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Potentiality and actuality: Characteristics and linkage of entrepreneurs and angel investors in Japan[1]

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Abstract

Certain individuals with experience in entrepreneurial activity tend to become angel investors as they understand the challenges encountered by founders in obtaining the funding needed to launch a business. The purpose of this study is to provide a clearer picture of the characteristics and linkages not only between actual entrepreneurs and angel investors, but also among actual and potential entrepreneurs and angel investors in Japan. This paper is based on the results of an internet survey of Japan conducted by RIETI which examined whether individuals have experience in starting a business and angel investing, as well as whether they are interested in starting a business or angel investing. The individuals are categorized into types of entrepreneurs and angel investors. According to the analysis, the number of entrepreneurs and angel investors is quite small across Japan, however we have established that there is a positive relationship in particular regions of Japan between potential entrepreneurs, angel investors, and potential angel investors. These findings can help vitalize entrepreneurial ecosystems where entrepreneurs are linked with angel investors.

Keywords: entrepreneurs, angel investors, potential, categorization
JEL classification: L26, O35

[1]This study is conducted as a part of the Project “Creation and Development of High-tech Startups” undertaken at the Research Institute of Economy, Trade and Industry (RIETI). This study utilizes the data from the survey above, "Internet Survey on the Characteristics and Decision-Making of Potential Entrepreneurs and Angel Investors", conducted by RIETI. The author is grateful for helpful comments and suggestions by members of the project and Discussion Paper seminar participants at RIETI.

1. Introduction

The presence of entrepreneurial activity is essential for sustainable growth in societies and economies as it is the driver of industrial revitalization. However, compared to the rest of the world, Japan is not highly ranked in terms of entrepreneurial activity and individual entrepreneurship (Honjo, 2015). The reasons for this may include a low level of entrepreneurial interest among Japanese individuals, which makes them hesitant to start new businesses; specifically, there are fewer Japanese investors willing to invest in start-up firms, and there are few entrepreneurs in the immediate community who are able to serve as role models. These causal factors have been confirmed in academic research based on reports and data published by the Global Entrepreneurship Monitor (GEM).

Regarding these issues, an ever-growing number of national and local initiatives in industry, government, and academia have been created to promote entrepreneurship in Japan. They range from national schemes, including an "angel tax system," to local government policies, for example, business plan contests and incubation facilities in local cities providing entrepreneurship-related training to start-up firms. However, it is not yet certain whether these initiatives have contributed to increasing entrepreneurial activity and angel investing. It is also necessary to vitalize the entrepreneur-angel investor relationship, which could provide an important clue for constructing the so-called entrepreneurial ecosystem that links actors and factors, including entrepreneurs and angel investors, in a region or country.

The purpose of this study is to provide a clearer picture of Japan's both actual and potential entrepreneurs and angel investors. From our survey's results, we establish that, in reality, the percentage of individuals with entrepreneurial and angel investment experience is not trivial. However, while some characteristics are similar between entrepreneurs and angel investors, others are completely different between them. Considering measures for the relationship between entrepreneurship and angel investing would be helpful in vitalizing the entrepreneurial ecosystem in a region or country.

The rest of this paper is organized as follows. The subsequent section provides a literature review. Section 3 explains the definitions of terms and data used in this study. The models used in this study are presented in Sections 4 to 6. Finally, concluding remarks are provided.

2. Literature review

Numerous existing studies have argued about the role of private equity capital, including angel investors, in the development of start-up firms (e.g., Mason and Harrison, 2000; Ho and Wong, 2007; Vanacker et al., 2013). While many start-up firms depend heavily on bank loans, some firms, including high-tech start-ups, often require risk capital provided by private equity funds. The importance of the interactions between entrepreneurs and angel investors has been highlighted in existing literature (e.g., Maxwell et al., 2011; OECD, 2011; Mason and Botelho, 2016). Certain studies have examined the relationship between entrepreneurs and venture capitalists (Jain, 2001; Kaplan and Stromberg, 2001; Elitzur and Gavious, 2003a, 2003b).

Unlike venture capitalists, angel investors tend to provide seed financing to entrepreneurs and firms, while venture capitalists invest in firms at later stages. When start-up firms need further investment, entrepreneurs and angel investors interact with venture capitalists (Elitzur and Gavious, 2003b).[1] Angel investors may rather play a role in bridge financing between start-up firms and venture capitals' investment. Additionally, angel investment is often a prerequisite for obtaining investment from venture capitalists (Madill et al., 2005). Because of the importance of angel investors during the early stages of a business, Maxwell et al. (2011) examined the decision-making process of potential angel investors by using interactions between entrepreneurs and potential angel investors in a reality TV show. As a result, they observed the decision process, identified specific factors, and broke down a complex process into stages. Another important difference between angel investors and venture capitalists is that angel investors are usually wealthy individuals, while venture capitalists are employed in an organization. An improved understanding of the factors used to trim the set of business opportunities looking for investment can increase an entrepreneur's likelihood of achieving funding (Maxwell et al., 2011).

It is plausible that angel investors play a critical role in the initial funding of start-up firms with growth potential, including high-tech start-ups, mainly because traditional financing sources, such as banks, are limited in their willingness to provide capital to uncertain businesses. Financing from external suppliers of capital is heterogeneous among start-up firms, and some potential entrepreneurs may expect funds from angel investors. However, the role of angel investing is limited in some countries, including Japan, mainly because there are fewer entrepreneurs and angel investors in these countries (Honjo and Nakamura, 2019). To promote angel investment, we should better understand an individual's intention and interest in entrepreneurship and angel investing, as such entrepreneurial intention is the most important and central determinant of

[1] Elitzur and Gavious (2003b) explicitly included angel investors to a game theoretic model of entrepreneurs and venture capitalists, characterized by equilibrium contracts among the players, and provided insights into related institutional agreements.

entrepreneurial behavior (Abraham et al., 1998; Bygrave, 1989; Krueger, 1993). To the best of our knowledge, however, an individual's intention and interest in entrepreneurship and angel investing, in addition to the relationship between entrepreneurship and angel investing, have not been investigated in existing literature. The entrepreneur-angel investor relationship is essential not only for seed financing but also for an entrepreneurial ecosystem that links actors and factors, including entrepreneurs and angel investors, in a region or country.

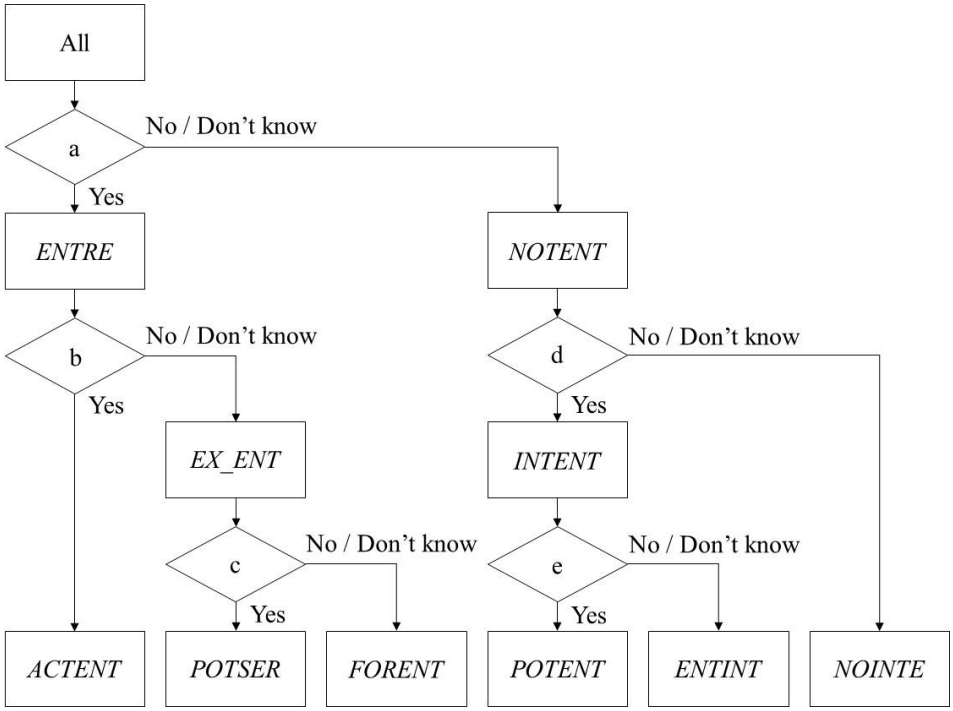
3. Definitions of terms and data collection

3.1. Categorized types of entrepreneurs

The definitions of various terms used in this study, such as "actual entrepreneurs," "actual angel investors," "potential entrepreneurs," and "potential angel investors" are presented.

Fig. 1 describes the categorized types of entrepreneurs. To categorize respondents by type of entrepreneur, we distinguish between individuals with entrepreneurial experience (ENTRE) and those without it (*NOTENT*). In this study, "entrepreneurial experience" is defined as "experience in founding, owning, and running a corporation that paid salaries and wages to employees and owners, as well as all other expenses, for three or more months." Respondents with entrepreneurial experience are categorized as "actual entrepreneurs (*ACTENT*)" if they are currently involved in business start-ups, and are categorized as "those with past entrepreneurial experience (*EX_ENT*)" if they retired from or shut down their businesses. For this latter group, we categorize respondents intending to start other businesses as "potential serial entrepreneurs (*POTSER*)" and those not intending to start any other businesses as "former entrepreneurs (*FORENT*)."

Respondents without entrepreneurial experience are categorized as "those without entrepreneurial interests (*NOINTE*)" if they are not interested in entrepreneurship. In addition, respondents without entrepreneurial experience are categorized as "those with entrepreneurial interests (*INTENT*)" if they are interested in entrepreneurship. Respondents in this latter group are further categorized as "those with general entrepreneurial interests (*ENTINT*)" if they do not intend to start businesses. Conversely, if they do, these respondents are categorized as "potential entrepreneurs (*POTENT*)."

