Journal of Economics and Management, 2018, Vol. 14, No. 1, 83-106

Does Human Capital Matter to Vendor Profitability: Evidence from Taiwan

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This paper examines the role of human capital on influencing vendor profit. Using a unique vendor survey from Taiwan, we find human capital, measured by owners' education and experience, is positively related to vendor profit. Particularly, education tends to associate an inversed-U relationship with the vendor profit that vendors run by high school educated owners gain a highest profit, on average. The influences of education and experience on profit are similar for both food and non-food vendors, even though their operation skills and knowledge are likely diverse. Other owner characteristics, such as age and gender, also matter to vendor profit.

Keywords: vendor, human capital, profitability
JEL classification: J49, L25

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1 Introduction

Street vending is a worldwide phenomenon and is particularly popular in developing countries. It not only provides inexpensive foods/goods for poor people and urban residents, but also contributes to the job creation that increases gross income (Bromley, 2000). In Asian countries the number of street vendors has witnessed a substantial increase in major cities, such as Bangkok, Hanoi, Kuala Lumpur, Manila, and Taipei. For example, the total number of street vendors in India is estimated at around 10 million (Bhowmik, 2005). The street food sector accounts for the largest part of the urban informal micro-business in Vietnam (Hiemstra *et al*., 2006). This suggests that the development of street vendors is quite influential to Asian economies. Indeed, night markets also exist in Mexico, Turkey, and even France and west coast cities of the U.S. (Hou, 2010).

Despite the fact that street vending increases with the shrinking of jobs in the formal sector and in the rural areas of Asian countries where lack for gainful employment (Bhowmik, 2005), the clustering of street vendors has turned into popular spots for attracting international tourists recently. Night markets contribute significantly to the Thai economy (Bishop and Robinson, 1998), and it ranks among the top three most popular sight-seeing spots for tourists spending their leisure time in Taiwan (Hsieh and Chang, 2006). Although Taiwan is a quasi-developed country, the number of street vendors has increased, leading the vendor sector to play a considerable role in the Taiwanese economy. For example, the estimated number of street vendors rose from 234,355 in 1988 to 309,154 in 2008, and 318,796 (491,883 workers, accounting for 4.49% of total labors) in 2012 (DGBAS, 2013). The estimated sales of vendors in Taiwan was NT$551 billion in 2012, accounting for about 4.1% of GDP. This development reflects the increased job losses brought about by outward foreign direct investment (FDI) by local labor-intensive industries. However, as of yet there is no academic research examining vendors' behavior and performance.

What factors determine firm profitability? This longstanding issue in industrial economics has attracted a large amount of empirical studies by focusing on various industries (Slade, 2004). Given the important role played by vendors on economic

development in many countries, there currently are scarce studies examining factors that affect the success of street enterprises, suggesting the need of more empirical studies (Wongtada, 2014). Smith and Metzger (1998) is the exception. Based on a 1994 survey of street vendors in Mexico, they find that the rates of return on capital and participating vendor associations approach 20% and 2.5%, respectively. Each additional year of education increases earnings an average of US$0.06 per hour after controlling for differences in capital. Although there some studies discuss the vendor issue from various viewpoints (see literature review), the lack of empirical studies on this topic inspires the main purpose of this paper to investigate the determinants of vendor profit in Taiwan, using a unique and comprehensive vendor survey data.

To examine the determinants of firm profit, this study adopts an approach by combining two schools of thought. The structure-conduct-performance (SCP) paradigm argues that the exogenous market structure determines firm conduct and performance, whereas the firm effect model emphasizes the role of firm characteristics on influencing profitability, because market structure is endogenously determined by firm characteristics (Mauri and Michaels, 1998). However, vendors are microenterprises in which the owner and manager are generally the same person, highlighting the importance of owners' human capital on vendor profitability.

Microenterprises theories, such as those by Bates (1990), Roper (1999), and Karlan *et al*. (2012), claim that the success of microenterprises depends heavily on owners' human capital, as the owner's (also usually the manager's) management and strategy choice strongly determine a microenterprise's performance. Specifically, Mramba *et al*. (2016) argue that street traders operate in a challenging environment, and make most of their decisions based on tacit knowledge. Schooling and experience are two primary channels to accumulate human capital and tacit knowledge according to the human capital theory, e.g., Mincer (1974). They enhance an individual's capacity to produce, thereby exercising functions and getting remuneration.

