

# **BOOTSTRAPPING AND NEW-BORN STARTUPS PERFORMANCE: THE ROLE OF FOUNDING TEAM HUMAN CAPITAL**

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## **ABSTRACT**

*This study examines the influences of bootstrapping approach on new-born startup performance by investigating the interactive effects of founding team human capital. The sample includes new-born startups at 3 years of age, an initial stage of business development. Data was collected from the longitudinal panel data from Kauffman Firm Survey conducted by the Ewing Marion Kauffman Foundation over the period of 2005-2007. Results indicate that bootstrapping approach is negatively related to a new-born startup's profitability and revenue growth. Types of founding team human capital has various moderating impacts on startup performance. Startup teams' industry experiences and startup experiences have significant growth constrains on bootstrapping startup firms; while teams' education and entrepreneurial expertise facilitate bootstrapping startups to achieve positive revenue growth.*

*Keywords: Bootstrapping, founding team, human capital, new-born startups, performance, profitability, growth*

## **INTRODUCTION**

It has been widely documented in the entrepreneurship literature that startups suffer from a liability of newness. One of the reasons for this liability is the limited resources available to new firms (Bruton & Rubanik, 2002). Financing constrain is being attributed as a principal reason that new ventures fail (Reuber & Fischer, 1999; Rujoub, Cook, & Hay, 1995; Ucbasaran, Shepherd, Lockett, & Lyon, 2013). Although there are large amounts of financial resources from external investors available such as venture capitalists, business angels, and other financial institutions, most new startups often experience limited access to external finances due to market imperfections, information asymmetries, or high transaction costs (Cassar, 2004; Cosh, Cumming, & Hughes, 2009; Venkataraman & Low, 1994). As a consequence, many startup firms respond with bootstrapping, through which they find creative ways to minimize cash requirements and reduce the need for external capital. For some other startups, pursuing bootstrapping approach is not due to the limited chances of accessing external finance, but a result of venturing strategic choice that is aiming for a complete control over their own firms by avoiding external finance (Sapienza, Korsgaard, & Forbes, 2003).

A pioneering study by Winborg and Landstrom (2001) found empirical evidence that startups bootstrapping activities can minimize cash requirements as well as the overall cost of operations; reduce the need for external capital; improve cash flows; and have greater use of internal financing. A growing body of literature has documented that bootstrap financing activities are creative routes of resource mobilization that lead to new startups' success (Grichnik,

Brinckmann, Singh, & Manigart, 2014; Jones & Jayawarna, 2010; Schildt, Maula, & Keil, 2005). Although entrepreneurship scholars have argued that bootstrapping activities can substantially reduce the amount of working capital and increase profitability through more efficient cash management practices, the entrepreneurship academic community has not fully understood the influences of bootstrapping on startup performance (Jones & Jayawarna, 2010; Lahm Jr & Little Jr, 2005; Patel, Fiet, & Sohl, 2011). There is a competing hypothesis explaining that bootstrapping would negatively influence the success of startups. This line of research argues that bootstrapping behaviors will hamper future investments, and the costs associated with bootstrap maybe higher than traditional sources of finance because entrepreneurs spend valuable time on implementing marginal savings but neglecting other more critical tasks in their firms; thereby, bootstrapping approach could hinder entrepreneurs from identifying and exploiting new opportunities and constrain subsequent venture growth (Carpenter & Petersen, 2002; Cassar, 2004; Vanacker, Manigart, Meuleman, & Sels, 2011).

To address this debate, the current study contributes the existing entrepreneurship literature by examining the moderating role of founding team human capital in the relationship between bootstrapping and new-born startup performance. It argues that the inconsistent results of the impacts of bootstrap are contingent in startup team human capital. Given the fact that most startups are typically launched and grown by teams but not individuals (Khan, Breiteneker, & Schwarz, 2015; Klotz, Hmieleski, Bradley, & Busenitz, 2014), entrepreneurial founding team plays a pivotal role in launching and growing high potential firms. Founding team human capital determines startups' accessibility of information and resources, influences choices of venturing strategies, and leads to various paths of venture creation and associated performance (Dess, Lumpkin, & Covin, 1997; Lu & Beamish, 2001; Sandberg & Hofer, 1987; Shane, 2000). Human capital at individual level can affect a person's knowledge, skills, ability of problem-solving, discipline, motivation, and self-confidence (Cooper, Gimeno-Gascon, & Woo, 1994). Once individuals form a founding team, each member's human capital is accumulated and transited into the team that improves the startup's ability of coping with uncertainty, choosing better strategies, and thereby these firms are more likely to success than solo-teamed firms (Cooper et al., 1994; Dahlqvist, Davidsson, & Wiklund, 2000; Davidsson & Honig, 2003; Wright, Hmieleski, Siegel, & Ensley, 2007). Therefore, founding team human capital can assist startups in searching creative solutions for resource constrains and offset the negative impacts of bootstrapping approach on startup performance.

