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Are nonprofit entrepreneurs also Jacks-of-all-trades?

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Abstract

We investigate whether nonprofit and for-profit entrepreneurs share similar observable and unobservable skills. In JLE 23:649-680, 2005 'Jacks-of-all-Trades' model of entrepreneurship, individuals with more diverse academic and occupational training are more likely to become entrepreneurs, while more narrowly trained individuals become employees. Data on college graduates from a single university show that observed diverse skills increase the probability that the graduate will open both for-profit and nonprofit venture. Positive correlation in the errors that jointly affect for-profit and nonprofit start-ups is consistent with the existence of an unobserved entrepreneurial skill, a key factor underlying Lazear's theory.

JEL codes: J24; L3
Keywords: Nonprofit; For-profit; Entrepreneurship; Jacks-of-All-Trades; Balanced skills

1. Introduction

In contrast with for-profit firms, nonprofit entrepreneurs are legally prohibited from taking profit from their operations. Despite this constraint on profit distributions, many individuals devote their entrepreneurial talents to founding and operating non-profit firms. One explanation advanced for the existence of nonprofit firms contends that in markets where the customer requires unverifiable service quality, customers will attach more credibility to promised quality from providers that are not motivated by profit (Hansmann 1980; Easley and O'Hara 1983; Holtmann 1983; Chillemi and Gui 1991; Mark 1996; Bilodeau and Slivinski 1998; Glaeser and Shleifer 2001)[1]. A second explanation attributes willingness to provide public goods at less than the opportunity cost of time, as with *pro bono* or legal aid services, to utility from doing work in the public interest (Weisbrod 1983; Preston 1989; Roomkin and Weisbrod 1999; Ghatak and Mueller 2011). Similarly, willingness to provide these services could be due to non-pecuniary motives such as altruism or philanthropy (Hansmann 1980; Young 1986; James 1987; Gassler 1998). Finally, provision of public goods may be a means to exploit tax advantages (Weisbrod 1983). To date, little attention has been paid to the role of entrepreneurial ability in nonprofit service provision except for the argument that career experiences may lower the cost of nonprofit entrepreneurship (Bilodeau and Slivinski 1996; Lakdawalla and Philipson 2006).

Lazear (2004, 2005) advanced the "Jacks-of-All-Trades" theory of entrepreneurship. By exploiting returns to scale from entrepreneurial talent, the earnings from the

owner's share of firm profits can dominate earnings expected from working for someone else. The main implication is that the pattern of human capital investment differs across entrepreneurs and those in paid employment—entrepreneurs acquire more varied skills necessary to run a business while those they employ specialize in more occupation-specific and narrowly focused skills. Several studies have provided empirical evidence that for-profit entrepreneurs are generalists with diverse skills, whereas paid workers are specialists (e.g., Wagner 2003, 2006; Silva 2007; Åstebro and Thompson 2011; Stuetzer et al. 2013; Lechmann and Schnabel 2014)[2]. Exceptions are the study by Hartog et al. (2010) who find that variety of skill sets does not affect the choice for entrepreneurship but positively affects entrepreneurial income and the study by Hessels et al. (2014) who find contradictory results between several measures of variety of skill sets and business startups among nascent entrepreneurs.

Lazear's Jacks-of-all-trades theory focuses on monetary compensation as the motivation for choosing entrepreneurship. However, studies commonly find that entrepreneurs earn less than what they could earn as salaried employees (Hamilton 2000; Åstebro and Thompson 2011) or on similarly risky common stock (Moskowitz and Vissing-Jorgensen 2002). Hamilton (2000) explained entrepreneurs' lower lifetime earnings by a presumed hedonic return from business ownership. Åstebro and Thompson (2011) argue that entrepreneurs have a taste for variety for which they are willing to pay with lower earnings. Consistent with these arguments, Benz and Frey (2004, 2007) found that the self-employed had higher job satisfaction than employees because of their greater independence. Benz (2009) argues that when non-pecuniary factors are added as an additional return to entrepreneurship into Lazear's model, entrepreneurship is best characterized as a nonprofit-seeking activity[3].

There may be a possible link between varied career experience and entrepreneurship simply because those who are less risk averse are more likely to change their jobs and more likely to become entrepreneurs (Åstebro and Thompson 2011) or because those with lower ability are more likely to change their jobs and thus more likely to enter self-employment (Evans and Leighton 1989). However, Åstebro and Thompson (2011) do not find any significant correlation between lower unobserved ability and earnings or entrepreneurship.

