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The Effect of Prior Employer Firm Size on Entrepreneurs' Skills

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Abstract

Although the entrepreneurial performance has been the main subject in entrepreneurial studies, little research has been attempted on its link with the entrepreneur's prior employer firm. In this study, we examined a relationship between employer firm size and post-entry self-employment performances. In startups, entrepreneurs should be "jacks-of-all-trades". Less definite division of labor in small business allows potential entrepreneurs to be generalists, producing more productive entrepreneurs. If that is the case, in manufacturing, in which interdependencies between production factors are strong, the necessity for being generalists is greater than in other industries. Our empirical investigation employed a rich data set representing the entire Taiwanese labor market, and confirmed hypotheses.

I. Introduction

Several empirical studies have found that the experience in paid employment

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contributes to entrepreneurial performances (McPherson, 1996; Abdesselam et al., 2002; Colombo et al., 2004; Åstebro and Bernhardt, 2005). In paid employment, employees' skill acquisition is affected by the internal conditions of firms, and these conditions tend to vary with employer firm size. In studies of entrepreneurs' experiences in paid employment, however, little attention has been given to the characteristics of prior employers that might influence the skill acquisition of potential entrepreneurs.

In a startup, the entrepreneur is generally responsible for all aspects of business. The entrepreneur not only directs the firm, but also provides labor in a number of operations. In a theoretical model, Lazear (2005) shows that entrepreneurs need to be "jacks-of-all-trades". In his model, a specialist stands to gain greater return from the specialty in paid employment, whereas the return for a generalist is greater in entrepreneurial activities.

By means of a balanced set of skills, the generalist entrepreneur is able to outlook how to organize all the management tasks in coordination with each other. This outlook over the entire production process is also especially important in startups, in which uncertainty in production is considerably high. Nevertheless, factors contributing to the development of potential entrepreneurs into generalists are not clear. On-the-job training and learning-by-doing allow many employees to enhance their productivity through performing tasks (Lazear, 1976). Prior to establishing a business, many potential entrepreneurs acquire skills in paid employment. If task-related experiences develop the employee's skills and diversified experiences broaden the range of the skills, firms providing opportunities for those experiences would produce generalist entrepreneurs.

With regard to this point, in large firms, which employ a number of specialists, it is

difficult for an employee to work beyond the specialty. As Garicano and Hubbard (2003) argue, division of labor in firms becomes more definite with firm size. In large firms, employees invest more in a specific specialty. In startups, past concentrated investments in the specific skill may hinder entrepreneurs from gaining an overview of the whole production process.

On the other hand, small business, in which the division of labor is less formal and the area of an employee's work is comparably broad, tends to provide an employee with diversified tasks. Rowden (2002) suggests that in small business, organizational learning is mainly achieved by the inter-personnel exchange of skills. This exchange between heterogeneous workers also raises the diversity of skills. The past experience of cooperating with and coordinating such heterogeneous workers may enable the entrepreneurs to communicate efficiently with other workers, and to gain the overview of the entire production process in startups.

Besides the diversity of skills, in large firms, analyses of information flowing into firms tend to be the work in charge of employees whose specialization matches the specific type of that information (Bolton and Dewatripont, 1994). If the stratified management hierarchy of large firms hinders efficient communications between these analytical specialists and other employees, then this specialization might prevent many employees from evaluating the possible external entrepreneurial opportunities of firms precisely. If that is the case, large firm employees are less likely to estimate the profitability of potential entrepreneurial opportunities with accuracy, implying that it is reasonable to find lower performances of businesses established by them. With regard to entrepreneurial opportunities, in addition, former small business employees can mimic business models of prior employers if necessary, while it is difficult for those

coming from large firms to imitate the whole sizeable business of prior employers.

Although small business has only been focused, comparative perspective is necessary when analyzing this issue. In large incumbent firms, compared to small business, there tends to be more new ideas that management of firms chose not to commercialize (Audretsch et al., 2006). If innovative employees could not put their ideas into practice in incumbent firms, they create new organizations to pursue their goals. In addition, recently, a series of empirical studies reported that the likelihood of the entrepreneurial choice declines as firm size increases, with other things being equal (Blanchflower and Meyer, 1994; Dobrev and Barnett, 2005; Wagner, 2004). It is probable that entrants leaving large firms despite this general propensity are carrying out more promisingly profitable ideas. Therefore, the net effect of small business employment appears to diminish when advantages of the large firm exceed those of small business.

The questions raised by these studies have received little further attention. In growth analyses of newly established firms, Dunkelberg and Cooper (1982) and Westhead and Birley (1995) both find that entrepreneurs previously employed by larger firms are more likely to achieve faster firm growth. In the U.S. automobile industry during the period between 1985 and 1966, Klepper (2002) reveals that spin-offs from the leading firms in the production of the industry displayed lower hazard rates holding other parameters constant. On the other hand, recently, economic sociologists, Sørensen and Phillips (2004) preliminarily report that the new self-employed previously employed by smaller firms are more likely to survive and generate greater incomes. Sørensen and Phillips' results are derived from a representative sample of the Danish labor market, which is a feature distinct from three studies mentioned above.

