduation? That is, under what conditions is student venture creation seen as a desirable choice? What roles, if any, do parental pressures, the availability of viable alternatives, the need to pay back college loans and individual risk tolerances play in weighing the choices? And if collegiate rankings have influenced students to pursue a "highly ranked" university out of high school, is the employment vs. entrepreneurship decision influenced by the culture of the university and the opportunity set facing its graduates? Are good jobs forming a trap that prevents students from starting their own companies?

Furthermore, is there an inherent conflict of interest for entrepreneurship programs in their encouragement of student ventures *immediately* following graduation? Programs emphasize the direct pathway to startups in part because it is far easier to do a headcount of the students who started a business just after their senior year than to follow alums across decades and observe new ventures along the way. Are ranking systems and donor expectations inadvertently setting up incentives for programs to favor venture creation without regard to whether a startup is the best option for the individual students? What about opportunity costs of pursuing an alternative and its relationship to rational choice? These questions motivated our interest in researching this subject area.

2. Research Hypothesis

Peter Thiel recently created waves with his "20 under 20" fellowship program in which young entrepreneurs are handed $100,000 to pursue their entrepreneurial dreams and are required to skip college for at least two years. As James O'Neill, head of the Thiel Foundation stated, "The broad aim of '20 under 20' is to produce more technological innovation, and in turn faster and more sustainable economic growth. That's best achieved by unleashing the creative and unsullied mind power of young people, before lofty student loans and academic orthodoxy funnel them into safe and risk-averse careers." Simply put, Mr. Thiel is attempting to maximize youth ventures by minimizing the opportunity cost of choosing to pursue an entrepreneurial dream. While we have some reservations with Mr. Thiel's philosophy, his program highlights the importance of opportunity cost in venture creation.

Opportunity cost is defined as the cost of an alternative that must be forgone in order to pursue a certain course of action. The better the alternative choices, the higher the opportunity cost and the less attractive is the option in question. Our hypothesis is that undergraduate students from highly ranked universities have strong incentives towards pursuing a traditional, corporate career versus self-employment. These "top" students have access to relatively high-paying corporate positions and a "track" for succeeding in large firms. For many students from highly ranked universities, the risk of starting their own venture immediately upon graduation, and passing over a corporate opportunity, is just too high. Whether university rankings are a true reflection of differences in candidates' abilities can be debated, but graduates of highly ranked programs do receive better job offers, as seen in Clark (2002) who critiques the ranking systems but cites one study that shows that graduates of the top-ranked US business schools are offered higher salaries even when employers know that lower-ranked schools offer a better education. Since highly ranked universities in the U.S. tend (on average) to be more expensive and may lead to higher levels of student debt upon graduation, we additionally hypothesize that debt obligations coupled with the probability of failure of a startup can serve as strong motivators against pursuing an entrepreneurial career path. Moreover, while not considered as a part of opportunity costs, parental and peer pressures and an upbringing that directs children towards a stable, "high-powered," corporate job (as a first job) can also play a strong role in dissuading students from pursuing an entrepreneurial career path immediately upon graduation.

Thus we see the conflict: programs, funding sources, and donors are incentivized to look for early entrepreneurial successes. However, for any graduating undergraduate student, the opportunity cost of an entrepreneurial path may be too high when compared to a corporate job that not only provides a near-term financial benefit in the face of debt, but also meets cultural norms. Furthermore, the opportunity cost may be considerably higher for graduates of highly ranked institutions due to various factors: higher paying and/or multiple job offers, higher debt levels and the tendency to pursue graduate study.

3. Literature Review

Most previous research in this subject examines the correlation of opportunity costs with either: i) general career choices and ability, or ii) success/profitability of entrepreneurial ventures. We were unable to find research that specifically linked opportunity costs to immediate student venture creation. Our paper not only links opportunity costs to immediate venture creation but also discusses student motivations behind such career choices.

3.1. Correlating Opportunity Cost to General Career Choices, Education and Ability

Scott Stern explored the relationship between wages and the scientific orientation of R&D organizations by researching the opportunity costs that scientists incur as they pursue research for "the sake of science" versus for the sake of commercialization. Firms were classified as "science" firms if they allowed their scientists to pursue a research agenda and distinctions were made between a scientist's motivations for research. Stern categorized the scientists into two primary groups: scientists who research for the sake of scientific knowledge and the others who pursue science for commercialization purposes. The paper found a negative relationship between wages and the pursuit of scientific research. The paper controls for unobserved productivity bias by looking at how many job offers a post-doctoral biologist received and then adjusting for the different salary levels offered to individual researchers. Stern finds that conditioned on perceived ability, scientists do indeed incur an opportunity cost for pursuing a research career. We adopt this aspect of Stern's approach and adapt it for studying the differences between salaried and entrepreneurial career choices.

Rees and Shah (1986) examined the choice between self-employment and paid-employment and assessed a sample of 4,762 individuals from the General Household Survey for 1978. They found "positive selection bias in the observed earnings of employees, that the probability of self-employment depended positively on the earnings difference between the two sectors and that education and age are significant determinants of self-employment." Chuang and Dellman-Jenkins (2010) surveyed 360 hospitality students and found that future career intentions in hospitality were significantly associated with a student's gender, work experience, transfer status, and outcome expectations in the industry. They also concluded that students focused on intrinsic outcomes regarding career accomplishments, a trait commonly associated with entrepreneurial intentions and decision-making.

Zane and DiRenzo examined the reasons behind why entrepreneurs chose to pursue certain opportunities when compared to others. Cognitive biases affecting risk perception were found in entrepreneurs, with entrepreneurs focused more on potential value, while non-entrepreneurs focused on cost. Their paper proposed a new model whereby opportunity cost and opportunity value mediated the relationship between cognitive biases and risk perception on one hand, and the decision to pursue an opportunity on the other.

