Bachelor's degrees and business start-ups: A reexamination of Lazear's Theory of Entrepreneurship

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Abstract

Edward Lazear developed a theory that entrepreneurs must be Jacks-of-All-Trades (JAT) whose skills complement those of the more specialized workers they employ. He showed the entrepreneurs will invest in general skills by selecting highly varied academic and employment experiences, allowing them to efficiently direct the talents of their employees. We build upon Lazear's single period model to study business entry choices during the life cycle, dynamically endogenizing human capital investment. We model the unobservable entrepreneurial skill as an ultimate mechanism driving the positive correlation between academic and occupational choices and entrepreneurial entry over time. Using a data base of Iowa State alumni graduating between 1982 and 2006, this study confirms a central assumption in Lazear's model that there exists a common unobserved factor that jointly raises the probability of selecting a broad college curriculum, having a more varied work career, and ultimately starting a business. However, academic diversity is also found to be initially important to starting a business but its importance declines over time, a prediction of our extension of the JAT model.

Key Words: Entrepreneurship; Jacks-of-all-trades; educational experiences; working experience; entry;

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At the heart of economic growth theories is the need for entrepreneurs to make profitable investments in capital, research and development, or technological advancements. In making investments that profit themselves, entrepreneurs also profit the rest of the economy. The key mechanism is an underlying complementarity between the entrepreneur and the inputs they employ. The spillovers from the entrepreneur's skill or knowledge to that of others in society are a common mechanism generating endogenous growth (Romer 1986, 1990; Lucas 2002). McMillan and Woodruff (2002) argued that the most successful transition economies were the ones that fostered the entrepreneurial skills necessary to allocate resources efficiently in the face of the tremendous economic shocks buffeting those countries.

Murphy, Schleifer and Vishny (1991) demonstrated that entrepreneurs capture rising returns to their ability, even as their entrepreneurship raises the total productivity of the society. The increasing returns to entrepreneurial skill come from returns to scale that managers can claim by applying their talents to the other resources. Rosen (1983) and Schultz (1993) pointed out that returns to rare skills increase with the intensity of their use. That intensity can only be increased by combining rare managerial skills with complementary capital and labor inputs.

Understanding the factors that lead to successful entrepreneurial entry is becoming increasingly important as economies are exposed to more rapid changes in technologies, competitive pressures and price shocks. Much of the research effort has been empirical, tying entrepreneurship to whether parents owned a business (Dunn and Holtz-Eakin 2000; Fairlie and Robb 2007), ethnicity (Borjas and Bronars 1989; Fairlie and Meyer 2000; Fairlie 1999), access to finance (Holtz_Eakin et al 1993; Dunn and Douglas Holtz-Eakin

2000), preference or managerial attributes (Fairlie 2002) , and business cycle conditions (Evans and Leighton 1989). However, strong theoretical predictions regarding human capital and managerial abilities had been lacking until Lazear's (2004, 2005) work which built upon the theme of Rosen, Schultz and others that entrepreneurs must have unique skills that complement the inputs they employ. Before that, Blau (1987) and Iyigun and Owen (1988) explicitly incorporated managerial abilities in the model of entrepreneurship, but their focuses were on relationship between economic development and entrepreneurship.

Lazear (2004, 2005) hypothesized that entrepreneurs have an innate managerial skill that drive their interest to enter entrepreneurship. However, to be successful, entrepreneurs need to be able to understand and direct many aspects of their operations. That requires a diversity of skills that can complement the more specialized skills of their employees. Entrepreneurs will invest in a broad range of skills that insure at least a minimum competency in all the areas that are critical to the functioning of their business. Consequently, entrepreneurs become "Jacks-of-All-Trades" (JAT). In contrast, their employees are rewarded for their maximum production capacities. That means laborers have an incentive to specialize their human capital investments in a single area so as to hone a single skill to its maximum potential. Lazear used data on the educational and occupational choices made by a sample of Stanford MBA graduates to test the model's predictions. He measured the breadth of skills alternatively by the number of professional positions held or by the breadth of the academic program in business school. More specialized students chose to work for others while more generally trained students were more likely to start a business after graduation.

JAT theory has been supported in some empirical analysis in several countries. For example, Wagner (2006) and Lechmann and Schnabel (2011) found empirical support for the JAT theory using a representative sample of the German population. However, alternative interpretations of the link between general human capital investments and entrepreneurship have been advanced. Åstebro and Thompson (2011) and Oberschachtsiek (2009) examined whether the correlation between breadth of human capital investments and entrepreneurship was due to taste for variety in Canada and in Germany respectively. They hypothesized that individuals with greater tastes for variety may seek out more varied careers including entrepreneurial ventures, finding mixed evidence on whether the taste for variety or JAT was more consistent with the data. In a similar vein, Silva (2007) argues that unobservable taste or productive factors lead to both greater breadth of human capital investments and entrepreneurship in Italy. He finds that after controlling for individual fixed effects, the significant positive correlation between past number of jobs and probability of entering entrepreneurship disappears. However, his methodology does not rule out that both entrepreneurial entry and occupational choices are due to an innate unobserved ability, the ultimate driver in the Lazear model. A recent study by Hsieh, Parker and Praag (2011) further finds that more risk averse individuals are more likely to invest in balanced skill profiles and therefore are likely to become entrepreneurs, using the Dutch university graduates dataset. Even within workplaces, workforce educational diversity within a firm in Denmark is found to promote entrepreneurial behavior of employees as well as the formation of new firms (Marino, Parrotta and Pozzoli 2012).

This study extends the past empirical and theoretical work on the "Jack-of-all-Trades" mechanism of entrepreneurship by building in the timing of the human capital and occupational choice decisions more explicitly. In doing so, we can examine the joint decisions on variety of educational experiences, variety of working experiences, and entrepreneurial entry. We evaluate those decisions at different times in the life cycle: after leaving high school; after leaving college; and after a period of time in the labor force. In doing so, we can examine the theoretical and empirical implications of allowing individuals to enter or leave entrepreneurship as their knowledge of their talents evolves over time. Our analysis uses a unique data set of more than 5,000 survey responses from Iowa State University (ISU) alumni graduating with a Bachelor's degree between 1982 and 2006. The survey includes questions about business start-ups, work histories of alumni after graduation, and family background, socioeconomic characteristics and extra-curricular activities before college. Information on academic diversity and success was merged in using data from each student's academic record in the University.

Consistent with the Lazear hypothesis, we find that unobservable productivities for entrepreneurship have common positive effects on breadth of college curriculum, diversity of occupational experiences, and probability of starting a business. Furthermore, consistent with Lazear's findings, students with more diverse academic programs are more likely to enter entrepreneurship. As we follow individuals along on their careers, we find that the importance of academic diversity declines while the diversity of work experiences become more important, consistent with our extension of Lazear's theoretical model. In particular, we find that individuals whose academic programs are more specialized may ultimately enter entrepreneurship, but are more likely to do so by picking more diverse occupational experiences to broaden their human capital portfolios before starting a business.

The next section extends Lazear's "Jack-of-all-Trades" model of entrepreneurship to two periods to show how and why occupational decisions can change over the life cycle, driven by both the mechanism of JAT theory and the unobserved entrepreneurial abilities. The theory leads to an empirical strategy which we outline next. Then, we present a summary of the data used to evaluate academic, occupational and entrepreneurial decisions. Section 4 proposes an empirical strategy and test hypotheses and reviews the empirical results. The last section concludes the paper.

A model of occupational, educational, and entrepreneurial choices

We illustrate the key elements of the entrepreneurial entry decision using a two-period model of human capital choices. At the beginning of each period, an individual decides whether to be an entrepreneur or a laborer[1]. Following Lazear (2005), we assume that a laborer's income is related to specialized skills. Thus, if human capital is measured along two dimensions, x_1^t and x_2^t in period t, the payoff function for a laborer in period t is associated with the skill that represents his comparative advantage, $Y_L^t = \max(x_1^t, x_2^t)$, $t = 1, 2$. On the other hand, entrepreneurs are "jacks-of-all-trades" whose payoff depends on holdings of both skills. If the generation of entrepreneurial earnings is subject to a Leontief technology in the two skills, entrepreneurial earnings are given by $Y_E^t = \lambda_t \min(x_1^t, x_2^t)$ where entrepreneurial

[1] If instead the first period skills are exogenously determined and only the second period occupation decision is modeled, we will still reach similar conclusions.

skill $\lambda_t > 1$. This entrepreneurial skill evolves over time such that $\lambda_t = \lambda_{t-1} + \varepsilon_t$, where ε_t is governed by a white noise process. At the start of each period, the individual learns ε_t and so λ_t becomes fully observed. As λ_t increases, entrepreneurial earnings rise relative to being a laborer and so the probability of choosing entrepreneurship increases. That means that λ_t will have a reservation property such that only individuals with $\lambda_t \geq \lambda^*$ will become entrepreneurs.

To make this precise, let the level of skill selected in period t be $H_t = x_1^t + x_2^t, t = 1, 2$ where H_t is exogenously given. Individual's strategy is choosing an optimal combination of x_1^t and x_2^t so as to maximize income. Specifically, at the start of period 1, each individual chooses whether to be an entrepreneur (E_1) or a laborer (L_1) and chooses to invest in appropriate skill levels x_2^t and x_2^t. We assume individuals are risk neutral, and so the choices are made so as to maximize lifetime income[2]:

$$\underset{\{E_1,S_1,x_1^1,x_2^1;E_2,S_2,x_1^2,x_2^2\}}{\text{Max}} \{Y^1 + E(Y^2|x_1^1, x_2^1)\} \text{ s.t. } x_1^t + x_2^t = H_t, t = 1,2 \qquad (1)$$

where $Y^1 = \text{Max}\{\lambda_1 \min(x_1^1, x_2^1), \max(x_1^1, x_2^1)\}$ and

$Y^2 = \text{Max}\{\lambda_2 \min(x_1^1 + x_1^2, x_2^1 + x_2^2), \max(x_1^1 + x_1^2, x_2^1 + x_2^2)\}$.

Individuals who receive a draw on entrepreneurial skill $\lambda_1 \geq 2$ will become entrepreneurs in the first period[3]. In doing so, they would invest in skills such that $\hat{x}_1^1 = \hat{x}_2^1 = \frac{H_1}{2}$ with expected earnings equal to $Y^1 = \lambda_1 \hat{x}_1^1 = \lambda_1 \hat{x}_2^1$. Because the expected entrepreneurial skill in period 2 will be $E(\lambda_2) = \lambda_1$, entrepreneurs will expect to set $\hat{x}_1^2 = \hat{x}_2^2 = \frac{H_2}{2}$ in period 2 and earn $E(Y^2) = \lambda_1 \hat{x}_1^2 = \lambda_2 \hat{x}_2^2$.