Although there are different views about the issue on whether entrepreneurship is a profit- or nonprofit-seeking activity, the diversity of skill sets from the Lazear's Jacks-of-all-trades theory in itself is important to understand the nature of entrepreneurial human capital. This is because taking non-monetary benefits into account does not change the central prediction that entrepreneurs should be generalists whereas employees should be specialists. Diverse skill sets are essential for running an efficient operation, whether it is to maximize profit from market sales or to minimize costs of producing the desired level of a public good. Even if an employer places a value more on non-pecuniary benefits from entrepreneurship, his business should continue to grow or at least remain in business so that he can get nonmonetary utility from entrepreneurship. To do so, he would have to exploit his entrepreneurial talent. In this view, the diverse skill sets should be considered important for both nonprofit and for-profit settings. Accordingly, we predict that diverse skills should have a positive effect on the choice of both nonprofit and for-profit startups over the alternative of working for someone else.

This study investigates whether nonprofit and for-profit entrepreneurs share similar observable and unobservable skills. Observable entrepreneurial skill is presumed to be indicated by more diverse time investments in educational and labor market skills. We further test whether unobservable entrepreneurial skills that are presumed to be important in for-profit ventures are important for nonprofit ventures as well.

We test the hypotheses using data drawn from a random sample of 25,000 Iowa State University (ISU) alumni who graduated between 1982 and 2006 with a Bachelor's degree. We first confirm that for-profit entrepreneurs are generalists with more occupational diversity while paid-employees are specialists, consistent with Lazear (2005). Furthermore, our empirical finding shows that a more diverse skill set increases the choice of nonprofit start-ups, supporting our hypothesis that nonprofit entrepreneurs are also "Jacks-of-All-Trades". Lastly, we find that unobserved factors that jointly affect for-profit and nonprofit startups are positively correlated, consistent with the presence of a common observed entrepreneurial skill that leads to both for-profit and nonprofit entrepreneurial success.

Our study suggests that nonprofit entrepreneurs are drawn from a common pool of entrepreneurial talents that are valuable in both the for-profit and nonprofit sectors. Although the motivations between for-profit and nonprofit startups may differ, the skill sets are similar. People who are atypically more likely to start a for-profit business given their observable skills are also more likely to start a nonprofit enterprise, and *vice versa*. Hence, our results suggest that public policies aimed at encouraging entrepreneurship should focus on providing diverse skills and experiences. However, entrepreneurial training need not differ between for-profit and nonprofit entrepreneurs as the two sectors will draw from the same pool of entrepreneurial talent.

2. Model and hypotheses

In Lazear's (2005) model, human capital can be decomposed into two skills, x_1 and x_2.[4] Employees receive an amount equal to their skill level in the market activity, so they specialize in their best skill and earn $w = \max[x_1, x_2]$. In contrast, entrepreneurs must be able to evaluate employees with specializations in either human capital subcomponent, and they can only do that effectively if they have skills in both areas. Consequently, expected earnings for an entrepreneur will depend on the extent of their weakest skill: $\lambda \min[x_1, x_2]$. The parameter λ measures entrepreneurial skill that will be unobserved in general.

An individual will become an entrepreneur if $\lambda \min[x_1, x_2] > max[x_1, x_2]$. That is, for any given λ, those with more balanced skills will choose to become entrepreneurs, while those with specialty in either one skill become specialists. Another implication of Lazear's model is that a larger endowment of the unobserved entrepreneurial skill λ increases the probability of becoming a for-profit entrepreneur.

To the extent that nonprofit entrepreneurs are also trying to maximize output, that same unobservable skill could be critical in the probability of starting a successful nonprofit venture. To explore that possibility, we need to add nonprofit entrepreneurship as an additional occupational choice in Lazear's framework.

We assume that an individual i is faced with the nonexclusive choices of creating a nonprofit start-up, creating a for-profit start-up, or working for someone else. His objective is to maximize the possible returns from devoting his time to working at one or

possibly more than two alternatives under time constraints. The returns include pecuniary benefits from either for-profit start-up or working for someone and nonpecuniary benefits from nonprofit start-up. He possesses two types of skills, x_1 and x_2. If H is the amount of time one can invest in skills and time translates directly into a quantity of human capital, a specialists' stock of skill will be either $[H,0]$ or $[0,H]$. Entrepreneurs will try to equalize their holdings of both skills so that their skill stock will be $\left[\frac{H}{2},\ \frac{H}{2}\right]$.

Following Lazear (2005), expected market productivity from wage work will involve specializing in his best skill, and so his wage is $w = \max[x_1, x_2]$. His expected returns from a for-profit venture depend on the extent of his weakest skill: $Y_f = \lambda_f \min[x_1, x_2] = \lambda_f \frac{H}{2}$. Similarly, his return from a nonprofit venture depends on his weakest skill, but it is the cash equivalent non-pecuniary return to nonprofit entrepreneurship which we assume is proportional to the output of the nonprofit: $Y_n = \lambda_n \min[x_1, x_2] = \lambda_n \frac{H}{2}$. It can also include perquisites such as better working environment, free meals, shorter workdays, or longer vacations.