Two papers lay the foundation for estimating linkages between opportunity costs and venture creation. Hamilton explored possible explanations for the decision between self-employment and salaried employment, finding the non-pecuniary benefits of self-employment to be substantial. Additionally, Hamilton finds that most entrepreneurs that stayed in business for 10 years had lower earnings when compared to salaried employees. Results indicated a median

earnings differential of 35 percent which could not be explained by the selection of low ability employees into self-employment. Hamilton concludes that non-pecuniary benefits closed the gap between salaried employment and venture creation.

Secondly, Amit et. al (1995) used multivariate regression and a large sample drawn from the 1992 Canadian Labor Market Activity Survey. The authors found that paid employees who chose to leave their employment to become entrepreneurs earned, prior to leaving, substantially less on average than those who remained salaried employees throughout the entire period sampled. Specifically, wages of workers who chose to remain paid employees were on average 12% higher than those who left to become entrepreneurs. They found that on average, entrepreneurs earned less than their salaried counterparts in the year following their career switch. The paper did not control for ability, attitudes or any predisposition towards entrepreneurship.

While these studies explain entrepreneurial career choice and explore intentions and risk perceptions among entrepreneurs, they do not explicitly link opportunity costs to actual entrepreneurial outcomes. Furthermore, most of these studies fail to account for environmental and financial pressures facing recent graduates that may force them to postpone their desires to start their own business. While these pressure are not accounted for in determining opportunity costs, they can play an important role in a student's career choice selection.

3.2. Correlating Opportunity Cost to Entrepreneurial Success

Gavin Cassar investigated how an entrepreneur's opportunity costs influence the intended future size of new ventures. The paper found that the higher opportunity costs an entrepreneur faced in terms of education, household income and managerial experience, the larger the expectations of growth and scale were for the venture. Relating it to this paper, the implications are that students from higher ranked universities would seek to establish higher growth ventures as they would potentially be turning down higher paying positions.

Fear of failure also plays a role in discouraging potential graduating students from starting a business. Arora and Nandkumar's recent paper on innovation-based industries explored this topic and found that entrepreneurs with high opportunity costs tended to focus on cashing out more quickly. This focus on quickly cashing out led to more mistakes, and ultimately more venture failures, as the entrepreneurs were more focused on short-term metrics versus long-term strategy.

Lowell (1999) stated that in order to understand entrepreneurial risk, we must use the lens of cognitive psychology and decision-making. The author argued that entrepreneurs use biases and heuristics, which are likely to lead them to perceive less risk in a given decision situation. In particular entrepreneurs use

representativeness to make business decisions and are more overconfident than managers in large organizations.

Similarly, Audet (2004) surveyed 512 MIT students to identify the causes of entrepreneurial intent among engineering students. The paper found that personality traits had a strong impact on the attitude towards self–employment and an "entrepreneurial attitude," was strongly linked to the intention of starting a new venture.

The papers outlined in this section hint at the opportunity costs involved with pursuing an entrepreneurial career choice but deal with intentions and not actual outcomes. Our study looks at actual career choices made, controls for student ability and explores intrinsic differences between students from different universities centered on culture, parental attitudes and university rankings.

4. Conceptual Model

Opportunity costs are defined as the value of the next-best foregone alternative, whenever a choice is made. Since our hypothesis is that students from higher ranked universities face a different choice set of alternatives upon graduation when compared to students from lower ranked universities, we need to account for these differences before attempting to make valid comparisons between the two groups. This problem can be viewed as a two-step process where prior to making any comparisons, the actual decision to apply to a certain set of universities must be taken into consideration.

Thus as a first step, we need to understand the reasons why students chose to apply to certain universities. Finding universities that are noticeably different in their rankings is key to establishing and calculating opportunity costs. The next step is to then look at career opportunities a student had immediately upon graduation and the actual choices they made. Actual job offers, number of job offers and the possibility of pursuing self-employment then help determine opportunity costs based on the outcome selected. Controlling for ability and parental pressures can add another dimension to understanding this issue from a holistic perspective. This conceptual model, with our two-step analytic process, is outlined in table 1 as shown below.

Table 1: Conceptual framework behind the analysis

Application choice ->	**University decision ->**	**Individual decision ->**	**Career choice upon graduation**
The decision to apply to a university is based on several factors such as ability, family preferences, distance from home, university ranking, courses offered etc. These are outlined in table 3.	The university decides to accept or reject a candidate based on perceived measures of ability (primarily SAT scores and GPA) and interest.	The individual decides to either accept or decline the universities offer if accepted into the university or keep exploring options if denied admission by the university.	Sometime near graduation, the individual decides on their first career choice. This choice is impacted by available job options, their perceptions of and ability towards entrepreneurship and, outside factors such as family and peer preferences.
Step 1			**Step 2**

5. Data Description

Several U.S. universities were contacted based on various characteristics and after careful considerations and negotiations; we reached agreement with two universities; an Ivy League university (ILU) and a Big 10 university (BTU). All data were collected utilizing an online survey. Since our target respondents are geographically spread out, conducting an online survey was the most effective option.

Recent graduates (2005-2010) from both universities were targeted for the survey. We reached out to the alumni offices at both universities and had them email the survey to their graduates. We received a total of 235 responses with 134 responses from our Ivy league university (ILU) and 101 responses from the Big 10 university (BTU). Questions were rated on a 6-point likert scale (strongly agree, agree, neutral, disagree, strongly disagree, N/A) and were designed to elicit attitudes towards venture creation and actual career choices.