A common practice of the available empirical literature on startup performance is using data on incumbents or established young firms but not startups at the initial stages of business development. Incumbent firms are survivors of startups in the marketplace. The positive impacts of bootstrapping on firm performance among incumbent firms are hardly generated to the whole startup population due to the survivorship bias of firms (Hyytinen, Pajarinen, & Rouvinen, 2015). According to the data of The Bureau of Labor Statistics and Business Dynamics Statistics of Census Bureau, 69% businesses survive 2 years or more (Regmi, Ahmed, & Quinn, 2015) and 49% small businesses survive 5 years or more (Robb & Farhat, 2013). Put in another way, about 31% startups are out of business in the third year, and 51% are out in the fifth years. Year 3-5 is a vital stage which startups must develop through. If bootstrapping has negative influences on

startup firms' performance, but a positive association between bootstrapping and growth is still found in incumbent firms, the growing startup firms that adopt bootstrapping approach are more likely to have a set of other strengths that enhance their performance. If this set of other strengths are not considered into the research, it will create larger error term in the regression model. To better understand how new-born startups survive and grow in their infant age, it must focus on a new-born startup sample. Findings from the investigation on the startup sample will provide more practical implementations to new-born startup entrepreneurs who are bootstrapping and struggling for the survival of the firm.

This study makes an important contribution to the literature by applying both resource-based view and human capital theory in the context of new-born startup settings. Specifically, it has empirical contribution to the literature by providing a document of the interdependent effects of founding team human capital and bootstrapping approach on new-born startups' profitability and revenue growth. Findings of this study also has practical implementations for entrepreneurs when they make venturing decisions in the very early stage of business development.

The rest of the article is organized as follows. The first following section presents the literature review and hypotheses development. The second section outlines the methods, data analysis, and findings. Discussion of the results is presented in the last.

## **LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT**

### **Bootstrapping Activities And New-born Startup Performance**

It is well acknowledged that new ventures suffer from the liability of newness. Entrepreneurship scholars argued that financial constrain was one of the major reasons that cause new venture to fail (R. B. Carter & Van Auken, 2005; Rujoub et al., 1995; Ucbasaran et al., 2013). Previous entrepreneurship literature has documented that startups respond to the problem in securing long-term external finance by creatively conduct bootstrapping activities (Neely & Van Auken, 2012). Winborg and Landstrom (2001) defined financial bootstrapping as "the use of methods for meeting the need for resources without relying on long-term external finance from debt holders and/or new owners". Bootstrap financing activities include a range of highly creative ways of acquiring resources without borrowing money or raising equity financing from traditional sources. Startups that take bootstrapping strategy typically involve the use personal savings, credit-card debt, loans from friends and family and other nontraditional forms of capital (Harrison, Mason, & Girling, 2004; Lahm Jr & Little Jr, 2005; Malmström, 2014; Winborg & Landstrom, 2001). Bootstrapping activities also include borrowing equipment; buying used equipment instead of new; delaying payments to suppliers, or carrying personal favors to secure the resources needed etc. (Malmström, 2014).

The existing literature has documented that as many as 80-95% of startups carry out some forms of bootstrapping activities (Harrison et al., 2004; Winborg & Landstrom, 2001). Although bootstrapping approaches are widespread in actual practice among start-ups, the effects of bootstrapping on the success of entrepreneurial startups are debatable. One stream of research outlines the importance of bootstrapping to startups. They argued that bootstrapping can be both financially and emotionally rewarding to entrepreneurs (Worrell, 2002). By applying

bootstrapping strategic practices, entrepreneurs find creative ways to avoid the need for external financing through reducing overall costs of operation, improving cash flow, or using internal financial supports to the company (Ebben & Johnson, 2006). Bootstrapping can help entrepreneurs develop cash management skills (Smith, Smith, Smith, & Bliss, 2011). Therefore, through changing dependence on external finance, startup firms can improve their chances of survival and success (Ebben & Johnson, 2006). Moreover, bootstrapping approach can be a major competitive advantage by creating a “discipline of leanness” (Timmons, 1999 : 39).

On the other hand, another stream of research is holding a competing argument by considering bootstrapping as a risky approach to startup performance (Lahm Jr & Little Jr, 2005). They argue that bootstrapping hampers future investments because bootstrappers usually emphasize marginal savings but neglect new opportunities (Baker & Nelson, 2005). Via bootstrapping approaches such as “do-it-yourself” model, entrepreneurs spend too much time learning how to perform or perform tasks that are worth less than other tasks (Lahm Jr & Little Jr, 2005). In addition, obtaining accesses to cheap resources might bring imperfect resources to the firm (Baker & Nelson, 2005). As a consequence, the business may not realize its full potential. Furthermore, as a way of ad hoc reduction of the operating costs of the business, bootstrapping may constrain firms from growing as fast as they might be in the same cases that instead use other strategic approaches (Harrison et al., 2004). Brush, Carter, Gatewood, Greene, and Hart (2006) examined the correspondence between bootstrapping and stage of business development. Their results show that, depending on stage of business development, significant different uses of bootstrapping options exist among women-led ventures, but the correspondence between bootstrapping activities and early growth of business was not supported.