For most individual-run vendors, the owners are not paid in any salary, but their return of human capital is presented as vendor profit. Another specific entrepreneurial characteristic differentiating vendors and small firms is that the education level of vendor owners is generally lower. This issue is particularly relevant to Taiwan's vendors, as their education level has risen significantly over the

past two decades (DGBAS, 2013). The possible reasons are twofold. One is the policy of educational expansion implemented in the mid-1990 induces to a large number of higher-educated workers, while their wages are squeezed. The other is that starting a vendor is easier relative to other business in terms of finance and operational skill requirements. However, does the formal education of the owners really matter to vendor profit?

This paper uses unique vendor survey data to examine the determinants of vendors' profit in Taiwan. Benefitting from the availability of comprehensive information regarding owners' characteristics contained in the dataset, we focus on the role of human capital influencing vendor performance. We contribute the following novelties to the literature. First, to our best knowledge it is one of the first studies analyzing the determinants of vendors' profit in the microenterprises literature. Second, as the requirement of human capital is low in operating a street vending business, this study justifies the pertinence of the human capital theory in explaining the differences in profit across vendors. Third, we investigate whether the importance of human capital varies across different types of vendors, mainly food and non-food vendors.

The remainder of this paper is as follows. Section 2 provides a brief literature review regarding vendor performance. We then summarize empirical discussions on the role of human capital on microenterprises' performances and propose testable hypotheses. Section 3 introduces the empirical specification and discusses the dataset. Section 4 presents and analyzes empirical results. The last section summarizes some major findings and provides concluding remarks.

2 Human Capital and Microenterprises Performance

Unlike the studies of traditional industrial economics focusing on firm characteristics, the research line of microenterprises puts more emphasize on the critical role human capital plays. Bates (1990) is one of the first studies to examine the influences of entrepreneurs' education on business performance in terms of longevity and confirms a positive relationship between owner's education and firm survival. Measuring firm performance by profitability, Honig (1998) finds that vocational training and years of experience in the business demonstrate a

consistently strong and positive association with increasing profits across microenterprises in Jamaica. That study highlights the importance of human capital on the performance of microenterprises, whereas the influence of education is not examined in this study. Maes *et al*. (2004) emphasize the importance of human capital and claim that industry experience, the level of education of the owner-managers, and management practice lead to higher profitability.

There accordingly is an emerging and large amount of literature devoted to investigating the relationship between human capital and various measures of microenterprises' performance. Some studies provide excellent and comprehensive surveys on this issue, such as Van der Sluis *et al*. (2005), Crook *et al*. (2011), and Unger *et al*. (2011). Their meta-analytical reviews of empirical studies overall conclude the importance of human capital on firm performance in terms of success and profitability in developing countries. Although the relationship is higher for outcomes of human capital investments (knowledge/skills) than for human capital investments (education/experience) themselves, a marginal year of schooling raises enterprise income by an average of 5.5%, which is close to the average return in industrial countries.

Karlan *et al*. (2012) propose a model to illustrate why the managerial capital constraint may impede experimentation and thus limit learning about the profitability of alternative firm sizes. The model shows how a lack of information about one's own type, but a willingness to experiment to learn one's type, may lead to short-run negative expected returns to investments on average, with some outliers succeeding. It implies that owners' characteristics and learning should strongly affect vendor outcome.

Microenterprises are composed of a large share of street vendors, particularly in developing countries. Recently, some studies investigate issues of street vendors from various perspectives, mainly factors motivating an informal micro-entrepreneurship (Franck, 2012; Otoo *et al*., 2012), policy environment (Recio and Gomez, 2013), business strategies (Walsh, 2014), poverty reduction (Chauke *et al*., 2015; Mramba, 2015), gender (Baliyan and Srivastava, 2016), entry barriers (Mramba *et al*., 2016), consumer preferences (Maruyama and Trung, 2010; Saha and Roy, 2016), and others. However, studies on vendor performance are rare due the unavailability of vendor information.

Using a sample of 211 street vendors in Mumbai, Saha (2011) shows that the profit varies considerably across street vendors, while the determinants of profit are not examined. Njaya (2016) assesses income disparities between male and female street vendors in Zimbabwe and finds that there is no association between sex and daily income of the street vendors. As mentioned previously, Smith and Metzger (1998) is the unique study linking education to vendor profit and finds a positive nexus. Moreover, Yamasaki (2012) indicates that there is a positive return to schooling in informal sector in South Africa, but its magnitude is much lower than that in formal sectors.

Drawn from the above literature review, the microenterprises literature has consistently associated higher levels of education with greater success. However, whether human capital really matters to vendor profitability needs a more careful and rigorous investigation. First, street vending is an informal economic activity, suggesting the difficulty of collecting representative nationwide data. Findings drawn from a formal and comprehensive survey provide more reliable and insightful implications. Second, previous research studies suggest that human capital attributes and tacit knowledge (including education, experience, and skills) and, in particular, the characteristics of top managers affect firm outcome. Human capital takes time and money to develop or acquire, but the vendor's operation does not require higher education attainment. It suggests that tacit and socially complex human capital like experience and skills might be more important for the vendor's operation.