Working time is assumed to be the only input required for production with T_f being time devoted to a for-profit enterprise and T_n being time devoted to a nonprofit venture. In efficiency units, entrepreneurial time allocated to the nonprofit and for-profit sectors is $E_n = \lambda_n T_n$ and $E_f = \lambda_f T_f$, respectively. Production in the for-profit ($F(E_f)$) and nonprofit ($G(E_n)$) firms increases ithe unobservable entrepreneurial skill at a decreasing rate, so $F_{E_f} > 0$; $G_{E_n} > 0$; $\mathrm{F}_{\mathrm{E_f E_f}} < 0$ and $G_{E_n E_n} < 0$. Diminishing marginal returns to time in each sector raises the possibility of working in more than one sector at once.

Each individual solves t sector choice problem:

$$\mathrm{Max}\left\{\lambda_f \min[x_1, x_2] F\left(\lambda_f T_f\right) + \lambda_n \min[x_1, x_2] G(\lambda_n T_n) + \max[x_1, x_2] T_w\right\} \tag{1}$$

subject to $T_f + T_n + T_w = \bar{T}$, $T_j \geq 0$ for $j = f, n, w$

where f, n, w indicate for-prof entrepreneurship, nonprofit entrepreneurship, and paid employment, respectively.

The Lagrangian is

$$\mathrm{L} = Y_f F\left(\lambda_f T_f\right) + Y_n G(\lambda_n T_n) + \mathrm{w} T_w - \theta\left[T_f + T_n + T_w - \bar{T}\right] \tag{2}$$

The first order conditions with respect to T_f, T_n, and T_w are:

$$Y_f \lambda_f F_{T_f} - \theta \leq 0 \ (= 0 \text{ if } T_f^* > 0) \tag{3}$$

$$Y_n \lambda_n G_{T_n} - \theta \leq 0 \ (= 0 \text{ if } T_n^* > 0) \tag{4}$$

$$w - \theta \leq 0 \ (= 0 \text{ if } T_w^* > 0) \tag{5}$$

Optimal allocation of time among the three choices depends on the marginal product of time, entrepreneurial talent, and returns. The individual will start a for-profit enterprise if the first equation holds with equality, he will start a nonprofit enterprise if the second condition holds, and he will engage in wage work if the third equation holds. The individual will devote time to both a for-profit and nonprofit enterprises if

$$\frac{Y_f}{Y_n} = \frac{\lambda_f \frac{H}{2}}{\lambda_n \frac{H}{2}} = \frac{\lambda_n G_{T_n}}{\lambda_f F_{T_f}} \tag{6}$$

which implies that $\lambda_f^2 F_{T_f} = \lambda_n^2 G_{T_n}$. Equation (6) indicates that when the individual

starts both for-profit and not-for-profit enterprises, he will allocate time across the two sectors so that the marginal products of the last unit of time expended in each enterprise are equal.

If the individual specializes in wage work only, we have that:

$$Y_f \lambda_f F_{T_f} < w = H \tag{7}$$

$$Y_n \lambda_n G_{T_n} < w = H \tag{8}$$

An individual will never engage in both wage work and entrepreneurship. To see this, note that to get a return from entrepreneurship, he will need to spread his human capital investments across the two skill types, meaning that his human capital will equal $\frac{H}{2}$. At least one of the following conditions must hold to both work for a wage and be an entrepreneur:

$$Y_f \lambda_f F_{T_f} = \lambda_f^2 \frac{H}{2} F_{T_f} = w = \frac{H}{2} \tag{9}$$

$$Y_n \lambda_n G_{T_n} = \lambda_n^2 \frac{H}{2} G_{T_n} = w = \frac{H}{2} \tag{10}$$

But the wage worker could have specialized in human capital, and so the wage will be less than H in both cases, and so the individual would not have chosen to become an entrepreneur.

In practice, virtually everyone will engage in wage work at some time over the life cycle. For individuals aspiring to entrepreneurship, wage work is an investment in skills to be used later as an entrepreneur. On the other hand, the theory demonstrates that a higher draw on the unobservable λ gives the decision maker an incentive to become both a for-profit and a nonprofit entrepreneur over the alternative of working for a wage. An important implication is that if λ_f and λ_n are positively correlated, an increase in either λ_f or λ_n will increase the probability of both types of entrepreneurship and decrease the probability of wage work.

Based on the discussion above, four testable hypotheses emerge:

Hypothesis 1: An individual with more diverse skills is more likely to become a for-profit entrepreneur.

Hypothesis 2: An individual with more diverse skills is more likely to become a nonprofit entrepreneur.

Hypothesis 3: More diverse skills decrease the probability of entering paid-employment.

Hypothesis 4: Unobserved entrepreneurial talent will raise the probability of both for-profit and nonprofit entrepreneurship, and so there will be a positive correlation in the error terms derived from models of for-profit and nonprofit entry.