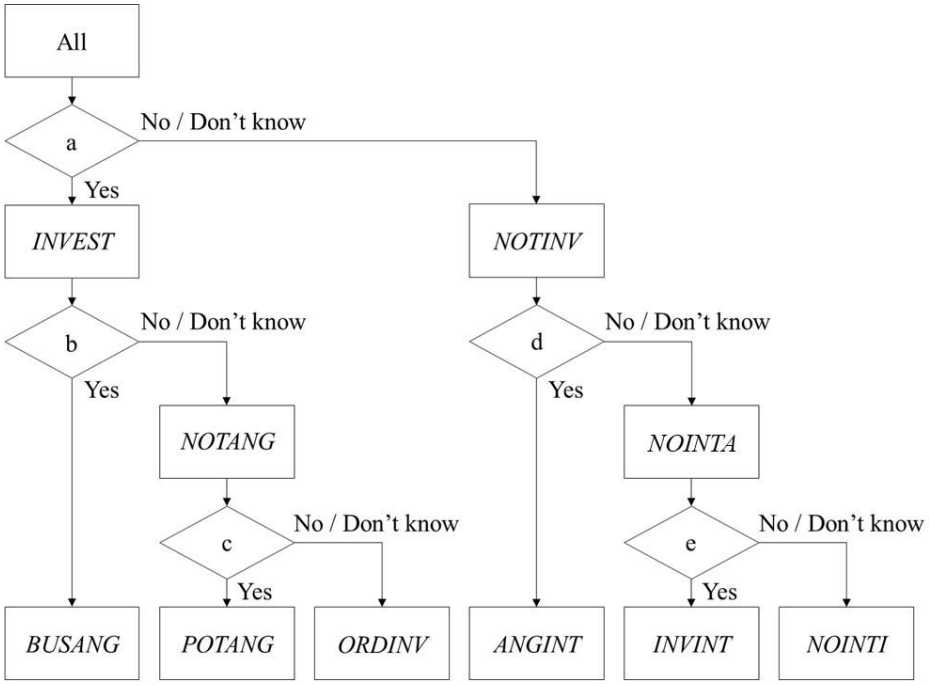


Notes: a. entrepreneurial experience; b. currently involved in a start-up business; c. intending to start another business; d. interest in entrepreneurship; e. intention to start a business by themselves

Figure 1. **Categorized types of entrepreneurs**

3.2. Categorized types of angel investors

Fig. 2 describes the categorized types of angel investors. To categorize respondents by type of angel investor, we distinguish between individuals with investment experience (*INVEST*) and those without it (*NOTINV*). Respondents with investment experience (*INVEST*) and angel investing experience are categorized as "actual angel investors (*BUSANG*)." In this study, "angel investing experience" is defined as experience in funding for a new business or project started by someone else during the previous three years. Investors without angel investment experience are categorized as "potential angel investors (*POTANG*)" if they are interested in investing in business start-ups; otherwise, they are categorized as "ordinary investors (*ORDINV*)." Respondents without investment experience are categorized as either "those interested in angel investing (*ANGINT*)" or "those not interested in angel investing (*NOINTA*)." Those not interested in angel investing are further categorized as "those interested in ordinary investing (*INVINT*)" or "those not interested in ordinary investing (*NOINTI*)."



Notes: a. investment experience; b. angel investing experience; c & d. interests in angel investing; e. interest in investment

Figure 2. Categorized types of angel investors

3.3. Data collection

Data for the study were collected via Internet surveys conducted by our project team from the Research Institute of Economy, Trade, and Industry (RIETI), Japan. The RIETI subcontracted the Rakuten Insight, Inc. (formerly Rakuten Research, Inc.) to distribute the survey, and collect and tabulate the responses between May 7-15, 2018.

The survey targeted male and female individuals between the ages of 18 and 79 throughout Japan. Surveys were distributed and collected in proportion to each prefecture's population by gender and age group. When the targeted proportion of responses for a group was not met, the number was supplemented with unused responses for that gender/age group from the same regional area. Surveys were sent to 150,144 people, and 13,449 responses were received (a response rate of 8.96%). After eliminating invalid survey responses, such as those with missing data, a final sample of 10,001 was used for the analysis. The respondents' places of residence are shown in Figure 3.

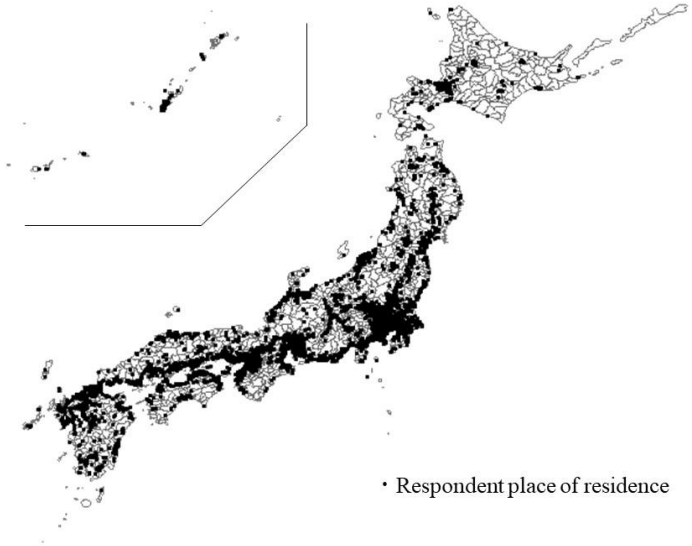


Figure 3. Respondents' places of residence

The survey consists of a total of 40 questions on, for example, gender, age, income, savings, risk/loss aversion, discount rate (expected rate of return), asset management/investment experience (yes/no), interest in asset management/investment, amount of commitment to investment, angel investing experience, interest in angel investing, amount of commitment to angel investment, entrepreneurial experience, general interest in business start-up, and intention to invest in a business start-up. Regarding a subjective question (for example, interest in angel investing, general interest in business start-up, and intention to invest in a business start-up), the participants' responses were rated on a 5-point scale (1. No, 2. Not very, 3. Neutral 4. Somewhat, or 5. Yes). As presented in Figures 1 and 2, we categorize the participants using these responses. For the analysis, responses 1 to 3 are treated as "no" and responses 4 to 5 are treated as "yes."

Table 1 indicates the number of respondents in each type of entrepreneur. Of the 10,001 respondents, 362 (3.6%) were "actual entrepreneurs," 131 (1.3%) were "potential serial entrepreneurs," 271 (2.7%) were "former entrepreneurs," 578 (5.8%) were "potential entrepreneurs," 742 (7.4%) had "general entrepreneurial interests," and 7,917 (79.2%) had "no entrepreneurial interests." Meanwhile, looking at the number of respondents by type of angel investor, 468 (4.7%) were "actual angel investors," 533 (5.3%) were "potential angel investors," 2,838 (28.4%) were "ordinary investors," 469 (4.7%) were "interested in angel investing," 733 (7.3%) were "interested in ordinary investing," and 4,960 (49.6%) were "not interested in investing."

Table 1. Respondents by types of entrepreneur and angel investor

	ACTENT	*POTSER*	*FORENT*	*POTENT*	*ENTINT*	*NOINTE*	Total
BUSANG	61	46	19	64	43	235	468
	(0.6)	(0.5)	(0.2)	(0.6)	(0.4)	(2.3)	(4.7)
POTANG	31	21	18	149	141	173	533
	(0.3)	(0.2)	(0.2)	(1.5)	(1.4)	(1.7)	(5.3)
ORDINV	111	36	108	103	137	2,343	2,838
	(1.1)	(0.4)	(1.1)	(1.0)	(1.4)	(23.4)	(28.4)
ANGINT	30	10	8	133	151	137	469
	(0.3)	(0.1)	(0.1)	(1.3)	(1.5)	(1.4)	(4.7)
INVINT	10	3	13	53	103	551	733
	(0.1)	(0.0)	(0.1)	(0.5)	(1.0)	(5.5)	(7.3)
NOINTI	119	15	105	76	167	4,478	4,960
	(1.2)	(0.1)	(1.0)	(0.8)	(1.7)	(44.8)	(49.6)
Total	362	131	271	578	742	7,917	10,001
	(3.6)	(1.3)	(2.7)	(5.8)	(7.4)	(79.2)	(100)

Notes: The numbers mean the number of respondents. Percentages are in parentheses.

3.4. Regional distribution of respondents

Tables 2 and 3 indicate the regional distribution of respondents by type. The proportions of "potential entrepreneurs" as well as "potential angel investors" in Hokkaido, Kyushu, and Kanto, and the proportion of respondents having "general entrepreneurial interests" in Kyushu were greater than in the other regions.

Table 2. Regional distribution of respondents by type of entrepreneur

	ACTENT	*POTSER*	*FORENT*	*POTENT*	*ENTINT*	*NOINTE*	Total
Hokkaido	18	6	6	31	33	330	424
	(4.2)	(1.4)	(1.4)	(7.3)	(7.8)	(77.8)	(100)
Tohoku	22	8	20	39	50	548	687
	(3.2)	(1.2)	(2.9)	(5.7)	(7.3)	(79.8)	(100)
Kanto	112	46	94	216	276	2,738	3,482
	(3.2)	(1.3)	(2.7)	(6.2)	(7.9)	(78.6)	(100)
Chubu	66	26	52	80	106	1,336	1,666
	(4.0)	(1.6)	(3.1)	(4.8)	(6.4)	(80.2)	(100)
Kinki	66	17	33	99	130	1,429	1,774

	(3.7)	(1.0)	(1.9)	(5.6)	(7.3)	(80.6)	(100)
Chugoku	22	7	15	27	36	466	573
	(3.8)	(1.2)	(2.6)	(4.7)	(6.3)	(81.3)	(100)
Shikoku	10	7	10	17	12	238	294
	(3.4)	(2.4)	(3.4)	(5.8)	(4.1)	(81)	(100)
Kyushu/Okinawa	46	14	41	69	99	832	1,101
	(4.2)	(1.3)	(3.7)	(6.3)	(9.0)	(75.6)	(100)
Total	362	131	271	578	742	7,917	10,001
	(3.6)	(1.3)	(2.7)	(5.8)	(7.4)	(79.2)	(100)

Notes: The numbers mean the number of respondents. Percentages are in parentheses.

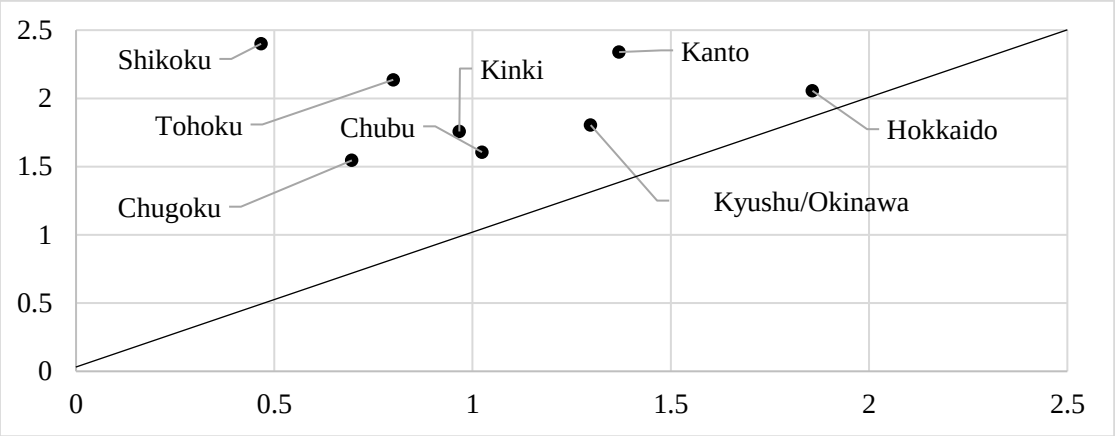
Table 3. Regional distribution of respondents by type of angel investor

	BUSANG	*POTANG*	*ORDINV*	*ANGINT*	*INVINT*	*NOINTI*	Total
Hokkaido	14	26	93	24	29	238	424
	(3.3)	(6.1)	(21.9)	(5.7)	(6.8)	(56.1)	(100)
Tohoku	30	24	185	38	54	356	687
	(4.4)	(3.5)	(26.9)	(5.5)	(7.9)	(51.8)	(100)
Kanto	165	226	1,043	164	267	1,617	3,482
	(4.7)	(6.5)	(30.0)	(4.7)	(7.7)	(46.4)	(100)
Chubu	84	86	462	68	106	860	1,666
	(5.0)	(5.2)	(27.7)	(4.1)	(6.4)	(51.6)	(100)
Kinki	90	87	523	74	134	866	1,774
	(5.1)	(4.9)	(29.5)	(4.2)	(7.6)	(48.8)	(100)
Chugoku	23	16	156	28	45	305	573
	(4.0)	(2.8)	(27.2)	(4.9)	(7.9)	(53.2)	(100)
Shikoku	15	7	87	15	22	148	294
	(5.1)	(2.4)	(29.6)	(5.1)	(7.5)	(50.3)	(100)
Kyushu	47	61	289	58	76	570	1,101
	(4.3)	(5.5)	(26.2)	(5.3)	(6.9)	(51.8)	(100)
Total	468	533	2,838	469	733	4,960	10,001
	(4.7)	(5.3)	(28.4)	(4.7)	(7.3)	(49.6)	(100)

Notes: The numbers mean the number of respondents. Percentages are in parentheses.