3 Data and Empirical Model

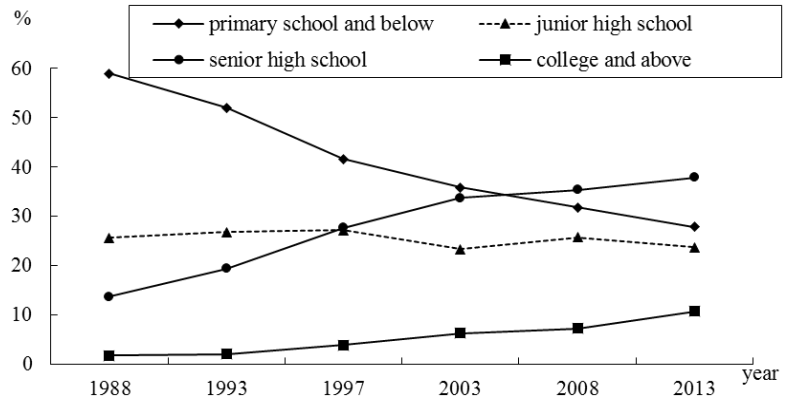
3.1 Data Source

Differentiating this study from previous studies by data quality, we adopt a formal vendor survey conducted by the Directorate-General of Budget, Accounting, and Statistics (DGBAS) of Taiwan in 2009. This survey provides additional information to the formal census survey. DGBAS conducted this nationwide survey using the method of stratified two-stage cluster sampling based on 23 regional sub-populations.

The questionnaire contains both financial and some non-financial information,

such as the location, business status, and main products of the vendor, etc. Specifically, each vendor reports detailed information regarding the owner, enabling us to construct measurable human capital variables. The raw dataset contains 4,576 vendors. After cleaning the dataset by deleting a few observations in which their profit cannot be calculated, we finally obtain a dataset of 4,464 vendors for year 2008. A panel dataset provides insightful analysis regarding vendor profit, though it is extremely difficult to obtain vendor-level panel data. The cross-sectional analysis is the limitation of this study.

Before looking further to the sample, we first depict the trend of higher-educated owner ratio across vendors during 1988-2013. As depicted in Figure 1, the share of vendor owners with a college and above degree increased four times from 1.71% in 1988 to 10.65% in 2013. In contrast, the share of vendor owners with a primary school degree decreased sharply from 58.96% in 1998 to 27.81% in 2013. It casts the doubt that do vendors run higher-educated owners generate a higher profit? This paper aims to test the pertinence of the human capital theory in street vendors.



Note: depicted by the authors using information in DGBAS (2013).

Figure 1. The Education Level Distribution of Vendor Owners in Taiwan

Table 1 displays both education and experience distributions of vendor owners in the 2009 survey. The educational distribution in column (2) indicates that the average education level of vender owners is quite low. Owners with a compulsory

education (primary and junior high schools) account for 59.46%, whereas the share of owners with a college/university diploma reaches only 6.99% in 2008. Taiwan's compulsory education extended from six to nine years in 1968. Some older vendor owners thus were educated only through primary school. It is also witnessed from the negative relationship between age and education, as shown in the Appendix Table. On the other hand, the distribution of owner experience is concentrated on 5 or less years, accounting for 55.79%. The share of vendors surviving longer than 10 years is quite high, reaching 28.08%. One point worth noting is that the correlation between owners' education and experience tends to be negative. The possible interpretation is that low-educated vendor owners lack specialized skills to work in formal sectors, forcing them to remain in the informal sector of street vending. Therefore, the question of whether and how the measurable human capital (education and experience) affects vendor profit is worth rigorous econometric analysis.

Table 1. Education and Experience Distribution of Vendor Owners

	Share (%)		Share (%)
Education level		**Experience**	
Primary school and below	33.13	1 year	19.25
Junior high school	26.33	2-3 years	23.36
Senior high school	33.54	4-5 years	13.18
College	5.31	6-10 years	16.13
University and above	1.68	10-20years	17.79
		Above 20 years	10.29
Total	100		100

3.2 Empirical Specification

To estimate the determinants of vendor profit, we assume vendor profit is related to owner characteristics, vendor characteristics, and environmental factors. Referring to the microenterprises literature such as Honing (1998), the reduced-form linear model is as follows:

$$\begin{aligned} PROFIT_i = {} & \alpha + \beta_1 SIZE_i + \beta_2 \ln OPENDAY_i + \beta_3 FRANCHISEE_i \\ & + \beta_4 FOOD_i + \gamma_1 \ln AGE_i + \gamma_2 GENDER_i + \gamma_3 \ln EDU_i \\ & + \gamma_4 \ln EXPER_i + D_j \delta + \varepsilon_i . \end{aligned} \tag{1}$$

The subscripts *i* and *j* denote firms and regions, respectively. The explained variable *PROFIT* is the logarithm of annual profit for vendor *i* in 2008.