3. Data

The empirical analysis is based on Iowa State University (ISU) Bachelor's degree alumni survey data, which is an excellent and novel source of data for conducting research on non-profit entrepreneurship. The 5,416 usable responses are obtained from a random sample of 25,000 ISU alumni who graduated between 1982 and 2006. The data set provides detailed information on respondents' employment histories, for-profit and nonprofit business start-ups, and socioeconomic characteristics. In addition, these data

were matched with each student's academic record, so we were able to get information on college major(s), courses taken inside and outside of the major, and even high school rank.

3.1. Endogenous variables

Nonprofit entrepreneurs are defined as those who ever started a nonprofit organization during their career. Likewise, for-profit entrepreneurs are identified as having ever initiated a for-profit enterprise. Individuals working for salary or wages at the time of the survey are categorized as wage workers. This means that some respondents fall into more than one category. Table 1 shows the distribution of respondents who fall either one or both categories of nonprofit and for-profit start-up. About 45% of nonprofit entrepreneurs (or 63 out of 140 nonprofit entrepreneurs) also become for-profit entrepreneurs. This distribution suggests that entrepreneurial skills that lead to for-profit start-up could also play a role in the decision to start a nonprofit venture.

We label as entrepreneurs individuals who started as wage workers but eventually became full-time entrepreneurs because wage work can serve as a means of acquiring necessary human capital for the venture (Bilodeau and Slivinski 1996; Lakdawalla and Philipson 2006). On the other hand, if an individual started a for-profit or nonprofit venture but returned to wage work later, we include them in both the wage worker and entrepreneurial occupations. That definition seems consistent with the Lazear framework where diversity of occupational experiences may be selected as a means to becoming an entrepreneur later, while individuals who misjudge their entrepreneurial venture and switch to wage work are clearly choosing entrepreneurial and wage work as separate occupations. In the data, 27% of the for-profit entrepreneurs and 20% of the not-for-profit entrepreneurs left their enterprises and returned to wage work.

3.2. Explanatory variables

The theory says that entrepreneurs will invest in balanced skills to manage their employed specialists efficiently. For our analysis, we include three measures of entrepreneurial skills as indicators of a balanced skill set. In the ISU alumni survey, respondents were asked to report the number of different jobs held since obtaining Bachelor's degree. After reporting the total number of different jobs, respondents subsequently

Table 1 Number and percent of for-profit and nonprofit entrepreneurs in ISU alumni data

	For-profit entrepreneur?		
Nonprofit entrepreneur?	**No**	**Yes**	**Total**
No	4,467	809	5,276
Row%	(84.7%)	(15.3%)	(100%)
Column%	[98.3%]	[92.8%]	[97.4%]
Yes	77	63	140
Row%	(55%)	(45%)	(100%)
Column%	[1.7%]	[7.2%]	[2.6%]
Total	4,544	872	5,416
Row%	(83.9%)	(16.1%)	(100%)
Column%	[100%]	[100%]	[100%]

answered the question, "what occupations have you had in these jobs? Check all that apply." Accordingly, we first measure the balanced skill set by the total number of different occupations associated with those jobs held since graduation, which is denoted by *Occupations*. The second measure is the total number of industries in which the jobs were located, denoted by *Industries*[5]. Higher values of these variables reflect more balanced skills. We include an academic skill set as a third measure of a balanced skill set as Lazear (2005) found that students with a more balanced university curriculum were more likely to enter entrepreneurship while those with general curricula chose to work for someone else. We measure an academic skill set by the difference between total number of courses taken in the major and the average number of courses taken in other departments, defined as *Course-specialization*. Lower value of this measure indicates a more diverse academic program.

As additional control variables, we include parental business experience because entrepreneurial ability can be passed from parents to their offspring (Lentz and Laband 1990). A set of other control variables includes age, age-squared, gender, race, marital status at graduation, parental education, close friends' business experience, and information on academic record such as high school rank, college GPA, and college dummies.

Table 2 shows some descriptive evidence on how the nonprofit and for-profit entrepreneurs are similar and how entrepreneurs in either sector differ from paid-employees. First of all, individuals who became for-profit entrepreneurs have, on average, higher number of