Taking together, bootstrapping practices are viewed as startups’ responses to the capital constrains (Winborg & Landstrom, 2001), or to a strategic intention of avoiding external finance in order to keep a complete control over the firm (Sapienza et al., 2003). Indeed, in the absence of substantial resources, startup firms are forced to utilize bootstrapping method as a means of survival (Ebben & Johnson, 2006). Entrepreneurs conduct bootstrapping activities to access resources necessary for business development, either to reduce the need for financial capital or to provide alternative sources of capital. Resources acquired through bootstrapping financing are largely insufficient to finance growth, especially in new startups that already tend to be undercapitalized (Vanacker et al., 2011). Through adopting bootstrapping approaches, startups utilize firm resources very cautiously and adopt a conservative path rather than a risk-taking one toward the future. Bootstrapping startups may rely on free or cheap access to obtain imperfect resources, and choose less desirable way for business implementation. As a consequence, these startup firms are unable to identify or exploit entrepreneurial opportunities thereby constrains the firm’s growth potential. For new-born startups that are at very early stage of business development, taking the conservative approach will take longer time for them to get the return from the market. Thus, even though as the first research stream holds that bootstrapping may have some cost benefits in the short run, it may trade off a firm’s competitive advantages. Furthermore, although bootstrapping helps develop cost management skills, it will take time for entrepreneurs to learn these skills and transit what they have learned into value created activities. At the very early stage of business development, the benefits of bootstrapping may not be able to appear in

startup performance. In this vein, bootstrapping activities are inherently associated with financial constrain and profitability, and consequently correspond to growth constrain of the firm. Furthermore, as young firms develop, they will gain leverage with outside parties and obtain legitimacy with their operations (Ebben & Johnson, 2006). These changes in their leverage with banks, investors, customers, and suppliers will also change the firm's desirability to apply bootstrapping techniques, or these techniques may not be available any more. Thus, along with this logic, bootstrapping strategy has a negative relationship with the profitability and growth of a new-born startup firm at initial stage of business development.

According, I hypothesize that

*H1: Bootstrapping approach is negatively associated with new-born startup firm's profitability.*

*H2: Bootstrapping approach is negatively associated with new-born startup firm's growth.*

### **The Interactive Effects of Founding Team Human Capital**

Human capital theory maintains that knowledge leads more productive and efficient individual activities by increasing their cognitive abilities (Becker, 1964). According to this theory, human capital is defined as the accumulation of personal attributes such as knowledge, abilities, experiences etc. that allow human beings to function (Pena, 2002). Put in another way, human capital comprises the stock of knowledge and skills that resides within individuals (Becker, 1964). It derives from investments that individuals make in themselves, often through education, formal and occupational experiences, and trainings (N. Carter, Williams, & Reynolds, 1997). Furthermore, human capital can be developed over time and transferred between individuals, which differentiates it from other individual characteristics, such as traits that have been found to have less impacts on new venture output (Wright et al., 2007). The underlying assumption of human capital theory is that individuals with more human capital are more productive than comparable ones. Thus, the more specific the human capital to the nature of the new startup firm, the higher the likelihood of success (N. Carter et al., 1997).

Entrepreneurial founding team represents a group of individual entrepreneurs working together to launch a new business venture (Shrader & Siegel, 2007). Founding team is formed by individual entrepreneurs who share various skills, knowledge, life experiences, social and personality attributes, and backgrounds. Each individual entrepreneur's human capital will together build up founding team human capital, an important stock of knowledge and ability of the team (Becker, 1964). Founding team human capital has been perceived as unique and valuable resources owned by startups. The team composition shows what knowledge, skills, accesses to information, and social networks available to a startup. Founding team human capital affects a startup's ability of attracting venture capital, and influences whether or not the startup can successfully complete its initial public offering (Beckman, Burton, & O'Reilly, 2007). Strong founding team human capital enables startups to break out from well-defined routines that are no longer adequate due to environmental changes, facilitate the recognition of new opportunities, and assemble resources to create maximized output (Alvarez & Busenitz, 2001). Therefore, founding team human capital can determine various paths of venture creation and associated startup

performance (Dess et al., 1997; Lu & Beamish, 2001; Sandberg & Hofer, 1987; Shane, 2000). Extensive empirical studies support the important role of founding team human capital played in strengthening firm performance (Baptista, Karaöz, & Mendonça, 2014; Cooper et al., 1994; Dahlqvist et al., 2000; Davidsson & Honig, 2003; Ganotakis, 2012; Wright et al., 2007).

Making strategic decisions and implementing strategic plans require involvement of human agent. Given the fact that founding team determines the strategies pursued within startups (Eesley, Hsu, & Roberts, 2014; Gruber, MacMillan, & Thompson, 2012), and the fact that new-born startup's firm size is very small at the very early stage of business development, bootstrapping financing would involve every founding team member's creativity, decisions, and actions to address needed resources of the firm (Ebben & Johnson, 2006). Every member must utilize his/her particular knowledge, skills, experience to employ bootstrapping. The results of bootstrapping and its impacts on the startup's survival and future development thereby well depend on the team's ability and choices (Lahm Jr & Little Jr, 2005). This is consistent with what Bhide (1991) suggested that the success of a startup hinges on the ability of its owners to create and leverage financial resources. According to the human capital theory, the higher the team human capital, the higher the team's ability is. Therefore, high level of founding team human capital can offset negative influences of bootstrapping approach.

Previous entrepreneurship literature provides supports for the interaction effect of strategic approaches and founding team human capital on venture performance. For instance, Shrader and Siegel (2007) conducted a longitudinal analysis of the role of human capital in the growth of 198 new technology-based ventures. Their results suggest significant contingent relationships between strategic choices, team experience, and long term firm performance. Similarly, Edelman, Brush, and Manolova (2005) examined the relationship between firm human capital, resources, strategy and performance. They found that neither human capital nor strategy alone explains firm performance, but human capital in combination with strategic decisions enhances firm performance.