In addition, Figure 4 presents the relationship between the ratio of potential to actual entrepreneurs and the ratio of potential to actual angel investors by region. Most regions are located in the higher left. This means that the ratio of the total number of potential entrepreneurs to the number of actual entrepreneurs was higher than the ratio of the total number of potential

angel investors to the number of actual angel investors.



Notes: Vertical axis: (*POTSER* + *POTENT*) / *ACTENT*. Horizontal axis: *POTANG* / *BUSANG*

Figure 4. Relationship between the ratio of potential to actual entrepreneurs and the ratio of potential to actual angel investors by region

3.5. Gender and age distribution

Figure 5 presents the comparison of the percentages of male and female respondents in each type of entrepreneur and angel investor. The percentage of men was generally larger and accounted for more than 70% of the "actual entrepreneurs," "potential serial entrepreneurs," and "potential angel investors." Women, however, accounted for the larger proportion of respondents in the "no entrepreneurial interests," "interested in ordinary investing," and "not interested in investing" categories.

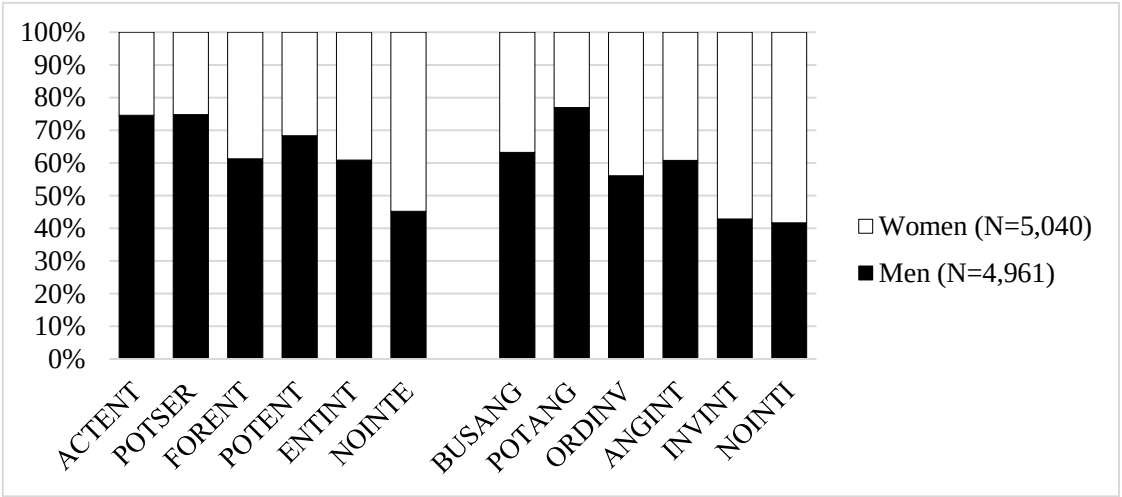


Figure 5. Gender distribution (*N* = 10,001)

Figures 6 presents the age distribution for each type of entrepreneur and angel investor. The

percentages of respondents in their 20s or younger and in their 30s were largest in the "potential entrepreneur," "general entrepreneurial interests," "interested in angel investing," and "interested in ordinary investing" categories, with the total for the two age groups accounting for more than 50%. On the other hand, the percentages of respondents in their 60s and 70s were largest in the "former entrepreneur" and "interested in ordinary investing" categories. In particular, more than 60% of the "former entrepreneurs" were aged 60 or older. Respondents in their 40s were distributed uniformly across categories, accounting for 10–20% of each. Similarly, the percentages of respondents in their 50s were not particularly large in any type, although they were somewhat larger in the "actual entrepreneur" and "potential serial entrepreneur" categories.

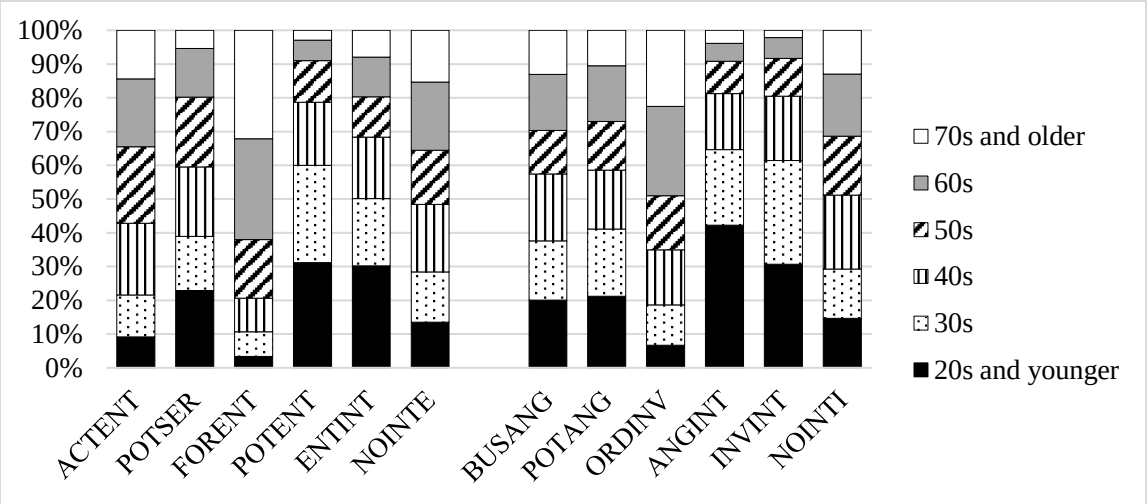


Figure 6. Age distribution (*N* = 10,001)

4. Model I: Characteristics and differences among types of entrepreneur

4.1. Data and analytical methods of model I

We consider a model to identify the factors affecting actual or potential entrepreneurship that is measured by an individual's entrepreneurial type, and attitude (*ATT*) such as perceived capabilities (*SUSKILL*), perceived opportunities (*OPPORT*), fear of failure (*FEARFAIL*), and entrepreneurial network (*KNOWENT*). The theoretical approach of this study is similar to that of Taylor (1996), Blanchflower and Oswald (1998), and Honjo (2015). We address how entrepreneurial attitudes affect the entrepreneurial type. Table 4 indicates the definitions of variables used. The variables regarding measures considered necessary to promote entrepreneurship, and important factors for start-up companies were chosen from the results (top 3) in Figures C2 and C5 in Appendix C.

Table 4. Definitions of variables in model I

Variable	Symbol	Definition
Entrepreneurial type (ENT_i)	*ACTENT*	1: if the individual is an *actual entrepreneur*;
	POTSER	2: if the individual is a *potential serial entrepreneur*;
	FORENT	3: if the individual is a *former entrepreneur*;
	POTENT	4: if the individual is a *potential entrepreneur*;
	ENTINT	5: if the individual has *general entrepreneurial interests*;
	NOINTE	6: if the individual has *no entrepreneurial interests*;
Entrepreneurial attitude (*ATT*)	*SUSKILL*	1: if the individual has the knowledge, skill, and experience required for starting a business; 0: otherwise.
	OPPORT	1: if in the next six months, there will be viable opportunities for starting a business in the area where the individual lives; 0: otherwise.
	FEARFAIL	0: if the fear of failure would prevent the individual from starting a business; 1: otherwise.
	KNOWENT	1: if the individual personally knows someone who started a business in the past two years; 0: otherwise.
Age	*AGE*	Current age (in years).
	AGESQ	= *AGE*×*AGE*
Gender	*MALE*	1: if the individual is male; 0: if the individual is female.
Education	*U_EDUC*	1: if the individual has post-secondary experience (undergraduate education); 0: otherwise.
	G_EDUC	1: if the individual has graduate experience (graduate

		education); 0: otherwise.
Income	*INCOME*	Logarithm of annual personal income.
Measures considered necessary to promote entrepreneurship	*FUNDSUP*	1: if the individual selects "Fund raising support (financing, investments, subsidies, grants, etc.)" as measures considered necessary to promote entrepreneurship; 0: otherwise.
	PLANSUP	1: if the individual selects "Assistance with creating business plans" as measures considered necessary to promote entrepreneurship; 0: otherwise.
	EXPESUP	1: if the individual selects "Expert business reviews, assistance, and advice" as measures considered necessary to promote entrepreneurship; 0: otherwise.
Important factors for start-up companies	*TECHCAP*	The individual rates "Technical capability" as an important factor for start-up companies on a 5-point scale (1. No, 2. Not very, 3. Neutral 4. Somewhat, or 5. Yes).
	INGENUI	The individual rates "Ingenuity" as an important factor for start-up companies on a 5-point scale (1. No, 2. Not very, 3. Neutral 4. Somewhat, or 5. Yes).
	PERSONA	The individual rates "The personal character and capabilities of the founder(s)" as important factors for start-up companies on a 5-point scale (1. No, 2. Not very, 3. Neutral 4. Somewhat, or 5. Yes).