Regarding explanatory variables, the first line of factors differentiating profit is vendor characteristics. Here, *SIZE* denotes vendor size, which is measured by number of workers. Previous studies of the effect of size on profit overall conclude a positive relation, whether using samples of large or small firms (e.g., Hall and Weiss, 1967; Lee, 2009). We thus expect a positive relation between vendor size and profit. *OPENDAY* is the number of open days per year and it enters the equation in logarithmic form. The estimated coefficient can be interpreted as the elasticity. Vendors do not have a shop front and sometimes are not open at a constant place, implying their operation is heavily influenced by weather. If a vendor can operate more days per year, then it is reasonably to expect a positive association with profit.

FRANCHISEE is a dummy variable that equals unity if a vendor is a franchisee of a branded chain vendor. In Taiwan, there are many branded food vendors that acquire the know-how of food production from the original vendor. A person is motivated to join a branded chain-vendor, because of the expectation for higher profits than the vendor experienced independently. The brand name is a signal for food or product quality, thereby attracting more customers and inducing a higher profit. *FOOD* is a dummy variable equaling one if a vendor sells food. Taiwanese food is internationally renowned, especially various kinds of side dishes in night markets. Indeed, tourist night markets are one of the most popular sight-seeing spots for tourists spending their leisure time in Taiwan. Eating out overwhelmingly dominates the leisure activities at a night market (Hsieh and Chang, 2006). However, whether food vendors earn higher profits remains an empirical issue.

Next, we include a variety of owner characteristics, especially human capital variables. *AGE* represents an owner's age and it might be negatively associated with vendors' profits. Older owners are apt to be more conservative and stick to old ways, whereas younger owners tend to be more innovative at developing new products and/or business models. Thus, age tends to have a negative effect on firm performance. *GENDER* is a dummy variable that equals one if the vendor owner is

male. The relationship between gender and small business performance is complex, as this variable represents not only a demographic feature, but also a culture-related factor. Thus, gender still appears to be a significant determinant of vendor performance, while its impact varies in previous studies, e.g., Rosa *et al*. (1996), Fairlie and Robb (2009), Díaz-García and Brush (2012), and Baliyan and Srivastava (2016).

The key variables of human capital contain education (*EDU*) and experience (*EXPER*). This study adopts two strategies to measure the degree of education. One is years of formal education (*EDU*), measured by years of schooling and it enters the equation in the logarithm form. The estimated coefficient is the elasticity of profit with respect to educating years and it is expected to be significantly positive if there is a considerable wage premium on education overall, as argued in the microenterprises literature. Although formal education is potentially crucial to microenterprises, being a street vendor seems to not require a high level of education. This study thus considers another measurable human capital, vendor experience (*EXPER*). Similarly, to evaluate the elasticity, this variable is estimated in the form of natural logarithm. The acquisition of skills and knowledge has many consequences for individuals who are vendors, and it might take some time. Working experience not only captures the learning mechanism of owners, but also somewhat represents the reputation of vendors, leading to a positive association with vendor performance. Finally, *D* is a series of regional dummies that measure the difference in external environment across regions. We include 22 region dummies, as there are 23 administrative regions in Taiwan. Table 2 summarizes the definitions and measures of the variables. Correlation matrix among explanatory variables are displayed in Appendix Table.

Table 2. Variable Definition and Basic Statistics

	Definition	Mean (S.D.)
PROFIT	Profit: sales minus cost (NT$ thousand)	494.375
		(692.660)
SIZE	Vendor size: number of workers	1.545
		(0.679)
OPENDAY	Number of operating days per year	281.576
		(85.402)
FRANCHISEE	Dummy variable: 1 = a vendor is a franchisee	0.012
	of a branded chain vendor	(0.110)
FOOD	Dummy variable: 1 = a vendor selling food	0.469
		(0.499)
AGE	A vendor owner's age	49.358
		(11.467)
GENDER	A vendor owner's gender. 1= male	0.464
		(0.499)
EDU	Years of schooling of a vendor owner	9.422
		(2.873)
EDU_P	Education level dummy 1 = primary school	0.331
		(0.471)
EDU_J	Education level dummy 1 = junior high school	0.263
		(0.440)
EDU_S	Education level dummy 1 = senior high school	0.335
		(0.472)
EDU_C	Education level dummy 1 = college	0.053
		(0.224)
EDU_U	Education level dummy 1 = university and	0.017
	above	(0.129)
EXPER		8.252
	Years of experience of a vendor owner	(8.945)