In the context of new-born startups, founding team human capital can facilitate the impacts of strategic choices on performance. Although bootstrapping new-born startups have inherent financial and growth constrains, the chances of their success could increase when the team human capital "fits" in the formulation and implementation of bootstrapping activities. Under the circumstance that founding teams have high level of human capital in forms of knowledge, skills, and experiences, bootstrapping startups are able to identify and exploit new opportunities that are usually neglected by other startups that have comparatively low founding team human capital. The negative impacts of bootstrapping is typically offset by strong teams through choosing the best bootstrapping activities that suit best for the resource need; decreasing the dependence on external financing on the need base; spending least time on implementing most valuable savings; efficiently allocating limited resources on the most critical tasks including: acquiring the best desirable resources; spending sufficient resources on the most critical tasks that are necessary for initial business developments and growth; and reducing costs in other unnecessary and marginal saving activities etc.

Founding team human capital has various forms. Numerous studies indicate that the entrepreneur's level of education is positively associated with entrepreneurial opportunity

discovery, identification, and exploitation (Ferrante, 2005; Marvel & Lumpkin, 2007; Unger, Rauch, Frese, & Rosenbusch, 2011), and firm survival and growth (T Bates, 1990; Cooper et al., 1994; Van der Sluis, Van Praag, & Vijverberg, 2008). Specific industry know-how has also turned out to be a significant determinant of profitability, survival and growth for a new venture (Cooper et al., 1994; Ganotakis, 2012; Muñoz-Bullon, Sanchez-Bueno, & Vos-Saz, 2015; Westhead, 2000). The prior experience of starting new business shows startup's capability of future development (Brush, Manolova, & Edelman, 2007), which is another useful determinant for venture performance (Dyke, Fischer, & Reuber, 1992). Furthermore, founding teams' specialized human capital in entrepreneurship can be accumulated to be "expertise in entrepreneurship" that is obtained through years of experience in the same industry in which the new business operates; through the various processes of starting new businesses; and through their experiences of managing different start-up businesses in dynamic and changing environments. Strong expertise in entrepreneurship is beneficial to the results of bootstrapping. The higher level of founding team's expertise in entrepreneurship, the more likely the startup would be successfully bootstrapping.

Thus, I hypothesize that

*H3a: Strong founding team human capital of education positively moderates the relationship between bootstrapping and growth of new-born startups.*

*H3b: Strong founding team human capital of expertise in entrepreneurship positively moderates the relationship between bootstrapping and growth of new-born startups.*

*H3c: Strong founding team human capital of industry experience positively moderates the relationship between bootstrapping and growth of new-born startups.*

*H3d: Strong founding team human capital of previous experience of starting new business positively moderates the relationship between bootstrapping and growth of new-born startups.*

## **RESEARCH METHOD**

### **Sample**

Data of this study was collected via Kauffman Firm Survey conducted by the Ewing Marion Kauffman Foundation over the period 2005-2012. Since the focus of this study is examining the performance influences of bootstrapping during the early 0-3 age period, the sample of this study was selected from the survey data over the period of 2005-2007. The random sample of this survey was obtained from the list of new business started 2004 that were included in the Dun & Bradstreet (D&B) database, which totaled roughly two hundred fifty thousand such businesses. A random sample of 32,469 businesses was released for data collection on the Baseline Survey, which was conducted between July 2005 and July 2006. The research team completed interviews with principals of 4,928 businesses that started operations in 2004, which translates to a 43 percent response rate when the sampling weights are applied. A self-administered Web survey and Computer-Assisted Telephone Interviewing (CATI) were used to collect data, and KFS respondents were paid \$50 to complete the interview. CATI completes accounted for 3,781 (77

percent) and Web completes accounted for 1,147 (23 percent) of the interviews. The results across sampling strata show that 2,034 interviews were completed in the two high technology strata, and the remaining 2,894 interviews were completed among non-high-tech businesses.

The First Follow-Up Survey sample consisted of the 4,928 businesses that completed the Baseline Survey. The First Follow-Up was conducted between June 2006 and January 2007, and 3,998 interviews were completed—an 89 percent response rate after adjusting for the sample weights. As with the Baseline Survey, respondents were paid \$50 to complete the interview, which was offered either on the Web or through CATI. During the First Follow-Up, a significantly larger percentage of interviews was completed through the Web survey (2,366 or 59 percent) than in the Baseline; CATI completes in the First Follow-Up accounted for 41 percent (1,632 interviews).

The second follow-up survey was conducted among 4,523 KFS businesses. This included businesses that completed both the baseline and first follow-up surveys, or those not able to be interviewed during the first follow-up. Businesses identified as no longer operating during the first follow-up were excluded, as were a small number that adamantly refused to participate in the first follow-up. The second follow-up was conducted between May and December 2007, during which 3,390 interviews were completed and 406 businesses were identified as no longer operating. During the second follow-up, 63% of the interviews (2,127) were completed through the Web survey, with CATI completes accounting for 37% (1,263 interviews).

## Measures

### *Dependent variables*

Dependent variables of this study are measured by two indicators: profitability and growth. Information of dependent variables was obtained from the second follow up survey, the year 3 after startups being established.