5.1. Selection of Universities

The two universities were selected because of several similarities and some key differences. Both universities offer a variety of undergraduate and postgraduate degrees, are close to, but are not in, major metropolitan cities, both have similar sized student populations and both universities focus on entrepreneurship education and venture creation. But, these universities also have several differences that help us estimate opportunity costs for student ventures. Specifically, we leverage the difference in rankings and tuition costs between the two universities. Over the past few years, ILU has been consistently ranked amongst the top 20 undergraduate institutions in the U.S. while BTU ranks outside the top 50 but in the top 100 institutions. Table 2 briefly profiles the two universities on other metrics.

Table 2: Basic comparison statistics between ILU and BTU

2011 Metrics	ILU	BTU
US News and BusinessWeek rankings	Top 20	70-100
Acceptance rate	Less than 20%	Above 50%
Average tuition and fees (excluding room & board)	$40,000	$15,000
Four year graduation rates	Above 75%	Less than 50%
% receiving financial aid	46%	46%
Average amount of need based financial aid	$30,000	$5,000

5.2. Choice of University

Since our hypothesis is that students from higher ranked universities face a different choice set upon graduation as they ponder future career direction, we first wanted to understand why students chose the given university during their high school search process. Table 3 summarizes these responses.

Table 3: A respondents reasons for choosing to attend a particular university. (respondents could select multiple responses)

	Ivy League University				Big 10 University		
Choice	**Agree**	**Disagree**	**Neutral & N/A**		**Agree**	**Disagree**	**Neutral & N/A**
Academic reputation	97%	1.5%	1.5%		87%	6%	7%
Alumni contacts	60%	32%	8%		70%	23%	7%
Job prospects	66%	6%	28%		54%	16%	30%
Family tradition	29%	29%	42%		37%	33%	30%
Highest ranking univ. accepted to	66%	16%	18%		8%	44%	48%
Proximity to home	21%	54%	25%		70%	12%	18%
This university was the least cost option	13%	63%	24%		60%	18%	22%
Cost was immaterial to my decision	32%	46%	22%		20%	58%	22%
Offerings in entrepreneurship	9%	40%	51%		9%	47%	44%
Track record of students starting own ventures	5%	25%	70%		7%	49%	44%

As evident from table 3, students at both schools considered similar items as they chose their undergraduate institution: academic reputation, alumni contacts and job prospects. But it is clear that a student bound for ILU places a higher value on the university ranking versus a student considering BTU. Additionally, 70% of BTU students stated that being close to home was a factor in their decision-making versus only 21% of ILU.

With the average cost of attending BTU pegged at approximately $13,000 and the average cost of attending ILU estimated to be approximately $40,000, we needed to explore how cost differences may have impacted a student's decision to attend either university. While BTU was more likely to be the lowest costs alternative for the respondents, costs matter in decision-making for students in both institutions, thus somewhat diluting the common notion that "most Ivy League students don't care about costs."

Finally, since we are interested in venture creation, we also wanted to adjust for a student choosing either university for its entrepreneurship offerings or track record in supporting student ventures. The last two questions in Table 2 outline the responses to this specific topic. At both universities, it appears that students were not overly concerned about the entrepreneurship offerings and instead, were more focused on other characteristics of a university. With factors such as student loans and family commitments factored in along with rankings, the above table lays the groundwork for estimating reasons why students tend to gravitate towards salaried positions versus starting their own ventures, and allows for comparisons between the two universities.

5.3. Background of Respondents

To allow for decision-making comparisons across universities and majors, it was critical that we cast a wide net and attract students from a variety of backgrounds. In our data, 35% of ILU students are Business majors with Engineering (14%), Sciences (16%), Social Sciences (18%) and Liberal Arts (17%) comprising the rest. Unfortunately for us, the majority of the respondents from BTU were business majors (84%) with Engineering and Liberal Arts making up the rest. We believe that the reason for this imbalance is that the alumni offices at BTU targeted recent Business school graduates versus all recent graduates.

Since a strong SAT score is a requirement for admission at most top ranked universities, it was not surprising to find that 80% of ILU graduates entered the university with a SAT score of 1300 or higher (out of 1600). At BTU, 58% of graduates entered with a similar SAT score. Upon graduation, 47% of ILU graduates finished with a cumulative GPA of 3.5 or higher compared to 25% of BTU graduates. Since many large corporations consider the GPA of an individual during the recruiting process, this data should help us control for differences in post-graduation compensation between graduates of each university and possible opportunity costs they may experience as they decide to pursue a self-employment path versus a salaried one.

5.4. Impact of Collegiate Entrepreneurship Courses on Career Choice

At ILU, 35% of the respondents did not participate in any entrepreneurship courses or activities compared to 59% of the respondents from BTU. For students that did participate in entrepreneurship offerings, 27% of ILU respondents and 23% of BTU respondents stated that the classes had no impact on their ultimate career choice immediately upon graduation.

5.5. External Impacts on Career Choice

As it has been well established in the literature, family pressures, cultural attitudes and risk perceptions towards entrepreneurship impact one's career choice. To account for and control for these measures, table 4 summarizes additional questions that were asked to establish an individual's perceptions towards venture creation.