4 Empirical Results and Discussion

4.1 Main Results

Table 3 displays a series of estimates obtained from various specifications using the OLS technique. All estimates are very similar. In terms of vendor characteristics, vendor size and number of opening days yearly are positive and significantly related to vendor profit. Street vending is essentially a labor-intensive industry and its operation is affected heavily by weather, and this is the main reason why there is a positive relationship between vender size and profitability as well as open days per year and profitability. The above finding is consistent with findings in the size-profit nexus in the traditional industrial economics literature. Particularly, the estimated elasticity of *OPENDAY* is larger than1 that hovers about 1.09. It suggests that a one percent increase in opening day (2.8 days), profit is associated with an increase of 1.09%. However, as shown on Table 2, the average number of opening days per year reaches 281.576 days, suggesting street vendors have much more working days yearly than that workers in formal sectors.

The estimated coefficient of *FRANCHISEE* is positive, but not statistically significant, implying that there is no profit premium brought about by joining a branded chain vendor. A brand name signals a certain level of product quality on the one hand. On the other hand, it implies that the food products have the same quality and offer nothing surprising, thereby reducing the attraction to more customers. The average product price of branded chain vendors is generally higher than that sold by non-chain vendors. The main clients of vendors are poor people (Maruyama and Trung, 2010), which is another factor impeding a franchisee to exploit for higher profit. In contrast to our expectation, we find a significantly negative association between a food vendor and profit. The general idea is that night markets are attractive spots for tourists, while they are relatively rare compared with total vendors. The unit price of vendor food is low, but the preparation of food material and cooking are time consuming, thereby resulting in lower profit compared with other vendors, *ceteris paribus*.

Table 3. Human Capital and Vendor Profit

	(1)	(2)	(3)
Constant	1.487***	1.599***	1.850***
	(0.394)	(0.406)	(0.363)
SIZE	0.532***	0.535***	0.550***
	(0.034)	(0.034)	(0.034)
ln*OPENDAY*	1.083***	1.091***	1.097***
	(0.025)	(0.024)	(0.024)
FRANCHISEE	0.056	0.080	0.059
	(0.118)	(0.115)	(0.115)
FOOD	-0.128***	-0.137***	-0.143***
	(0.027)	(0.026)	(0.026)
ln*AGE*	-0.641***	-0.643***	-0.637***
	(0.073)	(0.071)	(0.070)
GENDER	0.103***	0.123***	0.127***
	(0.027)	(0.026)	(0.026)
ln*EDU*	0.198***	0.176***	
	(0.055)	(0.053)	
ln*EXPER*	0.084***	0.080***	
	(0.013)	(0.013)	
EDU			0.015**
			(0.006)
EXPER			0.007***
			(0.002)
Region dummies	No	Yes	Yes
R^2	0.376	0.413	0.410
No. of observations	4,464	4,464	4,464

Notes: Figures in parentheses are standard deviations. *** p<0.01, ** p<0.05.

Owner characteristics, age and gender, are as expected to associate with a significantly negative and positive coefficient, respectively. As mentioned previously, older owners may tend to stick to old ways that are disadvantageous to making a quick profit. On the other hand, the operation of street vending is a heavy physical activity that is unfavorable to older owners running this business. This operational

feature of vendors might be also disadvantageous to females, and that is the reason why vendors operated by males achieve more profits compared with female vendors in Taiwan. This finding is consistent with most previous studies, such as Rosa *et al*. (1996), Fairlie and Robb (2009), and Baliyan and Srivastava (2016).

Looking at the human capital variables we concern, the coefficient of ln*EDU* is positive and significant at the 1% statistical level in all estimations, indicating that educational attainment is positively related to vendor profit in Taiwan. This result echoes the finding in the study of Mexican vendors conducted by Smith and Metzger (1998). Similarly, we find a strong positive relationship between experience and vendor profit, which is consistent with arguments in the microenterprises theory and empirics, e.g., Honig (1998), Maes *et al*. (2004), Karlan *et al*. (2012), and Mramba *et al*. (2016). The microenterprises theory emphasizes the characteristics of top managers affecting firm performance.