Individuals with weak draws on λ_1 in period 1 such that $\lambda_1 < 2$ will become

[2] We assume that cost of investing in two skills is not differentiated, which leaves individuals with choices in skills driven by return to occupation types.
[3] Please see the appendix for details of solving equation (1).

laborers. They will want to specialize in producing only x_1^1 or only x_2^1 because they can only extract a reward from one of the two skills. Laborer earnings will be either $\mathrm{Y}^1 = \hat{x}_1^1 = H_1$ or $\mathrm{Y}^1 = \hat{x}_2^1 = H_1$. The best forecast a laborer can make of their next draw on entrepreneurial skill in period 2 will be $E(\lambda_2) = \lambda_1 < 2$, and so they will expect to be laborers in period 2 as well, continuing to invest in the same skill in period 2 that they specialized in during period 1.

If the laborer specialized in skill $\hat{x}_j^1$, $\mathrm{j} = 1{,}2$ in period 1, the expected earnings in period 2 will be $E(\mathrm{Y}^2) = \hat{x}_1^2 + \hat{x}_2^2$. Everyone enters period 2 with the optimal skill portfolio $(\hat{x}_1^1, \hat{x}_2^1)$ from period 1 and the occupation decisions $\{E_1,\ L_1\}$. They also learn their true $\lambda_2 = \lambda_1 + \varepsilon_2$. At that point, each individual can reassess whether to stay with their planned occupation and projected skill decisions or to change. The occupational choice at the beginning of the second period is

$$\underset{\{E_2, S_2, x_1^2, x_2^2\}}{\mathrm{Max}} \{\lambda_2 \min(\hat{x}_1^1 + x_1^2, \hat{x}_2^1 + x_2^2), \max(\hat{x}_1^1 + x_1^2, \hat{x}_2^1 + x_2^2)\} \ \text{s.t.}\ x_1^2 + x_2^2 = H_2 \qquad (2)$$

This leads to four possible cases:

Case 1 An individual is an entrepreneur in both periods 1 and 2.

Case 2 An individual is an entrepreneur in period 1 but becomes a laborer in period 2.

Case 3 An individual is a laborer in period 1 but switches to become an entrepreneur in period 2.

Case 4 An individual is a laborer in both periods 1 and 2.

Figure 1 illustrates returns and conditions for different occupations in both periods. When there is no exogenous entrepreneurial shock ε_2, individuals will not switch their occupations. Sticking to their occupations will maximize their income in period 2. When random ε_2 is realized in the beginning of the second period, individuals may switch their occupations, depending on the magnitude and direction of ε_2 and timing, thereby, composition of H_2 and H_1.

As shown in Figure 1, occupational returns in each period mimic a buyer's profit of call options. Laborer's income is reservation wage, simulating the certain return (fixed cost) of call option when realized stock price is lower than the strike price. At the same time, entrepreneurial income depends on realized individual specific entrepreneurial ability λ and is linearly increasing in λ, simulating the profit of call option when the stock price goes beyond the strike price. We then examine the conditions necessary to support each of these cases when the shock ε_2 is realized only in the beginning of the second period.

Case 1 For an individual to be an entrepreneur in period 1, $\lambda_1 \geq 2$ and $\hat{x}_1^1 = \hat{x}_2^1 = \frac{H_1}{2}$. To remain an entrepreneur in period 2, $\lambda_2\left(\frac{H_1}{2} + \frac{H_2}{2}\right) > \frac{H_1}{2} + H_2$ or $\lambda_1 \geq 1 + \frac{H_2}{H_1+H_2} - \varepsilon_2$. The individual is more likely to remain an entrepreneur, the smaller the avenues for additional human capital accumulations in period 2 relative to period 1 and the more positive are the realizations of additional entrepreneurial skills at the start of period 2. Earnings for these entrepreneurs will be $Y^2 = \lambda_2(\frac{H_1+H_2}{2})$.

Case 2 An individual who initially enters entrepreneurship and then switches to laborer status will devote all their period 2 skill investment into only one of the two options, x_1^2 or x_2^2. Abandoning entrepreneurship will be optimal if $\lambda_1 < 1 + \frac{H_2}{H_1+H_2} - \varepsilon_2$, which will happen if the individual gets a large negative shock to their entrepreneurial skill and/or if there are substantial opportunities to acquire specialized skills in period 2 relative to period 1. In switching to laborer status, former entrepreneurs will get no reward from half their period 1 human capital, and so their period 2 earnings will be $Y_2 = \frac{H_1}{2} + H_2$.

Case 3 An individual who is a laborer in period 1 devotes all skill investment H_1 in one skill, either x_1^1 or x_2^1. For that person to switch to entrepreneurship, they would have to invest intensively in the other skill in period 2 so that by the end of period 2, $\hat{x}_1^1 + x_1^2$ is as close to $\hat{x}_2^1 + x_2^2$ as possible.

Case (3.A) $\boldsymbol{H_2 \geq H_1}$. Without loss of generality, suppose that all of the period 1 skill investment was in $\hat{x}_1^1$. When there is greater opportunity to add human capital in period 2, all of period 2 investment would be in x_2^2 up to the point where $\hat{x}_1^1 = x_2^2$. From then on, the entrepreneurial entrant would devote equal time to the two skills. Accumulated human capital would be $\frac{H_1+H_2}{2}$. That switch from laborer to entrepreneur would only make sense if $Y_2 = \lambda_2(\frac{H_1+H_2}{2}) > H_1 + H_2$ or $\lambda_1 > 2 - \varepsilon_2$. Switches from laborer to entrepreneurship require a large positive innovation $\varepsilon_2 > 0$ to make up for the fact that $\lambda_1 < 2$. In this case, the probability of entering entrepreneurship in period 2 is unrelated to past or current human capital investment opportunities but will depend only on the size of ε_2.

Case (3.B) $\boldsymbol{H_2 < H_1}$**.** Again, assume that all of the period 1 skill investment was in $\hat{x}_1^1$. When opportunities to invest in additional human capital are more limited in period 2 than period 1, all of period 2 investment would be in $x_2^2 = H_2 < H_1 = \hat{x}_1^1$. Entrepreneurial income is bounded from below on H_2. The laborers will switch to entrepreneurship only if $Y_2 = \lambda_2 H_2 > H_1 + H_2$ or $\lambda_1 > 1 + \frac{H_1}{H_2} - \varepsilon_2 > 2 - \varepsilon_2$.

Therefore, the condition for switching from laborer to entrepreneur requires an even larger positive shock $\varepsilon_2 > \frac{H_1}{H_2} - 1$ than in Case (3.A).

Case 4 An individual who becomes a laborer in period 1 will remain a laborer in period 2 if $\lambda_1 < 2 - \varepsilon_2$. It is optimal to continue specializing in the same skill selected in period 1, and so if $\hat{x}_j^1 > 0$, then $x_j^2 > 0$ for continuing laborers. Period 2 earnings for continuing laborers will be $Y_2 = H_1 + H_2$.

Formally, we define q as the probability to be an entrepreneur in the life,

$$q \equiv Prob(E_2 = 1|E_1 = 1) \times Prob(E_1 = 1) + Prob(E_2 = 1|L_1 = 1) \times Prob(L_1 = 1).$$

Then we will have

$$q = \int_2^{\infty} d\lambda_1 \int_{1+\frac{H_2}{H_1+H_2}-\lambda_1}^{\infty} g(\lambda_1, \varepsilon_2) d\varepsilon_2 + \int_1^2 d\lambda_1 \int_{2-\lambda_1}^{\infty} g(\lambda_1, \varepsilon_2) d\varepsilon_2 \text{ when } H_2 \geq H_1$$

and

$$q = \int_2^{\infty} d\lambda_1 \int_{1+\frac{H_2}{H_1+H_2}-\lambda_1}^{\infty} g(\lambda_1, \varepsilon_2) d\varepsilon_2 + \int_1^2 d\lambda_1 \int_{1+\frac{H_1}{H_2}-\lambda_1}^{\infty} g(\lambda_1, \varepsilon_2) d\varepsilon_2 \text{ when } H_2 < H_1.$$

If H_1 is measured by academic experience and H_2 is measured by work experience, we are reasonably more interested in the case of $H_2 \geq H_1$, as in the following empirical analysis. It can be shown that $\frac{\partial q}{\partial\left(\frac{H_1}{H_2}\right)} > 0$ when $H_2 \geq H_1$[4]. A marginal increase in the relative importance of H_1 over H_2 will lead to higher tendency to start a business. We therefore expect that skill diversity in the first period will affect entrepreneurship to a

[4] $\frac{\partial q}{\partial\left(\frac{H_1}{H_2}\right)}$ is undetermined when $H_2 < H_1$, depending on the shape of density function $g(\cdot)$. If $g(\cdot)$ is highly skewed right, $\frac{\partial q}{\partial\left(\frac{H_1}{H_2}\right)}$ may become negative. However, conditional comparative statics are unambiguous. $\frac{\partial Prob(E_2=1|E_1=1)}{\partial\left(\frac{H_1}{H_2}\right)} > 0$ and $\frac{\partial Prob(E_2=1|L_1=1)}{\partial\left(\frac{H_1}{H_2}\right)} < 0$, indicating starting a business is harder when old for an individual who has specialized human capital investment when young.

larger degree as $\frac{H_1}{H_2}$ increases. This notion indicates that studying the relationship between entrepreneurship likelihood and skill diversity depends on identified time length.

2.1 Empirical Strategy

Cases 1 and 4 are the ones that were derived in Lazear (2005). Our extension to a second period leads to Cases 2 and 3A-B in which individuals can change their entrepreneurial choices over the life cycle. These four cases allow us to derive several predictions that we can take to the data. For our purposes, it is useful to frame these predictions in the context of when we observe individual behavior, at the start of period 1 or at the start of period 2.

Period 1: During period 1, individuals will be planning their human capital investments, given knowledge of their entrepreneurial skills λ_1. Because λ_1 is unobservable to the econometrician, it will be a source of error in equations explaining human capital and occupational choices.