Table 2 Summary statistics

	Mean [Std]		
	Nonprofit entrepreneurship	**For-profit entrepreneurship**	**Wage work**
Balanced skill sets of human capital			
Occupations	2.06 [1.59]	2.22 [1.70]	1.62 [1.12]
Industries	2.14 [1.36]	2.06 [1.22]	1.70 [1.06]
Course_specialization	13.41 [8.05]	12.83[7.26]	13.51 [7.21]
Other human capital			
Male	0.61 [0.49]	0.67 [0.47]	0.59 [0.49]
Married at graduation	0.14 [0.35]	0.11 [0.31]	0.10 [0.30]
White	0.94 [0.24]	0.94 [0.24]	0.95 [0.22]
Mother education	4.58 [1.59]	4.53 [1.56]	4.72 [1.54]
Father education	4.65 [1.71]	4.83 [1.80]	4.91 [1.72]
Either of parents started business	0.57 [0.50]	0.56 [0.50]	0.47 [0.50]
Close friends started business	0.29 [0.46]	0.28 [0.45]	0.47 [0.50]
High school rank	68.30 [33.14]	62.18 [34.62]	70.59 [31.16]
Cumulative GPA	3.02 [0.57]	2.96 [0.58]	3.05 [0.59]
Age at graduation	23.82 [3.70]	24.10 [4.06]	23.50 [3.04]
Current age	41.01 [7.35]	40.50 [7.94]	36.88 [8.47]
College			
Agriculture and Life Sciences	0.22 [0.42]	0.16 [0.37]	0.18 [0.39]
Business	0.18 [0.38]	0.20 [0.40]	0.16 [0.37]
Design	0.15 [0.36]	0.18 [0.38]	0.17 [0.38]
Engineering	0.13 [0.34]	0.09 [0.29]	0.07 [0.25]
Human Sciences	0.23 [0.42]	0.26 [0.44]	0.29 [0.45]

Note: The number in the square bracket is standard deviation.

occupations than paid-employees. The average number of different occupations held by for-profit entrepreneurs is 37% higher than that for paid-employees. Similarly, the average number of different occupations held by nonprofit entrepreneurs is 27% higher than paid-employees. For-profit and nonprofit entrepreneurs also average more industries of employment compared to wage workers. The pattern is less clear cut with respect to academic diversity. For-profit entrepreneurs took the broadest academic programs, but there were no substantial differences between nonprofit entrepreneurs and wage workers.

On average, nonprofit and for-profit entrepreneurs were from families that owned a business and had less educated parents than did wage workers. Entrepreneurs were weaker students in both high school and college. Entrepreneurs came from all colleges, and so choice of major did not dictate a path to entrepreneurship.

4. Methodology

We test our hypotheses in the context of a trivariate probit model which allows correlation in the errors among three choices. The empirical model is based on the latent regression form:

$$y_j^* = X_j\,\beta_j + Z_j\gamma_j + \varepsilon_j, \tag{11}$$

$$y_j = 1\left(y_j^* > 0\right),\ j = f, n, w \tag{12}$$

where $j = n$ for nonprofit startup, f for for-profit startup, and w for paid employment. The latent variable y_j^* represents the value of an occupation j relative to other alternatives. The vector X contains two occupational diversity measures (*Occupations*, *Industries*) and one academic skill measure (*Course_specialization*). As control variables, Z is a vector of demographic variables that potentially alter the relative return to the three occupations as mentioned in the previous section.

The error structure of the trivariate probit is:

$$\begin{pmatrix}\varepsilon_n\\ \varepsilon_f\\ \varepsilon_w\end{pmatrix} \sim N\left[\begin{pmatrix}0\\0\\0\end{pmatrix}, \begin{pmatrix}1 & \rho_{nf} & \rho_{nw}\\ \rho_{nf} & 1 & \rho_{fw}\\ \rho_{nw} & \rho_{fw} & 1\end{pmatrix}\right] \tag{13}$$

For identification reasons, the variance of each ε_j must equal 1. Subject to that normalization, we can identify the three correlation coefficients (ρ_{nf}, ρ_{nw}, ρ_{fw}) which represent the extent to which unobserved covariates jointly determine the occupations. Importantly, the normalization preserves the signs of these cross equation correlations. Because entrepreneurial skill is unobservable to the researchers, it serves as the primary source of error. The sign of the correlation between ε_n and ε_f will depend on the correlation between the unobserved λ_f and λ_n. We expect a positive correlation between the incentives to start for-profit and nonprofit start-ups due to the common unobservable entrepreneurial talents that are presumably valued in both sectors ($\rho_{nf} > 0$). On the other hand, we expect that the unobserved skills that lead to specialization and wage work are negatively correlated with the unobserved general skills that enhance entrepreneurship and so $\rho_{nw} < 0$ and $\rho_{fw} < 0$.

5. Empirical results

The results from the trivariate probit model are reported in Table 3. The first three columns include no covariate controls. The second three columns add pre-college characteristics. The next three columns include more controls for college records. The last three columns report marginal effects associated with the third specification. Higher value of *Occupations* or *Industries* indicates a more balanced skill set while lower value of *Course_specialization* indicate a more diverse skill set. The main implications of the results for occupational choices are consistent across different specifications.

5.1. Do nonprofit and for-profit entrepreneurs share common skill sets?

Before getting to our main findings, we first investigate whether nonprofit entrepreneurs and for-profit entrepreneurs are more similar to one another than to wage workers. In the second set of results, 5 of 8 covariates have common signs across the for-profit and not-for-profit entrepreneurial choices. In the third set of results, 13 of 16 covariate pairs have common signs across the two choices. Parental education and high school rank are the only covariates that have different signs across the two entrepreneurship groups. The clearest distinction in factors that raise the probability of becoming either entrepreneur type while lowering the probability of wage work are growing up with a family or having friends that owned a business, being a member of a minority group, being married at graduation, having an engineering major, and getting older.