Previous empirical studies on the relationship between schooling and microenterprises' profitability find that a marginal year of schooling raises enterprise income by an average of 5.5% (Van der Sluis *et al*., 2005). To compare the education effect with existing literature, column (3) displays the estimates whereby education year and experience enter the specification in level rather than logarithm form. The estimated coefficient magnitude on *EDU* is about 0.015, suggesting that the marginal effect of vendor profit induced by one more year of schooling is 1.5%. In other words, the impact of education on firm performance is lower for vendors than that for general microenterprises. Moreover, the *EXPER* variable is accompanied by an estimated coefficient of 0.007, indicating a profit-enhancing effect of 0.7% higher through an incremental one-year experience, while this effect is much smaller than that induced by schooling, while it remains to support the considerable importance of tacit knowledge accumulated by operating experience, as claimed in Mramba *et al*. (2016).

The detail estimates for the 22 regional dummies are not shown on Table 3, while one point worth noting. Using Taipei city as the reference group, most dummies are associated with a significantly negative coefficient, except for some high income cities, such as Kaohsiung city, Tainan city, Taichung city, and Hsinchu city. It suggests that location matters to vendor profits that operating street vendors in high-income regions acquire more profits. However, living in metropolitan region

suffers from higher living costs, implying it is not always a better strategy to run a street vendor in big cities.

4.2 Does More Schooling or Experience Really Induce Higher Profit?

The aforementioned analysis highlights the influential role of human capital on affecting vendor profit, particularly education attainment. However, as indicated in Table 1, street vending is not a skill-intensive occupation, and most vendors (about 60%) are operated by owners with an education level lower than senior high school, whereas the distribution of experience tends to be more equal in that 17.79% and 10.29% of owners have experiences covering 10-20 years and over 20 years, respectively. This inspires a more important and interesting issue for whether more years on schooling and/or experience are really beneficial to higher profit? This subsection thus implements further estimations of various specifications and displays the results in Table 4.

We obtain the estimates in column (1) by adding the square terms of education and experience. The square term of ln*EDU* is found to be significantly negative, whereas the square term of ln*EXPER* is insignificantly negative - that is, the incremental profit enhancing effect of schooling decays faster and more significantly than that of experience. One point worth noting is that the maximum years of schooling is generally no greater than 18 years (master degree), and the significantly negative square term of ln*EDU* implies that higher education does not necessary help a vendor owner make higher profit. In column (2), the square term of ln*AGE* is also included to examine the possible nonlinearity of age effect on profit. Interestingly, the ln*AGE* variable becomes significantly positive, whereas the square terms is significantly negative, suggesting an inversed-U relationship between owners' age and vendor profit. Based on estimated coefficients, the calculated truing point of age is 45.651 [exp(AGE)=exp(4.291-1.123)= exp(3.821)] which is younger than the mean age of 49.358. It is why the coefficient of ln*AGE* is negative on Table 3.

Table 4. Education Level, Experience, and Vendor Profit

	(1)	(2)	(3)	(4)
Constant	-1.589*	-1.936***	1.798***	1.821***
	(0.895)	(0.694)	(0.346)	(0.350)
SIZE	0.534***	0.536***	0.534***	0.535***
	(0.034)	(0.035)	(0.034)	(0.034)
ln*OPENDAY*	1.091***	1.066***	1.091***	1.091***
	(0.024)	(0.025)	(0.024)	(0.024)
FRANCHISEE	0.115	0.125	0.122	0.121
	(0.115)	(0.116)	(0.115)	(0.115)
FOOD	-0.142***	-0.125***	-0.124***	-0.141***
	(0.026)	(0.023)	(0.026)	(0.026)
ln*AGE*	-0.627***	4.291***	-0.625***	-0.625***
	(0.071)	(1.234)	(0.071)	(0.071)
ln*AGE* ^{2}		-1.123***		
		(0.163)		
GENDER	0.121***	0.121***	0.120***	0.118***
	(0.026)	(0.026)	(0.026)	(0.026)
ln*EDU*	3.108***	3.046***		
	(0.739)	(0.733)		
ln*EDU* ^{2}	-0.675***	-0.652***		
	(0.169)	(0.168)		
EDU_J			0.161***	0.165**
			(0.037)	(0.065)
EDU_S			0.16[5]***	0.160**
			(0.040)	(0.063)
EDU_C			-0.002	-0.090
			(0.066)	(0.097)
EDU_U			0.140	0.281**
			(0.105)	(0.139)
ln*EXPER*	0.136***	0.135***	0.137***	0.075***
	(0.038)	(0.038)	(0.038)	(0.020)
ln*EXPER* ^{2}	-0.018	-0.018	-0.018	
	(0.011)	(0.012)	(0.011)	
*EDU_J**ln*EXPER*				0.001
				(0.030)
*EDU_S**ln*EXPER*				0.009
				(0.030)
*EDU*_C*ln*EXPER*				0.085
				(0.059)
*EDU_U**ln*EXPER*				-0.163*
				(0.092)
Region dummies	Yes	Yes	Yes	Yes
R^2	0.416	0.416	0.416	0.417
No. of observations	4,464	4,464	4,464	4,464

Notes: Figures in parentheses are standard deviations. *** p<0.01, ** p<0.05, * p<0.1.