Let $\mathrm{Var}(\mathrm{H}_{1i}^{s})$ be the variance in the schooling investments pursued by individual *i*. A highly varied education portfolio would include broad training over many different fields. A low variance education portfolio would involve many credits in a single major with limited exposure to coursework outside the major. Following Lazear's (2005) terms, high variance academic programs are pursued by generalists and low variance programs are pursued by specialists. Similarly, let $\mathrm{Var}(\mathrm{H}_{1i}^{o})$ be the variance in the types of occupational or industrial human capital pursued by individual *i*. Generalists would pick highly varied occupational experiences or wide ranging sectors of the economy while specialists would focus on a narrow range of job experiences. The choice to enter entrepreneurship E_i will be made more profitable with the high levels of $Var(H_{1i}^{s})$ and $Var(H_{1i}^{o})$. If Z_i is a vector of individual attributes known at the start of period 1 that affects relative earnings in entrepreneurial or laborer occupations, we can characterize the choices available to individual *i* at the start of period 1 as

$$Var\left(H_{1i}^{S}\right) = Z_i'\beta_Z^S + \beta_\lambda^S\lambda_{1i} + \xi_{1i}^S = Z_i'\beta_Z^S + v_{1i}^S$$

$$Var\left(H_{1i}^{O}\right) = Z_i'\beta_Z^O + \beta_\lambda^O\lambda_{1i} + \xi_{1i}^O = Z_i'\beta_Z^O + v_{1i}^O$$

$$E_{1i} = \gamma_S Var\left(H_{1i}^{S}\right) + \gamma_O Var\left(H_{1i}^{O}\right) + Z_i'\gamma_Z^E + \gamma_\lambda^E\lambda_{1i} + \xi_{1i}^E = Z_i'\beta_Z^E + \beta_\lambda^E\lambda_{1i} + \xi_{1i}^E = Z_i'\beta_Z^E + v_{1i}^E$$

where the right-hand-side of the last equation is the reduced form representation of the structured relationship between E_i and $Var\left(H_{1i}^{S}\right), Var\left(H_{1i}^{O}\right)$ and Z_i. We assume that the error terms ξ_{1i}^{E}; $k = S, O, E_1$; are identically and independently distributed such that $Cov(\xi_{1i}^{k}, \xi_{1i}^{l})$=0. However, the compound errors $v_{1i}^{k} = \beta_Z^k\lambda_{1i} + \xi_{1i}^{k}$; $k = S, O, E_1$; will be correlated because of the common unobserved entrepreneurial skill.

Proposition 1.1 $Cov\left(v_{1i}^{k}, v_{1i}^{l}\right) > 0; k \neq l$.

Because high values of λ_1 lead to broader human capital investments, we would expect $\beta_\lambda^k > 0$,k $= S, O, E_1$. Therefore, the theory requires that $Cov\left(v_{1i}^{k}, v_{1i}^{l}\right) > 0$.

Proposition 1.2 $sgn\left(\beta_Z^k\right) = sgn\left(\beta_Z^l\right); k \neq l$.

The maintained hypothesis underlying the theory is that human capital investment and entrepreneurial choices are being made simultaneously so as to increase expected lifetime earnings. Consequently, if Z_i raises expected entrepreneurial income and increases the probability that E_{1i}= 1, then it will also increase $Var\left(H_{1i}^{S}\right)$ and $Var\left(H_{1i}^{O}\right)$.

Start of Period 2: At the start of period 2, the individual receives the draw on λ_2. Because the innovation ε_2 is white noise and $Cov(\lambda_1, \lambda_2) > 0$, there will be persistence in the entrepreneurial and human capital choices undertaken in period 1. However some individuals will receive sufficiently large positive or negative draws on ε_2, which induces a change into or out of entrepreneurship. As a result, there will be several other predictions that can be derived from the theory.

We make the simplification that period 2 is defined by completion of formal schooling so that $\mathrm{Var}(H^S_{1i})$ was selected prior to the realization of ε_2. However, individual *i* can still alter the mix of occupational or industrial human capital in conjunction with decisions of whether to be an entrepreneur during period 2. We can characterize those choices as

$$\mathrm{Var}(H^O_{2i}) = Z_i'\theta^O_Z + \theta^O_S\mathrm{Var}(H^S_{1i}) + \theta^O_\lambda\lambda_{2i} + \xi^O_{2i} = Z_i'\theta^O_Z + \theta^O_S\mathrm{Var}(H^S_{1i}) + v^O_{2i} \qquad (3)$$

$$E_{2i} = Z_i'\omega^E_Z + \omega_S\mathrm{Var}(H^S_{1i}) + \omega_O\mathrm{Var}(H^O_{2i}) + \omega^E_\lambda\lambda_{2i} + \xi^E_{2i}$$

$$= Z_i'\theta^E_Z + \theta^E_S\,\mathrm{Var}(H^S_{1i}) + v^E_{2i} \qquad (4)$$

Proposition 2.1 $\mathrm{Cov}(v^O_{2i}, v^E_{2i}) > 0$.

High values of λ_2 will lead to broader human capital investments in period 2 as well as a higher likelihood of entrepreneurial status in period 2. Therefore, the theory requires that $\mathrm{Cov}(v^O_{2i}, v^E_{2i}) > 0$.

Proposition 2.2 As the gap between period 2 and 1 increases, $\theta^E_S \to 0$.

This prediction suggests that as an individual learns more about their entrepreneurial talents, the importance of their past human capital investment choices will decrease relative to their more recent decisions. This prediction is case sensitive in that Case 1 and Case 4 individuals will experience no loss of their period 1 human capital. However, Case 2 individuals moving from E_1 to L_2 will find that half of the human capital they generated in period 1 will be wasted. Case 3.B individuals moving from L_1

to E_2 will have $\hat{x}_1^1 > \hat{x}_2^2$ and so they will waste part of their period 1 human capital investment in $\hat{x}_1^1$. Case 3.A individuals moving from L_1 to E_2 will base their decision without regard to period 1 human capital investments. Therefore, period 1 human capital investments lose their correlation with entrepreneurial status as time goes by. Note that occupational or sectoral work decisions will continue to be adjusted with the entrepreneurial decision in period 2, and so the correlation between E_{2i} and $\mathrm{Var}(H_{2i}^O)$ will not diminish over time.

End of Period 2: It is easier to examine evidence for Proposition 2.2 if we consider examining data at the end of period 2 after occupational or sectoral employment decisions have been made. We can then modify (3.1) as

$$E_{2i} = Z_i^{'}\omega_Z^E + \omega_{S1}\mathrm{Var}(H_{1i}^S) + \omega_{S2}T_i \cdot \mathrm{Var}(H_{1i}^S) + \omega_O\mathrm{Var}(H_{2i}^O) + v_{2i}^E$$

where we are defining period 2 as composed of T_i subperiods from the timing of school leaving until the time we observe occupational status. If period 1 human capital investments decay in value over time, whether because new information on entrepreneurial skills alters entrepreneurial trajectory or because human capital is subject to depreciation over time ($\frac{\partial q}{\partial\left(\frac{H_1}{H_2}\right)} > 0$), $\omega_{S1}>0$ and $\omega_{S2} < 0$. On the other hand, the diversity of occupational experiences should increase the probability of entering entrepreneurship so that $\omega_O > 0$. Note that individuals who enter entrepreneurship early in their careers will have a relatively narrow mix of work experiences and so one would expect the impact of occupational or sectoral job diversity to be biased downward. As we will see, that concern does not seem to alter our conclusions from empirical tests of the theory, perhaps because even those who plan to enter entrepreneurship at an early age will try to establish a mix of occupational experiences soon after leaving school.

Data

The sample of alumni analyzed throughout this study is drawn from Iowa State University bachelor's degree recipients between 1982 and 2006. The sampling population consisted of 84,917 alumni. The sampling rate was approximately 24 percent. The total sample drawn was 25,025. We received 5,416 usable surveys for a response rate of 21.6 percent. The survey elicits information on all jobs held since graduating from ISU including whether the individual ever started a business. That survey information serves as the basis for our study of entrepreneurial entry. There are several advantages of our data set in testing and expanding Lazear's JAT theory relative to his survey of Stanford MBAs. The ISU survey includes BA recipients from a land-grant institution that is obligated to accept applications from any resident that finished in the top half of his or her high school class.

Compared to Stanford MBAs, our sample will reflect a much broader range of abilities, family incomes, and interests in business. In contrast, Stanford MBAs will be drawn atypically from the upper tail of distributions of socioeconomic status, cognitive ability, and business interests. At minimum, it is useful to examine the extent to which the JAT theory predictions extend to a less selective population that is also less naturally oriented toward entrepreneurship. For each alumni respondent to the ISU survey, we were allowed to merge in information from their academic record. The match worked very well with only 3 out of 5,416 observations missing. The student's transcript provides complete information on college major(s), coursework inside and outside the major, coursework in mathematics, science and business, and academic performance.

The student record also adds information on gender, foreign language skills, high school rank, and high school coursework.

The JAT theory predicts that those interested in entrepreneurship will select a more diverse academic program. Following Lazear, we define a variable AC_SPEC_i to measure the degree of specialization in individual *i*'s academic program. The value is the number of courses in the major minus the average number of courses taken in other departments. This is an inverse measure of the variance in academic human capital investments $Var(H_{1i}^S)$ referred to in equation (3A). In Lazear's analysis of Stanford MBAs, entrepreneurs had lower values of AC_SPEC_i.[5]

Table 1(a) shows entrepreneurship rates for different cohorts of respondents who rank high or low on this measure of academic specialization. There are significant differences in entrepreneurship rates only for the most recent cohort which was surveyed within five years of graduation. For that group, entrepreneurship rates are twice as high for those at the lower tail of AC_SPEC_i compared to those with the most specialized academic programs. The differences diminish in magnitude and significance as time since graduation increases, consistent with another prediction of the theory. We can also generate measure of the diversity of work experiences, $Var(H_{1i}^O)$ referred to in equation (3B). Using responses from the survey, we can measure the number and variety of jobs held since graduation. We propose two measures, $OCCUPATIONS_i$ which represents the number of different occupational experiences since graduation, and $INDUSTRIES_i$

[5] We also created an academic Herfindahl index measured as $\sum s_{ij}^2$, where s_{ij}^2 is the share of credits earned in major *j* by individual *i*. The simple correlation between the Herfindahl measure of coursework concentration and AC_SPEC_i was 0.69, and qualitative results were similar. However, some of the empirical models using the Herfindahl measure ran into convergence problems, and so we opted for AC_SPEC_i .

which measures the number of different industries in which those jobs were located[6]. Table 1(b) reports the average values of $OCCUPATIONS_i$ for respondents operating a business in the survey year versus non-entrepreneurs. Entrepreneurs consistently have held more occupations since graduation than non-entrepreneurs, although the difference is not always statistically significant. Note that individuals with successful entrepreneurial ventures will stop seeking other work, and so the bias in number of occupations would be against the JAT prediction that entrepreneurs would have more diverse work experiences.