Perhaps, it appears reasonable that surviving entrepreneurs coming from larger

firms achieve faster growth, because many of them are likely to have ideas of greater profitability taken from sizeable prior employers. Klepper's finding (2002) is attained in the industry emerging at that time, in which technologies were rapidly and continuously evolving. In such industry, it is possible that many larger firms have a greater stock of ideas and technologies not commercialized, and that stock in the industry appears more valuable compared to in other industries. While these empirical evidences support either small business or the large firm based on different types of data and measurements, the results are less clear as to which organizational characteristic gives the advantage to the entrepreneurs. Little is known of the provenance of the advantages of these spin-off entrepreneurs.

II. The Diversity of Skills

In exploring the research question mentioned above, we presume that a characteristic of the industry of the entrepreneurial firm is crucial. When establishing business in manufacturing, an entrepreneur tends to face a number of problems, since the production process of manufacturing firms is complex relative to other industries. A theoretical model formulated by Milgrom and Roberts (1990) proves the existence of strong complementarities between various production factors in manufacturing.

The introduction of efficiency in the design system such as computer-aided design (CAD) equipment enables frequent changes in design, thereby promoting the adoption of a more flexible manufacturing equipment process capable of producing a variety of products in small batches. This new flexible equipment allows a firm to minimize inventory costs, enabling greater flexibility in inventory strategies.

These interdependencies among various production factors inevitably alter manufacturing process, and also extend to marketing strategies. Production in small batches allows quick response to customer demand and the minimization of delay in delivery. As a result, a change in the design phase transforms marketing strategies by encouraging the adoption of a more efficient order transmission system and expedient delivery. Even if an entrepreneur changes only one of these factors, then the outcome includes not only the direct effect of that factor, but also indirect effect by way of other correlated factors. In manufacturing, we should consider close interrelationship among a number of production factors.

In fact, production factors such as design, engineering, and sales in manufacturing are so closely correlated that a growing number of new products in modern business are developed by teams comprised of designers, process engineers, and manufacturing managers in order to achieve concurrent information sharing (Chuma, 2003).

Another prediction of Lazear's formulation (2005) is that in new firms dealing with complex production process, the number of skills necessary for entrepreneurs rises substantially, thereby escalating the advantage of the generalist entrepreneur. Due to strong interdependencies between production factors, the production process in manufacturing appears to be characterized by its complexity. Hence, since an entrepreneur is expected to take complex interdependencies into consideration, when establishing a firm in manufacturing, such an entrepreneur would appear to have a distinct advantage coming from small business.

The current study analyzes the impact of the firm size of prior employers on entrepreneurial performance by using a rich data set representing the entire Taiwanese labor market. We would expect to find that entrepreneurs coming from small business

have definite advantages over those coming from large firms. If we find the effect of prior small business employment, then we examine whether the effect of prior small business employment is magnified due to the industry-specific characteristic of manufacturing, by making a comparison between entrepreneurs in manufacturing previously employed by small business and those who came from businesses similar in size, and are currently situated in other industries.

If we observe that the effect of small business employment is magnified within the scope of entrepreneurs in manufacturing, in which the entrepreneurs face strong interdependencies between production factors, then the effect of diversity of skills can be isolated from other advantages of small business, such as more precise recognition of external business opportunities. We can thereby separately identify the diversity of skills as an advantage of entrepreneurs coming from small business.

In the following section, our data is introduced. In spite of a number of advantages of our data, as in many social science studies, it has several constraints. Our two estimation models on the continuation of entrepreneurial activities and entrepreneurial incomes are also shown along with related variables. Estimates by these models are discussed in section IV. We found that entrepreneurs coming from larger firms are less likely to continue entrepreneurial activities, holding other factors constant. Our estimates also indicate that in manufacturing entrepreneurs previously employed by small business receive greater earnings compared to their counterparts in other industries. A summary of this study, implications, limitations of this study and future tasks are all given in section V.

III Estimation Methods

Data used for this study is derived from the Manpower Utilization Survey, an annual governmental labor survey in Taiwan[1]. Since this data is based on randomly selected individuals nation-wide, the possible findings of this study bear generalization.

Survey interviewers asked workers about, among other things, current job status, and whether they had resigned from jobs within a year previous to the interview[2]. Those responding affirmatively to that question were asked to describe the reason for the job changes. Of those who had resigned voluntarily from their previous jobs, 936 did so with the aim of establishing a business[3].

Resigning from a job to establish a business can be regarded as a transition from paid employment to entrepreneurial activities. Having entered the entrepreneurial sector, an entrepreneur decides in any point of time whether to remain in entrepreneurship. Our first dependent variable represents the continuation of entrepreneurial activities, taking 1 if this individual who had resigned from the job in order to establish business was the self-employed at the time of the interview, and 0 if he/she was either a paid worker or an unpaid family laborer.