Consider a general discrete choice model with n independent individuals, denoted by the subscript i, and $L(=6)$ nominal alternatives, denoted by the subscript l and numbered from 1 to 6 where the numbering corresponds to the 6 entrepreneur types. Let Y_i be the entrepreneurial type of individual i. Thus, $Y_i = ENT_l = l$ if individual i belongs to entrepreneurial type l. By defining the indicator variable $f_{il} = 1$, which takes the value one when the *i*th individual is observed in the *l*th group, the log likelihood function for *n* observations is as follows (Greene, 1993):

$$\ln L = \sum_{i=1}^{n} \sum_{l=1}^{6} f_{il} \ln \Pr(Y_i = l) \tag{1}$$

The assumption of the multinomial logit model is that the log odds of type l relative to the point of reference are determined by a linear combination of regressor variables.

$$\begin{cases} P_{il} = \Pr(Y_i = 1) = \frac{\exp(\alpha_{0l} + \alpha_{1l} ATT_i + \alpha_{2l} X_i)}{1 + \sum_{d=1}^{5} \exp(\alpha_{0d} + \alpha_{1d} ATT_i + \alpha_{2d} X_i)} \\ \text{for } l = 1, \dots, 5 \\ P_{iL} = \Pr(Y_i = 6) = \frac{1}{1 + \sum_{d=1}^{5} \exp(\alpha_{0d} + \alpha_{1d} ATT_i + \alpha_{2d} X_i)} \end{cases} \tag{2}$$

where ATT_i is a vector of variable for entrepreneurial attitude, X_i is a vector of controls, α_{0l} is a constant term, α_{1l} is the coefficient (vector) of each entrepreneurial attitude, and α_{2l} is the coefficient (vector) of controls. The ratio of the relative probability of $Y_i = ENT_l = 1, \dots, 5$ to the base outcome of $Y_i = ENT_l = 6$ are:

$$\frac{P_{ij}}{P_{iJ}} = \frac{\Pr(Y_i=l)}{\Pr(Y_i=6)} = \exp(\alpha_{0l} + \alpha_{1l} ATT_i + \alpha_{2l} X_i) \quad (3)$$

The effect of a unit increase in an explanatory variable on the probability of belonging to a certain type. These marginal effects are obtained from the estimated parameters by differentiating Eq. (1) with respect to ATT_i or X_i. These marginal effects can be written as:

$$\begin{cases} \frac{\alpha P_{il}}{\alpha ATT_i} = P_{il}\left(\alpha_{1l} - \sum_{k=1}^{5} P_{ik}\alpha_{1k}\right) \\ \frac{\alpha P_{il}}{\alpha X_i} = P_{il}\left(\alpha_{2l} - \sum_{k=1}^{5} P_{ik}\alpha_{2k}\right) \end{cases} \quad (4)$$

4.2. Descriptive statistics of model I

Table 5 presents the summary statistics of the variables and shows that the mean values of *ACTENT, POTSER*, *FORENT*, *POTENT*, *ENTINT*, and NOINTE are 0.036, 0.013, 0.027, 0.058, 0.074, and 0.792, respectively. The mean of *SUSKILL* is 0.090, indicating that about 9.0% of individuals presumably have the knowledge, skill, and experience required to start a new business. The mean of *OPPORT* is 0.112, indicating that about 11.2% of individuals presume that there will be viable opportunities for starting a business in the area where they live. Additionally, the mean of *FEARFAIL* is 0.141, indicating that about 14% of individuals presume that the fear of failure would prevent them from starting a business. Moreover, the mean of *KNOWENT* is 0.176, indicating that about 17.6% of individuals personally know someone who started a business in the past two years.

Table 5. Summary of variables in model I

Symbol	N	Mean	Standard deviation	Min	Max	Median
ACTENT	10001	0.036	0.187	0	1	
POTSER	10001	0.013	0.114	0	1	
FORENT	10001	0.027	0.027	0	1	
POTENT	10001	0.058	0.058	0	1	
ENTINT	10001	0.074	0.074	0	1	
NOINTE	10001	0.792	0.406	0	1	
SUSKILL	10001	0.090	0.287	0	1	
OPPORT	10001	0.112	0.315	0	1	

FEARFAIL	10001	0.141	0.348	0	1	
KNOWENT	10001	0.176	0.380	0	1	
AGE	10001	49.3	16.2	18	79	49
AGESQ	10001	2688.2	1593.9	324	6241	2401
MALE	10001	0.496	0.500	0	1	
U_EDUC	10001	0.373	0.484	0	1	
G_EDUC	10001	0.044	0.205	0	1	
INCOME	8663	5.379	1.044	3.912	8.517	5.298
FUNDSUP	10001	0.566	0.496	0	1	
PLANSUP	10001	0.314	0.464	0	1	
EXPESUP	10001	0.284	0.451	0	1	
TECHCAP	10001	4.009	1.015	1	5	
INGENUI	10001	4.100	0.973	1	5	
PERSONA	10001	4.052	0.975	1	5	

4.3. Estimation results of model I

Tables 6 indicates the estimation of the multinomial logit model coefficient of type of entrepreneur while controlling for individual-specific characteristics. The point of reference for the result of the coefficient is *NOINTE*. Table 7 indicates the marginal effects of explanatory variables on each type of entrepreneur. We established that *SUSKILL* have positive effects on *ACTENT*, *POTSER*, and *FORENT* with statistical significance, and the marginal effect value on *ACTENT* is the largest. This result means that people who have entrepreneurial experience tend to have the knowledge, skills, and experience required to start a new business. The marginal effects of *OPPORT* on *ACTENT*, *POTENT*, and *ENTINT* are positive, while those on *FORENT* and *NOINTE* are negative. The results indicate that the former entrepreneurs or people who have no entrepreneurial interests are not likely to presume that there will be viable opportunities for starting a business in the area where they live. Regarding *FEARFAIL* and *KNOWENT*, the marginal effects on *POTSER*, *FORENT*, *POTENT*, and *ENTINT* are positive. The potential entrepreneurs are more likely to presume that the fear of failure would prevent them from starting a business, and people who have general entrepreneurial interests are more likely to personally know someone who started a business in the past two years compared to the other types of entrepreneurs.

Table 6. Estimation results (coefficient) of model I

Ref. *NOINTE*	*ACTENT*	*POTSER*	*FORENT*	*POTENT*	*ENTINT*
SUSKILL	2.432***	2.094***	2.299***	0.311**	0.150
	(0.161)	(0.238)	(0.178)	(0.157)	(0.165)
OPPORT	1.515***	0.470*	-0.144	1.114***	0.457***
	(0.171)	(0.243)	(0.234)	(0.131)	(0.136)
FEARFAIL	0.535***	1.503***	0.638***	1.968***	1.226***
	(0.166)	(0.238)	(0.202)	(0.118)	(0.112)
KNOWENT	0.434***	1.142***	0.637***	0.402***	0.404***
	(0.152)	(0.225)	(0.174)	(0.114)	(0.103)
AGE	0.032	0.029	0.059	-0.040*	-0.100***
	(0.029)	(0.043)	(0.037)	(0.022)	(0.016)
AGESQ	-2.23×10^{-4}	-4.19×10^{-4}	-1.21×10^{-4}	-9.67×10^{-5}	0.001***
	(2.89×10^{-4})	(4.53×10^{-4})	(3.36×10^{-4})	(2.42×10^{-4})	(1.74×10^{-4})
MALE	0.634***	1.010***	0.562***	0.527***	0.425***
	(0.163)	(0.254)	(0.167)	(0.117)	(0.096)
U_EDUC	-0.481***	0.153	-0.367**	0.189*	0.069
	(0.142)	(0.217)	(0.156)	(0.109)	(0.092)
G_EDUC	-0.716**	0.286	-0.099	0.227	0.361**
	(0.318)	(0.404)	(0.343)	(0.213)	(0.180)
INCOME	0.461***	0.162	-0.072	0.200***	0.067
	(0.080)	(0.116)	(0.083)	(0.059)	(0.049)
FUNDSUP	0.153	-0.218	0.125	0.185*	0.248***
	(0.142)	(0.214)	(0.149)	(0.113)	(0.096)
PLANSUP	-0.073	-0.052	-0.391**	0.007	0.200**
	(0.154)	(0.240)	(0.174)	(0.112)	(0.093)
EXPESUP	-0.108	0.315	-0.030	0.130	0.220**
	(0.160)	(0.233)	(0.165)	(0.113)	(0.092)
TECHCAP	-0.059	-0.463***	-0.044	0.008	0.008
	(0.087)	(0.114)	(0.099)	(0.062)	(0.055)
INGENUI	-0.189**	-0.185	0.181	0.218***	0.221***
	(0.096)	(0.132)	(0.111)	(0.074)	(0.065)
PERSONA	0.276***	0.233*	-0.061	0.082	0.024
	(0.096)	(0.132)	(0.103)	(0.069)	(0.060)
Constant	-8.139***	-5.736***	-6.824***	-4.375***	-1.853***
	(0.794)	(1.034)	(1.036)	(0.528)	(0.423)

N	8663
R^2	0.208
Log likelihood	-5813.7
LR statistics	3052.7

Notes: Standard errors are in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively. *N* indicates the number of observations.

Table 7. Estimation results (marginal effect) of model I

	ACTENT	*POTSER*	*FORENT*	*POTENT*	*ENTINT*	*NOINTE*
SUSKILL	0.058***	0.018***	0.048***	-0.003	-0.006	-0.114***
	(0.005)	(0.003)	(0.005)	(0.007)	(0.010)	(0.013)
OPPORT	0.037***	-1.8×10^{4}	-0.010*	0.044***	0.016*	-0.087***
	(0.005)	(0.003)	(0.006)	(0.006)	(0.009)	(0.012)
FEARFAIL	-0.001	0.011***	0.008*	0.080***	0.062***	-0.160***
	(0.004)	(0.003)	(0.005)	(0.006)	(0.007)	(0.010)
KNOWENT	0.006	0.011***	0.013***	0.011**	0.020***	-0.061***
	(0.004)	(0.003)	(0.004)	(0.005)	(0.007)	(0.009)
AGE	0.001	4.6×10^{4}	0.002*	-0.001	-0.007***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
AGESQ	-1.0×10^{5}	-1.0×10^{5}	0.000	-1.0×10^{5}	5.0×10^{5}***	2.9×10^{5}*
	(1.0×10^{5})	(1.0×10^{5})	(1.0×10^{5})	(1.0×10^{5})	(1.0×10^{5})	(1.7×10^{5})
MALE	0.011**	0.009***	0.010**	0.017***	0.020***	-0.067***
	(0.005)	(0.003)	(0.004)	(0.006)	(0.007)	(0.009)
U_EDUC	-0.014***	0.003	-0.008**	0.011**	0.005	0.004
	(0.004)	(0.003)	(0.004)	(0.005)	(0.006)	(0.008)
G_EDUC	-0.023**	0.004	-0.002	0.010	0.025**	-0.015
	(0.009)	(0.005)	(0.008)	(0.010)	(0.012)	(0.018)
INCOME	0.012***	0.001	-0.004*	0.007**	0.001	-0.018***
	(0.002)	(0.001)	(0.002)	(0.003)	(0.003)	(0.005)
FUNDSUP	0.003	-0.004	0.002	0.006	0.015**	-0.023***
	(0.004)	(0.003)	(0.004)	(0.005)	(0.007)	(0.009)
PLANSUP	-0.002	-4.8×10^{4}	-0.010**	-0.001	0.015**	-0.022
	(0.004)	(0.003)	(0.004)	(0.005)	(0.006)	(0.009)
EXPESUP	-0.005	0.004	-0.001	0.004	0.014**	-0.016*
	(0.005)	(0.003)	(0.004)	(0.005)	(0.006)	(0.009)
TECHCAP	-0.001	-0.006***	-0.001	0.002	0.001	0.004
	(0.002)	(0.001)	(0.002)	(0.003)	(0.004)	(0.005)

INGENUI	-0.007***	-0.003*	0.004	0.010***	0.014***	-0.018***
	(0.003)	(0.002)	(0.003)	(0.004)	(0.004)	(0.006)
PERSONA	0.007***	0.002	-0.003	0.002	-1.0×10^{4}	-0.009
	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.006)

Notes: Standard errors are in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively.

5. Model II: Linkage of actual angel investors and entrepreneurs

5.1. Data and analytical methods of model II

We consider a model to analyze the linkage of actual angel investors and entrepreneurs, and the theoretical approach of this model is based on Honjo and Nakamura (2019). Table 8 indicates the definitions of variables used. We consider and compare 5 alternative models by taking the variables regarding personal financial variables, such as income and savings, into consideration.