Replacing school years by level of education, the estimates in column (3) demonstrate a striking finding. Using vendor owners with the level of primary school as the reference group, we find that vendor profit increases with owners' education level being junior and senior high school. However, surprisingly, there is no significant difference in profit between vendors run by owners with a primary school education and those with higher education (college and above). Adequate education helps owners learn knowledge and skills to improve vendor performance, while higher education seems to result in being overeducated for engaging in street vending.

As the square tem of experience remains insignificantly negative in column (3), it sheds light on the importance of experience in operating a vendor. We have to mention that owners' age increases also with experience, implying an opposing negative influence on profit. Therefore, "century-old shops" might represent reputation and high quality, whereas historic vendors, operated by the same boss, seem not to guarantee a higher profit. If a vendor is really famous and profitable, then one possible avenue is transforming from a vendor to being a historic store.

Estimates in columns (1)-(3) imply that it tends to exhibit an inversed-U relationship between education and vendor profit. That is, operating a street vendor does not require human capital of higher education. This result is reasonable, because the use of business strategies is quite limited for street vendors and varies in line with the street vendor's relationships with customers (Walsh, 2014). It thus does not require higher education that focuses on instructing specific knowledge. As depicted in Figure 1, the ratio of higher educated owners increased stably, highlighting the potential problem of overeducated situation in Taiwan. There is an emerging situation that more university graduates prefer to start a business by operating a street vendor. Although the entry barrier of street vendors is low, its main function is allowing migrants to have works and poverty reduction in developing countries (Franck, 2012; Otoo *et al*., 2012; Chauke *et al*., 2015; Mramba, 2015). Taiwan is a mature economy that most jobs are provided by formal sectors. Higher-educated workers should be easy to find jobs in formal sectors. The stagnant wage level is probably the primary cause, leading some higher-educated workers to engage in street vendors, while it could accompany with the overeducated situation and waste of higher education resources.

Do these two positive profit-enhancing effects of education and experience have a complementary effect, and if so, are they relevant to various education degrees? Figures in column (4) show that most interaction terms between education level and experience are statistically insignificant, lending no support to the existence of the complementary effect between education and experience. Running a vendor requires a certain level of knowledge that is relevant to education level. Operational knowledge and skill can also improve through learning-by-doing, while the learning process seems irrelevant to the education level.

4.3 Food vs. Non-food Vendors

Food vendors account for 46.9% of total vendors, as indicated in Table 1, but they are found to experience a lower profit. Local governments have been aggressive to develop tourist night markets (mainly composed of food vendors), as night markets have become attractive sight-seeing spots for both domestic and foreign tourists in Taiwan. Therefore, it is interesting to examine the possible differences in determinants of profit between food and non-food vendors, in particular, the role of human capital. Table 5 reports a series of estimating results.

The estimates in all columns are quite similar, thereby suggesting there are no significant differences in determinants of profit between food and non-food vendors, even though their production technology and knowledge might differ. This finding seems to be out of expectation, though two points remain worth noting. First, the variable of *FRANCHISEE* is dropped from the non-food estimations in columns (3) and (4). It indicates that branded chain vendors exist only in food vendors, but a brand franchisee earns similar profit to that of other food vendors. The main advantages are two-fold. First, it is easier to start up as a vendor through the licensing of know-how and to secure stable and qualified materials or intermediate goods. Second, the only factor differentiating profit between food and non-food vendors is owners' gender, with gender playing less of a role for food vendors.

