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Human capital effects on fundraising for necessity- and opportunity-based entrepreneurs

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Abstract This paper examines the effects of human capital on fundraising problems for necessity- and opportunity-based entrepreneurs by using a survey of 3974 new firms in Japan. The major findings of this paper are as follows. First, necessity-based entrepreneurs are more likely to have fundraising problems than opportunity-based entrepreneurs. Second, industry-specific experience contributes to solving fundraising problems for both necessity- and opportunity-based entrepreneurs. Third, necessity-based entrepreneurs with industry-specific experience are less likely to have fundraising problems than opportunity-based entrepreneurs without such experience.

Plain English Summary Do high levels of human capital help necessity-based entrepreneurs overcome their disadvantages in startup financing? In this study, we investigate whether necessity-based entrepreneurs with high levels of human capital are less likely to have fundraising problems than opportunity-based entrepreneurs without such human capital. Our results show that former entrepreneurs tend not to have fundraising problems than latter entrepreneurs. This implies that (1) high levels of human capital can be an insurance for potential necessity-based entrepreneurs when they are forced to start businesses and (2) potential opportunity-based entrepreneurs might have difficulty fundraising if they do not have high levels of human capital. Therefore, all potential entrepreneurs should recognize the importance of acquiring high levels of human capital.

Keywords Human capital · Fundraising · Necessity-based entrepreneurs · Opportunity-based entrepreneurs

JEL Classification L26, M13, M21

1 Introduction

Human capital is an important factor in achieving business success (Bosma et al., 2004; Chrisman et al., 2005; Davidsson & Honig, 2003; Ganotakis, 2012; Haber & Reichel, 2007). This is because entrepreneurs have difficulty obtaining external funds if they do not have high levels of human capital, even though the success of their business largely depends on obtaining sufficient external funds (Colombo & Grilli, 2010; Cooper et al., 1994; Honig, 1998). In

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contrast, entrepreneurs with high levels of human capital tend to have large initial financing amount (Ko & McKelvie, 2018) through receiving venture capital financing (Colombo & Grilli, 2010; Hsu, 2007; Piva & Rossi-Lamastra, 2018) and debt financing from commercial banks (Bates, 1990).

While there is abundant literature on the effects of human capital on entrepreneurial finance, a significant concern has remained. Specifically, the entrepreneurial finance literature has not controlled for the difference between necessity- and opportunity-based entrepreneurs (motivation difference), which has become a topic of interest in recent research on entrepreneurship.[1] Although the entrepreneurship literature have shown that these two types of entrepreneurs are essentially different in several aspects (e.g., Bergmann & Sternberg, 2007; Block et al., 2015; Calderon et al., 2017; Chrisman et al., 2005; Haber & Reichel, 2007), the entrepreneurial finance literature has treated them as equals. Given that the effects of human capital for these two types of entrepreneurs are heterogeneous (e.g., Baptista et al., 2014; Bourlès & Cozarenco, 2018; Calderon et al., 2017; Giotopoulos et al., 2017), ignoring the heterogeneity causes another serious concern.

More specifically, human capital and motivation difference not only individually affect fundraising (Colombo & Grilli, 2010), but are also correlated with each other (Bergmann & Sternberg, 2007; Block et al., 2015; Calderon et al., 2017). Thus, not controlling for the heterogeneity between necessity- and opportunity-based entrepreneurs can lead to either overestimation or underestimation of the effects of human capital on fundraising (Bergmann & Sternberg, 2007; Block et al., 2015; Calderon et al., 2017).[2] In extreme cases, human capital effects might even be offset by controlling for motivation difference.

Therefore, this study aims to examine human capital effects on fundraising problems by controlling for motivation difference. Further, we investigate which is larger between the "human capital effects" and "motivation-difference effects." Given that the entrepreneurial finance literature has not considered motivation difference even though the entrepreneurship literature has focused on the difference, introducing such a difference expands the entrepreneurial finance literature. One of the reasons why prior studies have not investigated the issue is data limitation that their datasets have lacked one or more of the following information: (i) human capital; (ii) fundraising problems; (iii) motivation difference. By contrast, a unique survey in Japan which includes information on 3974 new firms started in 2012, 2013, and 2016 enables us to address this limitation. The benefits of using this Japanese dataset are twofold.

First, the dataset includes information that the Global Entrepreneurship Monitor (GEM)—one of the most frequently employed datasets in previous entrepreneurship studies—does not include. Specifically, unlike the GEM data, our dataset covers information on entrepreneurs' fundraising and other types of human capital except for educational levels (e.g., industry-specific experience, managerial experience, and entrepreneurial experience). Second, our dataset can help overcome the limitations of the datasets in extant entrepreneurial finance literature. Specifically, this dataset allows us to introduce the concept of motivation difference.

The major findings of this paper are as follows. First, necessity-based entrepreneurs are more likely to have fundraising problems than opportunity-based entrepreneurs. This result suggests that motivation-difference effects observed in business performance (e.g., Baptista et al., 2014; Bourlès & Cozarenco, 2018; Calderon et al., 2017) are also observed in fundraising problems. Second, among the four representative types of human capital in the entrepreneurship literature (i.e., higher education, industry-specific experience, managerial experience, and entrepreneurial experience), industry-specific experience contributes to solving fundraising problems for both necessity- and opportunity-based entrepreneurs.[3] This result possibly implies that the effects of other three types of human capital on fundraising problems

[1] In general, necessity-based entrepreneurs are defined as entrepreneurs who have no option except for starting businesses, while opportunity-based entrepreneurs are defined as all other entrepreneurs.

[2] For simplicity, we refer to "the effects of human capital" as "human capital effects." Similarly, we refer to "the effects of motivation difference" as "motivation-difference effects."

[3] Unger et al. (2011), who conducted a meta-analysis on entrepreneurs' human capital, showed that these four types of human capital have received the most attention in the entrepreneurship literature.

are offset by motivation difference. Third, necessity-based entrepreneurs with such experience are less likely to have fundraising problems than opportunity-based entrepreneurs without the experience. In other words, human capital effects can exceed motivation-difference effects.

This study makes significant contributions to the two strands of literature. First, this study contributes to the entrepreneurial finance literature. Existing studies have examined how several types of human capital affect fundraising without identifying between necessity- and opportunity-based entrepreneurs (e.g., Beckman et al., 2007; Ko & McKelvie, 2018; Piva & Rossi-Lamastra, 2018). Because these two types of entrepreneurs are essentially different from each other (Block et al., 2015; Caliendo et al., 2015; Giotopoulos et al., 2017), human capital effects on fundraising may differ between necessity- and opportunity-based entrepreneurs. It is even possible that such effects are not observed in either type of entrepreneurs. By controlling for motivation difference, we argue that human capital effects are observed for both types of entrepreneurs but such effects are heterogeneous between these two types. As such, this study responds to the previous call in the entrepreneurial finance literature to consider the heterogeneity of necessity- and opportunity-based entrepreneurs.

Second, this study contributes to the entrepreneurship literature on necessity- and opportunity-based entrepreneurs. Previous studies have independently examined human capital and motivation-difference effects despite their closeness (e.g., Baptista et al., 2014). Because of this, these studies have rarely accounted for the mutual relationship between these two effects, especially which are larger. By combining these two closely related frameworks, we theoretically develop and empirically demonstrate that human capital effects can exceed motivation-difference effects. This expands the understanding of both human capital and motivation-difference effects.