Table 8. Definitions of variables in model II

Variable	Symbol	Definition
Angel investor	*BUSANG*	1: if the individual personally provided funds for a new business started by someone else, excluding any purchases of stocks in the past three years; 0: otherwise.
Entrepreneur	*ACTENT*	1: if the individual is an *actual entrepreneur*; 0: otherwise.
(*ENTRE*)	*EX_ENT*	1: if the individual is an *ex_entrepreneur*; 0: otherwise.
Age	*AGE*	Current age (in years).
	AGESQ	= *AGE*×*AGE*
Gender	*MALE*	1: if the individual is male; 0: if the individual is female.
Education	*U_EDUC*	1: if the individual has post-secondary experience (undergraduate education); 0: otherwise.
	G_EDUC	1: if the individual has graduate experience (graduate education); 0: otherwise.
Income	*INCOME*	= log(annual personal income)
House income	*HINCOME*	= log(house income)
Savings	*SAVING*	= log(savings)

Consider the likelihood of individual i engaging in angel investment. Let $BUSANG_i$ denote a dummy that represents whether individual i engages in angel investment. We estimate the likelihood of angel investment using the following regression model:

$$\begin{aligned} \mathrm{P'}_i &= \Pr(BUSANG_i = 1) \\ &= f(\beta_0 + \beta_1 ENTRE_i \\ &\quad + \beta_2 X'_i) = \frac{\exp(\beta_0 + \beta_1 ACTENT_i + \beta_2 EX\_ENT_i + \beta_3 X'_i)}{1 + \exp(\beta_0 + \beta_1 ACTENT_i + \beta_2 EX\_ENT_i + \beta_3 X'_i)} \end{aligned} \tag{5}$$

$$\ln\left(\frac{\mathrm{P'}_i}{1 - \mathrm{P'}_i}\right) = \beta_0 + \beta_1 ACTENT_i + \beta_2 EX\_ENT_i + \beta_3 X'_i \tag{6}$$

$$\frac{\mathrm{P'}_i}{1-\mathrm{P'}_i} = \exp(\beta_0 + \beta_1 ACTENT_i + \beta_2 EX\_ENT_i + \beta_3 X'_i) \quad (7)$$

$$\mathrm{OR}_{ACTENT} = \frac{\mathrm{Odds}_{ACTENT=1}}{\mathrm{Odds}_{ACTENT=0}} = \exp(\beta_1) \quad (8)$$

$$\mathrm{OR}_{EX\_ENT} = \frac{\mathrm{Odds}_{EX\_ENT=1}}{\mathrm{Odds}_{EX\_ENT=0}} = \exp(\beta_2) \quad (9)$$

where $ACTENT_i$ is a variable for current entrepreneur, EX_ENT_i is variable for people who have had entrepreneurial experience in the past, X'_i is a vector of controls, $f(\cdot)$ is the cumulative distribution function of an error term, β_0 is a constant term, β_1 is the coefficient of actual entrepreneurial activity, β_2 is the coefficient of past entrepreneurial experience, and β_3 is the coefficient (vector) of controls.

5.2. Descriptive statistics of model II

Table 9 presents the summary statistics of the variables and shows that the mean of *BUSANG* is 0.047, indicating that about 4.7% of individuals provided funds for a new business started by someone else, excluding any purchases of stocks in the past three years. The mean of *EX_ENT* is 0.040, indicating that about 4.0% of individuals have had entrepreneurial experience in the past.

Table 9. Summary of variables in model II

Symbol	N	Mean	Standard deviation	Min	Max	Median
BUSANG	10001	0.047	0.211	0	1	
ACTENT	10001	0.036	0.187	0	1	
EX_ENT	10001	0.040	0.196	0	1	
AGE	10001	49.3	16.2	18	79	49
AGESQ	10001	2688.2	1593.9	324	6241	2401
MALE	10001	0.496	0.500	0	1	
U_EDUC	10001	0.373	0.484	0	1	
G_EDUC	10001	0.044	0.205	0	1	
INCOME	8663	5.379	1.044	3.912	8.517	5.298
HINCOME	8200	6.212	0.774	3.912	8.517	5.991
SAVING	7506	5.640	1.497	3.912	8.517	5.298

Table 10 presents the cross tables of entrepreneurs and angel investors. The proportion of individuals who engage in angel investments (*BUSANG*) is about 20% among those who are currently involved in a start-up business (*ACTENT*) as well as among people who have had

entrepreneurial experience in the past (*EX_ENT*). The odds ratio of *ACTENT* and *BUSANG* is about 4.6, and that of *EX_ENT* and angel *BUSANG* is about 4.4, indicating that current entrepreneurs are more likely to engage in angel investments than former entrepreneurs.

Table 10. Cross table of entrepreneurs and angel investors

		BUSANG				
		No	Yes	Total	OR	χ^2
ACTENT	No	9232	407	9639	4.597	124.7***
	Yes	301	61	362		
	Total	9533	468	10001		
EX_ENT	No	9196	403	9599	4.401	124***
	Yes	337	65	402		
	Total	9533	468	10001		

Notes: OR indicates the odds ratio. χ^2 is a test statistic that the odds ratio is 1.

5.3. Estimation results of model II

We estimate the coefficient and odds ratio of the logit model that indicates the link between entrepreneurial activity and angel investment while controlling for individuals' personal attributes, such as age and gender (Tables 11 and 12). Table 12 indicates the estimated odds ratio of entrepreneurial activity (*ACTENT* and *EX_ENT*) and angel investment (*BUSANG*). The variables of personal income, house income, or savings, in addition to the variables of individuals' age, gender, and education status are included in column (i), (ii), and (iii), respectively, in Table 8. In columns (iv), we include both the variables of income and savings. In columns (iii), we include the variables of house income and savings.

We establish that the estimated odds ratios of *ACTENT* and *BUSANG* in Table 12 are lower than those calculated in Table 10, while the estimated odds ratios of *EX_ENT* and *BUSANG* in Table 12 are greater than those calculated in Table 10. In Table 12, we establish a greater positive link between entrepreneurial activity and angel investment, indicating that individuals with experience in entrepreneurial activity are more likely to engage in angel investment. Specifically, the likelihood that current entrepreneurs and people who have had entrepreneurial experience in the past would engage in angel investment is approximately four and five times greater than that of other individuals, respectively. Our findings provide support for a significant relationship between entrepreneurial activity and angel investment.

As indicated in Table 8, the coefficients of the age variable are negative. The results indicate that older individuals are less likely to invest in new businesses. In addition, the coefficients of the male variable are positive in columns (ii), (iii), and (iv), indicating that women are less likely

to invest in new businesses. Moreover, educational level is measured by two variables for undergraduate and graduate education, and the variables of undergraduate education have a significantly positive effect on angel investment in every model. The results indicate that individuals with undergraduate educational levels are more likely to invest in new businesses. We also establish that the financial variables (income, house income, and savings) are positively associated with angel investment in each alternative model.

Table 11. Estimation results (coefficient) of 5 alternative models of model II

	(i)	(ii)	(iii)	(iv)	(v)
ACTENT	1.465***	1.496***	1.428***	1.311***	1.337***
	(0.167)	(0.169)	(0.177)	(0.182)	(0.183)
EX_ENT	1.671***	1.657***	1.722***	1.724***	1.719***
	(0.157)	(0.159)	(0.164)	(0.165)	(0.165)
AGE	-0.049**	-0.038*	-0.049**	-0.054**	-0.053**
	(0.021)	(0.021)	(0.022)	(0.023)	(0.023)
AGESQ	3.63×10^{-4}*	2.66×10^{-4}	2.18×10^{-4}	2.82×10^{-4}	2.61×10^{-4}
	(2.18×10^{-4})	(2.18×10^{-4})	(2.26×10^{-4})	(2.34×10^{-4})	(2.34×10^{-4})
MALE	-0.047	0.233**	0.201*	0.046	0.202*
	(0.119)	(0.112)	(0.115)	(0.126)	(0.117)
U_EDUC	0.559***	0.579***	0.415***	0.356***	0.366***
	(0.111)	(0.112)	(0.116)	(0.118)	(0.119)
G_EDUC	0.650***	0.757***	0.343	0.264	0.316
	(0.207)	(0.205)	(0.219)	(0.223)	(0.222)
INCOME	0.382***			0.194***	
	(0.061)			(0.066)	
HINCOME		0.341***			0.140*
		(0.072)			(0.078)
SAVING			0.406***	0.364***	0.374***
			(0.041)	(0.044)	(0.045)
Constant	-4.212***	-4.629***	-4.089***	-4.721***	-4.682***
	(0.514)	(0.618)	(0.495)	(0.541)	(0.636)
N	8,663	8,200	7,506	7,372	7,123
R^2	0.082	0.075	0.100	0.102	0.099

Notes: Standard errors are in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively. *N* indicates the number of observations. The dependent variable is *BUSANG*.

Table 12. Estimation results (odds ratios) of 5 alternative models of model II

	(i)	(ii)	(iii)	(iv)	(v)
ACTENT	4.326***	4.463***	4.169***	3.712***	3.809***
	(0.722)	(0.755)	(0.738)	(0.676)	(0.698)
EX_ENT	5.317***	5.243***	5.594***	5.606***	5.579***
	(0.834)	(0.833)	(0.916)	(0.923)	(0.923)
AGE	0.953**	0.962*	0.952**	0.947**	0.949**
	(0.020)	(0.020)	(0.021)	(0.021)	(0.022)
AGESQ	1.000*	1.000	1.000	1.000	1.000
	(2.19×10^{-4})	(2.18×10^{-4})	(2.26×10^{-4})	(2.34×10^{-4})	(2.34×10^{-4})
MALE	0.954	1.262**	1.222*	1.047	1.223*
	(0.113)	(0.141)	(0.140)	(0.132)	(0.143)
U_EDUC	1.749***	1.784***	1.515***	1.427***	1.442***
	(0.195)	(0.200)	(0.176)	(0.169)	(0.171)
G_EDUC	1.915***	2.131***	1.410	1.302	1.372
	(0.396)	(0.437)	(0.309)	(0.291)	(0.304)
INCOME	1.465***			1.214***	
	(0.089)			(0.080)	
HINCOME		1.407***			1.150*
		(0.101)			(0.089)
SAVING			1.501***	1.438***	1.453***
			(0.062)	(0.063)	(0.065)
Constant	0.015***	0.010***	0.017***	0.009***	0.009***
	(0.008)	(0.006)	(0.008)	(0.005)	(0.006)
N	8,663	8,200	7,506	7,372	7,123
Log likelihood	-1562	-1520	-1408	-1383	-1355
LR statistics	279***	245***	313***	315***	297***

Notes: Standard errors are in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively. *N* indicates the number of observations. The dependent variable is *BUSANG*.

5.4. Geographically weighted regression and results based on model II

To build on the spatial expansion method, we apply the geographically weighted regression (GWR), a local regression technique for investigating the spatial non-stationarity, which aims at estimating parameters of a local regression model with a function of some other attributes representing spatial variation.