We now turn to the main finding on the relationship between balanced skill sets and occupational choice. Having more diverse job experiences across *Occupations* and across *Industries* raises the probability of starting both for-profit and nonprofit enterprises compared to wage work. As we add more controls, the effects of *Occupations* and *Industries* decrease slightly in magnitude but they still raise the probability of both types of entrepreneurship while lowering the probability of wage work, consistent with the predictions from Lazear's "Jacks-of-All-Trades" theory. More precisely, adding one more occupation held since graduation raises the probability of nonprofit startups by 0.2% and the probability of initiating a for-profit venture by 2.7%. Meanwhile, it lowers the probability of working for wages by 2.9%. Likewise, increasing prior sectoral work experience by one more industry increases the probability of nonprofit entrepreneurship by 0.3% and for-profit startup by 1.6%, but it reduces the chance to become a wage worker by 2%. In contrast with Lazear's (2005) findings, more specialized coursework did not affect the likelihood of any of the three occupational choices[6]. The marginal effects across occupations are virtually zero. Nevertheless, the broad sweep of findings from Table 3 support hypotheses 1–3 derived from our extension of Lazear's 'Jack-of-all-Trades' model to include nonprofit entrepreneurship.

To investigate the fourth hypothesis that unobservable entrepreneurial skills λ_n and λ_f create a positive correlation in the errors of the nonprofit and for-profit equations reported at the bottom of Table 3. We find that $\rho_{nf} > 0$ in all specifications, consistent with the presumed common role of unobservable entrepreneurial talent. On the other hand, regardless of specification, unobserved skills that raise the probability of either type of entrepreneurship lower the probability of paid-employment ($\rho_{nw} < 0$ and $\rho_{fw} < 0$).

Because our tests of the "Jacks-of-all-Trades" theory represent three measures: *Occupations, Industries,* and *Course_specialization,* that will be correlated if chosen to raise

Table 3 Trivariate probit model of the joint choices of wage work and for-profit and nonprofit entrepreneurship

	1: No controls			2: Controls for pre-college attributes			3: Controls for pre-labor market entry attributes			Marginal effects		
	(1.1)	(1.2)	(1.3)	(2.1)	(2.2)	(2.3)	(3.1)	(3.2)	(3.3)	(4.1)	(4.2)	(4.3)
	Nonprofit startup	For-profit startup	Wage work	Nonprofit startup	For-profit startup	Wage work	Nonprofit startup	For-profit startup	Wage work	Non- profit startup	For-profit startup	Wage work
Balanced skill sets												
Occupations	0.062*** (2.36)	0.191*** (11.22)	−0.047*** (2.72)	0.046* (1.64)	0.157*** (8.79)	−0.074*** (4.07)	0.039 (1.36)	0.150*** (8.25)	−0.074*** (4.00)	0.002	0.027	−0.029
Industries	0.105*** (3.37)	0.104*** (5.45)	−0.052*** (2.53)	0.084*** (2.54)	0.093*** (4.63)	−0.014 (0.64)	0.076** (2.26)	0.089*** (4.35)	−0.006 (0.26)	0.003	0.016	−0.019
Course_specialization	0.001 (0.22)	−0.004 (1.34)	0.004 (1.39)	0.006 (1.10)	−0.002 (0.51)	0.003 (0.99)	0.003 (0.46)	−0.003 (0.96)	0.004 (1.20)	0.000	−0.001	0.001
Controls												
Age				0.119*** (2.65)	0.062*** (3.04)	−0.005 (0.27)	0.112*** (2.46)	0.052*** (2.38)	−0.015 (0.69)	0.005	0.012	−0.017
Age^2				−0.001** (2.18)	−0.001* (1.86)	−0.000 (0.05)	−0.001** (1.98)	−0.000 (1.29)	0.000 (0.43)	−0.000	−0.000	0.000
Male				0.114 (1.41)	0.169*** (3.67)	0.485*** (10.36)	0.084 (0.96)	0.133*** (2.65)	0.433*** (8.54)	0.001	0.009	−0.010
White				−0.065 (0.37)	−0.249*** (2.60)	0.056 (0.54)	−0.055 (0.31)	−0.219** (2.26)	0.061 (0.58)	−0.001	−0.037	0.038
Father education				−0.034 (1.35)	0.031** (2.06)	−0.059*** (3.74)	−0.036 (1.41)	0.028* (1.87)	−0.060*** (3.77)	−0.002	0.007	−0.005
Mother education				0.017 (0.58)	−0.014 (0.81)	0.028 (1.58)	0.013 (0.44)	−0.015 (0.90)	0.027 (1.53)	0.001	−0.004	0.004
Either of parents started business				0.158** (2.05)	0.190*** (4.27)	−0.150*** (3.27)	0.125 (1.55)	0.155*** (3.38)	−0.127*** (2.71)	0.006	0.030	−0.036