Table 5. Human Capital and Vendor Profit: Food vs. Non-food

	(1) Food	(2) Food	(3) Non-food	(4) Non-food
Constant	0.762	0.938*	1.458**	1.690***
	(0.579)	(0.504)	(0.565)	(0.493)
SIZE	0.588***	0.585***	0.497***	0.499***
	(0.047)	(0.047)	(0.049)	(0.049)
ln*OPENDAY*	1.067***	1.069***	1.097***	1.098***
	(0.044)	(0.044)	(0.030)	(0.030)
FRANCHISEE	0.085	0.122	--	--
	(0.110)	(0.111)		
ln*AGE*	-0.620***	-0.605***	-0.680***	-0.659***
	(0.096)	(0.096)	(0.104)	(0.104)
GENDER	0.060	0.064*	0.176***	0.166***
	(0.037)	(0.037)	(0.037)	(0.037)
ln*EDU*	0.139*		0.197**	
	(0.073)		(0.077)	
ln*EXPER*	0.081***	0.081***	0.076***	0.074***
	(0.018)	(0.018)	(0.018)	(0.018)
EDU_J		0.147***		0.183***
		(0.050)		(0.053)
EDU_S		0.142***		0.187***
		(0.053)		(0.058)
EDU_C		-0.042		0.039
		(0.094)		(0.092)
EDU_U		0.127		0.170
		(0.159)		(0.141)
Region dummies	Yes	Yes	Yes	Yes
R^2	0.369	0.372	0.456	0.458
No. of observations	2,094	2,094	2,370	2,370

Notes: Figures in parentheses are standard deviations. *** p<0.01, ** p<0.05, * p<0.1.

5 Conclusions and Policy Implications

Street vending plays a critical role in economic activity for many countries, especially in developing countries. It is also a shelter for poor people to temporarily escape from unemployment. Despite a large amount of literature examining factors influencing microenterprises performance, studies investigating the determinants of vendor profit are rare due to the limitation of reliable and comprehensive datasets. Vendors sometimes being run by only one person, the owner, highlight the critical role of owners' human capital on influencing vendor profit.

This paper adopts the 2008 vendor survey conducted by the Taiwan government to empirically examine the determinants of vendor profit, and in particular, the role of human capital. Various estimations show that vendor attributes, including size and number of running days, are positively related to profit, while food vendors tend to have lower profit than other vendors.

In terms of owner characteristics, our empirical evidence shows that age negatively relates to vendor profit. Gender also matters to vendor performance in that male street vendors appear to have higher profit than the female street vendors. Human capital in terms of education and experience, which are the main variables of concern, is positively related to vendor profit, echoing the critical role of human capital emphasized by the microenterprise theory. However, the positive influence of schooling on vendor profit decays sharply along with the increase in years of schooling. Replacing years of schooling by various education levels in order to implement empirical estimations, we find that vendor profit increases with owners' educational level up until the level of senior high school, whereas vendors run by higher educated owners exhibit similar performances to those operated by owners with a primary school level of education. It implies an inversed-U relationship between schooling years and vendor profit. As more and more vendors are run by higher-educated workers recently, our finding highlights a potential problem of overeducated situation.

The square term of experience is negative, but not statistically significant, showing that the positive influence of experience on vendor profit lasts longer than years of schooling. An increase in years of experience denotes owners becoming older, which is negatively associated with vendor profit, and hence we cannot claim

that longer experience at street vending is always beneficial to raising profits. This paper also finds an interesting result that there is no complementary effect between education and experience on enhancing vendor profit. Finally, the determinants of profit between food and non-food vendors are overall similar, except for gender.

Drawn from our empirical analysis, some implications emerge. First, from the perspective of human resources it seems to be a waste that higher educated workers migrate into becoming vendors, which does not require higher educated labor. In terms of the management perspective, joining a branded chain vendor makes it easier to start up a vendor business, but there is no guarantee for a higher profit. Location matters to profits that vendors operating in big cities overall earn a higher profit. The owner of street vendors can choose the location strategically, considering both costs and benefirs. Moreover, street vending is widespread, and it is also a temporary shelter away from unemployment. For a long-lasting operation if a vendor is profitable, then one possible strategy is to transform from a street vendor to a physical store, because vendors suffer legal and environmental challenges that are disadvantageous for long-term sustainable operation.

Acknowledgement

This paper is a revised version of Yu-Hsien Tsai's master thesis. Helpful comments and suggestions from Meng-Wen Tsou and Jin-Long Liu as well as three referees are highly appreciated. We are responsible for all errors.

Appendix Table. Correlation Matrix among Explanatory Variables

	SIZE	ln*OPENDAY*	*FRANCHISEE*	*FOOD*	ln*AGE*	*GENDER*	ln*EDU*	ln*EXPER*
SIZE	1							
ln*OPENDAY*	0.061	1						
FRANCHISEE	-0.040	-0.011	1					
FOOD	0.142	0.106	-0.148	1				
ln*AGE*	-0.064	-0.022	0.104	-0.051	1			
GENDER	-0.130	0.054	0.012	0.063	-0.015	1		
lnEDU	0.086	-0.017	-0.081	0.021	-0.646	-0.121	1	
ln*EXPER*	0.089	0.093	0.078	-0.099	0.385	-0.038	-0.298	1

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