The time-horizon of our analysis on the continuation starts when the observation resigns from the job, and ends when interviewed, being different from many previous studies, in which it starts at the moment when the business is established. Although we are informed of the entrepreneur's status both at the beginning and the end of the

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[1] Of the characteristics of Taiwanese economy, it is a well-known fact that Taiwanese small businesses have been highly competitive, especially in the foreign market. In the labor market, mobility in employment is quite high. As to social norms, Taiwanese society has attached great importance to entrepreneurship. Shieh (1989) conducted in-depth field research on the dynamism of Taiwanese entrepreneurship.

[2] For non-workers, the survey has no information on their previous jobs. Since we traced back from a working population defined at the time of survey to entrants in the previous year, observations who had been entrants in the previous year but consequently becoming non-workers at the time of the survey were left out of the scope of our analysis.

[3] In response to the question "why did you leave previous jobs?", they choose the answer "I hoped to establish a business by myself"

period, we do not have data just at the moment when the business is established.[4] Also, we cannot specify which month of the year previous to the survey, the resignation from the job occurred within the year previous to the survey, so the length of the period is possibly longer (shorter) for those who had resigned at the beginning (end) of the year.[5]

As sample size derived from a survey in a single year is not sufficient for regression analysis, we pooled annual samples for ten years from 1995 to 2004. The annual samples of this governmental survey are different across years, making it impossible to utilize the panel data method.

Prior to entries, 49 observations had changed jobs during the year previous to the survey, indicating that their prior employment was not sufficiently long. In order to reduce possible heterogeneities in prior employment experiences, these observations with extremely short prior employment histories were excluded from our sample[6].

We used variables representing the status of the entrepreneur's spouse in the subsequent analysis. Since our household-based labor force survey also incorporates other members of entrepreneurs' households, we attempted to pick the entrepreneur's spouse out of these members. A marital relationship within a household was identified according to each member's family relation to a household head. For example, if an entrepreneur is a son of the household head, we identified a household member whose family relation is the wife of the son. However, when there are two or more married sons within the same household, the entrepreneur's wife could not be specified. Spouses living outside the entrepreneur's household could not be identified either. We excluded

[4] It is probable that some may return to paid employment without establishing business.

[5] Since the interview is conducted in May, the length of the analytical period possibly ranges from five months to twelve months.

[6] Nevertheless, we could not control completely heterogeneities arising from the length of tenures in prior employment. This possibility might not be ignorable, especially in our Taiwanese data, where mobility in employment is considerably high.

63 observations whose information on spouses was missing in this way, which reduced our sample size to 735[7].

The second analysis is on the determinants of entrepreneurial incomes conditional on the continuation of entrepreneurial activities. The logarithm of the hourly income generated by the main occupation of the entrepreneur was used. This dependent variable was adjusted by the Consumer Price Index (CPI) to the 2001 price, and expressed in New Taiwan Dollars. For this analysis, 624 observations were available.[8]

Our primary interest is the firm size of the prior employer. Four classes were set up according to the number of workers: less than ten workers, no more than ten and less than 50 workers, no more than 50 and less than 200 workers, and 200 workers or more.

The next variable of main interest is an interaction variable in which each of four employer firm size dummies was multiplied with an industry control on manufacturing. By adding these interaction variables into the regression equation, we decomposed the effect of prior small business employment into a manufacturing-specific component and other general component. Used together with a control on the entrepreneur's industry-specific experience shown later, the interaction variable, representing the manufacturing-specific component, examines the hypothesis that entrepreneurs in manufacturing coming from small business obtain greater incomes than their counterparts in other industries. The control on manufacturing included in the interaction variable, representing the industry of the entrepreneurial firm, was excluded from the analysis on continuation, since at the starting point of the analytical

[7] In addition, as to five observations, information was not responded by the persons in question themselves, thus seemingly unreliable.58 observations resigned from jobs together with family members, and later becoming unpaid family laborers. We excluded both observations for the accuracy of estimation. In addition, 26 observations were previously employed by governmental agencies. They were also excluded, since the use of these might amplify measurement errors in the assessment of the impact of firm-size.

[8] We excluded entrepreneurs working on part-time basis.

period, when they resigned from jobs, entrants have yet to establish businesses.

To control remaining factors in the error term, the degree of risk aversion, demographic factors, the level of other human capital and financial capital were included in the model.

Gender differences were controlled by a dichotomous variable. Married entrepreneurs and those with more children in families are more likely to become risk averse, lowering the probability of continuing entrepreneurial activities. On the contrary, emotional support from the family member appears to exert a positive impact. In order to capture these effects, marital status and the number of children under 18 years old were included in the model.[9]

Our model included both the entrepreneur's age and a square of the age. Entrepreneur's age should be considered in the way in which it is divided into two factors. The first factor is human and financial capital accumulated gradually with age. The other is physical strength, which, in contrast, decreases with age. Establishing a business is a laborious process, putting older entrepreneurs at a disadvantage. Thus, combining these two opposing effects, overall functional form in which age exerts influence on entrepreneurial outcome might be quadratic.