The remainder of the paper is organized as follows. Section 2 develops theoretical framework and our research hypotheses. Section 3 describes our dataset and empirical methodology. Section 4 presents our results. Section 5 provides the discussion, limitations, and concluding remarks.

2 Theoretical framework and hypothesis development

2.1 Human capital effects on fundraising problems for entrepreneurs

Entrepreneurs tend to face fundraising problems unless they obtain external funds (Colombo & Grilli, 2010). However, to obtain such funds, they must solve the asymmetric information problem with external suppliers of capital (Stiglitz & Weiss, 1981). Under such severe circumstances, signals are effective in reducing asymmetric information (Spence, 1974, 2002). In particular, performance track records can be firms' symbolic signals to reduce information asymmetry (Hsu, 2007; Ko & McKelvie, 2018). However, entrepreneurs generally do not have performance track records (Delmar & Shane, 2004). In such a case, human capital can act as signals to distinguish between high- and low-quality entrepreneurs through the following mechanisms.

Specifically, high levels of human capital enable entrepreneurs to identify and exploit innovative opportunities (Bayon et al., 2016; Marvel & Lumpkin, 2007; Wright et al., 2007), leading to increasing entrepreneurs' performance and providing higher returns to external suppliers of capital. In other words, high levels of human capital serve as productivity-enhancing tools (Becker, 1964, 1993). Acquiring these tools is relatively less costly for high-productivity entrepreneurs, but relatively more costly for low-productivity entrepreneurs. Thus, only high-productivity entrepreneurs acquire high levels of human capital (Spence, 1973). Moreover, entrepreneurs' human capital is heterogeneous and immobile (Wright & McMahan, 1992). As such, entrepreneurs without high levels of human capital cannot pretend to be those with such human capital. Hence, high levels of human capital can be used to distinguish between high- and low-quality entrepreneurs (Backes-Gellner & Werner, 2007; Barrera-Osorio & Bayona-Rodríguez, 2019; Bedard, 2001; Bublitz et al., 2018; Spence, 1973), and entrepreneurs with such human capital can obtain external funds (Beckman et al., 2007; Gimmon & Levie, 2010; Ko & McKelvie, 2018; Piva & Rossi-Lamastra, 2018; Plummer et al., 2016). Consequently, high levels of human capital can solve fundraising problems.

Although extant studies have shown that high levels of human capital contribute to solving fundraising problems, motivation difference (i.e., the difference between necessity- and opportunity-based entrepreneurs) has not been considered. Because the difference can affect fundraising problems, we extend the existing theoretical framework in the entrepreneurial finance literature by introducing such a difference.

2.2 Motivation difference

2.2.1 Human capital effects on fundraising problems for necessity- and opportunity-based entrepreneurs

Opportunity-based entrepreneurs start businesses even though they have at least one job option other than starting their businesses. These entrepreneurs start businesses to pursue new opportunities (Baptista et al., 2014) and attain independence or self-fulfillment (Dalborg & Wincent, 2015). By contrast, necessity-based entrepreneurs start businesses because they have no option other than starting their businesses (Bergmann & Sternberg, 2007). In other words, these entrepreneurs can be described as entrepreneurs who start businesses from necessity or against their will (Bourlès & Cozarenco, 2018).

Based on previous studies, we argue that necessity-based entrepreneurs are less likely to obtain external funds than opportunity-based entrepreneurs. Because necessity-based entrepreneurs are forced to start businesses out of necessity, their preparation period tends to be shorter than that of opportunity-based entrepreneurs. Consequently, necessity-based entrepreneurs' business plans tend to be relatively insufficient (Block et al., 2015; Caliendo et al., 2015) and their businesses are hard to succeed (Brinckmann et al., 2010). Thus, necessity-based entrepreneurs are less attractive to external suppliers of capital, and they have difficulty obtaining external funds. However, because high levels of human capital can increase performance of entrepreneurs even when their preparation is insufficient (Chrisman et al., 2005; Haber & Reichel, 2007), we expect that high levels of human capital will make it easier for necessity-based entrepreneurs to obtain external funds. Given that these arguments can be applied irrespective of the preparation period (Chrisman et al., 2005; Haber & Reichel, 2007), high levels of human capital will also help opportunity-based entrepreneurs receive external funds. Hence, we posit Hypothesis 1:

Hypothesis 1: High levels of human capital contribute to solving fundraising problems for both necessity- and opportunity-based entrepreneurs.

2.2.2 Motivation-difference effects on fundraising problems

As explained in Section 2.2.1, necessity-based entrepreneurs tend to have shorter preparation periods than opportunity-based entrepreneurs. Because entrepreneurs with insufficient preparation for starting businesses are less attractive to external suppliers of capital, we propose that necessity-based entrepreneurs have more difficulty obtaining external funds than opportunity-based entrepreneurs. Besides, there are two additional reasons.

First, necessity-based entrepreneurs are inferior to opportunity-based entrepreneurs in terms of human capital. Specifically, necessity-based entrepreneurs tend to be less educated (Bergmann & Sternberg, 2007; Block et al., 2015; Calderon et al., 2017) and lack (1) labor market experience (Block & Wagner, 2010), (2) management practices (Calderon et al., 2017), and (3) entrepreneurial experience (Block et al., 2015). Because entrepreneurs with low levels of human capital display worse business performance (Colombo & Grilli, 2010), external suppliers of capital are unwilling to provide financing to those entrepreneurs. As a result, these entrepreneurs will have difficulty obtaining external funds. Considering that necessity-based entrepreneurs have relatively low levels of human capital, we expect that they tend not to receive external funds.

Second, necessity-based entrepreneurs are inferior to opportunity-based entrepreneurs in terms of their fundamental characteristics. For example, necessity-based entrepreneurs tend to be older (Block & Wagner, 2010; Bourlès & Cozarenco, 2018) and older entrepreneurs lack high-growth intentions and innovativeness (Giotopoulos et al., 2017), leading to poor business performance (Rosenbusch et al., 2011). Because firms with worse business performance are less attractive to external suppliers of capital, they are less likely to be selected by the suppliers. Moreover, necessity-based entrepreneurs have less self-confidence (Caliendo et al., 2015) and entrepreneurs with

less self-confidence tend to have low levels of social capital (Hayward et al., 2010). This leads to poor performance (Stam et al., 2014). Furthermore, necessity-based entrepreneurs have lower intrinsic motivation (Bourlès & Cozarenco, 2018) and entrepreneurs with low levels of intrinsic motivation lack high-growth intentions and innovativeness (Giotopoulos et al., 2017). This also leads to poor performance (Rosenbusch et al., 2011). Hence, it is conceivable that necessity-based entrepreneurs are less likely to obtain external funds.

Taken together, necessity-based entrepreneurs have shorter preparation periods, low levels of human capital, and inferior characteristics. Because these factors will cause external suppliers of capital to hesitate to provide financing to entrepreneurs (Bates, 1990; Colombo & Grilli, 2010; Hsu, 2007), necessity-based entrepreneurs would have more difficulty in receiving external funds than opportunity-based entrepreneurs. Hence, we posit Hypothesis 2:

Hypothesis 2: Necessity-based entrepreneurs are more likely to have fundraising problems than opportunity-based entrepreneurs.