The expansion method can only represent the broad spatial trends and may mask significant local variation (Fotheringham et al., 2002). In contrast, GWR is suitable for modeling the complex

local variation of regression parameters. In its most basic form, the GWR model takes the following equation:

$$\begin{aligned} \mathrm{P'}_i &= \Pr(BUSANG_i = 1) = f(\beta_0(u_i, v_i) + \beta_1(u_i, v_i)ENTRE_i + \beta_2(u_i, v_i)X'_i) \\ &= \frac{\exp(\beta_0(u_i, v_i) + \beta_1(u_i, v_i)ACTENT_i + \beta_2(u_i, v_i)EX\_ENT_i + \beta_3(u_i, v_i)X'_i)}{1 + \exp(\beta_0(u_i, v_i) + \beta_1(u_i, v_i)ACTENT_i + \beta_2(u_i, v_i)EX\_ENT_i + \beta_3(u_i, v_i)X'_i)} \end{aligned} \quad (10)$$

$$\ln\left(\frac{\mathrm{P'}_i}{1 - \mathrm{P'}_i}\right) = \beta_0(u_i, v_i) + \beta_1(u_i, v_i)ACTENT_i + \beta_2(u_i, v_i)EX\_ENT_i + \beta_3(u_i, v_i)X'_i \quad (11)$$

$$\frac{\mathrm{P'}_i}{1 - \mathrm{P'}_i} = \exp(\beta_0(u_i, v_i) + \beta_1(u_i, v_i)ACTENT_i + \beta_2(u_i, v_i)EX\_ENT_i + \beta_3(u_i, v_i)X'_i) \quad (12)$$

$$\mathrm{OR}_{ACTENT} = \frac{\mathrm{Odds}_{ACTENT=1}}{\mathrm{Odds}_{ACTENT=0}} = \exp(\beta_1(u_i, v_i)) \quad (13)$$

$$\mathrm{OR}_{EX\_ENT} = \frac{\mathrm{Odds}_{EX\_ENT=1}}{\mathrm{Odds}_{EX\_ENT=0}} = \exp(\beta_2(u_i, v_i)) \quad (14)$$

Here, (u_i, v_i) are geographical coordinates of i, and smooth geographical variation of coefficients according to this location is assumed. However, the model does not have enough statistical degrees of freedom. In order to estimate the coefficient parameters specific to the location of each point, a GWR is performed using a subset of samples including surrounding point data. More specifically, the local coefficient of point i is determined by the weighted least squares method using the weight w_{ih} using a kernel function that takes the maximum value at point i, and the value decreases with distance from point i. Typical weights include the following Gaussian functions:

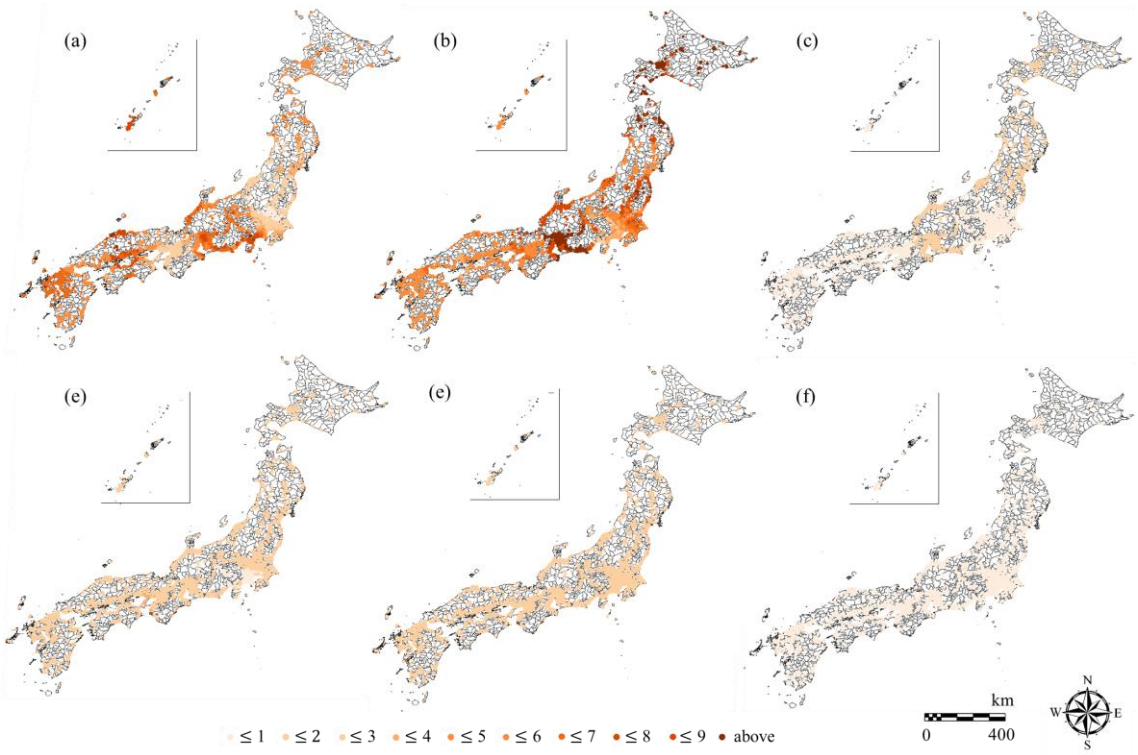
$$w_{ih} = \exp\left(-\frac{1}{2}\left(\frac{D_{ih}}{G}\right)^2\right) \quad (15)$$

D_{ih} is the distance between points i and h, G is a parameter that controls the substantial geographical area used for estimation, and is called bandwidth. The larger the bandwidth, the wider the geographical range used for local coefficient estimation, and consequently, the smaller the geographical variation of the coefficients obtained. If G is fixed to one numerical value in all, the local range used for weighting will be geographically constant in size. This is called fixed kernel. In this method, the local range for estimation is clear, and interpretation is easy; however, there is a concern that the number of available data will be scarce in the periphery of the target area, and the estimation will become unstable. On the other hand, a method of variably changing the range of weighting by the kernel function according to the distribution state of data is called adaptive kernel. Typically, kernels using the following bi-square function are often used.

$$w_{ih} = \begin{cases} \left[1 - \left(\frac{D_{ih}}{D_{i(g)}}\right)^2\right]^2 & if \;\; D_{ih} < D_{i(g)} \\ 0 & otherwise \end{cases} \tag{16}$$

$D_{i(g)}$ is the distance from point i to the g^{th} closest point, and the range indicated by this distance is the range of local weighting. The bandwidth is controlled by parameter g. If g = 100, data in the range of approximately 100 points will always be used to estimate the coefficients of the regression model. The parameters G and g that determine the bandwidth are determined by comparing multiple models with different bandwidth parameter values using CV (cross validation) scores, Akaike Information Criterion (AIC), and selecting the optimal band (Páez et al., 2002a,b).

Figure 7 presents the odds ratio of spatial analysis results. The odds ratio value of both (a) *ACTENT* and (b) *EX_ENT* are larger than the other values, and the odds ratio value of (b) *EX_ENT* in some specific areas in the middle and north part of Japan are greater than the value of (a) *ACTENT*. This indicates that the relationship between past entrepreneurial experience and angel investment is more indispensable than the relationship between current entrepreneurial activity and angel investment in such areas.



Notes: (a) *ACTENT*; (b) *EX_ENT*; (c) *MALE*; (d) *AGE*; (e) *U_EDU*; (f) *SAVING*. The number of observations is 7506. The bandwidth is 1334505. Akaike information criterion (AICs) is 2872.

Figure 7. Spatial analysis results (odds ratio) of each variable based on model II

Table 13 presents the average values (odds ratio) of each variable by region. The results indicate that the value of (a) *ACTENT* in Kyushu is the highest, and that of (b) *EX_ENT* in Hokkaido is the highest in Japan. The second highest region of both (a) and (b) is Chubu. This indicates that the relationships between current entrepreneurship and angel investment in Kyushu, and the relationships between past entrepreneurial experience and angel investment in Hokkaido are deeper than those of the other regions.

Table 13. Average values (odds ratio) of each variable based on model II by regions

Region	(a)	(b)	(c)	(d)	(e)	(f)
Hokkaido	5.31	9.19	1.51	0.98	1.12	1.29
Tohoku	3.64	6.86	1.43	0.97	1.25	1.26
Kanto	3.17	4.48	0.71	0.98	1.06	1.59
Chubu	6.12	8.20	1.27	0.97	1.35	1.55
Kansai	2.45	5.92	0.73	0.96	2.43	1.57
Chugoku	5.94	4.81	0.51	0.96	1.78	1.63
Shikoku	5.37	4.84	0.48	0.97	2.18	1.54
Kyushu/Okinawa	6.14	5.34	0.56	0.96	1.28	1.66

Notes: (a) *ACTENT*; (b) *EX_ENT*; (c) *MALE*; (d) *AGE*; (e) *U_EDU*; (f) *SAVING*.

6. Model III: Linkage of actual and potential angel investors and entrepreneurs

6.1. Data and analytical methods of model III

We consider a model to analyze the linkage of actual and potential angel investors and entrepreneurs. Table 14 presents the definitions of variables used. The variables regarding discount rate index and risk index measures are explained in detail in Appendix B. The variables regarding considered necessary to promote angel investment, important factors for start-up companies, and business areas of interest were selected from the results in Figures C4-C6 in Appendix C.

Table 14. Definitions of variables in model III

Variable	Symbol	Definition
Investor type (INV_j)	*BUSANG*	1: if the individual is an *actual angel investor*;
	POTANG	2: if the individual is a *potential angel investor*;
	ORDINV	3: if the individual is an *ordinary investor*;
	ANGINT	4: if the individual is *interested in angel investing*;
	INVINT	5: if the individual is *interested in ordinary investing*;
	NOINTI	6: if the individual is *not interested in investing*;
Entrepreneur type (ENT_i)	*ACTENT*	1: if the individual is an *actual entrepreneur*; 0: otherwise.
	POTSER	1: if the individual is a *potential serial entrepreneur*; 0: otherwise.
	FORENT	1: if the individual is a *former entrepreneur*; 0: otherwise.
	POTENT	1: if the individual is a *potential entrepreneur*; 0: otherwise.
	ENTINT	1: if the individual has *general entrepreneurial interests*; 0: otherwise.
Age	*AGE*	Current age (in years).
	AGESQ	= *AGE*×*AGE*
Gender	*MALE*	1: if the individual is male; 0: if the individual is female.
Education	*U_EDUC*	1: if the individual has post-secondary experience (undergraduate education); 0: otherwise.
	G_EDUC	1: if the individual has graduate experience (graduate education); 0: otherwise.
Income	*INCOME*	= log(Annual personal income)
Savings	*SAVING*	= log(Annual personal income)
Discount rate index	*DISCRAT*	Discount rate indicator

Risk index	*RISK_LOT*	Risk aversion (RA) index (lottery)
	RISK_INS	Risk aversion (RA) index (Insurance)
Measures considered necessary to promote angel investment	*SMLINV*	1: if the individual selects "small investments system" as measures considered necessary to promote angel investment; 0: otherwise.
	ANGTAX	1: if the individual selects "tax relief for angel investors" as measures considered necessary to promote angel investment; 0: otherwise.
	EXPSUG	1: if the individual selects "investment suggestions and advice from experts" as measures considered necessary to promote angel investment; 0: otherwise.
Important factors for start-up companies	*TECHCAP*	The individual rates "Technical capability" as an important factor for start-up companies on a 5-point scale (1. No, 2. Not very, 3. Neutral 4. Somewhat, or 5. Yes).
	INGENUI	The individual rates "Ingenuity" as an important factor for start-up companies on a 5-point scale (1. No, 2. Not very, 3. Neutral 4. Somewhat, or 5. Yes).
	PERSONA	The individual rates "The personal character and capabilities of the founder(s)" as important factors for start-up companies on a 5-point scale (1. No, 2. Not very, 3. Neutral 4. Somewhat, or 5. Yes).
Business areas of interest	*AI*	1: if the individual selects "AI" as business areas of interest; 0: otherwise.