Proposition 1.1 suggests that individuals with strong draws on entrepreneurial skill will have consistently broad academic and occupational experiences. As a result, we should see that those who select more varied academic programs will also have more varied work histories. The first-pass look at the data appears to be consistent with that expectation. In Table 1(c), we examine the occupational choices of alumni with the 25% most and 25% least diverse programs of study. Graduates from more narrowly focused majors also tend to have more specialized work careers. Graduates who had broader academic training have a slightly greater tendency toward more diverse work careers.

While the broad tendencies in the data appear to be consistent with the JAT theory, we need to examine whether the first-pass evaluations hold up to controls for other covariates that could affect decisions on academic and occupational choices. Summary statistics on those covariates are shown in Table 2. The sample statistics are reported by early entrepreneurs (started a business within five years of graduation), later entrepreneurs, and non-entrepreneurs. Consistent with national data on the incidence of self-employment, 15.8% of the ISU alumni have started a business. Early entrepreneurs

[6] Please see the appendix for detailed information about specific industries and occupations in the survey.

are those who have ever started a business within five years after graduation from ISU. Late entrepreneurs started businesses more than five years after graduation. We further divide the variables by when they occur in the life cycle, either before going to college, at graduation, or later in the life cycle. Turning to the information on the ISU alumni before they even attended college, we note first that as a science and technology university, the population of graduates is atypically male. Nevertheless, men are more likely to have started a business than women. Entrepreneurs come from larger families whose parents have less education than non-entrepreneurs. In addition, non-entrepreneurs were better students in high school, although the two groups perform equally well in college.

By the time of graduation, entrepreneurs are more likely to be married. Students in the Colleges of Agriculture and Design are atypically more likely to start businesses, but the other majors have similar proportions working for others and owning businesses. Similar to Tables 1A and 1B, entrepreneurs worked in more diverse occupations and industries and had broader academic programs.

Empirical findings

Period 1: Entering college

At the time they leave high school, the model predicts that individuals will be planning their academic and occupational trajectories with knowledge of their potential entrepreneurial talent. The empirical specification that follows from the theory if given by equations 3(A-C). The model suggests that decisions on academic diversity $Var(H_{1i}^{S})$, occupational diversity $Var\left(H_{1i}^{O}\right)$ and entrepreneurship E_{1i} will be made jointly based on a vector of attributes Z_i composed of information available to the individuals at the time of college entry. To operationalize the empirical construct, we proxy the dependent variables as a vector of dummy variables. $Var\left(H_{1i}^S\right)$ is indicated by a dichotomous variable $S_i = 1$ if $AC\_SPEC_i \leq AC\_SPEC_{25\%}$, where $AC\_SP\ EC_{25\%}$ divides the measure of course concentration from the lowest 25% and the upper 75%. $S_i = 1$ indicates that individual *i* has one of the 25% most diverse academic programs in the sample.

Similarly, $Var\left(H_{1i}^O\right)$ is indicated by a dichotomous variable $O_i = 1$ if $OCCUPATION\ S_i > 2$ which is the 75th percentile number of occupations. The variable E_{1i} is alternatively defined as indicating whether individual *i* has ever started a business or whether individual *i* has ever started business that was ultimately successful. We posit that the error terms $v_i^k = \beta_\lambda^k \lambda_{1i} + \xi_i^k,\ k = S, O, E$; are distributed such that $\lambda_{1i} \sim N(0, \sigma^2),\ \xi_i^k \sim N(0,1)$ and $Cov(\xi_i^k, \lambda_{1i}) = 0$. Then the system 3(A-C) can be estimated using a trivariate probit specification[7].

The correlation coefficient between any two random errors out of the three equations is

$$\rho_k^l = \frac{\beta_\lambda^k \beta_\lambda^l}{\sqrt{1 + {\beta_\lambda^k}^2 \sigma^2}\sqrt{1 + {\beta_\lambda^l}^2 \sigma^2}}, \qquad k, l = S, O, E; k \neq l.$$

A finding of $\rho_{SO} > 0$, $\rho_{SE} > 0$ and $\rho_{OE} > 0$ is consistent with Proposition 1.1 that there is a common unobserved factor λ_{1i} that generates a positive correlation among the errors in the three decisions. That unobservable factor is consistent with an unobserved

[7] We use the Generalized Linear Latent and Mixed Models procedure in STATA to estimate the model. It uses the Newton—Raphson method and adaptive quadrature to approximate the likelihood function by numerical integration (Rabe-Hesketh et al 2004). The model also takes into account sample weights in order to obtain robust standard errors (Rabe-Hesketh et al 2006).

entrepreneurial skill. The signs and magnitudes of the parameter β_λ^S, β_λ^O, and β_λ^E will show how and to what extent the unmeasured entrepreneurial human capital affects their skill investment portfolio and occupation choices. We have to use an added restriction to identify the parameters, which we do by setting $\beta_\lambda^S = 1$.

The remaining parameters β_λ^S, β_λ^O, and β_λ^E will test for the validity of Proposition 1.2 that $sgn(\beta_\lambda^S) = sgn(\beta_\lambda^O) = sgn(\beta_\lambda^E)$. The model presumes that the three choices are subject to a common set of factors Z_i that affects returns to all three choices similarly. The results are shown in Table 3 for the two alternative measures of entrepreneurship. First, it is apparent that the error term parameters β_λ^O and β_λ^E are significantly positive, implying positive correlation coefficients ρ_k^l. As the effect of λ_i is normalized at 1 for schooling diversity, its impact is even larger on job experiences and entrepreneurial entry. Consistent with Lazear's JAT theory, there is a common unobservable attribute that drives academic, occupational and entrepreneurial choices, consistent with the model predictions of the effect of unobserved entrepreneurial skill.

There is also support for the proposition that there are common effects of individual attributes on the three choices. In both specifications, the signs are the same on all three choices for five of the seven factors. In Panel A, males, those from larger families with more educated fathers and at least one parent who had started a business were more likely to become entrepreneurs, have a varied work history, and select a more diverse college curriculum. High school rank lowered the likelihood of all three decisions. Mother's education had only a negative effect in the two cases where the coefficients were significant. In panel A, the only conflicting finding was for ethnic minority status which raised the probability of entrepreneurship despite increasing both academic and occupational specialization. Even that case was reversed in Panel B when only successful entrepreneurial ventures were considered. The overall evidence is that a factor that raises returns to entrepreneurship increases incentives to have diverse occupational and academic experiences as well, consistent with Proposition 1.2.

Period 2: Leaving college

Upon leaving college, individuals decide whether to start a business or accept employment from someone else. The decision will be influenced by the diversity of the academic program with the prediction from equation (5) that $\theta_S^E > 0$, consistent with Proposition 2.1. As time goes by and individuals learn more about their entrepreneurial skill, we would expect the importance of the academic program to fall as additional occupational or industrial experiences gain in importance, consistent with Proposition 2.2. We can test these propositions using a logit specification of equation (5). We time the analysis in two ways, whether the individual starts a business within five years of graduating which we refer to as early entrepreneurial entry. We then redo the analysis where the dependent variable is ever starting a business after graduating which we refer to as life time entrepreneurial entry. Academic diversity should be more important for early entry and occupational or industrial diversity should matter more for lifetime entry.

The results are shown in Table 4. The first two columns examine early entrepreneurial entry and the last two columns examine lifetime entry. More specialized academic programs (high values of AC_SPEC_i) reduce the probability of starting a business within five years of graduation, consistent with Proposition 2.1. The result is unchanged when we add controls for the breadth of occupational or industrial experiences per year of post graduation work experience. Although the latter are selected jointly with entrepreneurship and so should more properly considered endogenous, it is interesting to note that even in the short period following graduation, entrepreneurs tend to also have more varied occupations than those who did not start a business. There is no systematic relationship between number of industrial experiences and business start-ups.

Expanding the time frame to as many as 25 years after graduation depending on date of bachelor's degree issuance, we find that the importance of academic diversity diminishes. We cannot reject that the effect is significantly different from zero. On the other hand, the size and significance of occupational diversity increases as we add additional years of work experience to the sample frame. Furthermore, diversity of industrial experiences also increases the probability of starting a business. Note that the occupational and industrial experiences are normalized by years of post graduation work experience so the positive correlation between occupational or industrial diversity and lifetime entrepreneurial entry is not just due to a coincidence of rising probability of starting a business with rising career length. These findings are broadly consistent with Proposition 2.2.

The more definitive test allows us to treat occupational diversity as endogenous in the early post-graduation period, as shown in equation (4) and (5). In the first model of Table 5, early entrepreneurship and early occupational choices are jointly estimated, treating academic achievement as given. Because alumni graduating in early years tend to have more $OCCUPATIONS_i$, we normalize the measure of occupation choices in their early career by its average. Academic specialization AC_SPEC_i is negatively correlated with both entrepreneurship and occupation diversity, consistent with proposition 2.1.

Similarly, joint estimation of life time entrepreneurship and occupation diversity is estimated. As shown in the second model in Table 5, coefficient of AC_SPEC_i is also negatively and notably smaller in absolute value than the one in the first model in Table 5. The findings from both table 3 and table 5 suggest that we will show that $Cov(v_{2i}^{O}, v_{2i}^{E}) > 0$ even as the impact of academic diversity is positive but diminishes over time.

Is this positive correlation in human capital and occupation choices due to taste for variety?

As we have shown in previous analysis, unobservable managerial abilities λ have common positive effects on breadth of college curriculum, diversity of occupational experiences, and probability of starting a business. Some empirical evidence has challenged this mechanism by arguing that individuals who have strong preference for variety will have balanced skill sets, which consequently enables them to start the business (Åstebro and Thompson 2011; Oberschachtsiek 2009).

Using the retrospective information about individual's behavior and psychological question in the survey, we can at least identify the role played by taste for variety played. We use three measures to approximate the taste for variety. Firstly, we use the number of extra-curricular activities students were active in, which includes sports, music or band, drama, academic clubs, 4-H/ FFA, boy or girl scouts and others. Secondly, I use the number of foreign language classes students took before entering the college: French, Spanish, German, Russian, Latin and others. Lastly, students responded the psychological question " Some people can be characterized as being precise, reliable, efficient, and well-disciplined – the kind of person that prefers 'doing things better'. Others can be described as more non-conforming, questioning, and challenging of authority. Such people, uncomfortable with structured situations, prefer 'doing things differently'". A binary variable is created to indicate revealed preference for variety if individuals prefer doing things differently.