Table 4: Cultural and familial impacts on career choice (respondents could select multiple responses)

	Ivy League University				Big 10 University		
Choice	**Agree**	**Disagree**	**Neutral & N/A**		**Agree**	**Disagree**	**Neutral & N/A**
My parents influenced my undergraduate education choice.	53%	25%	22%		48%	37%	15%
My immediate family prefers that I pursue salaried employment versus self-employment.	47%	21%	32%		33%	40%	27%
Starting my own business would not be encouraged by my immediate family.	25%	45%	30%		13%	64%	23%
Entrepreneurs are highly regarded in my ethnic culture.	46%	10%	44%		46%	14%	40%
At least one of my immediate family members is a successful entrepreneur.	40%	39%	21%		38%	55%	17%

Not surprisingly, we notice that for a majority of the students, parents do influence career choices and while immediate family members may prefer that an individual pursue salaried employment, respondents generally agreed that if they chose to pursue an entrepreneurial path, they would feel supported by their families.

When asked to rate how respondents felt about venture creation versus pursuing salaried employment, we had nearly identical results for graduates from both universities. 92% of ILU graduates stated that they thought starting their own business was riskier than pursuing salaried employment with only 2% claiming

that starting a business was less risky. Amongst BTU graduates, 90% stated that they felt starting a business was riskier than working a salaried position with 2% claiming the opposite. 6% of ILU graduates and 7% of BTU graduates characterized the risk as even.

5.6. Career Choice upon Graduation

As we are seeking to estimate an opportunity cost to pursuing an entrepreneurial career over salaried employment, the survey asked respondents to outline their job choice immediately upon graduation and their current employment status. With respondents being relatively recent graduates (2005 onwards), the chances that a respondent has switched careers multiple times is low. We address and adjust for one career change and Table 5 summarizes respondent career choices from both universities.

Table 5: Summary of career choices made upon graduation and today

	Ivy League University		**Big 10 University**	
Choice	**Upon Graduation**	**Current employment**	**Upon Graduation**	**Current employment**
Self employed in your own for-profit business	1.5%	8.8%	7.4%	20.8%
Self employed in your own not-for-profit	0.0%	0.8%	1.9%	0.0%
Family business (not founded by you)	3.0%	2.4%	1.9%	2.1%
Salaried employee	69.7%	68.8%	77.8%	70.8%
Enrolled in Graduate (M.D./Law etc.) school	23.5%	15.2%	5.6%	2.1%
Enrolled in the military	0.0%	0.0%	0.0%	0.0%
Unsalaried volunteer work	0.8%	0.0%	3.7%	4.2%
Unemployed	1.5%	4.0%	1.9%	0.0%

What is interesting is that there are a higher percentage of students choosing to pursue entrepreneurship upon graduation at BTU than at ILU. This trend is also reflected in current career choices and lends credence to our hypothesis that students at a higher ranked university face a higher opportunity cost as it relates to venture creation. With higher tuition costs and loans, we believe that students from top ranked universities face a bigger hurdle pursuing the entrepreneurial "gamble." Alternatively, it could also indicate that BTU graduates had fewer job offers and thus chose self-employment. While most of the other percentages are similar amongst the two universities, almost four times as many ILU graduates choose to go on to graduate school, indicating another potential hurdle against pursuing venture creation upon graduation.

Since we expected the majority of respondents at both universities chose to pursue salaried employment, we asked them for reasons why they chose salaried employment upon graduation (table 6) and more importantly, why they chose not to start their own ventures (table 7). The following tables outline their responses.

Table 6: Reasons for choosing salaried employment (respondents could select multiple responses)

	Ivy League University				Big 10 University		
Choice	**Agree**	**Disagree**	**Neutral & N/A**		**Agree**	**Disagree**	**Neutral & N/A**
Received the offer I was looking for.	84%	8%	8%		76%	16%	8%
Prefer stability of salaried/corporate career path.	77%	9%	14%		89%	6%	5%
Gaining experience to eventually start my own business.	44%	26%	30%		24%	27%	49%
Never considered any other employment options.	28%	64%	18%		38%	38%	24%
Wanted certain geographical area to be close to family	59%	24%	17%		54%	30%	16%
No funding($) to start my own business.	7%	68%	25%		11%	73%	16%

Table 7: Reasons for not pursuing an entrepreneurial career path immediately upon graduation – salaried employees only (respondents could select multiple responses)

	Ivy League University				Big 10 University		
Choice	**Agree**	**Disagree**	**Neutral & N/A**		**Agree**	**Disagree**	**Neutral & N/A**
No interest in entrepreneurship.	17%	68%	15%		34%	50%	16%
I believe that I can have greater financial success in the corporate world.	38%	32%	30%		50%	21%	29%
I was worried that failure in my own venture would reflect poorly on me.	16%	54%	30%		16%	55%	29%
Prefer the stability offered by salaried employment versus starting my own business.	64%	16%	20%		81%	9%	10%
No financial resources to start my own business.	62%	12%	26%		74%	13%	13%
Financial obligations (family, loans etc) and was looking for guaranteed income	56%	28%	16%		45%	39%	16%
Not the right time for me to start my own business though I may pursue this at a later date.	71%	12%	17%		58%	16%	26%
I did not have a viable idea.	61%	15%	24%		55%	16%	29%

Overwhelmingly, the majority of the respondents at both universities accepted salaried employment because they received the offer they were seeking and they preferred the stability of paid employment. With the economic downturn that recent graduates are facing, this result is not unexpected. What is unexpected

though is that 44% of ILU respondents state that they are using their salaried employment to gain experience to eventually start their own business. Only, 24% of BTU respondents claim that their salaried employment is grooming them for future self-employment. This may lend credibility to the claims of ILU university faculty when they share anecdotal evidence that suggests their students wait a few years to start their own ventures.