Profitability is measured by a dummy variable. Respondents were asked whether the business loss or profit in this year. Answer for “loss” was coded as 0, “profit” was coded as 1.

Growth is measured by growth in revenue. Respondents were asked whether the amount of revenue increases, has no change, or decreases in this year. The answers for the amount of business revenue increases was coded as 1, has no change was coded as 0, decreases in this year was coded as -1.

### *Independent variables*

Bootstrapping is measured by the degree of bootstrapping techniques used in a venture. The researcher identified whether or not a startup has engaged in bootstrapping activities, then coded 1 if the answer was yes, otherwise coded 0. All answers of “yes” were sum together to obtain the degree of bootstrapping activities of the firm, which indicates bootstrapping approach pursued by the startup.

The bootstrapping activities include: 1) whether or not the startup has part-time employees. Answer for “yes” was coded as 1, 0 otherwise. 2) The average number of unpaid owners of a firm, which calculated by dividing the total number of unpaid owners by the total number of owners of the startup. 3) Whether or not business uses personal loans from a bank to finance the operation. “Yes” was coded as 1, 0 otherwise. 4) Whether or not business uses personal credit card to finance the operation. “Yes” was coded as 1, 0 otherwise. 5) Whether or not business uses personal loans



from family to finance the operation. “Yes” was coded as 1, 0 otherwise. 6) Whether or not business uses personal loans from other individuals to finance the operation. “Yes” was coded as 1, 0 otherwise. 7) Whether or not business uses loans from family of the owners. “Yes” was coded as 1, 0 otherwise. 8) Whether or not business uses loans from employees that are not owners. “Yes” was coded as 1, 0 otherwise. 9) Whether or not business uses loans from another owner of the business. “Yes” was coded as 1, 0 otherwise. 10) Whether or not business uses loans from other business. “Yes” was coded as 1, 0 otherwise. 11) Whether or not business uses loans from other individuals. “Yes” was coded as 1, 0 otherwise. 12) Whether or not business rent or lease machinery. “Yes” was coded as 1, 0 otherwise. 13) Whether or not business rent or lease buildings. “Yes” was coded as 1, 0 otherwise. 14) Whether or not business obtains equity financing from spouses of owners. “Yes” was coded as 1, 0 otherwise. 15) Whether or not business obtains equity financing from parents of owners. “Yes” was coded as 1, 0 otherwise.

The founding team human capital is measured by four indicators: owners’ formal education, owners’ industry experience, owners’ experience of starting new businesses, and expertise in entrepreneurship. All indicators are measured at the team level.

Owners’ education level is captured by asking respondents for the highest level of education they had completed. This variable, ranging from less than 9th grade to professional school or doctorate, was coded from 1 to 9. The team level of education is measured by dividing the sum of total number of formal education by the total number of owners of the venture.

Owners’ industry experience is measured by owners’ years of working experience in industry which business competes. The respondents were asked “how many years of working experience have you had in this industry—the one in which the business competes?” Team level of owners’ industry experience is calculated by dividing total years of industry experience of the founding team by the total number of owners of the venture.

Owners’ experience of starting new businesses is captured by asking respondents “how many other new businesses have you started besides?” Team level of owners’ new business start-up experience is calculated by dividing total number of other new business the owners have started within a founding team by the total number of owners of the startup.

Expertise in entrepreneurship is captured by: 1) if you have other new businesses started besides, were (was) these new businesses in the same industry as this business? The answer is coded as 1 (yes) or 0 (no). Then sum all owners’ answers for “yes” (1) together. 2) The number of owners who have more than 25 years of working experience in the same industry which the business competes. Each owner has more than 25 years of industry working experience was coded as 1, otherwise 0. Then sum all “1” together. 3) The number of owners who have more than 5 other new businesses started besides. Each owner has more than 5 other new business started besides was coded as 1, otherwise 0. Then sum all answer “1” together. The sum of the results from the three items measures the level of expertise in entrepreneurship. Team level of entrepreneurial expertise is measured by average entrepreneurial expertise of the startup. That is, dividing the total level of entrepreneurial expertise by the total number of owners of the startup.

#### *Control Variables*

Both firm age and industry type may affect the new venture performance. All new ventures in the sample of this study were started in year 2004, therefore, they are at the same age. After

matching NAICS code with SIC code, the sample was broadly classified into two industry categories, technological and non-technological industry (dummy coded as 1 and 0).

Other control variables include firm size and total asset. Firm size is measured by the number of employees, a dummy variable. The number of employees is more than 1 was coded as 1, otherwise 0. Total asset is measured by a dummy variable. Firm total asset above 10,000 was coded as 1, otherwise 0.

## Data Analysis

Hierarchical multiple binary logistic regression was used for testing the direct effects of bootstrapping on startups' profitability. Binary logistic regression model was used when the dependent variable has a value between 0 and 1. It is used for investigation the likelihood or probability (odds) of the dependent variable: profitability in this case.

Since this study examines the interaction effects of multiple independent variables on startup performance, in order to avoid multicollinearity problem, all independent variables were centered (Jewell, 2004). Outliers were excluded after testing residuals. In addition, all models were appropriately weighted before data analysis.