To explain the effect of education, we included dichotomous variables representing education in each level of high school, junior college and university. As with the entrepreneur's age, education appears to have two opposing impacts. Although education might contribute to entrepreneurial activities, at the same time, it also raises expected potential earnings obtained alternatively from paid employment. When considering this occupational choice of the entrepreneur and the opportunity costs of

[9] Holtz-Eakin et al. (1994a; 1994b) find that the number of children under 18 years old has no significant impact.

entrepreneurial activities, well-educated entrepreneurs are more likely to discontinue entrepreneurship attracted by substantial potential return from paid employment[10].

Our model included three financial capital variables all captured by dichotomous variables; the spouse's working status, the contribution of the spouse as an unpaid family laborer, and the secondary occupation. Earnings generated by the spouse work as a financial base and raises capacity to take risks[11]. If the spouse works as an unpaid family laborer, this intra-household labor supply might relieves the financial constraints of a startup, in which it is costly to employ additional wage workers. The secondary occupation of the entrepreneur provides another source of financing.

When the entrepreneur operates business in the same industry as that of previous employer, the industry-specific experience may contribute to entrepreneurial performance by providing detailed information on the industry's environment and norms. The industry of current business and that of the previous employer were matched according to the two-digit Standard Industrial Classification (SIC) code. The Industry-specific experience was represented by a dichotomous variable taking 1 if the current and prior industry were matched and 0 otherwise.

To control factors other than entrepreneurial attributes, our formulation contained firm age measured in months. Industry dummies, prior occupational dummies, year dummies were also included in the model. Prior occupations controlled by dummies were middle managers, professionals, clerical, sales and craft (CSC) workers, and service workers. The experience of administrational work in the prior employer is

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[10] Bates (1990) shows that education raises the survival rate of firms whose owners are white males in the United States, whereas negative impacts on the firm's survival are shown by Bates' analysis (1989) on black males in the United States, and Nafziger's investigation (1996) on Indian entrepreneurs.

[11] The role of the spouse in the entrepreneurship has rarely been taken up in the previous literature, except for Wong (1986) who reveals the contribution of the spouse's education to entrepreneurial earnings, and Bernhardt (1994) who finds a positive impact on the probability of entry amongst Canadian white males.

expected to have a positive impact on the entrepreneurial outcome. We captured this effect by an occupational dummy representing middle mangers[12].

In order to capture income disparity between professional and non-professional entrepreneurs, our model included a dichotomous variable representing professional entrepreneurship such as engineers, scientists, lawyers and accountants.

Variables representing the characteristics of self-employed business, firm age, the industry-specific experiences, the secondary occupation, professional entrepreneurship, and industry controls could not be included in the continuation equation, since at the starting point of its analytical period, when the resignations from prior jobs occurred, we could not specify the characteristics of self-employment business. Basic statistics and correlation matrices of these variables are shown in the Appendix.

IV. Results

Table I shows the determinants of the probabilities of the continuation of entrepreneurial activities estimated by Probit regression. A Likelihood Ratio (LR) Test rejected a null hypothesis by the one percent significance level that all of the year dummy variables are jointly insignificant. It did not reject joint insignificance of four prior occupational dummies.

As can be observed from Column 1, three classes of firm size dummies all have significant and positive impacts on continuation. It is also noteworthy that the statistical significance of these variables multiplies as employer firm size declines.

The marginal effects of these variables in Column 2 indicate that the magnitude of

[12] Bates' empirical model (1990) takes experiences in management capacity into consideration, but finds no significant impact.

the coefficients rises as employer firm size declines. When other parameters are evaluated at means, entrepreneurs previously employed by firms with more than 99 and less than 200 workers are approximately 14.3 percent more likely to continue compared to those employed by firms having 200 workers or more, which is a substantial impact. This difference expands by approximately 0.2 percent when moving to the prior employer having no less than ten and less than 50 workers. Finally, firms in the smallest category, less than ten workers, produce entrepreneurs that are close to 17 percent more likely to continue than firms having 200 workers or more do.

Females are less likely to continue, and the probability of continuation significantly declines by roughly eleven percent for females. Education appears to exhibit a negative and significant impact, and university graduates are significantly less likely to continue entrepreneurial activities. In paid employment, the return from university education appears to be greater than in entrepreneurship, resulting in the lower rate of the continuation of well-educated entrepreneurs.

When the fields of specialization in university and junior college were attempted to be analyzed, marginal effects indicate that the specialties of both liberal arts and natural science have significant and negative effects, but the absolute magnitude of the effect of liberal arts was greater than that of natural science, though not shown here for space constraints.

The spouse's labor market status has significant but negative impact, inconsistent with Bernhardt (1994), who finds its positive impact on the entrepreneurial entry. As Bernhardt's study utilizes a sample of males, we tried the same specification by excluding female observations. We found that the coefficient was still negative, but insignificant.