2.2.3 Comparison between human capital and motivation-difference effects on fundraising problems

Although necessity-based entrepreneurs have difficulty obtaining external funds, they can receive such funds more easily if they have high levels of human capital. In light of this, we argue that high levels of human capital would overcome the disadvantages of being necessity-based entrepreneurs in obtaining external funds.

Even when controlling for the main characteristics of necessity-based entrepreneurs such as shorter preparation periods and inferior characteristics, high levels of human capital contribute to providing better access to angel investors (Becker-Blease & Sohl, 2015), obtaining funds through crowdfunding (Davis et al., 2017), and improving capital constraints (Parker & Praag, 2006). Moreover, it is even possible that human capital effects are larger than the effects of the preparation period and fundamental characteristics on receiving external funds (Oo et al., 2019; Piva & Rossi-Lamastra, 2018). In other words, among the factors that affect obtaining external funds, human capital has a particularly large impact. Furthermore, it is suggested that human capital effects are larger particularly for entrepreneurs with low levels of human capital (Baptista et al., 2014).[4] Given that necessity-based entrepreneurs tend to have low levels of human capital (Bergmann & Sternberg, 2007; Block & Wagner, 2010; Block et al., 2015; Calderon et al., 2017), human capital effects for necessity-based entrepreneurs may more than offset the disadvantages of being necessity-based entrepreneurs. Hence, we posit Hypothesis 3:

Hypothesis 3: Necessity-based entrepreneurs with high levels of human capital are less likely to have fundraising problems than opportunity-based entrepreneurs without high levels of human capital.

3 Data and methodology

3.1 Data

In this paper, we use 3974 sample firms from the Survey on Business Startups in 2012, 2013, and 2016.[5] Table 1 shows the distributions of these firms by fiscal year and industry. The survey was conducted by the Japan Finance Corporation Research Institute (JFCRI), which is one of the major government-controlled financial institutions in Japan and "offers a wide spectrum of services by drawing on the combined expertise of the respective fields of operations" (cited from the JFC homepage).[6] Two units of the JFC—the Micro Business and Individual Unit and the Small and Medium Enterprise Unit—provide financial and start-up support to small- and medium-sized enterprises (SMEs), including micro businesses, for policy objectives such as "contribution to the growth and development of the Japanese economy" and

[4] Baptista et al. (2014) differ from this study in that they have separately examined human capital effects for necessity-based entrepreneurs and for opportunity-based entrepreneurs. In contrast, we investigate (1) the interaction effects of human capital and motivation difference and (2) which effects are larger between these two.

[5] Response rates of the survey in 2012, 2013, and 2016 are 25.6%, 23.6%, and 24.1%, respectively. The average response rate for those three years is 24.4%.

[6] For details of the JFC, see https://www.jfc.go.jp/n/english/ (last accessed: July 2020).

Table 1 Distributions of sample firms

(A) Fiscal year			
Fiscal year	All firms	Necessity-based entrepreneurs	Opportunity-based entrepreneurs
2012	703	73	630
2013	1467	116	1351
2016	1798	112	1686
Total	3968	301	3667
(B) Industry			
Industry	All firms	Necessity-based entrepreneurs	Opportunity-based entrepreneurs
Manufacturing	167	19	148
Wholesale	242	39	203
Retail	424	37	387
Service	2521	162	2359
Construction	299	27	272
Transportation	90	1	89
Real estate	184	13	171
Others	41	3	38
Total	3968	301	3667

Note: We cannot use the sample other than the above three fiscal years because these excluded years miss information necessary for our analyses

"contribution to regional revitalization." These units determine whether to provide financing to a firm based on the contents of its startup plan.

In Japan, most SMEs and micro businesses apply for loans from the JFC. One reason for this is that Japan is one of the most bank-dependent countries. Another reason is that the lending systems of the JFC are well developed. Specifically, the JFC provides unsecured and unguaranteed long-term loans. In addition, entrepreneurs without financial statements can obtain financing from the JFC if they satisfy certain conditions. Moreover, even entrepreneurs who cannot receive other external funds can obtain JFC loans. Thus, JFC loans are popular and are used more frequently than loans from other institutions. However, creditworthy borrowers (e.g., firms with parent companies) often use loans from other institutions (e.g., private financial institutions and local government institutions) because JFC loans have relatively high interest rates. Thus, among firms obtaining external startup funding, JFC borrowers have the lowest scale and creditworthiness.

The purpose of the survey is to ascertain the actual status of business startups with survey items such as entrepreneurs' characteristics and careers, funds for entry, and fundraising. Based on this purpose, this survey targets firms that (1) are provided loans by the Micro Business and Individual Unit between April and September in the previous year of the survey and (2) were established within one year of receiving financing (including pre-startup firms).

3.2 Variables

3.2.1 Dependent variable

Tables 2 and 3 show the variable definitions and descriptive statistics, respectively. Our dependent variable is the fundraising problem dummy, which is based on Bosma et al. (2004) and Parker and Praag (2006). In our sample, 46.2% of necessity-based and 36.5% of opportunity-based entrepreneurs have fundraising problems, where the mean and median differences are both statistically significant ($p < 0.01$). This result suggests that necessity-based entrepreneurs are more likely to have fundraising problems than opportunity-based entrepreneurs.

3.2.2 Independent variables

The independent variables in this paper can be classified into two groups.

First, we use variables for human capital. In the entrepreneurship literature, higher education, industry-specific experience, managerial experience, and entrepreneurial experience are commonly used (Unger et al., 2011) because these four types of human capital can serve as signals when entrepreneurs raise external funds (Ko & McKelvie, 2018). Specifically, higher education enhances the ability to (1) acquire the knowledge necessary for entrepreneurs' businesses (Shane, 2000), (2) discover business opportunities (Davidsson & Honig, 2003; Shane, 2000), and (3) integrate new knowledge and adapt to new situations (Shane, 2000). In addition, industry-specific experience (1) provides knowledge about customers and effective business strategies (Brüderl et al., 1992; Gimeno et al., 1997; Shane & Stuart, 2002), (2) offers social ties with important stakeholders (Brüderl et al., 1992; Gimeno et al., 1997), and (3)