The second regression model was used in this study was multi-nominal logit regression (MNL), which examined direct effects of bootstrapping and the interactive effects of founding team human capital on startup growth, which was coded as -1, 0 and 1. Because there is an order to the three outcomes of growth, and they are categorical in nature, ordinal logistic regression was first tested whether or not it was preferred to use. There are two major assumptions for ordinal regression model: 1) parallel lines assumption assumes the regression lines to be parallel for each level of the dependent, indicating that the independents have the same relationship to the logit. 2) The adequate cell count assumption requires 80% of cells should have a count of 5 or more, and no cells should have a zero count. Unfortunately, the results show that the assumptions of ordinal regression model were violated, which indicated that the use of ordinal regression is inappropriate. Therefore, MNL was employed to test relationships of interest.

Logistic regression is more robust to the violation of the normality assumption relating to categorical explanatory variables, and MNL is an extension of the common binary logit model when the dependent variable is represented by more than two categories (Cooper et al., 1994). The outcome of revenue increase had more interest, therefore revenue decrease was chosen as the reference variable. As such, the coefficients in MNL should be interpreted as describing the effects of the explanatory variables on the probability of a particular outcome (Increases in Revenue, and Has No Change) relative to the probability of revenue decreases. The coefficients do not represent any absolute effect on the probability of that outcome (Cooper et al., 1994).

## RESULTS

Table 1 provides Spearman correlation coefficients for the variables used in the models. Because the variables included into this study are in the form of ordinal, interval or dichotomous variable. Both Pearson correlation and Spearman correlation tests were conducted. Spearman correlation is the most common correlation for use with two ordinal variables or an ordinal and an

interval variable. These correlations provide initial indications of strong relationships between founding team human capital, bootstrapping, resources, and performance. No evidence of multicollinearity was indicated.

Table 1. Spearman's Rho Correlation

Variable	1	2	3	4	5	6	7	8	9
1 Revenues change	1								
2 Profitability	.048*	1							
3 Bootstrapping	-.062**	-.084***	1						
4 Founding team education	.095***	.019	.011	1					
5 FT industry experience	.009	.129***	-.079***	.039**	1				
6 FT new business experience	.048*	-.004	.063***	.098***	.064***	1			
7 FT owner expertise	.020	.061**	-.008	.020	.539***	.442***	1		
8 The number of employees	-.100***	-.047*	.161***	.026	-.005	.052**	.014	1	
9 Total assets	-.096***	.038*	.265***	-.014	-.05	.079***	.067***	.246***	1

\* p < .05, \*\* p < .01, \*\*\* p < .001

Table 2 presents the results of regression analyses for profitability and growth. Normal binary logistic model is tested to examine the direct and contingent relationships among all explanatory variables and the performance measure: profitability. All results from normal binary logistic regression models show that Omnibus test of Model coefficients are significant at  $p = .000$  level, which indicates the model changes are significant. The Chi-squares for H-L (Hosmer-Lemeshow test) of all normal binary logistic regression are not significant, demonstrating that the logistic models are good fit with the data.

**Table 2. Multinomial Logistic Regressions results for Bootstrapping, Foundi Human Capital on Profitability and Growth in Revenue**

Models	Profitability		Growth in Revenue			
			Model 1 (increase)		Model 2 (no change)	
			b	EXP(B)	b	EXP(B)
<b>Main Effects Model</b>						
Industry			0.3***	1.35	0.241	1.272
Entrepreneurial human capital						
Industry experience	.034***	1.034	0	1	-.006	.994
Expertise	-.066	.936	-.074	.929	.111	1.117
Experience in new business startup	-.028	.972	-.023	.977	.08	1.083
General human capital	.025	1.026	-.021	.979	-.114***	.893
Bootstrapping	-.143***	.867	-.43	.28	-.12**	.887
Resources						
The number of employees	.046	1.047	-.290***	.748	-.045	.956
Total assets	-.334***	.716	-.18	.835	-.008	.992
R <sup>2</sup>	R <sup>2</sup> =0.046		Pseudo R <sup>2</sup> =.029			
Hosmer-Lemeshow test	$\chi^2(df)=8.208(8)$ , p=.413		-2LL: 4.021E3-> 3.964E3, $\chi^2(df)=57(22)$ , p=.000 Pearson $\chi^2(df)=4645(4740)$ , , p=.979			
<b>Model A1: Founding Team human capital XBootstrapping</b>						
Industry	0.056	1.058	0.315***	1.37	0.251	1.285
Founding Team human capital						
Industry experience	.034***	1.034	0	1	-.003	.997
Expertise	-.06	.942	-.086	.918	.052	1.053
Experience in new business startup	-.029	.971	-.008	.992	.071	1.074
Education	.025	1.026	-.015	.985	-.116***	.89
Bootstrapping	-.144***	.866	-.036	.964	-.126**	.882
Resources						
The number of employees	.046	1.048	-.271**	.763	-.046	.955
Total assets	-.333***	.717	-.175	.84	.004	1.004
Industry experience X bootstrapping	0	1	-.021***	.979	-.012	.989
Expertise X bootstrapping	-.048	.953	.378***	1.459	.209	1.233
Experience of starting new business X bootstrapping	.009	1.009	-.148***	.863	-.234***	.792
General human capital X bootstrapping	.004	1.004	.044**	1.045	-.035	.966
R <sup>2</sup>	R <sup>2</sup> =0.046		Pseudo R <sup>2</sup> =.050			
Hosmer-Lemeshow test	$\chi^2(df)=11.860(8)$ , p=.158		-2LL: 4.021E3-> 3.922E3, $\chi^2(df)=99(30)$ , p=.000 Pearson $\chi^2(df)=4540(4732)$ , , p=.977			