In contrast, a positive and significant impact of the spouse's unpaid family labor was found. In the earlier stage of establishment, when it is costly to employ workers in the labor market, the spouse's contribution through the internal supply of labor appears to be significant. Neither of age, marital status, the number of children, and the middle management experience are significant.

[Insert Table I about here.]

Ordinary Least Square (OLS) estimates of the determinants of entrepreneurial income are shown in Table II. The F test rejected neither of two null hypotheses, one of which assumes that year dummy variables are jointly insignificant, and the other, that prior occupational dummies are jointly insignificant.

As can be observed from Column 1, neither of coefficient estimates of dummies representing the experience in small business are significantly different from zero, inconsistent with results shown in Table I.

In Column 2, when we decompose each firm size dummy into a manufacturing-specific component and other general component by introducing interaction variables, all of the interaction variables have significant and positive impacts. For entrepreneurs in manufacturing previously employed by firms having no less than 50 and less than 200 workers, while other parameters are evaluated at means, they earn roughly 319 New Taiwan Dollars (NT Dollars) more per hour than those in other industries coming from firms of the same class (one NT Dollar is roughly equivalent to 0.03 U.S. dollars). In the same way, entrepreneurs in manufacturing whose prior employer firm size is less than 10 and less than 50 workers receive

approximately 488 NT Dollars more hourly incomes than their counterparts in other industries. Similarly, entrepreneurs coming from firms having less than ten workers earn approximately 410 NT Dollars additionally owing to the industry-specific characteristic of manufacturing.

These results imply that in manufacturing, in which interdependencies between production factors is especially strong, the advantage of small business employment is substantially magnified[13]. This significant magnification of the contribution of the experience in small business employment found in manufacturing cannot be explained by the small business employee's comparably precise evaluation of external business opportunities of the prior employer firm. Therefore, mostly by virtue of possessing balanced sets of skills, there appears to be an advantage to entrepreneurs produced by small business.

As to other human capital variables, entrepreneurs previously employed in the same industry as their current businesses generate greater income holding other parameters constant. This finding is consistent with those of many previous studies. The estimate of the middle management experience is not significantly different from zero.

Education has no significant impact, implying that the entrepreneurial income might not rise significantly with education. Instead, in connection with the analysis of continuation probabilities, education appears to primarily increase alternative potential earnings in paid employment, discouraging entrepreneurs from continuing entrepreneurial activities.

One might argue that our result is limited to entrepreneurs who had decided to continue, thus suffering potentially from sample selection bias. Heckman's Two-step

[13] We find no similar effect in any other industry than manufacturing.

Estimation was also attempted, but showing that our main results were not changed, though not shown here for space constraints.

If workers who have high unobservable entrepreneurial abilities, for some reasons, self-select to work in small businesses, then our results does not imply organizational advantages of small business, but rather the consequence of the self-selection of workers, and the unobservable ability that influences simultaneously both the choice of the workplace and the entrepreneurial outcome. In order to check this alternative interpretation, we treated the firm-size dummy as endogenously determined, employed a structural equation model, and furthermore allowed the correlation between two unobserved errors in equations[14]. If the alternative interpretation holds, the correlation between errors (rho) should be positive, since entrepreneurially talented workers were previously more likely to choose small business, and the same workers later exhibit better post-entry performances. However, even in this structural model, the results in Table I was still unchanged, and the correlation between two errors was significant but negative.

As our final concern, we take in consideration the wage level that the entrepreneurs had earned in paid employment prior to entry. Wages paid to small business employees tend to be in average lower than those of large firms. Entrepreneurial success gives small business employees a substantial increase in their expected lifetime earnings relative to large firm employees. Given these wage differentials, due to the discontinuous rise in expected lifetime earnings, small business employees are more likely to be highly motivated to prepare the entrepreneurial entry in paid employment, concentrating resources on investing in entrepreneurial skills. If that is the case, the

[14] In the choice equation, we regressed a small business dummy on educational variables and a dummy variable for urban residents.

advantage of small business employment obtained earlier might not be due to the diversity of skills, but rather because of the small business employees' intensive preparatory human capital investments.

After sorting the entrepreneurs into in order of predicted prior earnings[15], by extracting the fourth quartile of the entire sample, we examined the effect of employer firm size within the bounds of the entrepreneurs who had previously received comparably high earnings. As a result, the negative impact of employer firm size onto continuation probabilities found earlier was still robust, showing that even within the prior high income recipients, the experience in small business still gives entrepreneurs advantages.

[Insert Table II about here.]

V. Conclusions

The work experience of entrepreneurs was discussed with particular focus on firm size of the prior employer. In small business, an employee is able to obtain a more uniformly distributed set of skills, thus having less difficulty when establishing business.

By isolating the effect of prior small business employment specific to manufacturing, we have found that in manufacturing, the advantage of small business is distinctively magnified. Our findings highlight the role of small business in creating more productive entrepreneurs, and this is possibly because small business provides a balanced set of skills. Many new businesses established by former small business employees are

[15] Since prior wages are not available from our data, we first estimated a wage function over current employees, and then by using this estimated function and available control variables, predicted the prior wages.

subsequently incorporated into the small business sector, thereby promoting the self-consolidation of the sector. In the policy agenda, further attention should be paid to this reproduction process of the small business sector. The fact that small business develops entrepreneurial skills points out the importance of the skill acquisition process of potential entrepreneurs in this type of firms. Comparably vulnerable current position of small business employees relative to their large firm counterparts reminds us of the necessity of supporting their skill acquisition process politically and financially.