Table 2 Variable definitions

Variable	Definition
Dependent variables	
Fundraising problems	1 if an entrepreneur has fundraising problems in answering the questionnaire, 0 otherwise
External startup funding	Amount of startup funding except for personal funds (billion yen)
Independent variables	
Higher education	1 if an entrepreneur is a university or graduate school graduate, 0 otherwise
Industry-specific experience	1 if an entrepreneur has experience related to current job, 0 otherwise
Managerial experience	1 if an entrepreneur was in a managerial position in prior job, 0 otherwise
Entrepreneurial experience	1 if an entrepreneur has experience in managing his/her own business, 0 otherwise
Necessity-based entrepreneurs	1 if an entrepreneur started his/her business because he/she had no choice of workplace other than starting business (i.e., a necessity-based entrepreneur), 0 otherwise
Control variables	
Age	Age of an entrepreneur in entry
Male	1 if an entrepreneur is male, 0 otherwise
Employees	Total number of family employees, full-time executive, regular employees, and non-full-time employees in answering the questionnaire
Sole proprietorship in entry	1 if the business structure of a firm is a sole proprietorship in entry, 0 otherwise
Sole proprietorship in answering the questionnaire	1 if the business structure of a firm is a sole proprietorship in answering the questionnaire, 0 otherwise
Franchisee	1 if a firm is a franchisee, 0 otherwise
Firm age	Firm age in answering the questionnaire (month)
Preparation period	Number of months of preparation period for starting a business (month)
Personal funds (ln)	Natural logarithm of the amount of personal funds (million yen, the amount is replaced with 0.0001 if it is zero)
External startup funding (ln)	Natural logarithm of the amount of external startup funding in a broad sense (million yen, the amount is replaced with 0.0001 if it is zero)

promotes the understanding of opportunities in industries (Kotha & George, 2012). Moreover, managerial experience (1) develops the ability to identify and pursue new business opportunities (Ucbasaran et al., 2008), (2) provides insights into personnel management, contract negotiation, and asset deployment (Becker-Blease & Sohl, 2015), and (3) offers knowledge of stakeholders, products, and services (Unger et al., 2011). Furthermore, entrepreneurial experience provides the ability to accurately recognize or evaluate new business opportunities (Parker, 2006), utilize resources to pursue opportunities (Ucbasaran et al., 2008), and solve problems occurring in starting businesses (Estrin et al., 2016). Hence, higher education, industry-specific experience, managerial experience, and entrepreneurial experience can be entrepreneurs' signals.

In our sample, these four types of human capital are measured by a university or graduate school graduate (higher education), experience related to current job (industry-specific experience), experience in being managerial position in prior job (managerial experience), and experience in managing his/her own business (entrepreneurial experience). According to Tables 3 (B) and (C), 35.2% of necessity-based and 38.0% of opportunity-based entrepreneurs receive higher education. In addition, 88.0% of necessity-based and 85.6% of opportunity-based entrepreneurs have experiences related to their current jobs. Moreover, 43.4% of necessity-based and 44.8% of opportunity-based entrepreneurs were in managerial positions in prior jobs. Furthermore, 12.3% of necessity-based and 13.6% of opportunity-based entrepreneurs have experiences in managing their own businesses. It is important to note that the mean and median differences of these four types of human capital between necessity- and opportunity-based entrepreneurs are all statistically insignificant.

Second, to control for motivation difference, we use the necessity-based entrepreneur dummy. In

Table 3 Descriptive statistics

Variable	N	Mean	S.D	Min	Median	Max
(A) Full sample (necessity- and opportunity-based entrepreneurs)						
Dependent variables						
Fundraising problems	3974	0.372	0.483	0	0	1
External startup funding	3637	1.076	1.948	−2.000	0.600	45.900
Independent variables						
Higher education	3947	0.377	0.485	0	0	1
Industry-specific experience	3966	0.858	0.350	0	1	1
Managerial experience	3914	0.447	0.497	0	0	1
Entrepreneurial experience	3716	0.135	0.342	0	0	1
Necessity-based entrepreneurs	3968	0.076	0.265	0	0	1
Control variables						
Age	3974	42.057	9.888	20.000	41.000	80.000
Male	3974	0.840	0.366	0	1	1
Employees	3974	3.938	7.169	0.000	2.000	180.000
Sole proprietorship in entry	3974	0.609	0.488	0	1	1
Sole proprietorship in answering the questionnaire	3974	0.589	0.492	0	1	1
Franchisee	3974	0.064	0.246	0	0	1
Firm age	3974	14.598	4.623	0.000	14.000	29.000
Preparation period	3974	9.613	12.770	1.000	6.000	206.000
Personal funds (ln)	3974	3.653	4.883	−9.210	5.298	9.210
External startup funding (ln)	3974	5.493	3.946	¬9.210	6.397	10.734
(B) Necessity-based entrepreneurs						
Dependent variables						
Fundraising problems	301	0.462	0.499	0	0	1
External startup funding	281	0.697	0.835	0.000	0.500	5.850
Independent variables						
Higher education	301	0.352	0.478	0	0	1
Industry-specific experience	301	0.880	0.325	0	1	1
Managerial experience	297	0.434	0.497	0	0	1
Entrepreneurial experience	285	0.123	0.329	0	0	1
Necessity-based entrepreneurs	301	1	0	1	1	1
Control variables						
Age	301	44.708	8.875	24.000	44.000	69.000
Male	301	0.821	0.384	0	1	1
Employees	301	3.286	5.371	0.000	2.000	40.000
Sole proprietorship in entry	301	0.618	0.487	0	1	1
Sole proprietorship in answering the questionnaire	301	0.595	0.492	0	1	1
Franchisee	301	0.076	0.266	0	0	1
Firm age	301	15.309	4.689	2.000	14.000	29.000
Preparation period	301	6.542	12.948	1.000	4.000	206.000
Personal funds (ln)	301	3.602	4.681	−9.210	5.094	8.614
External startup funding (ln)	301	4.792	4.582	−9.210	6.215	9.036
(C) Opportunity-based entrepreneurs						
Dependent variables						
Fundraising problems	3667	0.365	0.481	0	0	1
External startup funding	3351	1.107	2.011	−2.000	0.600	45.900

Table 3 (continued)

Variable	N	Mean	S.D	Min	Median	Max
Independent variables						
Higher education	3640	0.380	0.485	0	0	1
Industry-specific experience	3659	0.856	0.351	0	1	1
Managerial experience	3612	0.448	0.497	0	0	1
Entrepreneurial experience	3425	0.136	0.343	0	0	1
Necessity-based entrepreneurs	3667	0	0	0	0	0
Control variables						
Age	3667	41.834	9.934	20.000	40.000	80.000
Male	3667	0.842	0.364	0	1	1
Employees	3667	3.990	7.300	0.000	2.000	180.000
Sole proprietorship in entry	3667	0.608	0.488	0	1	1
Sole proprietorship in answering the questionnaire	3667	0.589	0.492	0	1	1
Franchisee	3667	0.064	0.244	0.000	0.000	1.000
Firm age	3667	14.541	4.614	0.000	14.000	29.000
Preparation period	3667	9.869	12.733	1.000	6.000	179.000
Personal funds (ln)	3667	3.658	4.898	−9.210	5.298	9.210
External startup funding (ln)	3667	5.548	3.887	−9.210	6.397	10.734

identifying between necessity- and opportunity-based entrepreneurs, we use the question "Why did you start your business?" in the abovementioned survey. To this question, the survey provides 11 possible responses: (a) wanting to increase income; (b) wanting to work freely; (c) being interested in business management; (d) wanting to commercialize their technologies or ideas; (e) wanting to use their experience, knowledge, or qualifications acquired in their prior jobs; (f) wanting to use their hobbies or special ability at work; (g) wanting to work to help society; (h) wanting to work regardless of age or sex; (i) wanting to have enough free time and peace of mind; (j) having no job option other than starting a business; (k) other reasons. Using these items, we classify the respondents into necessity- and opportunity-based entrepreneurs. Specifically, we define necessity-based entrepreneurs as entrepreneurs who choose (j) and opportunity-based entrepreneurs as those who choose any of (a)–(i) or (k).[7] This classification method is based on most previous studies that have classified entrepreneurs into necessity- and opportunity-based entrepreneurs (e.g., Bergmann & Sternberg, 2007; Calderon et al., 2017; Giotopoulos et al., 2017).[8]

Our sample comprises 7.6% of necessity-based and 92.4% of opportunity-based entrepreneurs. One of the reasons why the percentage of necessity-based entrepreneurs in our sample is lower than the percentage in other studies may be the difference in entrepreneurial attitudes by country. Specifically, Japanese individuals are less likely to face unemployment, which is the primary reason for becoming necessity-based entrepreneurs.[9] Moreover, Japanese individuals scarcely have confidence and the intention to start

[7] Multiple answers are allowed in several years. In such cases, we regard entrepreneurs who choose (j) among one of their answers as necessity-based entrepreneurs.