As can be seen from the regression results shown in Table 6, even after we control for preference toward taste variety, the JAT mechanism is still significant. However, though only the taste of doing things differently matters for entrepreneurship, we do find that individuals who seek variety in everyday life are more likely to become entrepreneurs. Furthermore, because the coefficient for the interaction term of *AC_SPEC* and taste measure is significant negative, indicating that both taste toward variety and diversity investment in human capital is reinforcing each other to boost entrepreneurship.

Is this positive correlation in human capital and occupation choices due to risk aversion?

Entrepreneurs are believed to be willing to take risk. If risk aversion is correlated with human capital investments strategies but ignored in regression of entrepreneurship, JAT mechanism will be spurious and estimates have omitted variable bias. In fact, Hsieh, Parker and Praag (2011) find that more risk averse individuals are more likely to diversify skill investment and therefore are likely to become entrepreneurs, using the Dutch university graduates dataset. It is clearly shown in Figure 1 that if λ_1 is just a little higher than entrepreneurship threshold 2, $\lambda_1 = 2 + \epsilon$ where ϵ is positively close to zero, more risk averse individuals may want to equalize human capital investment in H_1, as long as risk premium paid is smaller than $\frac{H_1}{2}$.

There is no direct measure of risk aversion or risk preference in the survey data. We include industry fixed effects, following Lazaer (2005). Lazear uses the standard deviation of income in each of different industry/occupation where each MBA graduate's first job after graduation was to proxy risk preference. We have no information about student's industry / occupation categories for their first jobs. Therefore, we adjust the measure by using a series of dummy variables are industries in which individuals have worked and are working. The idea is that variation in industry experience, capturing fixed industry effects, can approximate variation in willingness to take risks and tolerance for risk. Of course, choices of industries reflect individual's risk preference, but it may also include different levels of entrepreneurial opportunities. For example, due to rapid technology advancement, information technology industry, having lowered entry barrier and having burgeoning opportunities, is more entrepreneurial than some other industries like education.

Augmented regression, adding these results are reported in Table 7. Dummy variables of industry fixed effect are jointly significant, indicating that individual specific industry experience matters for entrepreneurship. However, adding these industry fixed effect does not affect the significance level of both academic human capital and work experience diversity in any of the model specification. Our results of consistency of JAT mechanism through entrepreneurial abilities and dissipating relevance of academic knowledge diversity over time are robust.

Conclusion

This paper examines the theoretical predictions of the Lazear "Jack-of-all-Trades" model of entrepreneurship when multiple periods are allowed and then tests those predictions using data collected from a sample of Iowa State University bachelor's degree recipients from 1982-2006. Several of the findings from Lazear's (2005) paper using a sample of Stanford MBAs are confirmed using this broader sample of college graduates. Individuals selecting broader academic programs and that have more varied occupational and industrial work experiences are more likely to become entrepreneurs.

In the Lazear framework, the mechanism driving the positive correlation between academic and occupational choices and entrepreneurial entry is an unobservable entrepreneurial skill. Hence, the positive correlation between academic or occupational diversity and entrepreneurship is not causal but a reflection of a common missing variable that affects all choices in the same direction. This paper explores that possibility by treating choice of academic program, occupational path and entrepreneurship as joint decisions planned at the time of college entry. The results are broadly consistent with the theory. Error terms in the three equations are positively correlated, consistent with the existence of a common unobservable factor that increases the likelihood of all three decisions. Furthermore, observable factors that raise the probability of one decision raise the probability of the other two as well in 5 of 7 instances. We view these results as strong confirmation of Lazear's JAT theory.

We are also able to examine evidence of predictions from our extension of the Lazear theory to multiple periods. Most importantly, we find that broader academic programs raise the probability of entrepreneurial entry early in the career, but the effect dissipates over time as individuals gain additional information on their entrepreneurial skills. The effect of skill diversity at the young age on entrepreneurship incidence will be diluted along the time. This finding is consistent with our simple extension of the

Lazear JAT theory, further supporting the strength of the insight that entrepreneurs require broad training and workers require specialized training to be successful in their chosen occupational paths.

Though we use proxy measures of preference which may introduce additional noise, we still find the robustness of mechanism through unobserved entrepreneurial abilities even after controlling for taste for variety and risk aversion. There are two possible development of entrepreneurship. One is that individuals intentionally make investment in human capital including both skills at school and at workplace because of entrepreneurial unobservables. The other is that there might be some unobserved alternative factors that triggers diversity of human capital investment. Academic diversity then becomes endowment for potential entrepreneurship and finally enables individuals to start a business. Though investment in diversity of human capital is not initially triggered by entrepreneurial shocks, the accumulated human capital and structure of skills sets make individuals have entrepreneurial traits. This is alternative possible interpretation to which using proxies may leave our results open.

Appendix

Optimal human capital investment in period one

There are two possibilities about timing of investing two kinds of human capital. Firstly, $H_2 \geq H_1$, such that total human capital accumulated in the second period is more than the one in the first period. For example, H_1 can be total amount of human capital accumulated in college and early years of work experience while H_2 are accumulated as longer work experience.

There will be four possible solutions for occupation choices over two periods. Without loss of generality, assume that $x_1^1 \geq x_2^1$. At the beginning of the second period, if an individual chooses to be an entrepreneur, he will equalize two types of skills at $\frac{H_1+H_2}{2}$. In contrast, if he chooses to be a laborer, he will further specialize on the first type of skill: $x_1^1 + H_2$. By backward induction, we can obtain the expected lifetime returns $Y_{jk}, j, k = E, L$, in four scenarios where subspcript E, L represents occupations of being entrepreneur and laborer respectively.

Case 1 An individual is an entrepreneur in both periods 1 and 2. $Y_{EE} = \lambda_1 x_2^1 + \lambda_1 \frac{H_1+H_2}{2}$.

Case 2 An individual is an entrepreneur in period 1 but becomes a laborer in period 2. $Y_{EL} = \lambda_1 x_2^1 + x_1^1 + H_2$.

Case 3 An individual is a laborer in period 1 but switches to become an entrepreneur in period 2. $Y_{LE} = x_1^1 + \lambda_1 \frac{H_1+H_2}{2}$.

Case 4 An individual is a laborer in both periods 1 and 2. $Y_{LL} = x_1^1 + x_1^1 + H_2$.

Conditional on optimal choice from the second period, an individual will choose to start a business if $\lambda_1 \geq \frac{H_1}{x_2^1} - 1$. At the same time, optimal choice in first period entrepreneurship is derived from $Y_{EE} \geq Y_{EL}$, or $\lambda_1 \geq 2 - \frac{2x_2^1}{H_1+H_2}$. Figure A1 illustrates the possible solutions of human capital investment in the first period and the entry threshold for entrepreneurial skill λ_1. For a given human capital combination (x_1^1, x_2^1), individuals with $\lambda_1 \in \text{Area } (E, E)$ will choose to be an entrepreneur at the beginning of the first period. Individuals with $\lambda_1 \in \text{Area } (L, L)$ will choose to be an entrepreneur at the beginning of the first period.

For a given entrepreneurial level λ_1 observed by individual in the beginning of the first period, there is an increasing return in entrepreneurship from investing more on the least skill x_2^1. Therefore, individual optimal human capital investment is $\hat{x}_1^1 + \hat{x}_2^1 = \frac{H1}{2}$ and expects to continue to equally invest between two kinds of skills in the second period. This implies entrepreneurial entry threshold is $\lambda_1 \geq 2 - \frac{H_1}{H_1+H_2}$. Expected life time return is $Y_{EE} = \lambda_1(2H_1 + H_2)$. However, this choice (*Case 1*) is dominated by $Y_{LL} = 2H_1 + H_2$ when $2 - \frac{H_1}{H_1+H_2} \leq \lambda_1 < 2$. As shown in Figure A2, expected life time return and optimal career choice is a kinked line, depending on realized entrepreneurial skill λ_1. Individual's occupation choices are consistent in two periods. The other choices (*Case2* and *Case 3*) are dominated (by C*ase 1 and Case 4* respectively) in the first period.

Similarly, when $H_2 < H_1$, expected return for the four cases are as follows, still assuming $x_1^1 \geq x_2^1$ without loss of generality:

C*ase 1* $Y_{EE} = \lambda_1 x_2^1 + \lambda_1 \frac{H_1+H_2}{2}$. So $x_2^1 = \frac{H_1}{2}$.

C*ase 2* $Y_{EL} = \lambda_1 x_2^1 + x_1^1 + H_2$. So Y_{EL} is increasing in x_2^1 and $x_2^1 = \frac{H_1}{2}$, $\lambda_1 \geq 1$.

C*ase 3* $Y_{LE} = x_1^1 + \lambda_1 \frac{H_1+H_2}{2}$ when $x_1^1 \leq \frac{H_1+H_2}{2}$ or $Y_{LE} = x_1^1 + \lambda_1(x_2^1 + H_2)$ when $x_1^1 > \frac{H_1+H_2}{2}$. We have $Y_{LE} = (\lambda_1 + 1)\frac{H_1+H_2}{2}$

C*ase 4* $Y_{LL} = 2H_1 + H_2$.

Again, *Case 2* and *Case 3* are dominated by *Case 1* and *Case 4* respectively. When $\lambda_1 \geq 2$, individuals become entrepreneurs in both periods and when $\lambda_1 < 2$ they become laborers then.

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Table 1(a) Entrepreneurship rate and balanced skills across time

Cohort	High balanced skills	Low balanced skills	Difference	t-value
1982-1986	0.232 [0.028]	0.224 [0.033]	0.008	0.184
1987-1991	0.199 [0.028]	0.225 [0.035]	-0.025	-0.565
1992-1996	0.178 [0.026]	0.169 [0.029]	0.009	0.238
1997-2001	0.124 [0.024]	0.133 [0.024]	-0.009	-0.278
2002-2006	0.079 [0.017]	0.036 [0.009]	0.042	2.125**

Note: Number in the bracket is standard error of mean estimates. Individuals with high balanced skills are in the lower 25% distribution of variable *AC_SPEC*. Individuals with low balanced skills are in the upper 25% distribution of the *AC_SPEC*. Variable *AC_SPEC* is defined as number of courses in the major minus the average number of courses taken in other departments.