Table 3 Trivariate probit model of the joint choices of wage work and for-profit and nonprofit entrepreneurship *(Continued)*

	1: No controls			2: Controls for pre-college attributes			3: Controls for pre-labor market entry attributes			Marginal effects		
	(1.1)	(1.2)	(1.3)	(2.1)	(2.2)	(2.3)	(3.1)	(3.2)	(3.3)	(4.1)	(4.2)	(4.3)
	Non-profit startup	For-profit startup	Wage work	Non-profit startup	For-profit startup	Wage work	Nonprofit startup	For-profit startup	Wage work	Non- profit startup	For-profit startup	Wage work
High school rank				0.001 (0.93)	−0.003*** (4.30)	0.000 (0.51)	0.002 (1.20)	−0.003*** (3.85)	0.000 (0.06)	0.000	−0.000	0.000
Married at graduation							0.208* (1.81)	0.124* (1.74)	−0.078 (1.09)	0.011	0.024	−0.035
Close friends started business							−0.187** (2.26)	−0.322*** (6.85)	0.115*** (2.43)	−0.008	−0.059	0.066
Cumulative GPA							0.011 (0.15)	0.034 (0.84)	−0.046 (1.08)	0.000	0.004	−0.004
College												
Agriculture							0.223 (1.50)	0.015 (0.18)	0.013 (0.17)	0.012	−0.008	−0.004
Business							0.171 (1.12)	0.152* (1.82)	0.022 (0.27)	0.007	0.016	−0.023
Design							0.095 (0.59)	0.044 (0.49)	0.143* (1.68)	0.005	0.004	−0.009
Engineering							0.490*** (2.83)	0.321*** (3.09)	0.015 (0.15)	0.033	0.054	−0.086
Human sciences							0.116 (0.76)	0.092 (1.13)	0.217*** (2.69)	0.005	0.004	−0.009
Constant	−2.27*** (22.0)	−1.47*** (24.2)	1.23*** (19.83)	−5.01*** (5.71)	−2.91*** (7.11)	1.37*** (3.46)	−4.96*** (5.25)	−2.72*** (5.88)	1.55*** (3.41)			
ρ_{nf}		0.294*** (6.81)			0.28*** (6.35)			0.28*** (6.09)				
ρ_{nW}		−0.39*** (16.1)			−0.43*** (16.7)			−0.43*** (16.7)				
ρ_{fW}		−0.11*** (2.38)			−0.095* (1.90)			−0.16*** (3.24)				

Note: t-statistics are in parenthesis. */**/*** significance level at 10%/5%/1%, respectively.

productivity in wage work or entrepreneurship, the individual coefficients may provide an incorrect inference regarding their joint influence on occupational choice. Table 4 presents joint tests of the joint significance and impact of the three human capital measures. Panel A shows the likelihood ratio (LR) test of the restriction that the three measures have no effect on the probability of selecting each occupation. Panel B provides the test that the three measures have no effect across all three occupations[7]. Both within and between occupations, the LR test of joint significance soundly rejects the null hypothesis that the three measures do not jointly affect the occupational choice. Panel C reports the average of the estimated summed effects of the three measures on each individual's occupational choice[8]. Panel D reports tests of the hypothesis that the summed effects equal zero. As shown in Panel C, the net effects of three measures are positive on both nonprofit and for-profit ventures, while it is negative on paid-employment. The LR tests in Panel D soundly reject the null hypotheses that these effects sum to zero. A unit increase in each of the three measures raises the probability of nonprofit startups by 0.5%, raises probability of for-profit startup by 4.2%, and lowers the probability of wage work by 4.7%.

Our results strongly support the hypothesis that nonprofit and for-profit entrepreneurs share similar skill requirements. Both nonprofit and for-profit entrepreneurs are generalists with more balanced skill sets, while those working for pay are specialists. Furthermore, both for-profit and nonprofit entrepreneurs share common unobserved human capital, consistent with the hypothesized roles of the entrepreneurial skill λ. These findings are consistent with the observation that in the sample of Iowa State University alumni, nonprofit entrepreneurs atypically had also started a for-profit business, and *vice versa*.