[8] In contrast, several studies have employed their own definitions of necessity- and opportunity-based entrepreneurs because of data limitations. For example, Baptista et al. (2014) defined necessity-based entrepreneurs as previously unemployed entrepreneurs, and Colombo and Grilli (2010) defined opportunity-based entrepreneurs as entrepreneurs with innovative motivations. In this respect, Baptista et al. (2014) acknowledged that they could not use the widely accepted definition as one of the limitations of their study.

[9] According to OECD (2021), Japan has long had the lowest level of unemployment rate among members of the Organization for Economic Co-operation and Development.

a business.[10] Furthermore, they prefer to be hired when they are unemployed. Hence, Japan has a relatively small number of necessity-based entrepreneurs, which is also reflected in our dataset.

3.2.3 Control variables

In line with previous studies, we employ ten variables for the characteristics of entrepreneurs. Specifically, based on the following reasons, we control for (1) age, (2) male dummy, (3) employees, (4) sole proprietorship in entry dummy, (5) sole proprietorship in answering the questionnaire dummy, (6) franchisee dummy, (7) firm age, (8) preparation period, (9) personal funds, and (10) external startup funding.

Regarding age, SMEs with young owners are more likely to receive loan approval (Vos et al., 2007). With respect to the male dummy, male entrepreneurs face more difficulty in obtaining funds through crowdfunding than female entrepreneurs (Johnson et al., 2018). In regard to employees, firms with a large number of employees easily obtain venture capital financing (Beckman et al., 2007). Regarding sole proprietorship in entry and in answering the questionnaire dummies, firms that are founded as sole proprietorships have more difficulty in receiving bank lending than limited companies (Storey, 1994). Relating to the franchisee dummy, entrepreneurs who have received some resources from a parent company are more likely to obtain venture capital financing (Colombo & Grilli, 2010). With respect to firm age, young firms tend to face difficulties in obtaining venture capital financing (Hsu, 2007). Relating to the preparation period, entrepreneurs who sufficiently prepare for starting their businesses easily receive venture capital financing (Chen et al., 2009). With respect to personal funds, entrepreneurs who have personal funds are more likely to obtain loans from banks (Blumberg & Letterie, 2008). Regarding external startup funding, entrepreneurs who receive large amounts of external funds easily obtain financing from many institutional investors (Higgins & Gulati, 2006).

It should also be noted that we take the natural logarithm of personal funds and external startup funding (these variables are replaced with 0.0001 before log-transforming if they are zero). Dummy variables for year and industry are also included in the regressions.

[10] According to GEM (2020), among 50 countries, Japan is ranked the lowest in terms of both confidence and intention.

4 Results

4.1 Probit estimations

Table 4 reports the results of the probit estimations, where the dependent variable is the fundraising problem dummy. Model 1 reports the baseline model with only control variables, Model 2 includes the independent variables, and Model 3 introduces the interactions.

In line with Hypothesis 1, while the marginal effects of higher education, managerial experience, and entrepreneurial experience are statistically insignificant, the marginal effect of industry-specific experience is negative and statistically significant (Model 3: $\beta = -0.279$, $p < 0.01$), suggesting that high levels of human capital contribute to solving fundraising problems for opportunity-based entrepreneurs. Similarly, while the interaction effects of (1) higher education and necessity-based entrepreneurs, (2) managerial experience and necessity-based entrepreneurs, and (3) entrepreneurial experience and necessity-based entrepreneurs are statistically insignificant, the interaction effect of industry-specific experience and necessity-based entrepreneurs is negative and statistically significant (Model 3: $\beta = -0.181$, $p < 0.05$). Moreover, the sum of this statistically significant interaction effect and the marginal effect of industry-specific experience has a negative sign ($= -0.460$ ($= -0.279 - 0.181$) in Model 3), suggesting that high levels of human capital contribute to solving fundraising problems for necessity-based entrepreneurs. Thus, Hypothesis 1 is supported only when industry-specific experience is used as a proxy for human capital.

According to Hypothesis 2, the marginal effect of necessity-based entrepreneurs is positive and statistically significant (Model 2: $\beta = 0.056$, $p < 0.10$; Model 3: $\beta = 0.214$, $p < 0.05$), suggesting that necessity-based entrepreneurs are more likely to have fundraising problems than opportunity-based entrepreneurs. This result supports Hypothesis 2.

In line with Hypothesis 3, the sum of these three effects (i.e., the marginal effect of industry-specific experience, that of necessity-based entrepreneurs, and the interaction effect of industry-specific experience

Table 4 Probit estimations for fundraising problems

Dependent variable: Fundraising problems	Model 1	Model 2	Model 3
Independent variables			
Higher education		−0.023	−0.026
		(0.017)	(0.061)
Industry-specific experience		−0.089***	−0.279***
		(0.025)	(0.097)
Managerial experience		−0.017	0.009
		(0.017)	(0.059)
Entrepreneurial experience		−0.026	0.043
		(0.025)	(0.090)
Necessity-based entrepreneurs		0.056*	0.214**
		(0.031)	(0.105)
Interaction terms			
Higher education × Necessity-based entrepreneurs			−0.002
			(0.064)
Industry-specific experience × Necessity-based entrepreneurs			−0.181**
			(0.084)
Managerial experience × Necessity-based entrepreneurs			0.028
			(0.061)
Entrepreneurial experience × Necessity-based entrepreneurs			0.069
			(0.086)
Control variables			
Age	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)
Male	0.057***	0.075***	0.075***
	(0.021)	(0.022)	(0.022)
Employees	−0.003***	−0.003***	−0.003***
	(0.001)	(0.001)	(0.001)
Sole proprietorship in entry	−0.094*	−0.098*	−0.099*
	(0.055)	(0.057)	(0.057)
Sole proprietorship in answering the questionnaire	−0.016	−0.017	−0.016
	(0.054)	(0.057)	(0.057)
Franchisee	0.120***	0.089**	0.088**
	(0.033)	(0.035)	(0.035)

Table 4 (continued)

Firm age	0.004**	0.005**	0.005**
	(0.002)	(0.002)	(0.002)
Preparation period	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)
Personal funds (ln)	−0.002	−0.002	−0.002
	(0.002)	(0.002)	(0.002)
External startup funding (ln)	−0.002	−0.002	−0.002
	(0.002)	(0.002)	(0.002)
Opening year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Number of observations	3974	3632	3632
Log likelihood	−2519.617	−2291.594	−2289.388
Prob > chi2	0.000	0.000	0.000
Pseudo R-squared	0.039	0.045	0.046