Table 1(b) Entrepreneurship and work experience diversity across time

Cohort	Number of occupations by current entrepreneurs[a]	Number of occupations by others	Difference	t-value
1982-1986	3.117[1.142]	1.861[0.044]	1.256	1.099
1987-1991	2.882[0.543]	1.847[0.049]	1.034	1.899*
1992-1996	2.927[0.565]	1.624[0.042]	1.303	2.301**
1997-2001	1.597[0.233]	1.517[0.038]	0.080	0.338
2002-2006	2.062[0.293]	1.253[0.031]	0.809	2.745***

Note: a. Current entrepreneurs are those who started businesses between 2002 and 2007 and survived till the end of 2007, when the survey was conducted. Number in the bracket is standard error of mean estimates

Table 1(c) Contingency table of skill diversity in college and in work

	Less work experience (25th percentile)	More work experience (75th percentile)	Total
Specialized skills in college (25th percentile)	32.5%	17.5%	50.0%
Balanced skills in college (75th percentile)	23.5%	26.4%	50.0%
Total	56.1%	44.0%	100.00%

Table 2 Summary of statistics

	Early Entrepreneurs		Late Entrepreneurs		Non-entrepreneurs	
Male	0.595	[0.492]	0.643	[0.479]	0.513	[0.5]
Married at graduation	0.167	[0.374]	0.165	[0.371]	0.101	[0.302]
Ethnicity	0.107	[0.309]	0.122	[0.328]	0.076	[0.264]
Number of siblings	2.274	[1.47]	2.679	[1.986]	2.221	[1.625]
Grow up with 2 parents in household	0.881	[0.324]	0.88	[0.325]	0.900	[0.300]
Mother education	4.780	[1.713]	5.009	[1.801]	5.041	[1.691]
Father education	4.682	[1.493]	4.456	[1.619]	4.815	[1.523]
Either of parents started business	0.557	[0.498]	0.544	[0.498]	0.451	[0.498]
Close friends started business	0.341	[0.475]	0.269	[0.444]	0.498	[0.500]
High school rank	63.628	[32.829]	57.342	[36.484]	71.498	[30.228]
Cumulative GPA	3.049	[0.621]	2.912	[0.550]	3.069	[0.571]
Taste for variety						
Number of extra-curricular activities	2.659	[1.374]	2.427	[1.361]	2.608	[1.395]
One foreign language	0.662	[0.474]	0.559	[0.497]	0.743	[0.437]
≥2 foreign languages	0.040	[0.197]	0.022	[0.148]	0.035	[0.184]
Doing things differently	0.224	[0.418]	0.273	[0.446]	0.156	[0.363]
Colleges						
Agriculture and Life Sciences	0.249	[0.433]	0.141	[0.348]	0.129	[0.336]
Business	0.160	[0.368]	0.186	[0.389]	0.181	[0.385]
Design	0.111	[0.315]	0.125	[0.332]	0.066	[0.248]
Engineering	0.134	[0.341]	0.182	[0.386]	0.187	[0.39]
Human Sciences	0.178	[0.384]	0.144	[0.351]	0.171	[0.377]
Graduation years						
1987-1991	0.183	[0.388]	0.278	[0.448]	0.188	[0.391]
1992-1996	0.196	[0.398]	0.228	[0.420]	0.187	[0.39]
1997-2001	0.215	[0.412]	0.107	[0.309]	0.201	[0.401]
2002-2006	0.288	[0.454]	0.011	[0.102]	0.249	[0.432]
Skill Diversities						
AC_SPEC	12.349	[6.931]	12.673	[6.559]	13.126	[7.238]
OCCUPATIONS	2.124	[1.681]	2.234	[1.626]	1.525	[1.074]
INDUSTRIES	3.398	[2.195]	5.305	[2.971]	3.475	[2.510]
Number of occupations per year	0.398	[0.603]	0.521	[0.830]	0.171	[0.198]
Number of industry per year	0.499	[0.649]	1.112	[1.806]	0.206	[0.214]

Note: number in the square bracket is standard deviation. Individuals responded the survey question about the most successful businesses if any. About three quarters of entrepreneurs have only one businesses started. According the year when their most business was started, early entrepreneurs are those who have ever started a business within five years after graduation from ISU. Late entrepreneurs started businesses more than five years after graduation.

Table 3 Trivariate probit model of academic skill diversity, work experience diversity and entrepreneurship

	Panel A		
Variable	Academic Diversity (S)	Work Diversity (O)	Entrepreneurship (E)
Male	0.173(3.86)**	0.341(3.49)**	0.194(3.83)**
Ethnicity	-0.122(-1.43)	-0.338(-1.81)	0.183(2.09)**
High School Rank	-0.001(-1.42)	-0.005(-3.45)**	-0.006(-8.47)**
Number of siblings	0.02(1.56)	0.053(1.85)	0.032(2.29)**
Father education	0.019(1.2.)	0.031(0.94)	0.028(1.62)
Mother education	-0.033(-2.00)*	0.001(0.03)	-0.071(-3.72)**
Either of parents started a business	0.043(0.94)	0.311(3.14)**	0.208(4.1.)**
Constant	-0.719(-8.91)**		
Parameters for entrepreneurial human capital			
β_{λ}^{O}	9.862[1.459]**		
β_{λ}^{E}	1.263[0.245]**		
σ^2	0.045[0.014] **		
Number of observations	5310		
	Panel B		
Variable	Academic Diversity	Work Diversity	Successful Entrepreneurship
Male	0.092(2.03)*	0.11(2.01)*	-0.203(-3.35)**
Ethnicity	-0.221(-2.51)**	-0.266(-2.52)**	-0.211(-1.84)
High School Rank	-0.003(-4.51)**	-0.005(-4.27)**	-0.006(-7.61)**
Number of siblings	-0.018(-1.39)	-0.006(-0.38)	-0.033(-1.93)
Father education	-0.019(-1.22)	-0.018(-0.97)	-0.037(-1.93)
Mother education	-0.077(-4.55)**	-0.039(-1.82)	-0.143(-6.49)**
Either of parents started a business	-0.024(-0.52)	0.108(1.95)*	0.084(1.39)
Constant	-0.719(-8.91)**		
Parameters for entrepreneurial human capital			
β_{λ}^{O}	2.520[1.230]*		
β_{λ}^{E}	1.223 [0.271]**		
σ^2	0.100[0.046] **		
Number of observations	5310		

Note: Dependant variables are binary choices. *S* is equal to one for lower 25th percentile of *AC_SPEC* at ISU, and zero for the remaining 75% unspecialized alumni. *O* is equal to one if the number of occupations held by the end of year 2007 is equal or greater than two, which is the 75th percentile of OCCUPATIONS; E is equal to one if individual has ever started a business and remain as an entrepreneur till the end of year 2007. Probability weights are considered in the model and the standard errors are therefore robust. The number in the bracket is the standard error of the corresponding estimate. * denotes the estimated parameters are significant at 5% and ** denote the significance at 1%. Value of *t* statistics is in parentheses and standard error in square bracket. β_{λ}^{S} is normalized to be one to identify the model.

Table 4 Logic model of entrepreneurship in early career and academic diversity

	(3)	(4)	(5)	(6)
Dependent variable	Entrepreneurship in up to 5 years after graduation	Entrepreneurship in up to 5 years after graduation	Lifetime entrepreneurial entry	Lifetime entrepreneurial entry
AC_SPEC	-0.032	-0.031	-0.009	-0.005
	(2.01)*	(1.98)*	(1.20)	(0.57)
Number of occupations per year		0.537		1.180
		(2.90)**		(2.91)**
Number of industries per year		0.020		4.208
		(0.23)		(12.46)**
Male	0.484	0.458	0.265	0.339
	(2.77)**	(2.59)**	(2.51)*	(2.71)**
Married at graduation	0.359	0.391	0.399	0.561
	(1.42)	(1.54)	(2.85)**	(3.65)**
Ethnicity	0.081	0.090	0.428	0.291
	(0.29)	(0.32)	(2.81)**	(1.54)
High school rank	-0.001	-0.001	-0.006	-0.006
	(0.46)	(0.40)	(3.98)**	(3.86)**
Cumulative GPA	0.206	0.268	-0.075	0.041
	(1.38)	(1.72) †	(0.90)	(0.41)
Number of siblings	-0.017	-0.015	0.027	0.007
	(0.42)	(0.37)	(1.06)	(0.22)
Grow up with two parents in household	-0.213	-0.177	-0.232	-0.281
	(0.88)	(0.72)	(1.57)	(1.54)
Either of parents started business	0.092	0.078	0.356	0.259
	(0.57)	(0.48)	(3.70)**	(2.31)*
Close friends started business	-0.486	-0.462	-0.576	-0.563
	(2.78)**	(2.62)**	(5.55)**	(4.49)**
Father education	-0.079	-0.082	0.070	0.065
	(1.43)	(1.43)	(2.17)*	(1.74) †
Mother education	0.000	-0.007	-0.077	-0.113
	(0.00)	(0.11)	(2.16)*	(2.68)**
Colleges				
Agriculture and Life Sciences	0.953	0.936	0.445	0.540

	(3.61)**	(3.52)**	(2.79)**	(2.87)**
Business	0.075	0.031	0.092	0.147
	(0.25)	(0.10)	(0.58)	(0.76)
Design	1.047	1.028	0.769	0.682
	(3.25)**	(3.17)**	(3.88)**	(3.08)**
Engineering	0.046	0.051	0.117	0.259
	(0.17)	(0.19)	(0.81)	(1.53)
Human Sciences	0.736	0.659	0.134	0.080
	(2.61)**	(2.28)*	(0.77)	(0.38)
Graduation years				
1987-1991	0.694	0.683	-0.146	-0.330
	(2.32)*	(2.25)*	(1.05)	(2.22)*
1992-1996	0.817	0.771	-0.300	-0.673
	(2.96)**	(2.73)**	(2.18)*	(4.38)**
1997-2001	1.027	0.961	-0.637	-1.601
	(3.77)**	(3.49)**	(4.32)**	(8.53)**
2002-2006	1.224	1.063	-0.992	-3.685
	(4.34)**	(3.74)**	(6.09)**	(9.86)**
Constant	-3.990	-4.246	-0.816	-1.849
	(5.99)**	(6.14)**	(2.23)*	(4.15)**
Log pseudolikelihood	-16110.6	-15888.1	-36705.8	-26082.7
Observations	5248	5227	5242	5221

Note: Numbers in the parenthesis are absolute value of t-statistics. Numbers in the bracket are standard errors. †, * and ** represent statistic significance 10%, 5% and 1% respectively.