Differences between student attitudes towards their career choices come to the forefront as we analyze table 6. When compared to ILU graduates, 50% of BTU graduates feel that they can have greater success in the corporate world and 81% of BTU respondents prefer the stability offered by salaried employment. ILU respondents on the other hand, appear to be more willing to pursue self-employment, albeit at a later time. This "later date" hypothesis is one of the causes tested in our model as we believe that it represents the higher opportunity costs ILU graduates face upon graduation as it relates to starting a business.

5.7. Controlling for Ability

In order to make direct comparisons between graduates from ILU and BTU, we need the ability to randomly assign a student to the other university and then gauge the impact of the assignment. While SAT scores and GPA upon graduation provide some measure of ability and are the primary admissions criteria used by U.S. universities, we also wanted to account for what other universities a student applied to and was accepted to. By determining what other collegiate prospects a particular respondent had prior to choosing either university, we can use publically available university rankings to include other measures of their potential. In addition to including all eight Ivy League members and all eleven Big 10 member institutions, a few other regional universities were also included into the mix to serve as additional controls. Including these additional schools gives us the overall overlap in rankings and geographical proximity that a potential applicant to either of our target universities would consider. In total, 22 universities were used as controls for ability in addition to GPA and SAT scores.

6. Empirical Model

Our hypothesis is that undergraduate students from highly ranked universities have strong financial incentives (the "good job" trap) that lead them to pursue traditional, corporate careers immediately upon graduation. These students may also self-select into ILU due to different career motivations. Since data was collected from two target universities, questions of selection bias arise when making comparisons between the two samples. Simply put, selection bias is a type of bias caused by choosing non-random data for statistical analysis. In a

regression context, selection bias occurs when one or more of the regressors are correlated with the error term. Random allocation to control (BTU) and treated groups (ILU) can help eliminate this bias.

Ideally, we would solicit responses from individuals that both graduated from, and individuals whose applications were rejected from, the two universities. Since it was not practical to seek out undergraduate applicants that were rejected from either university, we instead proceed by trying to match similar students at the two universities based on the other schools they had applied to, and where they were accepted. Additionally, we would have liked a cross section of students of similar backgrounds who had been randomly assigned to ILU or BTU. While we did not find anyone at BTU that applied to ILU or vice versa, we did have overlap with some of our control universities having common applicants from our sample. A university similar to ILU (for example) would have similar academic and admission standards and requirements to ILU. Thus, using this overlap of respondents applying to and being accepted/rejected from our group of control universities serves as an additional method to adjust for ability or ambition of a respondent.

Besides using comparable universities as a control for selection issues, we also asked respondents for their SAT scores entering college, their cumulative GPA upon graduation, starting salary in their first job (for salaried employees, first year compensation for self-employed) and finally, how many job offers they received before selecting their career choice – self employment or salaried employment. These additional variables help control for an individual's ambition and any biases that arise from sample selection issues.

In general, when evaluating the treatment effects of a program (here, the choice of university), we need to address the counterfactual: what is the change in outcomes given treatment Y(1), compared to the potential outcome in the group with no treatment Y(0)? With our non-experimental data, we cannot answer this question just by regressing the observed outcome Y (an indicator of whether a person is an entrepreneur) on a dummy for whether the unit is treated (D = 1) or non-treated (D = 0). This is the problem of selection bias. To address this issue, propensity score matching was used.[1]

6.1. Propensity Score Matching

Propensity score matching is a method that estimates the probability of taking a treatment given observed variables. Propensity scores summarize all background

1. In OLS, sample selection bias occurs when data on the dependent variable is missing non-randomly, conditional on the independent variables. For example, if we use OLS to estimate a regression model in which large values of the dependent variable are underrepresented in a sample, estimates of coefficients typically will be biased. Using a dummy for treated/not treated will not account for self-selection as the assignment to the group is non-random. Thus, we have to simulate randomization of our data. Propensity score matching is helpful here.

information on treatment selection into a scalar and allow us to adjust for selection bias in observational studies of causal effects. When possible, we want to compare control groups and treated groups that are similar in all aspects except for the treatment, which is assigned randomly. Practically, this is not possible. To adjust for this, we use observables to match individuals in the treated (ILU) and non-treated (BTU) samples, and have built our model based on theory to test for multiple covariates.

Propensity score = Pr [treatment | observed variables]

The score is used to match respondents from either group that are similar and allows us to infer the relationship between the treatment and outcome based on observational data. The scores help adjust for selection bias and estimate counterfactual effects. Average treatment effects for the "treated" and average treatment effects for the "untreated" can also be inferred. Simply put, propensity score matching allows us to simulate the random assignment of a student to either university, and then estimate based on the student's characteristics, what the outcomes would be on our variable of interest. For more details, please see Rosenbaum and Rubin (1983).

6.2. Stage 1- Estimation Equation: Selecting a University to Attend

To estimate opportunity costs as they relate to career choices immediately upon graduation, we need to think of the problem in two steps. In step one, the decision to apply to a certain university has to be accounted for. In the second step, we need to determine if an opportunity cost exists and if it does exist, does it exist due career selection (salaried employment versus venture creation) choices. Thus the model needs to be run in two stages.