Note: The upper rows are marginal effects, while the lower rows are standard errors

*Significant at the 10% level

**Significant at the 5% level

***Significant at the 1% level

Table 5 Ai and Norton's (2003) approach for fundraising problems

Variable		Table 4	Mean
(1)	Industry-specific experience × Necessity-based entrepreneurs	Model 3	−0.195**
			(0.095)

Note: The upper rows are interaction effects, while the lower rows are standard errors

"Table 4" represents the column to which the results in Table 4 correspond

**Significant at the 5% level

and necessity-based entrepreneurs) has a negative sign (=−0.246 (=−0.279+0.214−0.181) in Model 3), suggesting that necessity-based entrepreneurs with industry-specific experience are less likely to face fundraising problems than opportunity-based entrepreneurs without such experience. This result provides support for Hypothesis 3. In contrast, in Model 3, the marginal effects of other variables for human capital (i.e., higher education, managerial experience, and entrepreneurial experience) and their interaction effects with necessity-based entrepreneurs are all statistically insignificant. Thus, Hypothesis 3 is not supported when higher education, managerial experience, and entrepreneurial experience are used as proxies for human capital.

To confirm the validity of the interaction effect of industry-specific experience and necessity-based entrepreneurs in Model 3 of Table 4, we calculate its interaction effect using Ai and Norton's (2003) method. The result is presented in Table 5. The correct interaction effect of industry-specific experience and necessity-based entrepreneurs evaluated at the mean is also negative and statistically significant ($\beta=-0.195$, $p<0.05$). This tendency generally holds even when the effect is evaluated for each observation. Figures 1 (A) and (B) show the interaction effect and the z-statistic as a function of the predicted probability, respectively. According to these figures, the correct interaction effect has a negative sign in all observations (Fig.1 (A)) and 3110 of 3632 observations are statistically significant ($p<0.05$) (Fig.1 (B)). These results suggest that the results obtained in Table 4 hold even when using the interaction terms corrected by Ai and Norton's (2003) method.

4.2 Quantile regressions

To verify that the results in Table 4 can be attributed to signaling effects, in this subsection, we investigate whether entrepreneurs with industry-specific experience obtain large amounts of external startup funding. In this analysis, because the results of the Chow test are statistically significant ($p<0.01$), we employ a subsample of necessity- and opportunity-based entrepreneurs.[11] Given that the amount of external startup funding may not follow a normal distribution, we perform a quantile regression instead of estimating an ordinary least squares regression.

Table 6 reports the results of the quantile regressions, where the dependent variables are external startup funding. Models 1–3 present the results at the 25, 50, and 75 percentiles of the amount of external startup funding for only necessity-based entrepreneurs. The coefficients on industry-specific experience are positive and statistically significant (Model 1: $\beta=0.099$, $p<0.05$; Model 2: $\beta=0.182$, $p<0.01$; Model 3: $\beta=0.222$, $p<0.05$), supporting the assumption that industry-specific experience serves as a positive signal and increases external startup funding. Moreover, the magnitude of these coefficients increases over the quantiles, suggesting that signaling effects are larger among necessity-based entrepreneurs who obtain large amounts of the funding.

Models 4–6 present the results at the 25, 50, and 75 percentiles of the amount of external startup funding for only opportunity-based entrepreneurs. The coefficients on industry-specific experience are positive and statistically significant (Model 4: $\beta=0.078$, $p<0.01$; Model 5: $\beta=0.084$, $p<0.01$; Model 6: $\beta=0.080$, $p<0.10$), supporting the assumption that industry-specific experience serves as a positive signal and increases external startup funding.[12] However, unlike

[11] The statistically significant results of the Chow test suggest that a structural break exists between these two types of entrepreneurs.

[12] Note also that the coefficients on higher education are also positive and statistically significant (Model 5: $\beta=0.049$, $p<0.05$; Model 6: $\beta=0.236$, $p<0.01$), suggesting that higher education also serves as a positive signal for opportunity-based entrepreneurs.

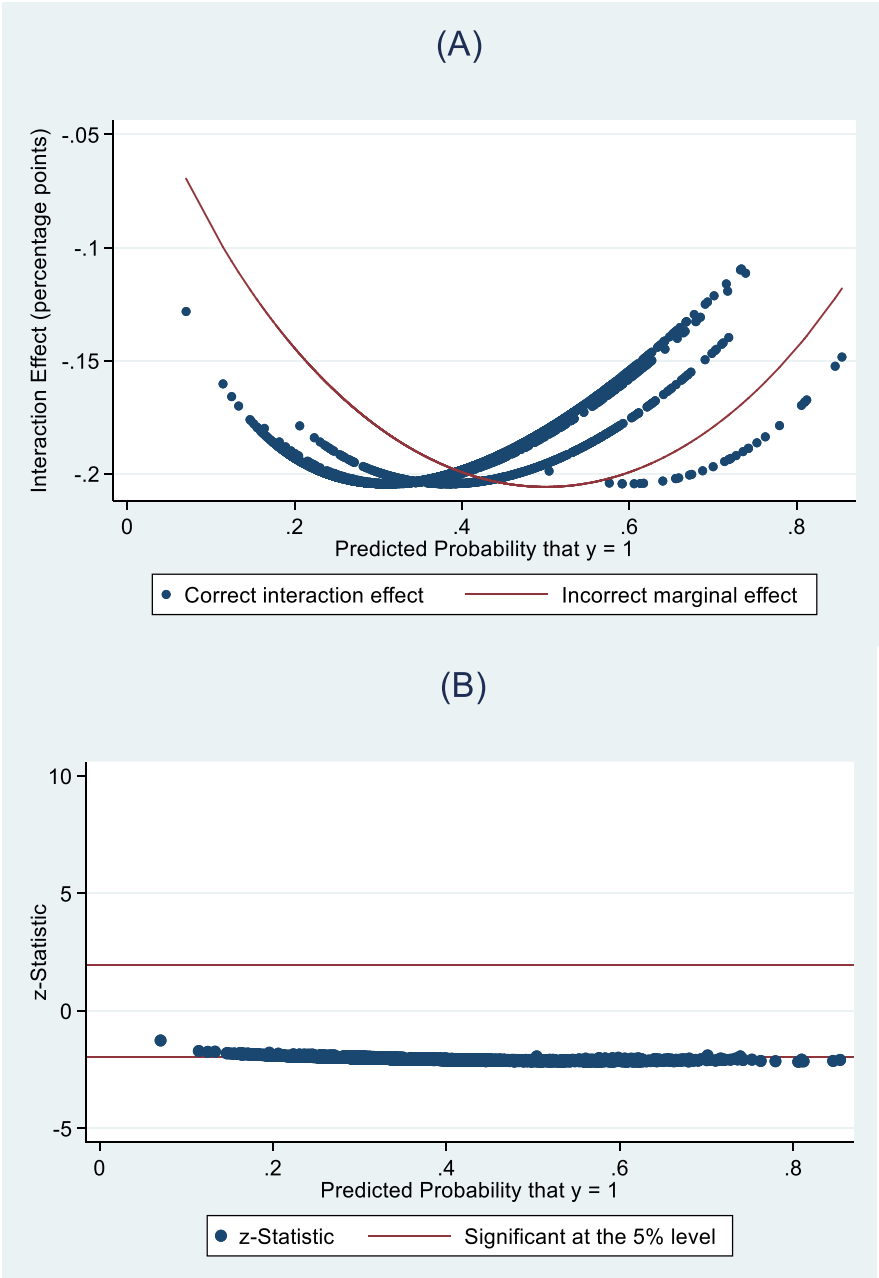

Fig. 1 (**A**) Interaction effects after probit; (**B**) *z*-Statistics of interaction effects after probit

the case of necessity-based entrepreneurs, the magnitude of these coefficients does not vary over the quantiles, suggesting that signaling effects for opportunity-based entrepreneurs are almost the same regardless of the amount of external startup funding.