Nevertheless, our research might have a limitation. As previously mentioned, entrants who subsequently joined a non-working population were left out of our data. It is possible that this, more or less, biases our estimation.

For the future development, we can propose two points. First, although the organizational characteristic discussed here was firm size, further extension might be possibly realized by the introduction of other organizational characteristics such as the position that the potential entrepreneur holds in the managerial hierarchy. It is possible that the effect of firm size varies according to the employee's intra-firm rank-order.

Second, although the skill-advantage of former small business employees in entrepreneurial performance is hypothesized and our data has by and large proved to fit those hypotheses, there appears to be another situation in which the large firm has the advantage over small business. As a pool of advanced technologies and ideas not commercialized in large firms appears to be one of the most prominent advantages of entrepreneurs spinning-off from there, similar investigation into entrepreneurs of New Technology-based Firms (NTBFs) may provide a useful comparison.

Appendix

Table I　Determinants of the Continuation of Entrepreneurial Activities

: This table shows Probit estimates of the determinants of probabilities of continuing entrepreneurial activities. All of the estimates of three firm size dummies are both significant and positive, implying that entrepreneurs previously employed by small firms are more likely to continue. When comparing between marginal effects of firm size dummies, we found that the effect of prior small business employment increases as employer firm size decreases.

Variable	Coefficient	Marginal Effect
Female	−0.484 ***	−0.132 ***
	(0.132)	(0.039)
Married	0.408 *	0.106 *
	(0.234)	(0.063)
Number of Children	−0.069	−0.017
	(0.078)	(0.019)
High School	−0.029	−0.007
	(0.153)	(0.038)
Junior College	−0.416 **	−0.117 *
	(0.208)	(0.065)
University	−0.668 ***	−0.203 **
	(0.241)	(0.085)
Age	0.094 *	0.023 *
	(0.056)	(0.014)
$Age^2/100$	−0.103	−0.026
	(0.077)	(0.019)
Firm Size 1−9	0.573 **	0.146 **
	(0.241)	(0.063)
Firm Size 10−49	0.474 **	0.105 **
	(0.239)	(0.048)
Firm Size 50−199	0.466 *	0.095 **
	(0.271)	(0.044)
Spouse Works	−0.412 **	−0.108 **
	(0.191)	(0.053)
Spouse Unpaid Family Laborer	0.681 **	0.128 ***
	(0.318)	(0.041)
Constant	−1.883 *	
	(0.977)	
LR Statistics for Prior Occupational Dummies	6.180	
LR Statistics for Year Dummies	26.640 ***	
Number of Observations	735	
Log−likelihood	−319.529	

Figures in parentheses are standard errors. ***significant at the 1% level. **significant at the 5% level.

*significant at the 10% level.

Table II　Determinants of Entrepreneurial Incomes

: This table shows OLS estimates of the determinants of entrepreneurial incomes. While in the model 1, we only analyze the direct effects of firm size, in the model 2 we also consider the interaction effects between firm size and the manufacturing industry. In the model 1, firm size dummies are not significantly correlated with incomes. In the model 2, the interaction effects are both positive and significant. This finding implies that entrepreneurs coming from small business receive greater incomes in manufacturing, compared to when they run businesses in other industries.

Variable	Model 1	Model 2
Firm Age	0.050 ***	0.049 ***
	(0.009)	(0.009)
Female	−0.061	−0.068
	(0.100)	(0.100)
Married	0.215	0.197
	(0.147)	(0.146)
Number of Children	0.053	0.054
	(0.049)	(0.049)
High School	0.059	0.041
	(0.094)	(0.094)
Junior College	0.188	0.164
	(0.137)	(0.137)
University	0.020	0.008
	(0.170)	(0.170)
Age	0.002	0.009
	(0.036)	(0.036)
$Age^2/100$	−0.006	−0.015
	(0.047)	(0.047)
Industry-specific Experience	0.120	0.123
	(0.087)	(0.086)
Firm Size 1-9	−0.009	−0.240
	(0.200)	(0.216)
Firm Size 10-49	0.073	−0.171
	(0.200)	(0.217)
Firm Size 50-199	−0.050	−0.259
	(0.218)	(0.235)
(Firm Size 1-9)*(Manufacturing)		1.399 ***
		(0.536)
(Firm Size 10-49)*(Manufacturing)		1.480 ***
		(0.528)
(Firm-Size 50-199)*(Manufacturing)		1.229 **
		(0.618)
Secondary Occupation	0.348	0.368
	(0.274)	(0.273)
Spouse Works	−0.212 *	−0.198 *
	(0.117)	(0.117)
Spouse Unpaid Family Laborer	0.065	0.087
	(0.136)	(0.136)
Professional	0.847 ***	0.832 ***
	(0.257)	(0.256)
Agriculture	−0.343 *	−1.635 *
	(0.209)	(0.508)
Manufacturing	−0.441	−0.438 ***
	0.262	0.260
Construction	0.071	0.088
	0.251	0.250
Commerce	−0.186	−0.174
	0.173	0.173
Logistics and Communicaton	0.032	0.053
	0.265	0.264
Consumer Service	−0.175	−0.164
	0.183	0.183
Constant	4.659 ***	4.748 ***
	(0.695)	(0.693)
F statistics for Prior Occupational Dummies	0.627	0.624
F statistics for Year dummies	0.900	0.900
Number of Observation	579	579
Log Likelihood	−728.267	−723.936