In stage one, a Probit model is first used to predict what factors are significant in an applicant's decision as they select a university. A Probit model is used to model dichotomous outcome variables where the inverse standard normal distribution of the probability is modeled as a linear combination of the predictors. Our dependent variable *Ivy* is binary, with "1" representing the decision to apply to ILU and "0" representing the decision to apply to BTU. The independent variables are outlined in table 1 where respondents indicated their agreement on a 6-point likert scale[2]. Ability is controlled for in this equation by adding a list of universities that respondents had commonly applied to as high

2. An "ordered probit" regression was used here as the variable "y" has an ordered response and the values we assign to each outcome are no longer arbitrary. The fact that 6 (strongly disagree) is a higher rating than 5 (disagree) conveys useful information, even though "y" itself only has ordinal meaning. For example, we cannot say that the difference between 4 and 2 is twice as important as the difference between 1 and 0. This can now be calculated using maximum likelihood and marginal effects can be calculated. N/A were treated as missing data.

schoolers. As long as we had an overlap with at least one respondent from each university (ILU or BTU) applying to a "control" university while in high school, that university was included in equation 1 to adjust for ability. All universities that a respondent applied to out of high school were also included, irrespective of whether the respondent was accepted to that university. If a respondent was accepted to a university, their "application to the university" value was not included in the equation.

Equation 1

Pr (y = Ivy) = *f* (Academic reputation, Alumni contacts, Job prospects, Family tradition, Highest ranking university, Proximity to home, Least cost option, Cost was immaterial, Offerings in entrepreneurship, Track record of students starting own ventures, Application to comparable universities, Acceptance to comparable universities)

6.3. Stage 2 - Estimation Equations: Determining Opportunity Costs

In stage 2, a propensity score matching system was used to match and compare respondents from ILU and BTU to determine what factors were critical in the decision to pursue salaried employment or pursue self-employment. Nearest neighbor matching (nnmatch) was used as it estimates the average treatment effect on our dependent variable by comparing outcomes between treated and control observations using nearest neighbor matching. The program pairs observations to the closest matches in the opposite treatment group to provide an estimate of the counterfactual treatment outcome. In addition, the program also allows for bias correction of the treatment effect, and allows observations to be used as a match more than once, thus making the order of matching irrelevant.

In equation 2, using propensity score matching, an individual's actual decision to pursue an entrepreneurial career path immediately upon graduation was matched between the two groups, and control variables from equation 1 were used for matching. Additionally, we had asked respondents for their undergraduate major and whether they had an entrepreneur in their family. These two variables are used as additional controls in the matching algorithm to account for major and familial impacts.

Equation 2

Entrepreneur career choice = *f* (SAT score, Entrepreneur in the family, Undergraduate major, Application to comparable universities, Acceptance to comparable universities)

In equation 3, using propensity score matching once again, a student's total first year compensation was matched with variables from equation 2 to determine if first year compensation impacted the decision to become an entrepreneur. Since the majority of our respondents from BTU were business majors, the equation was run limiting both sets of respondents to business majors only to provide relevant matching between ILU and BTU. If significant, this equation would indicate whether our hypothesis that students from top ranked universities faced a higher opportunity cost held.

Equation 3

Total first year compensation for business majors = *f* (SAT, Entrepreneur in the family, Undergraduate major, Application to comparable universities, Acceptance to comparable universities)

6.4. Estimation Equation: Is Entrepreneurship a Career Choice or No-Choice Option?

In order to control for the reasons behind becoming an entrepreneur immediately upon graduation, we wanted to explore whether students became entrepreneurs by choice or because they had no other viable job options. All current entrepreneurs were asked questions around their employment decision. The variable *Graduating from Ivy* is binary, with "1" representing ILU graduates and "0" representing BTU graduates. We include total first year compensation and abundance (or lack thereof) of job offers to determine the probability of becoming an entrepreneur conditional on these variables. The term *first year compensation* includes the first year salary and bonuses a salaried employee received. For entrepreneurs, this includes any money they might have withdrawn from their businesses. Only business majors are included in the analysis as the majority of our BTU respondents were business majors.

Equation 4

Pr (y = Entrepreneur) = *f* (Graduating from Ivy, First year compensation, No exciting job offers, Lack of any job offers, Business major)

6.5. Estimation Equation: Factoring in Opportunity Costs With Outside Pressures

Finally, a Probit equation was designed around the variables from table 3 to estimate the impacts of opportunity costs (starting salaries) and outside pressures

(parental and cultural influences, gender and race) on self-employed respondents to gauge how these factors may have impacted their current career choice. This equation also accounted for a respondent having an entrepreneur in their immediate family.

Equation 5

Pr (y = Entrepreneur) = *f* (Graduating from Ivy, First year compensation, Entrepreneur in the family, Parental influence of undergraduate degree choice, Family preferences on self-employment, cultural attitudes towards self-employment, Race, Gender)

7. Empirical Results

7.1. Equation 1 Results: Selecting a University to Attend

Probit results from equation 1 are outlined in table 8. Due to our sample size of 235 respondents, we argue that a 5% level would be too restrictive and may not convey the full story. Variables significant at a 10% level are thus also highlighted.

Looking over table 8, we notice that the academic reputation of the university and alumni contacts are significant and with a negative relationship for ILU respondents. This indicates that students applying to BTU are more likely to focus on the academic reputation and potential alumni contacts from their university versus ILU applicants. ILU applicants on the other hand, are more likely to pick a university that is closer to their home.

This may seem counter intuitive but if we subscribe to the argument that ILU applicants are applying to other highly ranked universities, then it is likely that the academic reputation and/or ranking is not a primary concern as most of the other universities are similar high in ranking. This effect also explains the negative coefficient on how important being accepted to the "best ranked" university is to our ILU applicants. The control universities for ILU graduates are likely to bring out this interaction due to their higher rankings as well. Many of our control universities are also significant and generally represent how likely a particular respondent from ILU was to apply to it, relative to a respondent from BTU. While the equation included all dummy variables for application and acceptance to all the control universities, table 8 does not display these additional coefficients for brevity considerations.

Table 8: Marginal effects from Equation 1 (Probit) showing factors significant to respondents in university choice. Control university results not displayed.