4.3 Robustness checks

To increase the rigor of the results in Sections 4.1 and 4.2, we performed several robustness checks. The results are reported in the Online Appendix.

Table 6 Quantile regressions for the amount of external startup funding

	Necessity-based entrepreneurs			Opportunity-based entrepreneurs		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable: External startup funding	p25	p50	p75	p25	p50	p75
Independent variables						
Higher education	−0.021	0.053	−0.043	−0.011	0.049**	0.236***
	(0.050)	(0.047)	(0.095)	(0.017)	(0.019)	(0.060)
Industry-specific experience	0.099**	0.182***	0.222**	0.078***	0.084***	0.080*
	(0.042)	(0.051)	(0.092)	(0.013)	(0.021)	(0.048)
Managerial experience	0.005	0.012	−0.107*	0.025*	0.025	0.012
	(0.041)	(0.041)	(0.061)	(0.013)	(0.015)	(0.027)
Entrepreneurial experience	−0.042	−0.126	−0.035	−0.018	0.031	0.034
	(0.056)	(0.079)	(0.264)	(0.025)	(0.038)	(0.050)
Control variables						
Age	−0.003	−0.000	−0.001	−0.002**	−0.002**	−0.001
	(0.003)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)
Male	0.004	−0.121**	−0.035	0.037***	0.075***	0.070*
	(0.065)	(0.049)	(0.054)	(0.014)	(0.022)	(0.038)
Employees	0.001	0.010	0.021	0.006***	0.020***	0.053***
	(0.005)	(0.009)	(0.019)	(0.002)	(0.005)	(0.010)
Sole proprietorship in entry	−0.211	−0.569***	−0.591*	−0.035	−0.093*	−0.099
	(0.229)	(0.216)	(0.342)	(0.050)	(0.054)	(0.229)
Sole proprietorship in answering the questionnaire	0.143	0.354	0.189	0.078*	0.091*	0.123
	(0.216)	(0.216)	(0.331)	(0.047)	(0.052)	(0.228)
Franchisee	0.113*	0.069	0.196	0.006	−0.006	−0.054
	(0.066)	(0.097)	(0.193)	(0.016)	(0.021)	(0.071)
Preparation period	0.000	−0.001	0.023	0.001	0.002***	0.003
	(0.002)	(0.015)	(0.018)	(0.001)	(0.001)	(0.003)
Personal funds	0.262	0.434**	0.972*	0.468***	0.783***	1.363***
	(0.256)	(0.210)	(0.507)	(0.059)	(0.071)	(0.147)
Opening year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	281	281	281	3351	3351	3351
Pseudo R-squared	0.073	0.123	0.208	0.036	0.077	0.129

Note: The upper rows are coefficients, while the lower rows are heteroscedasticity-robust standard errors

*Significant at the 10% level

**Significant at the 5% level

***Significant at the 1% level

First, using the method developed by Oster (2019), we examined endogeneity issues in the results in Table 4 (Table A1 in the Online Appendix). This approach enables us to calculate consistent estimates of the bias-adjusted treatment effects under two assumptions, thereby verifying the extent to which the obtained estimates in Table 4 are robust to unobserved confounders.[13] As a result, similar to the results in Table 4, industry-specific experience leads to solving fundraising problems for both necessity-based

[13] The two assumptions refer to the following: (1) unobserved controls are as important as observed controls in explaining the treatment ($\delta = 1$) and (2) $R_{max} = 1.3\tilde{R}$, where $\tilde{R}$ is R-squared from the regression with observed controls.

($\beta = -4.888$ ($= -2.976 - 1.912$), $p < 0.01$) and opportunity-based entrepreneurs ($\beta = -2.976$, $p < 0.01$) even after controlling for unobserved confounders to a certain extent. In addition, even after considering the confounders to some extent, necessity-based entrepreneurs are more likely to have fundraising problems than opportunity-based entrepreneurs ($\beta = 3.587$, $p < 0.01$). As a result, even after controlling for unobserved confounders to some extent, our initial finding that human capital effects for necessity-based entrepreneurs exceed motivation-difference effects is confirmed.

Second, we considered two remaining possibilities related to the results in Table 6. First, large amounts of external startup funding for entrepreneurs with industry-specific experience may stem from their high demand for credit. Second, entrepreneurs with such experience are less likely to have fundraising problems because they have larger amounts of personal funds than those without it.

To consider these possibilities, we compared startup costs and personal funds between entrepreneurs with and without industry-specific experience (Table A2 in the Online Appendix). As a result, there is no difference in the costs and funds between necessity- and opportunity-based entrepreneurs. In contrast, the amount of external startup funding of entrepreneurs with industry-specific experience is larger than that of entrepreneurs without such experience, for both necessity- and opportunity-based entrepreneurs.[14] As a result, among entrepreneurs who have fundraising problems, the percentages of those with industry-specific experience are lower than the percentages of those without this experience, for both necessity- and opportunity-based entrepreneurs.[15] These results suggest that, for both types of entrepreneurs, industry-specific experience serves as a positive signal to increase the amount of external startup funding and solves fundraising problems. Furthermore, we examined endogeneity issues in the results in Table 6 by employing Oster's (2019) approach (Table A3 in the Online Appendix). Specifically, we confirmed that industry-specific experience contributes to increasing the amount of external startup funding for both necessity-based ($\beta = 0.162$, $p < 0.10$) and opportunity-based entrepreneurs ($\beta = 0.211$, $p < 0.01$) even after controlling for unobserved confounders to a certain extent.

5 Discussion, limitations, and concluding remarks

5.1 Discussion and implications

Our study contributes to the literature in three ways.

First, we expand the entrepreneurial finance literature by controlling for the heterogeneity between necessity- and opportunity-based entrepreneurs. Previous studies have examined human capital effects on fundraising problems (e.g., Ko & McKelvie, 2018; Shane & Stuart, 2002), while very little research has distinguished between motivation difference (i.e., the difference between necessity- and opportunity-based entrepreneurs) despite its importance. Because these two types of entrepreneurs are completely different in several aspects (Block & Wagner, 2010; Bourlès & Cozarenco, 2018; Caliendo et al., 2015) and such a difference is closely related to the levels of human capital (Bergmann & Sternberg, 2007; Block et al., 2015; Calderon et al., 2017), the difference may affect fundraising problems (Caliendo et al., 2015; Colombo & Grilli, 2010). This study introduces motivation difference into the entrepreneurial finance literature. We find that industry-specific experience contributes to solving fundraising problems for both types of entrepreneurs, particularly for necessity-based entrepreneurs. This result suggests that human capital effects on fundraising problems are heterogeneous between necessity- and opportunity-based entrepreneurs, which is consistent with the theoretical suggestion in the entrepreneurship literature. As the entrepreneurial finance literature has yet to consider motivation difference, this study contributes to the literature by introducing the concept of such a difference.