Figures in parentheses are standard errors. ***significant at the 1% level. **significant at the 5% level.

*significant at the 10% level.

Table III A Summary of Variables

Variable	Number of Observations	Mean	Standard Deviation	Min	Max
Continuation	735	0.796	0.403	0	1
Female	735	0.268	0.443	0	1
Married	735	0.626	0.484	0	1
Number of Children	735	1.001	1.144	0	4
High School	735	0.435	0.496	0	1
Junior College	735	0.150	0.357	0	1
University	735	0.117	0.322	0	1
Age	735	33.769	8.132	17	62
$Age^2/100$	735	12.064	6.012	2.89	38.44
Firm Size 1-9	735	0.556	0.497	0	1
Firm Size 10-49	735	0.282	0.450	0	1
Firm Size 50-199	735	0.106	0.308	0	1
Spouse Works	735	0.346	0.476	0	1
Spouse Unpaid Family Laborer	735	0.120	0.325	0	1
Prior Middle Manager	735	0.041	0.198	0	1
Prior Professonal	735	0.293	0.455	0	1
Prior CSC Worker	735	0.320	0.467	0	1
Prior Service Worker	735	0.136	0.343	0	1
Year 1995	735	0.125	0.331	0	1
Year 1996	735	0.121	0.326	0	1
Year 1997	735	0.113	0.317	0	1
Year 1998	735	0.124	0.330	0	1
Year 1999	735	0.101	0.301	0	1
Year 2000	735	0.090	0.286	0	1
Year 2001	735	0.072	0.259	0	1
Year 2002	735	0.088	0.284	0	1
Year 2003	735	0.079	0.270	0	1
Year 2004	735	0.087	0.282	0	1
Log Hourly Income	579	5.038	0.931	0	7.40795
Firm Age	579	8.313	4.307	1	16
Industry-specific Experience	579	0.408	0.492	0	1
(Firm Size 1-9)*(Manufacturing)	579	0.029	0.169	0	1
(Firm Size 10-49)*(Manufacturing)	579	0.029	0.169	0	1
(Firm Size 50-199)*(Manufacturing)	579	0.038	0.191	0	1
Secondary Occupation	579	0.010	0.101	0	1
Professional Entrepreneur	579	0.026	0.159	0	1
Agriculture	579	0.036	0.187	0	1
Manufacturing	579	0.085	0.279	0	1
Construction	579	0.040	0.195	0	1
Commerce	579	0.539	0.499	0	1
Logistics and Communicaton	579	0.035	0.183	0	1
Consumer Service	579	0.207	0.406	0	1

Table V　Pearson's Correlation Coefficients between Variables of Interest (579 Observations)