In testing the direct and interactive effects of bootstrapping and founding team human capital on startup's growth in revenue, MNL model was employed. The "Goodness of Fit" table in multinomial logistic regression reports two overall model fit tests: Pearson and Deviance statistics. Like the Hosmer-Lemeshow goodness of fit test in binomial logistic regression, adequate fit corresponds to a finding of non-significance for these tests. Since Pearson statistic is based on traditional chi-square and the deviance statistic is based on likelihood ratio chi-square. The deviance test is preferred over the Pearson (Menard, 2002 : 47). Then likelihood ratio chi-square was used to examine the model fit in this study. The results of the -2LL statistics were used to examine whether to reject the null hypothesis that a certain independent makes no difference in predicting the dependent in logistic regression.

Hypothesis 1 predicts that there is a significant negative relationship between bootstrapping and startup profitability. Results show that bootstrapping approach is significantly and strongly, but negatively associated with profitability. Hypothesis 1 is supported (-.143,  $p=.000$ ). In addition, a significant negative coefficient (-.12,  $p=0.00$ ) was found for bootstrapping in the model of "has no change", indicating that bootstrapping startups have more odds of decrease in revenue than the odds for no change in revenue. A negative coefficient (-.043) was also found for "revenue increase" model, indicating that bootstrapping startups less likely to obtain revenue increase compared with revenue decrease. However, the coefficient is not significant. Therefore, H2 is partially supported.

Hypothesis 3a, 3b, 3c, and 3d predict the moderating effects of founding team human capital on bootstrapping-growth relationship. As expected, all proxies of founding team human capital combined with bootstrapping approach significantly moderating the impacts of bootstrapping on startup growth. However, types of human capital have opposing directions of the moderating impacts. Bootstrapping conducted by founding teams with high expertise in entrepreneurship and formal education can overcome growth constraints that are inherent from bootstrapping activities. These two proxies of team human capital, combined with bootstrapping activities, significantly positively improve the likelihood of revenue increase rather than decrease, supporting 3a (.044,  $p=0.00$ ) and 3b (.378,  $p=0.000$ ). When teams with strong industry experience and experience in starting new businesses startups bootstrap, they are significantly related to the odds of "revenue decrease" rather than "revenue increase". This result indicates that by pursuing bootstrapping approach, startups have more significant growth constraints when founding teams have strong industry experience and experiences of starting new business. Taken together, founding team human capital is significantly moderating the bootstrapping-growth relationship, but types of human capital may have opposing impacts.

## DISCUSSION

Entrepreneurship scholars highlight bootstrapping as a key resource acquisition approach that new startups use to respond to their financial constrain, but empirical findings for the influences of bootstrapping activities on startup performance are contradictory. One stream of research supports positive influences of bootstrapping approach on performance. Along with this line of research, bootstrapping activities are perceived as creative routes of resource mobilization that lead to new startups' success. By pursuing bootstrapping, startups minimize cash

requirements, reduce the need for external capital, improve cash flows, and reduce the overall cost of operations, and have greater use of internal financing. On the other hand, another research stream is holding a competing hypothesis that bootstrapping approach would negatively influence the success of startups. This line of research argues that bootstrapping behaviors will hamper future investments, have higher costs of resources, decrease the efficiency of management, and hinder entrepreneurs from identifying and exploiting new opportunities thereby constrain subsequent venture growth. To address this debate, this study examined the direct impact of bootstrapping on new-born startup performance, and the interactive effect of founding team human capital on bootstrapping-performance relationship. Consistent with the second stream of research, results of this study show that bootstrapping approach has significantly negative impacts on new-born startups' profitability and revenue growth.

Findings of this study provide strong evidence supporting the importance of founding team human capital to startups. Founding team human capital significantly moderates bootstrapping-performance relationship. More specifically, founding team education and expertise in entrepreneurship can offset the negative impacts of bootstrapping financing. That is, founding teams that have high education and strong expertise in the starting, running, and managing self-owned businesses in the same industry are more likely to obtain revenue increase than decrease. However, strong industry experiences or experiences in starting new businesses causes more growth constrain when startups take bootstrapping approach during the initial period of business development.

High level of general education can increase an individual's communication and social abilities as well as his/her learning ability (Avermaete et al., 2004), which in turn increases the necessary skills for entrepreneurial opportunity discovery, identification, and exploitation (Ferrante, 2005; Marvel & Lumpkin, 2007; Unger et al., 2011). Entrepreneurs' general education is an important factor for "post-entry" firm performance such as productivity, profitability, and growth (Timothy Bates, 1985; Jo & Lee, 1996; Van der Sluis et al., 2008). The findings of the current study supports the prediction of human resource theory by showing that high educated founding teams are able to discover opportunity and implement it with the best use of internal resources, thereby bootstrap better than low educated teams.