To identify the linkage between actual and potential entrepreneurial activities and angel investment, we use a multinomial logit model. To estimate the impacts of variables on the probability of belonging to one of many categories, separate logit models for each of the groups are usually used. However, the estimated probabilities of all categories do not necessarily add up to 100%. Thus, the multinomial logit model was employed. The use of the multinomial logit model makes it possible to examine the impacts of background characteristics on all the categories within a unified modeling framework.

Consider a model with n independent individuals, denoted by the subscript i, and $J(=6)$ nominal alternatives, denoted by the subscript j and numbered from 1 to 6 where the numbering corresponds to the 6 investor types. Let Z_i be the investor type of individual i. Thus, $Z_i = INV_j = j$ if individual i selects alternative investor type j. The log likelihood function for n observations is as follows (Greene, 1993):

$$\ln L' = \sum_{i=1}^{n} \sum_{j=1}^{6} f_{ij} \ln \Pr(Z_i = j) \quad (17)$$

The assumption of the multinomial logit model is that the log odds of type j relative to the point of reference are determined by a linear combination of regression variables. The probability that an individual is observed as belonging to one of the 6 investor types is given by:

$$\begin{cases} P'_{ij} = \Pr(Z_i = 1) = \frac{\exp(\beta_j + \sum_l^6 \gamma_{lj} ENT_{li} + \delta_j X'_i)}{1 + \sum_{k=1}^{5} \exp(\beta_k + \sum_l^6 \gamma_{lk} ENT_{li} + \delta_k X'_i)} \\ \text{for } j = 1, \dots, 5 \\ P'_{iJ} = \Pr(Z_i = 6) = \frac{1}{1 + \sum_{k=1}^{5} \exp(\beta_k + \sum_l^6 \gamma_{lk} ENT_{li} + \delta_k X'_i)} \end{cases} \quad (18)$$

where ENT_{li} is a variable for entrepreneurial type l $(l = 1, \dots, 6)$, X'_i is a vector of controls, β_j is a constant term, γ_{li} is the coefficient of each entrepreneurial type, and δ_j is the coefficient (vector) of controls. The ratio of the relative probability of $Y_i = INV_j = 1, \dots, 5$ to the base outcome of $Z_i = INV_j = 6$ is:

$$\ln\left(\frac{P'_{ij}}{P'_{iJ}}\right) = \ln\left(\frac{\Pr(Z_i = j)}{\Pr(Z_i = 6)}\right) = \beta_j + \sum_l^6 \gamma_{lj} ENT_{li} + \delta_j X'_i \quad (19)$$

The effect of a unit increase in an explanatory variable on the probability of belonging to a certain type. These marginal effects are obtained from the estimated parameters by differentiating Eq. (18) with respect to ENT_{li} or X'_i. These marginal effects can be written as:

$$\begin{cases} \frac{\alpha P'_{ij}}{\alpha ENT_{li}} = P'_{ij}\left(\gamma_{lj} - \sum_{k=1}^{5} P'_{ik} \gamma_{lk}\right) \\ \frac{\alpha P'_{ij}}{\alpha X'_i} = P'_{ij}\left(\delta_j - \sum_{k=1}^{5} P'_{ik} \delta_k\right) \end{cases} \quad (20)$$

6.2. Descriptive statistics of model III

Table 15 indicates the summary statistics of the variables. Regarding investor type, the mean values of *BUSANG*, *POTANG*, *ORDINV*, *ANGINT*, *INVINT*, *NOINTI* are 0.047, 0.053, 0.284, 0.047, 0.073, and 0.496, respectively. The number of people who are not interested in investing is greater compared to those of the other types, and the numbers of actual angel investors and people who are interested in angel investing are the least (about 4.7%). The variables for type of entrepreneur are included in the analytic model, and the point of reference for the type of entrepreneur dummies is the dummy for *NOINTE*. The mean values of *ACTENT, POTSER*, *FORENT*, *POTENT*, and *ENTINT* are 0.036, 0.013, 0.027, 0.058, and 0.074, respectively.

Table 15. Definitions of variables in model III

Symbol	N	Mean	Standard deviation	Min	Max	Median
BUSANG	10001	0.047	0.211	0	1	
POTANG	10001	0.053	0.225	0	1	

ORDINV	10001	0.284	0.451	0	1	
ANGINT	10001	0.047	0.211	0	1	
INVINT	10001	0.073	0.261	0	1	
NOINTI	10001	0.496	0.500	0	1	
ACTENT	10001	0.036	0.187	0	1	
POTSER	10001	0.013	0.114	0	1	
FORENT	10001	0.027	0.027	0	1	
POTENT	10001	0.058	0.058	0	1	
ENTINT	10001	0.074	0.074	0	1	
AGE	10001	49.3	16.2	18	79	49
AGESQ	10001	2688.2	1593.9	324	6241	2401
MALE	10001	0.496	0.500	0	1	
U_EDUC	10001	0.373	0.484	0	1	
G_EDUC	10001	0.044	0.205	0	1	
INCOME	8663	5.379	1.044	3.912	8.517	5.298
SAVING	7506	5.640	1.497	3.912	8.517	5.298
DISCRAT	10001	2.67×10^{-8}	0.839	-0.890	2.141	-0.171
RISK_LOT	9048	-13.24	0.535	-22.34	-13.12	-13.15
RISK_INS	7088	-13.32	0.502	-22.34	-13.12	-13.23
SMLINV	10001	0.654	0.476	0	1	
ANGTAX	10001	0.232	0.422	0	1	
EXPSUG	10001	0.205	0.404	0	1	
TECHCAP	10001	4.009	1.015	1	5	
INGENUI	10001	4.100	0.973	1	5	
PERSONA	10001	4.052	0.975	1	5	
AI	10001	0.476	0.499	1	5	

6.3. Estimation results of model III

Tables 16 and 17 provide the estimation results for the multinomial logit model. The results indicate that while the largest positive impact on angel investors and potential angel investors is from potential serial entrepreneurs, the same impact on people who are interested in angel investing is from potential entrepreneurs. Potential entrepreneurs and people who have general entrepreneurial interests are more likely to be potential angel investors.

As indicated in Table 17, the marginal effects of *AGE* on *BUSANG* and *ANGINT* are negative, while those of its squared term on *BUSANG* are positive. The results indicate that the relationship between *AGE* and *BUSANG* is U-shaped. Moreover, the variables of undergraduate education

have a significantly positive effect on *BUSANG*, *POTANG*, and *ORDINV.* The results indicate that individuals with undergraduate educational levels are more likely to have investment experience (*INVEST*). We also establish, in Table 17, that while income variables (*INCOME*) are positively associated with *BUSANG*, but negatively associated with *NOINTI*, saving variables (*SAVING*) are positively associated with *BUSANG*, *POTANG*, and *ORDINV*, but negatively associated with *ANGINT* and *NOINTI*,

The marginal effect of *RISK_LOT* on *POTANG* is negative, and those of *RISK_INS* and *DISCRAT* on *POTANG* are positive. These results indicate that people who do not take risks related to the lottery (the payoff) are less likely to be potential angel investors; however, those who have higher discount rates and who are averse to risk related to insurance (the loss) are more likely to be potential angel investors. There is a possibility that potential angel investors tend to be passive to risk.

Not only *POTANG* but also *ANGINT* tend to select small investment systems (*SMLINV*), tax relief for angel investors (*ANGTAX*), and investment suggestions and advice from experts (*EXPSUG*) as measures considered necessary to promote angel investment. Only potential angel investors are more likely to rate technical capability (*TECHCAP*) and the personal character and capabilities of the founder(s) (*PERSONA*) as important factors for start-up companies, and *POTANG* and *ORDINV* are more likely to select AI (*AI*) as business areas of interest.

Table 16. Estimation results (coefficient) of model III

Ref: *NOINTI*	*BUSANG*	*POTANG*	*ORDINV*	*ANGINT*	*INVINT*
ACTENT	1.986***	1.456***	0.330	1.800***	-0.099
	(0.276)	(0.343)	(0.214)	(0.384)	(0.532)
POTSER	3.789***	3.928***	1.803***	3.304***	0.334
	(0.467)	(0.595)	(0.442)	(0.582)	(1.073)
FORENT	1.874***	1.706***	0.705***	1.508***	0.782*
	(0.350)	(0.403)	(0.226)	(0.550)	(0.456)
POTENT	2.568***	3.643***	1.095***	3.509***	1.490***
	(0.286)	(0.256)	(0.235)	(0.263)	(0.274)
ENTINT	1.582***	2.659***	0.504***	2.909***	1.040***
	(0.260)	(0.213)	(0.174)	(0.214)	(0.208)
AGE	-0.098***	-0.072**	-0.024	-0.101***	-0.016
	(0.031)	(0.031)	(0.017)	(0.032)	(0.027)
AGESQ	0.001**	0.001**	3.85×10^{-4}**	0.001**	-4.04×10^{-4}
	(3.17×10^{-4})	(3.16×10^{-4})	(1.65×10^{-4})	(3.45×10^{-4})	(2.98×10^{-4})
MALE	-0.051	0.562***	0.116	0.452***	-0.568***

	(0.173)	(0.180)	(0.088)	(0.185)	(0.144)
U_EDUC	0.616***	0.570***	0.501***	0.146	0.366***
	(0.162)	(0.163)	(0.082)	(0.177)	(0.135)
G_EDUC	0.409	1.028***	0.443**	-0.286	0.573*
	(0.342)	(0.291)	(0.196)	(0.447)	(0.297)
INCOME	0.261***	0.227**	0.198***	0.172*	0.120*
	(0.090)	(0.091)	(0.045)	(0.097)	(0.071)
SAVING	0.615***	0.513***	0.492***	0.060	0.178***
	(0.061)	(0.059)	(0.029)	(0.072)	(0.053)
DISCRAT	0.031	0.134	-0.061	0.009	-0.072
	(0.087)	(0.087)	(0.045)	(0.096)	(0.075)
RISK_LOT	-0.465	-0.922***	-0.333*	0.079	-0.358
	(0.302)	(0.258)	(0.180)	(0.329)	(0.257)
RISK_INS	0.223	0.577**	0.069	-0.271	0.212
	(0.292)	(0.253)	(0.161)	(0.305)	(0.235)
SMLINV	0.196	0.749***	0.141*	0.911***	0.792***
	(0.159)	(0.172)	(0.079)	(0.208)	(0.152)
ANGTAX	0.290	0.531***	0.291***	0.713***	0.404***
	(0.178)	(0.161)	(0.092)	(0.178)	(0.144)
EXPSUG	0.376**	0.565***	0.117	0.571***	0.749***
	(0.185)	(0.170)	(0.098)	(0.186)	(0.140)
TECHCAP	-0.074	0.195*	-0.058	0.057	-0.006
	(0.098)	(0.102)	(0.052)	(0.102)	(0.083)
INGENUI	0.054	-0.026	0.094	0.029	0.154*
	(0.108)	(0.111)	(0.059)	(0.114)	(0.094)
PERSONA	0.002	0.262**	0.033	0.161	0.120
	(0.106)	(0.109)	(0.057)	(0.111)	(0.091)
AI	0.121	0.833***	0.448***	0.347**	0.377***
	(0.155)	(0.156)	(0.077)	(0.165)	(0.126)
Constant	-8.779***	-13.552***	-8.757***	-6.724**	-5.952**
	(2.376)	(2.167)	(1.881)	(2.738)	(2.644)
N	4,766				
Log likelihood	-5194				
Pseudo R^2	0.193				
LR statistics	2487***				

Notes: Standard errors are in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively. *N* indicates the number of observations.