Table 4 Bi probit model of entrepreneurship in late career

	(1)		(2)		(2)	
Dependent variable	Entrepreneurship in up to 5 years after graduation (E)	Annual occupation diversity	Entrepreneurship in up to 25 years after graduation (E)	Total occupations diversity (O)	Successful Entrepreneurship	Total occupations diversity (O)
AC_SPEC	-0.012	-0.006	-0.005	-0.005	-0.006	-0.005
	(1.93) †	(1.46)	(1.31)	(1.33)	(1.43)	(1.31)
Male	0.206	0.108	0.141	0.011	0.149	0.015
	(2.58)*	(2.00)*	(2.48)*	(0.24)	(2.32)*	(0.31)
Married at graduation	0.152	0.033	0.228	0.001	0.102	0.007
	(1.30)	(0.38)	(2.86)**	(0.02)	(1.15)	(0.11)
Ethnicity	0.035	0.170	0.235	-0.125	0.199	-0.123
	(0.27)	(2.01)*	(2.70)**	(1.55)	(2.05)*	(1.53)
High school rank	-0.001	-0.001	-0.004	-0.000	-0.002	-0.000
	(0.63)	(1.56)	(4.19)**	(0.27)	(2.03)*	(0.24)
Cumulative GPA	0.086	-0.151	-0.042	-0.274	-0.013	-0.271
	(1.29)	(3.28)**	(0.90)	(6.83)**	(0.24)	(6.78)**
Number of siblings	-0.005	0.013	0.015	-0.016	0.018	-0.015
	(0.28)	(0.90)	(1.02)	(1.20)	(1.11)	(1.13)
Grow up with two parents in household	-0.103	-0.051	-0.124	-0.083	0.043	-0.089
	(0.91)	(0.65)	(1.49)	(1.16)	(0.44)	(1.24)
Either of parents started business	0.041	0.174	0.196	0.077	0.197	0.075
	(0.55)	(3.52)**	(3.72)**	(1.78)	(3.29)**	(1.73) †
Close friends started business	-0.217	-0.081	-0.326	-0.172	-0.304	-0.168
	(2.77)**	(1.64) †	(5.92)**	(3.96)**	(4.87)**	(3.88)**
Father education	-0.032	0.003	0.038	-0.007	0.034	-0.006
	(1.28)	(0.18)	(2.16)*	(0.45)	(1.71) †	(0.40)
Mother education	-0.001	-0.008	-0.045	0.001	-0.026	0.001
	(0.03)	(0.43)	(2.28)*	(0.06)	(1.19)	(0.08)
Colleges						
Agriculture and Life Sciences	0.442	0.301	0.254	0.317	0.297	0.319
	(3.66)**	(3.72)**	(2.89)**	(4.36)**	(3.01)**	(4.40)**
Business	0.044	0.143	0.048	0.376	0.058	0.376
	(0.33)	(1.79) †	(0.56)	(5.36)**	(0.60)	(5.35)**

Design	0.462	0.307	0.433	0.135	0.505	0.133
	(3.15)**	(2.79)**	(3.86)**	(1.35)	(4.06)**	(1.33)
Engineering	0.019	0.087	0.060	-0.119	0.034	-0.120
	(0.16)	(1.20)	(0.77)	(1.88) †	(0.38)	(1.91) †
Human Sciences	0.323	-0.019	0.064	0.040	0.172	0.039
	(2.56)*	(0.21)	(0.68)	(0.54)	(1.66) †	(0.54)
Graduation years						
1987-1991	0.303	0.236	-0.085	-0.022	-0.014	-0.026
	(2.31)*	(2.39)*	(1.07)	(0.31)	(0.16)	(0.36)
1992-1996	0.353	0.389	-0.175	-0.168	-0.099	-0.173
	(2.87)**	(4.07)**	(2.25)*	(2.49)*	(1.13)	(2.57)*
1997-2001	0.434	0.901	-0.358	-0.276	-0.237	-0.283
	(3.60)**	(10.13)**	(4.42)**	(4.09)**	(2.57)*	(4.20)**
2002-2006	0.526	1.938	-0.536	-0.533	-0.423	-0.539
	(4.23)**	(22.01)**	(6.31)**	(7.78)**	(4.34)**	(7.88)**
Constant	-2.079	-1.068	-0.471	0.994	-1.246	0.983
	(7.01)**	(5.52)**	(2.31)*	(5.63)**	(5.49)**	(5.58)**
Correlation coefficient	0.192[0.045]**		0.203[0.032]**		0.183[0.036]**	
Log pseudolikelihood	-57153.7		-94768.9		-86595.0	
Observations	5248		5242		5248	

Note: Average annual number of occupations is a dummy variable, equal to one for the upper 25% of OCCUPATIONS per year, which is 0.235 and equal to zero for the remaining 75%. *O* is equal to one if the number of occupations held by the end of year 2007 is greater than or equal to two, which is the 75th percentile of OCCUPATIONS. Numbers in the parenthesis are absolute value of t-statistics. Numbers in the bracket are standard errors. †, * and ** represent statistic significance at 10%, 5% and 1% respectively.

Table 6 Taste for variety and early and lifetime entrepreneurial entry

Dependent variable	Entrepreneurship in up to 5 years after graduation			Lifetime entrepreneurial entry			Number of businesses started after graduation		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
AC_SPEC	-0.043	-0.043	-0.016	-0.007	-0.007	0.056	-0.008	-0.008	0.013
	(2.61)**	(2.63)**	(0.37)	(0.79)	(0.77)	(2.24)*	(1.14)	(1.11)	(0.61)
Number of occupations per year	0.532	0.532	0.533	1.213	1.233	1.240	0.439	0.461	0.464
	(2.79)**	(2.83)**	(2.85)**	(2.91)**	(2.95)**	(2.90)**	(2.15)*	(2.11)*	(2.13)*
Number of industries per year	0.022	0.026	0.023	4.202	4.206	4.208	0.632	0.593	0.594
	(0.26)	(0.30)	(0.27)	(12.17)**	(12.19)**	(12.26)**	(4.21)**	(3.86)**	(3.82)**
Number of extra-curricular activities		-0.017	-0.017		-0.040	-0.041			0.005
		(0.30)	(0.29)		(0.93)	(0.96)			(0.16)
One foreign language		-0.347	-0.349		-0.160	-0.159			-0.185
		(1.32)	(1.33)		(1.06)	(1.05)			(0.96)
≥2 foreign languages		0.096	0.086		-0.011	-0.026			-0.016
		(0.23)	(0.20)		(0.04)	(0.08)			(0.05)
Doing things differently	0.208	0.210	0.485	0.263	0.267	0.942		0.285	0.507
	(1.09)	(1.09)	(1.10)	(1.92)†	(1.94) †	(3.24)**		(2.73)**	(2.04)*
AC_SPEC × Doing things differently			-0.023			-0.054			-0.018
			(0.72)			(2.59)**			(1.02)
α							1.465	1.467	1.468
							[0.18]**	[0.19**]	[0.19]**

Note: We also did alternative regressions and results are robust. The robustness check includes the following. We use continuous measure of the number of foreign languages and with or without corresponding quadratic variables and /or use quadratic form of extra-curricular activities. We also interact the variable of 'Doing things differently' with occupation and industry variety, but these interactions terms are not statistically significant. Numbers in the parenthesis are absolute value of t-statistics. Numbers in the bracket are standard errors. †, * and ** represent statistic significance at 10%, 5% and 1% respectively. We also include other variables as shown in Table 5. α is negative binomial distribution parameter.

Table 7 Risk aversion and early and lifetime entrepreneurial entry

Dependent variable	Entrepreneurship in up to 5 years after graduation			Lifetime entrepreneurial entry			Number of businesses started after graduation		
	(16)	(17)	(18)	(19)	(20)	(21)	(13)	(14)	(15)
AC_SPEC	-0.043	-0.043	-0.045	-0.004	-0.005	-0.004	-0.004	-0.005	-0.004
	(2.55)*	(2.61)**	(2.60)**	(0.49)	(0.54)	(0.48)	(0.54)	(0.74)	(0.51)
Number of occupations per year	0.545	0.524	0.573	1.239	1.236	1.303	0.461	0.432	0.464
	(2.72)**	(2.64)**	(2.79)**	(3.25)**	(2.62)**	(3.04)**	(2.30)*	(2.11)*	(2.49)*
Number of industries per year	0.005	-0.012	-0.024	4.324	4.784	4.855	0.517	0.533	0.485
	(0.05)	(0.13)	(0.24)	(12.27)**	(11.28)**	(11.42)**	(3.49)**	(3.11)**	(3.04)**
Doing things differently	0.228	0.175	0.198	0.303	0.326	0.343	0.299	0.262	0.272
	(1.17)	(0.89)	(0.99)	(2.18)*	(2.32)*	(2.43)*	(2.82)**	(2.43)*	(2.53)*
Current industries	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Industries ever worked in	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
α							1.290	1.314	1.200
							[0.19]**	[0.19**]	[0.19]**

Note: Numbers in the parenthesis are absolute value of t-statistics. Numbers in the bracket are standard errors. †, * and ** represent statistic significance at 10%, 5% and 1% respectively. We also include foreign language dummy variables, number of extra-curricular activities and other variables as shown in Table 5. α is negative binomial distribution parameter. Binary industry variables are shown in the table A1 in the Appendix.