Second, this study advances the entrepreneurship literature on necessity- and opportunity-based entrepreneurs by comparing human capital effects between these types of entrepreneurs. Although this strand of literature has focused on the effects of several types of human capital for both types of entrepreneurs, it has separately examined human capital effects for necessity-based entrepreneurs and those for opportunity-based entrepreneurs (e.g., Baptista et al., 2014). This prevents us from deepening our understanding of the mutual relationship between human capital and motivation-difference

[14] Specifically, the result for necessity-based entrepreneurs is 0.69 million yen versus 0.47 million yen ($p < 0.10$), while that for opportunity-based entrepreneurs is 0.99 million yen versus 0.86 million yen ($p < 0.10$).

[15] Specifically, the result for necessity-based entrepreneurs is 42.7% versus 69.7% ($p < 0.01$), while that for opportunity-based entrepreneurs is 35.4% versus 44.6% ($p < 0.01$).

effects. We find that necessity-based entrepreneurs with industry-specific experience are less likely to have fundraising problems than opportunity-based entrepreneurs without such experience. This result suggests that, to solve fundraising problems, it is more important for entrepreneurs to acquire high levels of human capital than engage in other preparations for starting businesses. Further, our results imply that entrepreneurs without high levels of human capital are more likely to stumble in entrepreneurial finance even if they sufficiently prepare in advance for starting businesses. As such, this finding helps potential entrepreneurs recognize the importance of acquiring high levels of human capital regardless of motivation difference.

Finally, we expand the literature on signaling effects in the context of entrepreneurial finance by providing empirical evidence for a widely accepted theoretical assumption. While numerous studies have theoretically assumed that high levels of human capital affect fundraising because of signaling effects (e.g., Beckman et al., 2007; Gimmon & Levie, 2010; Ko & McKelvie, 2018; Piva & Rossi-Lamastra, 2018; Plummer et al., 2016), there is very little empirical evidence that has directly examined the validity of this theoretical assumption. Our study attempts to empirically examine the validity of signaling effects as a possible mechanism. We find that, for both necessity- and opportunity-based entrepreneurs, industry-specific experience contributes to increasing the amount of external startup funding even when considering personal funds and startup costs. This suggests that these two types of entrepreneurs with high levels of human capital can obtain large amounts of external startup funding not because they demand credit but because external suppliers of capital provide it by using such human capital as signals. In this way, our study contributes to the entrepreneurial finance literature by empirically demonstrating signaling effects.

5.2 Limitations and future research

Although this study has several limitations, they can also be interesting avenues for future studies.

First, because of data limitations, we did not investigate the effects of human capital except for higher education, industry-specific experience, managerial experience, and entrepreneurial experience. Although these are prime examples of human capital (Unger et al., 2011) and numerous studies have typically controlled for only them as human capital (e.g., Ko & McKelvie, 2018), a few studies have controlled for other types of human capital (e.g., Baptista et al., 2014). Future research can explore these effects by using alternative datasets that cover these types of human capital.

Second, while we examined human capital effects on fundraising problems for necessity- and opportunity-based entrepreneurs, which is one of the main contributions of this paper, we may not be able to generalize our findings to other proxies for fundraising. As examples of such proxies, previous studies without identifying between necessity- and opportunity-based entrepreneurs have focused on initial financing amount (e.g., Ko & McKelvie, 2018) and the probability of receiving venture capital financing (e.g., Beckman et al., 2007; Colombo & Grilli, 2010; Hsu, 2007; Piva & Rossi-Lamastra, 2018). Thus, it may be intriguing for future studies to investigate the same effects by employing other proxies for fundraising.

Third, although we attempted to examine whether human capital acts as signals in fundraising for both necessity- and opportunity-based entrepreneurs, there is still room for improvement. In this respect, previous studies have also not fully elucidated signaling mechanisms (e.g., Beckman et al., 2007; Gimmon & Levie, 2010; Ko & McKelvie, 2018; Piva & Rossi-Lamastra, 2018; Plummer et al., 2016).[16] Thus, disentangling the mechanisms might be a subject for future studies.

Finally, as with other empirical studies, we could not provide precise reasons why the three types of human capital (i.e., higher education, managerial experience, and entrepreneurial experience) are statistically insignificant. Although all the four types of human capital could theoretically contribute to solving fundraising problems, very few studies have empirically shown that all the four types affect fundraising and statistically significant human capital differs across studies (e.g., Bates, 1990; Colombo & Grilli, 2010; Ko & McKelvie, 2018; Piva & Rossi-Lamastra, 2018). Because previous studies have also

[16] In fact, while Ko and McKelvie (2018) also attempted to isolate human capital factors from performance-related factors, they could not fully disentangle the mechanisms, and consequently listed this issue as one of their limitations to be further considered in the future.

not provided the exact reasons, it could be intriguing to identify the reasons for such a difference.

Regarding this issue, although the precise identification of the mechanism is empirically difficult, one possible explanation may be that external suppliers of capital emphasize the ability acquired only through industry-specific experience in providing financing to entrepreneurs. More specifically, as entrepreneurs' signals, external suppliers of capital could attach special importance to (1) knowledge about effective business strategies, (2) social ties with important stakeholders, and (3) the understanding of opportunities in the industries, which cannot be acquired through other three types of human capital (i.e., higher education, managerial experience, and entrepreneurial experience). In fact, given that entrepreneurs' social capital leads to their business success (Bosma et al., 2004; Stam et al., 2014), it is no wonder that external suppliers of capital use the entrepreneur's social ties as a particularly important signal and thus would like to provide financing to entrepreneurs with industry-specific experience. Notwithstanding the above, because this argument has yet to be supported by empirical evidence, exploring the exact mechanisms is a topic that awaits future research.

5.3 Concluding remarks

This study examines the effects of human capital on fundraising problems for necessity- and opportunity-based entrepreneurs, and whether such effects exceed the disadvantages of being necessity-based entrepreneurs by combining two separate theoretical frameworks. We find that necessity-based entrepreneurs tend to have more fundraising problems than opportunity-based entrepreneurs. We also find that industry-specific experience contributes to solving fundraising problems for both types of entrepreneurs. Furthermore, necessity-based entrepreneurs with such experience tend not to have fundraising problems than opportunity-based entrepreneurs without the experience. Our findings highlight the importance of acquiring high levels of human capital. Specifically, high levels of human capital can be an insurance when potential necessity-based entrepreneurs are forced to start businesses. Moreover, for potential opportunity-based entrepreneurs, not having high levels of human capital might be a barrier that offsets their sufficient preparation for starting businesses. Thus, acquiring high levels of human capital will be useful for all potential entrepreneurs. All in all, besides the abovementioned issues that offer potential avenues for future research, this study advances the extant literature on the effects of human capital on entrepreneurial finance.

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