		1	2	3	4	5	6
1	Log hourly income	1.000					
2	Firm Age	0.252	1.000				
3	Female	−0.086	0.041	1.000			
4	Married	0.109	−0.026	−0.261	1.000		
5	Number of Children	0.115	−0.030	−0.141	0.672	1.000	
6	High school	−0.017	−0.031	0.035	−0.083	−0.044	1.000
7	Junior College	0.061	0.009	−0.071	0.007	−0.040	−0.364
8	University	0.047	0.012	−0.070	0.053	0.027	−0.294
9	Age	0.015	0.029	−0.048	0.332	0.153	−0.279
10	$Age^2/100$	0.003	0.016	−0.049	0.300	0.096	−0.264
11	Industry-specific Experience	0.096	0.100	0.032	−0.122	−0.053	0.019
12	Firm-size 1-9	−0.016	−0.010	0.031	−0.082	−0.034	0.037
13	Firm-size 10-49	0.028	0.003	−0.052	0.021	0.004	0.050
14	Firm-size 50-199	−0.031	−0.009	0.060	0.049	0.022	−0.082
15	(Firm-size 1-9)*(Manufacturing)	0.010	0.075	−0.071	0.066	0.035	−0.052
16	(Firm-size 10-49)*(Manufacturing)	0.024	0.015	−0.087	0.092	0.086	0.078
17	(Firm-size 50-199)*(Manufacturing)	−0.024	−0.004	−0.056	0.076	0.060	−0.022
18	Secondary Occupation	0.069	0.046	−0.046	0.051	0.044	0.029
19	Spouse Works	−0.052	−0.099	0.007	0.509	0.280	−0.077
20	Spouse Unpaid Family Laboer	0.116	0.145	−0.145	0.309	0.165	−0.016
21	Professional	0.158	0.011	−0.037	0.076	0.037	−0.145
22	Agriculture	−0.083	−0.008	−0.040	−0.010	−0.084	−0.043
23	Manufacturing	−0.016	0.059	−0.137	0.149	0.118	−0.008
24	Construction	0.090	0.037	−0.111	0.078	0.061	0.033
25	Commerce	−0.080	−0.129	0.077	−0.018	−0.024	0.035
26	Logistics and Communication	0.056	0.032	−0.103	0.003	0.057	−0.035
27	Consumer Service	0.041	0.085	0.116	−0.081	−0.025	0.042
		7	8	9	10	11	12
7	Junior College	1.000					
8	University	−0.135	1.000				
9	Age	0.007	0.044	1.000			
10	$Age^2/100$	0.001	0.024	0.990	1.000		
11	Industry-specific Experience	−0.069	0.068	−0.145	−0.141	1.000	
12	Firm-size 1-9	−0.165	−0.160	−0.077	−0.062	0.296	1.000
13	Firm-size 10-49	0.049	0.050	0.065	0.054	−0.178	−0.729
14	Firm-size 50-199	0.090	0.157	0.038	0.032	−0.152	−0.391
15	(Firm-size 1-9)*(Manufacturing)	−0.042	−0.023	−0.019	−0.021	0.043	0.150
16	(Firm-size 10-49)*(Manufacturing)	−0.030	0.025	0.056	0.053	−0.036	−0.230
17	(Firm-size 50-199)*(Manufacturing)	0.007	0.081	0.022	0.019	0.019	−0.119
18	Secondary Occupation	−0.021	−0.046	0.069	0.071	−0.038	0.018
19	Spouse Works	0.112	0.148	0.203	0.187	−0.053	−0.139
20	Spouse Unpaid Family Laboer	−0.044	−0.039	0.122	0.114	−0.056	0.052
21	Professional	0.057	0.348	0.110	0.098	0.086	−0.035
22	Agriculture	−0.027	−0.064	0.098	0.107	−0.086	0.037
23	Manufacturing	−0.036	0.045	0.040	0.034	0.000	−0.139
24	Construction	0.018	−0.038	−0.015	−0.014	0.029	0.032
25	Commerce	0.003	−0.160	0.039	0.039	−0.255	−0.013
26	Logistics and Communication	0.031	−0.031	0.036	0.036	0.016	−0.009
27	Consumer Service	−0.100	0.117	−0.124	−0.119	0.313	0.140
		13	14	15	16	17	18
13	Firm-size 10-49	1.000					
14	Firm-size 50-199	−0.212	1.000				
15	(Firm-size 1-9)*(Manufacturing)	−0.109	−0.059	1.000			
16	(Firm-size 10-49)*(Manufacturing)	0.316	−0.067	−0.035	1.000		
17	(Firm-size 50-199)*(Manufacturing)	−0.064	0.304	−0.018	−0.020	1.000	
18	Secondary Occupation	−0.003	−0.005	−0.024	−0.028	−0.014	1.000
19	Spouse Works	0.040	0.101	0.013	0.078	0.040	0.041
20	Spouse Unpaid Family Laboer	−0.044	−0.027	0.015	−0.057	0.006	−0.022
21	Professional	−0.030	0.089	−0.028	−0.032	−0.017	−0.023
22	Agriculture	−0.040	−0.004	−0.034	−0.039	−0.020	0.041
23	Manufacturing	0.112	0.021	0.572	0.654	0.337	−0.042
24	Construction	−0.010	−0.039	−0.035	−0.040	−0.021	0.037
25	Commerce	0.028	0.002	−0.188	−0.215	−0.111	0.053
26	Logistics and Communication	0.049	−0.064	−0.033	−0.038	−0.019	−0.026
27	Consumer Service	−0.132	−0.003	−0.089	−0.102	−0.052	−0.040
		19	20	21	22	23	24
19	Spouse Works	1.000					
20	Spouse Unpaid Family Laboer	−0.283	1.000				
21	Professional	0.076	−0.006	1.000			
22	Agriculture	0.007	0.050	−0.032	1.000		
23	Manufacturing	0.099	−0.021	−0.050	−0.059	1.000	
24	Construction	0.013	−0.059	−0.033	−0.040	−0.062	1.000
25	Commerce	−0.068	0.110	−0.133	−0.210	−0.329	−0.220
26	Logistics and Communication	0.013	−0.079	−0.031	−0.037	−0.058	−0.039
27	Consumer Service	−0.001	−0.056	0.185	−0.099	−0.156	−0.104
		25	26	27			
25	Commerce	1.000					
26	Logistics and Communication	−0.205	1.000				
27	Consumer Service	−0.553	−0.097	1.000			

*Prior occupational controls are not shown due to space constraints

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