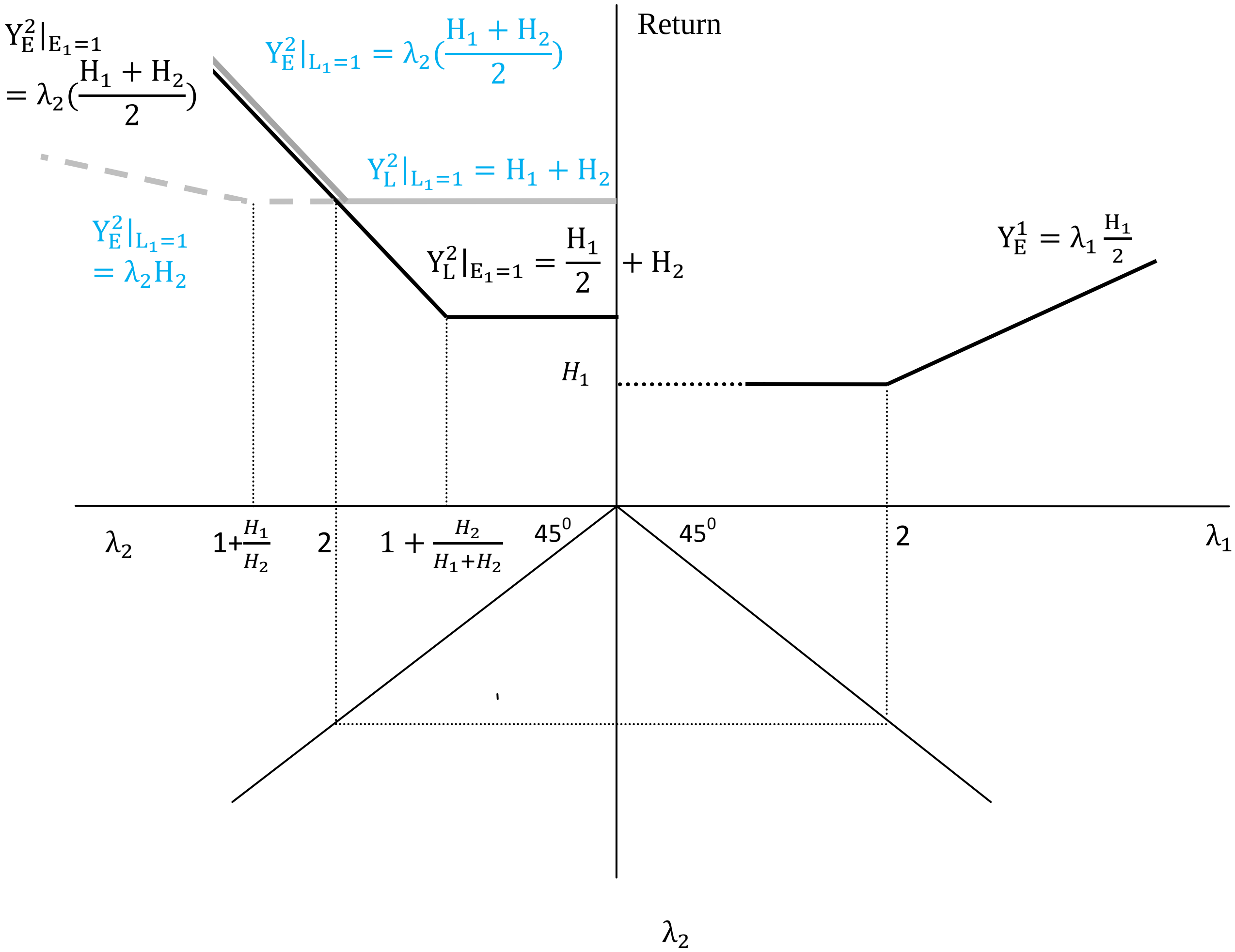

Figure 1. Illustration of optimal occupation choices and returns in the first period (upper right corner) and in the second period (upper left corner)

Note: In the upper left coordinate, the black solid line represents the second period return, conditional on being an entrepreneur in the first period. The gray solid line presents the second period return, conditional on being a laborer in the first period and $H_2 \geq H_1$. The dashed gray line represents the second period return, conditional on being a laborer in the first period and $H_2 < H_1$. Formally, $Y_E^2|_{E_1=1} = \lambda_2(\frac{H_1+H_2}{2})$ if $\lambda_2 \geq 1+\frac{H_2}{H_1+H_2}$ and $\lambda_1 > 2$. $Y_E^2|_{L_1=1} = \lambda_2(\frac{H_1+H_2}{2})$ if $\lambda_2 \geq 2$, $\lambda_1 \leq 2$ and $H_2 \geq H_1$. $Y_E^2|_{L_1=1} = \lambda_2 H_2$ if $\lambda_2 \geq 1+\frac{H_1}{H_2}$, $\lambda_1 \leq 2$ and $H_2 < H_1$.

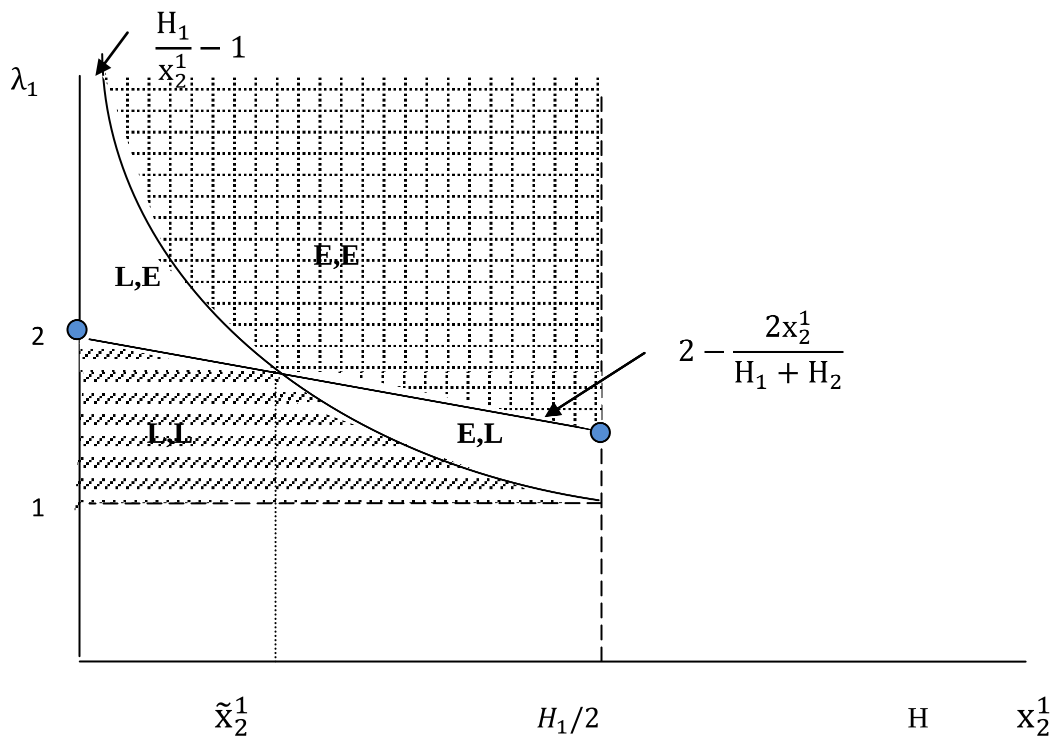

Figure A1. Illustration of occupation choices in the first period

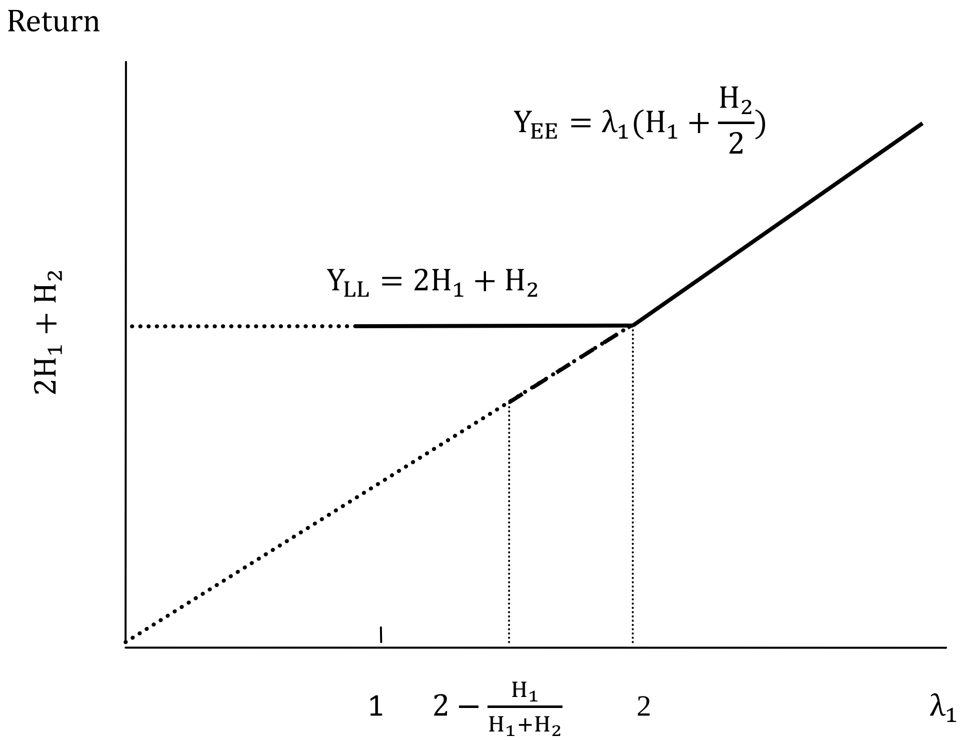

Figure A2. Illustration of optimal occupation choices and returns in the first period

Table A1 Employment distribution of entrepreneurs and non-entrepreneurs across industries

Industry	Entrepreneurs	Non-entrepreneurs
Agriculture	16.48%	11.62%
Arts, Entertainment, & Recreation	7.65%	3.85%
Construction	13.81%	7.40%
Finance/Insurance	17.46%	15.07%
Hospitality	5.56%	3.57%
Manufacturing	19.69%	16.71%
Mining	0.44%	0.30%
Real Estate	6.49%	1.98%
Social Services	4.33%	4.08%
Transportation & Utilities	7.73%	6.83%
Accommodation & Food Services	3.86%	4.17%
Communications	10.13%	5.42%
Education	16.85%	21.61%
Government/Military	12.51%	12.96%
Legal	4.01%	2.33%
Medicine/Health Care	11.09%	13.46%
Non-profit	7.93%	7.05%
Retail	16.64%	11.16%
Information Technology	16.04%	11.68%
Other	18.73%	14.82%

Note: entrepreneurs are those who had ever started a business. Individuals report any industry where they had ever worked. An individual could have a working history in multiple industries.

Table A2 Employment distribution of entrepreneurs and non-entrepreneurs by occupations

Occupation	Entrepreneurs	Non-entrepreneurs
Marketing & sales managers	23.95%	11.48%
Financial managers	11.70%	7.26%
Industrial production managers	3.81%	3.51%
Transportation, storage, & distribution managers	3.99%	2.92%
Service occupations	16.58%	12.72%
Office, clerical, & administrative support occupations	14.35%	13.97%
Construction & extraction occupation	7.13%	3.04%
Transportation & material moving occupations	3.39%	2.84%
Chief executives	17.52%	2.53%
Computer & information systems managers	9.77%	7.16%
Human resources managers	5.91%	3.37%
Purchasing managers	6.76%	3.21%
Professional & technical occupations	53.62%	55.94%
Sales & related occupations	27.19%	16.54%
Farming, fishing, & forestry occupations	7.81%	3.21%
Production occupations: Laborers & operatives	5.47%	2.76%