Table 4 Joint effects of three measures (*Occupations*, *Industries*, *Course_specialization*)

Panel A			
Within occupation ($H_0: \beta_{1j} = \beta_{2j} = \beta_{3j} = 0$)	Nonprofit entrepreneurship	For-profit entrepreneurship	Wage work
	$\chi^2(3) = 10.09$ $p = 0.018$	$\chi^2(3) = 122.26$ $p = 0.000$	$\chi^2(3) = 20.50$ $p = 0.000$
Panel B			
Across occupations			
($H_0: \beta_{1j} = \beta_{2j} = \beta_{3j} = \beta_{1k} = \beta_{2k} = \beta_{3k} = 0$)	$\chi^2(6) = 127.44$ $p = 0.000$		
Panel C			
	Nonprofit entrepreneurship	For-profit entrepreneurship	Wage work
The average effect of three measures on individuals :			
$\left(\beta_{1j}X_1 + \beta_{2j}\bar{X}_2 + \beta_{3j}X_3\right)$ [marginal effect]	0.278 [0.005]	0.472 [0.042]	−0.070 [−0.047]
Panel D			
	Nonprofit entrepreneurship	For-profit entrepreneurship	Wage work
($H_0: \beta_{1j}X_1 + \beta_{2j}X_2 + \beta_{3j}X_3 = 0$)	$\chi^2(1) = 10.20$ $p = 0.0015$	$\chi^2(1) = 103.03$ $p = 0.0000$	$\chi^2(1) = 9.76$ $p = 0.0018$

Note: Panel A shows the likelihood ratio (LR) test of the restriction that the three measures have no effect on the probability of selecting each occupation. Panel B provides the test of the hypothesis across the three occupations. Panel C shows the numerical net effect of three measures for each occupation and Panel D reports test of the hypothesis that the sum of each effect equals zero.

While our data are consistent with Lazear's presumption of the role of general versus specific skills in the decision to become an entrepreneur, differences in risk aversion could also explain our findings. Entrepreneurs may be less risk averse and so they are willing to accept a higher variance in earnings in exchange for a higher expected return, although Hamilton's (2000) finding that entrepreneurs have lower average earnings than like-skilled employees casts doubt on arguments focused solely on compensating differentials. An alternative is that if less risk averse people are more likely to try new occupations, even random choice would cause one of the occupations to be entrepreneurship. A similar taste-based explanation was advanced by Åstebro and Thompson (2011) who argued that entrepreneurs have stronger taste for variety and tend to have experienced more occupations at the cost of lower earnings. These taste based arguments would predict that entrepreneurs would tend to move in and out of the entrepreneurial occupation whereas the skill-based arguments would suggest more persistence in the choice to be an entrepreneur. Future studies could examine whether spells of entrepreneurship are more likely to end than other spells, although one could just as easily explain that result with the high mortality rate of new ventures.

6. Conclusion

In Lazear's (2005) 'Jacks-of-All-Trades' model of entrepreneurship, individuals who are broadly trained are more likely to become entrepreneurs whereas individuals with specialized skills tend to work for someone else. The entrepreneur's more diverse skills are important to organize the specialists they hire. We show that when Lazear's model is extended to the nonprofit sector, these diverse skills should also increase the likelihood of initiating a nonprofit venture. Using successive cohorts of college graduates, we find that a more balanced skill set increases the choice of nonprofit start-ups, supporting our hypothesis that nonprofit entrepreneurs are also "Jacks-of-All-Trades". In addition, we find that unobserved factors that jointly affect for-profit and nonprofit start-ups are positively correlated, consistent with the presence of a common observed entrepreneurial skill that leads to both for-profit and nonprofit entrepreneurial success. In other words, people who are atypically more likely to start a for-profit business given their observable skills are also more likely to start a nonprofit enterprise.

Endnotes

[1]Mark (1996) found that nonprofit hospitals offered higher quality services but Sloan et al. (2001) found no significant differences in service quality between for-profit and nonprofit hospitals.

[2]While Silva (2007) produces supporting evidence in cross-sectional analysis, the results are not robust to panel techniques that control for individual unobservable factors. Silva attributes the cross-sectional results to individual unobservable characteristics. Similarly, Lechmann and Schnabel (2014) find that the variety of skill sets increases the probability of becoming an entrepreneur, but they also find that entrepreneurs need both general and specific skill sets.

[3]Arabsheibani et al. (2000) argue that lower returns to entrepreneurship are due to entrepreneurs' over-optimism toward their future income. In other words, entrepreneurs are

neither maximizing their income, nor their utility because they cannot make unbiased income forecasts.

[4]Lazear shows that the basic predictions of the model still go through when human capital has more than two subcomponents.

[5]We may measure a balanced skill set by number of different jobs ever held since graduation. The number of different jobs, however, does not necessarily reflect the degree of different work experience because some different jobs may be classified into the same occupation category or they are in the same industry. Because of this possibility, we count the total number of occupations and industries in which the jobs were located. Nevertheless, the results are not sensitive to this alternative measure.

[6]An alternative measure of academic skill set is a Herfindahl index of academic credit concentration denoted by $\sum S_{ij}^2$, where S_{ij} is the share of credits earned in major j by individual i. The results are not sensitive to this alternative measure.

[7]Note that because the marginal effects have to sum to zero, this hypothesis imposes 6 restrictions.

[8]Nearly identical estimates are generated when we sum the three effects evaluated at sample means.

Competing interests
The IZA Journal of Labor Economics is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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