Variables	Coefficient Marginal Effects	Std. Err.	P-value
Academic reputation	- 0.14	0.06	0.028**
Alumni contacts	- 0.11	0.05	0.045**
Job prospects	0.02	0.03	0.490
Family tradition	0.01	0.02	0.539
This university was the least cost option	0.01	0.02	0.597
Highest ranking university accepted to	- 0.05	0.03	0.065*
Proximity to home	0.08	0.04	0.045**
Offerings in entrepreneurship	- 0.004	0.04	0.917
Track record of students starting own ventures	0.01	0.04	0.800
Cost was immaterial to my decision	0.007	0.02	0.677
SAT score	0.01	0.03	0.698
Parental influence on education choices	0.01	0.02	0.563

7.2. Equations 2 & 3 Results: Determining Opportunity Costs

Propensity score matching on equation 2 indicates that pursuing an entrepreneurial career has a negative relationship with graduation from an ILU. Table 9 highlights that students graduating from BTU are more likely to become entrepreneurs immediately upon graduation. Equation 3 matches total first year compensation of business majors and gives even more distinct results. ILU business graduates on average, earn approximately $18,500 more than business graduates from BTU.

This result is also reflected in the anecdotal evidence cited by ILU faculty where many students state that they would rather wait, gain experience, payoff loans and then consider starting their own ventures. Based on survey responses, 56% of ILU respondents had financial obligations upon graduation and were seeking guaranteed income to offset these obligations. With the average annual cost of ILU education approximately $25,000 more than the average annual cost of education at BTU, these financial obligations create an additional hurdle for ILU students who may harbor entrepreneurial intentions.This result, coupled with the result from equation 2 on the probability of pursuing a self-employment career, indicates that there exists a higher financial opportunity cost for ILU students. ILU graduates have a higher financial hurdle to jump as they consider entrepreneurial options. Propensity score matching is also run on the entire population of BTU respondents (not limited to just business majors) and results continue to hold, and are significant. We observe that ILU graduates, on average,

earn approximately $12,000 more in their first year compensation when compared to BTU graduates.

Table 9: Propensity score results from Equations 2 and 3 showing combined effects of opportunity costs. ILU is reference group.
Equation 2: Actual decision to pursue an entrepreneurial career path immediately upon graduation.
Equation 3: Impact of first year compensation on decision to pursue entrepreneurship.

Equation	Variable	Coefficient	Std. Err.	P-value
2	Entrepreneur	- 0.18	0.07	0.016**
3	First year compensation (business majors only)	18.45	5.54	0.001***

7.3. Equation 4 Results: Is Entrepreneurship a Career Choice or No-Choice Option?

This equation explores whether students became entrepreneurs by choice or because they had no other viable job options. In line with our hypothesis and opportunity costs results, graduating from ILU has a negative probability on a respondent being an entrepreneur today. Conversely, not having any job offers at graduation is a positive indicator for being self-employed today. Thus, it can be concluded that pursuing self-employment is a "no other choice" for BTU graduates that pursue self-employment immediately upon graduation as these students tend to have fewer job offers at relatively lower salaries, when compared to ILU graduates. These probit results are outlined in table 10.

Table 10: Marginal effects from Equation 4 (Probit) exploring entrepreneurial career immediately upon graduation – by choice or no other option.

Variable	Coefficient	Std. Err.	P-value
Graduating from Ivy	- 0.15	0.08	0.071*
First year compensation	-0.001	0.00	0.166
Lack of any job offers	0.13	0.07	0.05**
Lack of exciting job offers	-0.12	0.08	0.133
Business major	-0.083	0.06	0.174

7.4. Equation 5 Results: Factoring in Opportunity Costs with Outside Pressures

Equation 5 results further support our hypothesis that higher starting salaries (opportunity costs) have a negative effect on self-employment as outlined in table 11. Results indicate that for every $1,000 increase in starting salary, the relative probably of pursuing self-employment decreases by 0.2% points. While this may not seem like a large number, it is important to note than this probability is a

relative probability and is to be compared to baseline cases of self-employment versus salaried employment for both ILU and BTU respondents.

In our dataset, the actual percentage of respondents pursuing self-employment immediately upon graduation was 1.5% for ILU and 7.4% for BTU (table 2). A $20,000 higher starting salary for an ILU graduate versus a BTU graduate (for example), leads to a probability decrease of 4% in self-employment for the ILU graduate. With the initial probability of pursuing self-employment itself being low, this 4% difference due to salary considerations on top of the already low probability of self-employment, is relatively high and significant. The previous equation (equation 4) further supports this finding as graduating from ILU is negatively related to self-employment. Additionally, the gender variable is significant indicating that males are more likely to pursue self-employment. In our sample, we had a nearly even split between male-female respondents.

Table 11: Marginal Effects from Equation 5 (Probit). Impacts of salary and outside pressures on self-employment choice immediately upon graduation.

Variable	Coefficient	Std. Err.	P-value
Graduating from Ivy	- 0.04	0.05	0.35
First year compensation	-0.002	0.00	0.01**
Entrepreneur in the family	0.01	0.01	0.47
Family prefers salaried employment	0.015	0.02	0.53
Family would discourage self-employment	0.002	0.03	0.932
Entrepreneurs are highly regarded in my culture	-0.007	0.02	0.47
Gender	0.089	0.04	0.04**
Race	0.011	0.01	0.268

7.5. Results Summary

While some of these results individually may not be surprising, combining results from all five equations confirms the existence of higher opportunity costs for ILU graduates, as hypothesized. Essentially, a student considering entrepreneurship and graduating from a more highly ranked university, when compared to a similar student graduating from a lower ranked university, faces an entirely different choice and risk set. This student will likely have (i) a higher paying position, (ii) multiple job interviews and offers, and (iii) parental and peer pressures to interview for and accept "top" corporate positions as these are viewed as "safer" alternatives. With the existence of financial opportunity costs as shown in this section, and the peer/familial pressures outlined in table 3, we claim that pursuing self-employment presents a lower utility option for this student.