Founding teams' expertise in entrepreneurship is accumulated through long-term "learning by doing" processes. Entrepreneurs who have strong expertise in entrepreneurship first have strong domain knowledge of the industry and/or business sector in which the startup operates. They also have strong knowledge and rich experience in starting, running, and managing entrepreneurial firms. In addition to the knowledge stocked through previous life/work experiences, strong expertise in entrepreneurship indicates that the individual not only has strong ability of learning but also he/she is able to transit what has learned into value created activities. When pursuing bootstrapping activities, expertise in entrepreneurship helps founding teams to sorter the most critical tasks, utilize limited resources more efficiently and effectively, reduce unnecessary costs, and avoid making incorrect decisions. Founding teams with strong expertise in entrepreneurship can overcome the inherent growth constrain of bootstrapping approach, thereby achieving better performance to the firm.

The negative moderating effects of industry experience and experience of starting new business on bootstrapping startups' growth are unexpected. One explanation could be entrepreneurs with strong industry experience might be very overconfident due to their skills and knowledge in the industry and/or the business sector, which constrains them from gathering further information that can improve bootstrapping decisions or better implement bootstrapping activities. With strong prior knowledge and experiences in the industry, startups may become unable to identify, discover, or exploit opportunities outside their "comfort zone". Over-familiar with the industry and/or business sector may let entrepreneurs stick with old routines, focus on early defined market segments, follow old existing practices, but neglect new changes in the environments and market, thereby depress the startup's growth overtime. Furthermore, Due to the strong "know-how" and "know-who" in the industry or business sector, bootstrapping startups are inclined to access the most familiar cheap resources through social contacts, and avoid of pursuing novel techniques that have not previously existed in the industry. For example, although second-hand equipment may help these bootstrapping new-born startups access to cheap resources and reduce the startup costs, acquiring eliminated equipment from others limits the startup's potential of creating the best value to the market.

The number of previous business started by the founding team also shows negative moderating effects on the outcome of bootstrapping. One reason for this result may be that although entrepreneurs are very familiar with the process of starting a new business, the only knowledge of how to establish new business may not be sufficient enough to obtain knowledge that is required for success in the market. The second reason may be that the number of previous business started does not reflect the quality of specific knowledge learned by entrepreneurs. If entrepreneurs fail to learn from their prior startup experiences, it is unable for them to turn their human capital into firm performance. In addition, serial entrepreneurs could be more inclined to adopt routines and decisions that have worked in the past, ignoring new information and new opportunities, which hampers subsequent startup growth.

This study makes a few contributions and implementations as follows:

First, this study contributes to the existing debate in the entrepreneurship literature by examining direct impacts of bootstrapping approach on new-born startup performance. The results show that bootstrapping approach is negatively associated with startup's profitability and growth in revenue, but such negative influences are contingent in startup team human capital.

Second, this study contributes to the human capital theory and resource-based theory by investigating mutual effects of team level human capital and bootstrapping in the new-born startup settings. It provides an empirical evidence that entrepreneurial founding team, as unique heterogeneous resources of startup firms, is an important factor that influences startup outperformance. Importantly, results of current study are consistent with previous studies that suggest that founding team human capital affects the exploitation of resources and the implementation of firm strategies. Shrader and Siegel (2007) study provide more direct and strong support for the importance of founding team human capital on firm outcomes. The current research provides further support for their work and extends it as well.

The third contribution of this research is that instead of having incumbent firms as the sample, this study sheds light on startup firms at initial stage of business development. The sample

includes startups established in year 2004 and all startups are 3 years of age. These startups were surveyed during the first year right after the firm was established. Investigating impacts of bootstrapping on performance on the startup sample well mirrors the uncertainty of business development and reduces the survivorship bias of firms. In addition, by using a new-born startup sample, this study fills a gap in the entrepreneurship literature by examining bootstrapping activities during the infant and toddler period of startups. Therefore, results of this study provides valuable insights for further theory development in both entrepreneurship financing and new venture creation literature.

Fourth, this study contributes to the empirical entrepreneurship literature by providing a longitudinal causal investigation. The current study uses longitudinal data that better investigates the influences of bootstrapping approach on business development overtime. The results of bootstrapping activities will affect firm performance only within a certain time lag. This study uses 2-year time lag for the impact of bootstrapping on profitability and growth, which overcomes the limitations of widespread cross-sectional empirical studies in the entrepreneurship literature.

As with all research, this study has limitations too. First, even though this study found significant moderating effects of founding team human capital on revenue growth, but it failed to find same significant moderating effects on profitability. This result hints that other contingencies may impact the relationship between bootstrapping and profitability. Identifying other contingencies is an interesting area for future research. Bootstrapping approach decreases the likelihood of achieving high profitability through cost-reducing activities. To overcome the negative impacts of bootstrapping approach, these contingencies might center in the categories of variables that are associated with largest value created.

Second, this study focused only on the role founding team human capital plays in bootstrapping-performance relationship. Previous literature has identified other team variables such as team composition, diversity, or team member's personal interaction etc. also impact founding team performance. We need more future studies investigating the role of founding team plays in the early financing stage of new-born startups.

Despite its limitations, the study provides valuable insights to scholars and entrepreneurs. Entrepreneurs should be aware of that although bootstrapping approach may help reduce the need for external finance, reduce the costs during the initial venturing process, this approach can be a double-edged sword to firms' profitability and growth. Entrepreneurial founding teams must keep learning in the venturing processes, and formulate the most desirable approach that addresses both resource constrains and the need for profits and growth.

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