In response to the question about having any regrets they may have today about the career choices they made upon graduation, 74% of all respondents stated that they would not change their choices while 12% were unsure at this

point. Less than 2% of the respondents stated that they would change their initial choice and instead start their own venture. These numbers strengthen our assertion that students are in fact making an informed and practical choice when faced with a career decision.

The bigger challenge, when conflicted on an immediate career decision, is for students graduating from higher ranked universities. Students from these institutions have access to more salaried employment options and often, higher salaries. These students thus face a higher hurdle of turning down a "sure thing" and considering an entrepreneurial venture. On the other hand, it can be argued that a student without any job offers looks at self-employment as "just another employment option" and views his choices and their risks differently. In this instance, many students may consider starting a venture as a short term option or as a "nothing to lose" option. It is this difference in attitudes that we address in the next section.

8. Conclusions and Discussion

The findings confirm that students attending top ranked universities and facing higher financial obligations upon graduation have a tough career choice upon graduation and face a significant hurdle starting their own ventures. Starting their own ventures may be appealing but the financial risks, coupled with the potential of turning down a high paying position, makes it financially unwise for many students to consider self-employment as a "rational" option. This result may come across as "expected" or "not surprising" to some but there are some significant policy implications that matter in a university setting.

For one, the logic of the career decision sheds light on the limitations of *immediate* venture creation as a metric of success for entrepreneur programs (especially in highly ranked universities). Instead of immediate success, programs should be trying to measure longer-term impacts of the entrepreneurship education on the career paths of their graduates. Unfortunately, there is continued pressure to produce immediate startups. Donors who fund professorships and other dimensions of university entrepreneurship programs look for an immediate spike in student venture creation. In informal discussions with several entrepreneurship program leaders, we found that media-fueled examples such as Facebook worsen this trend as donors expect programs to launch the next big exciting venture. With donor expectations and the practical realities of data collection, many entrepreneurship program leaders are simply accepting that they have to use immediate startups as a primary barometer of success.

Secondly, ranking systems for entrepreneurship programs that place a primary weight on venture creation exacerbate the problem. University administrators increasingly pay attention to ranking systems and may even set program targets with the rankings in mind. This is counter productive in settings

where students face high opportunities costs when considering *immediate* venture creation. Students with cultural pressures, high debt levels and good job offers often adopt a "later in life" approach to pursuing self-employment. In the absence of other ways to measure this delayed entrepreneurship activity, highly ranked universities face difficult programmatic and faculty resource allocation decisions, and risk disappointing potential donors.

Finally and probably most importantly, there is an even more troubling outcome when universities overemphasize immediate venture creation: large resources may be directed to a very small segment of the university, while ignoring the longer-term outcomes for a larger student population. Business plan contests, incubators, and venture funds to encourage a path directly from undergraduate programs to a new startup benefit only those individuals who either overlook the opportunity costs or do not generate alternative opportunities. In contrast, those who delay their entrepreneurial ventures could benefit from a broader programmatic approach that emphasizes a longer-term outlook.

As mentioned previously, approximately 44% of the top 160 programs (as ranked by Entrepreneur magazine) focus on venture creation in their mission statements. We believe that our results can help put some of these expectations in perspective. In the absence of policies that might minimize the opportunity costs at the time of graduation, we argue that the rational choice for a student is to pursue salaried employment especially if they are graduating from better-ranked institutions. We also argue that the higher the potential opportunity cost a student faces, the more of a "homerun" is needed in terms of immediate and long-term payoffs to equalize the opportunities.

The Global Entrepreneurship Monitor recently found that people over the age of 35 made up 80 percent of the total entrepreneurship activity in 2009. Is the pushing of venture creation out to later in life due to a lack of interest upon graduation, a lack of experience or something as basic as mounting student loans, parental expectations and other aspects of opportunity costs? We argue that one key component of statistic is opportunity cost and as this paper shows, the financial element is significant.

Understanding the opportunity costs faced by their own students upon graduation can help universities in several ways:

1. It can shed light on what the appropriate metrics of success should be. If students tend to be "delayed entrepreneurs" then tracking graduates over time and enumerating and celebrating the later successes will be very important.

2. It can guide curriculum development. For example, students from highly ranked programs may benefit most from broadening the business plan approaches beyond companies that could be launched immediately. Continuing education for entrepreneurs who start ventures later could be developed. Programs could be developed that

focus on the development of long term networks to help graduates connect, start and fund businesses later in their career paths.

3. It can point to ways to lower opportunity costs, equalizing choices. Entrepreneurship programs where students face high opportunity costs may want to consider approaches like the one recently established at the University of Rochester, where they now offer a one-year stipend (Kauffman Entrepreneurial Year) to allow a student "extra runway" to pursue additional courses as well as focusing on getting their startup venture off the ground. Sponsored by the Kauffman foundation, this program may have some merit if venture creation is a focus and decreasing the opportunity costs is a desire of the university.

From an economics perspective, universities face a simple dilemma – their entrepreneurship programs are supplying students with encouragement to opt for *immediate* venture creation, but does that choice make economic sense for the student? Are these students actually demanding venture creation opportunities immediately upon graduation? Our research says no. We argue that as long as a high opportunity costs exist for students, the "good job" trap will continue to limit the number of students opting for startups right after graduation.

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