Table 17. Estimation results (marginal effects) of model III

	BUSANG	*POTANG*	*ORDINV*	*ANGINT*	*INVINT*	*NOINTI*
ACTENT	0.067***	0.040***	-0.012	0.048***	-0.034	-0.109***
	(0.011)	(0.014)	(0.034)	(0.013)	(0.032)	(0.039)
POTSER	0.101***	0.106***	0.158**	0.068***	-0.055	-0.379***
	(0.014)	(0.017)	(0.063)	(0.018)	(0.063)	(0.083)
FORENT	0.053***	0.043**	0.040	0.029	0.015	-0.180***
	(0.014)	(0.017)	(0.035)	(0.019)	(0.027)	(0.040)
POTENT	0.060***	0.105***	0.037	0.080***	0.031**	-0.312***
	(0.010)	(0.009)	(0.034)	(0.008)	(0.013)	(0.038)
ENTINT	0.034***	0.082***	-0.023	0.074***	0.023**	-0.191***
	(0.010)	(0.008)	(0.026)	(0.007)	(0.011)	(0.027)
AGE	-0.003**	-0.002	-3.7×10^{-4}	-0.003**	0.001	0.007***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.003)
AGESQ	2.28×10^{-5}*	1.57×10^{-5}	4.53×10^{-5}*	1.85×10^{-5}	-3.98×10^{-5}**	-6.25×10^{-5}**
	(1.28×10^{-5})	(1.34×10^{-5})	(2.75×10^{-5})	(1.19×10^{-5})	(1.78×10^{-5})	(2.79×10^{-5})
MALE	-0.006	0.023***	0.017	0.015**	-0.041***	-0.008
	(0.007)	(0.008)	(0.015)	(0.006)	(0.008)	(0.015)
U_EDUC	0.013**	0.012*	0.062***	-0.006	0.009	-0.091***
	(0.007)	(0.007)	(0.013)	(0.006)	(0.008)	(0.014)
G_EDUC	0.004	0.036***	0.048	-0.024	0.024	-0.087**
	(0.013)	(0.011)	(0.030)	(0.015)	(0.017)	(0.034)
INCOME	0.006	0.004	0.024***	0.002	0.001	-0.037***
	(0.004)	(0.004)	(0.007)	(0.003)	(0.004)	(0.008)
SAVING	0.015***	0.010***	0.065***	-0.008***	-0.001	-0.081***
	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.005)
DISCRAT	0.002	0.007**	-0.013*	3.18×10^{-4}	-0.004	0.007
	(0.003)	(0.004)	(0.007)	(0.003)	(0.004)	(0.008)
RISK_LOT	-0.009	-0.032***	-0.031	0.014	-0.012	0.069**
	(0.011)	(0.010)	(0.027)	(0.011)	(0.014)	(0.032)
RISK_INS	0.006	0.024**	-0.003	-0.015	0.010	-0.022
	(0.011)	(0.010)	(0.025)	(0.010)	(0.013)	(0.028)
SMLINV	-0.003	0.021***	-0.011	0.022***	0.037***	-0.067***
	(0.006)	(0.007)	(0.013)	(0.007)	(0.009)	(0.014)
ANGTAX	0.002	0.011*	0.026*	0.017***	0.013	-0.069***
	(0.007)	(0.007)	(0.015)	(0.006)	(0.008)	(0.016)

EXPSUG	0.007	0.015**	-0.012	0.011*	0.037***	-0.059***
	(0.007)	(0.007)	(0.013)	(0.006)	(0.008)	(0.016)
TECHCAP	-0.003	0.010**	-0.013	0.002	-3.55×10^{-4}	0.005
	(0.004)	(0.004)	(0.009)	(0.003)	(0.005)	(0.009)
INGENUI	2.46×10^{-4}	-0.004	0.014	-0.001	0.008	-0.017*
	(0.004)	(0.005)	(0.010)	(0.004)	(0.005)	(0.010)
PERSONA	-0.003	0.010**	-0.002	0.003	0.005	-0.013
	(0.004)	(0.005)	(0.009)	(0.004)	(0.005)	(0.010)
AI	-0.008	0.025***	0.055***	0.001	0.010	-0.083***
	(0.006)	(0.007)	(0.013)	(0.006)	(0.007)	(0.013)

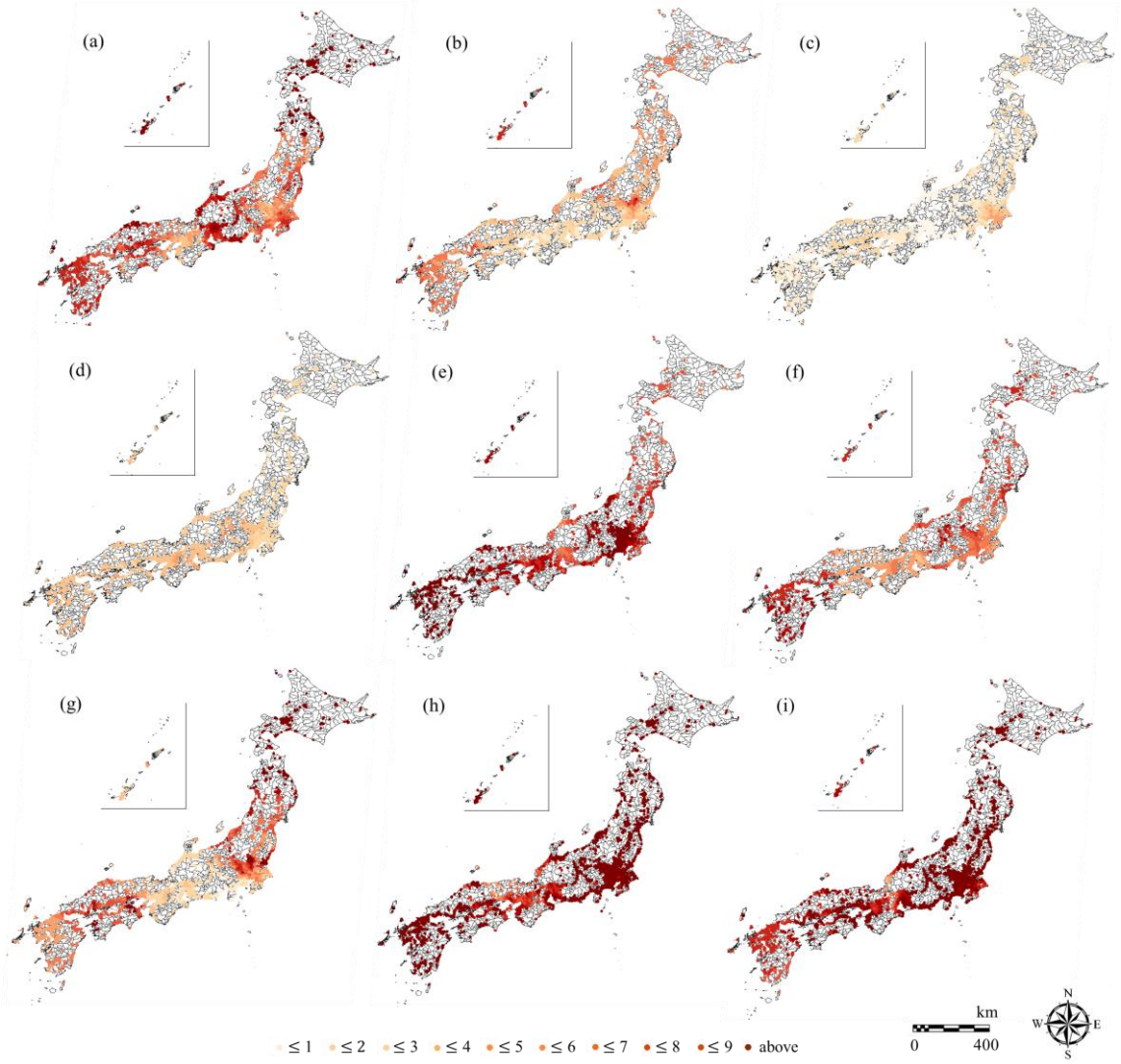
Notes: Standard errors are in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively.

6.4. Geographically weighted regression and results based on model III

To identify the spatial linkage between actual and potential entrepreneurial activities and angel investment, we use geographically weighted regression (GWR). In this GWR based on model III, we used the *ENTRE* variable instead of *ACTENT*, *POTSER*, and *FORENT* for simplicity, and analyzed the spatial linkage between (a) *BUSANG* and *ENTRE*; (b) *BUSANG* and *POTENT*; (c) *BUSANG* and *ENTINT*; (d) *POTANG* and *ENTRE*; (e) *POTANG* and *POTENT*; (f) *POTANG* and *ENTINT*; (g) *ANGINT* and *ENTRE*; (h) *ANGINT* and *POTENT*; (i) *ANGINT* and *ENTINT*.

Figure 8 presents the odds ratio of spatial analysis results. The number of observations is 7506 and the bandwidth is 1334505 in the (a)-(c) and (g)-(i) analysis. The Akaike information criterion (AIC) is 2817 in (a)-(c) and 2570 for (g)-(i). In (d)-(f), the number of observations is 4188, the bandwidth is 1535422, and AIC is 2533. In general, regarding *BUSANG*, the odds ratio value of (a) *BUSANG* and *ENTRE* is larger than that of (b) *BUSANG* and *POTENT,* and (c) *BUSANG* and *ENTINT*.

These results indicate that the relationship between actual entrepreneurial experience and angel investment is more indispensable than the relationship between potential entrepreneurship and angel investment. The odds ratio of (e) *POTANG* and *POTENT* is larger than that of (d) *POTANG* and *ENTRE,* and (f) *POTANG* and *ENTINT*, especially in the middle and southwest part of Japan. These results indicate that the relationship between potential entrepreneurs and potential angel investors is more positively associated in such an area. Regarding *ANGINT*, the odds ratio value of (g) *ANGINT* and *ENTRE* is less than that of (h) *ANGINT* and *POTENT,* and (i) *ANGINT* and *ENTINT* especially in the slightly left side of central Japan. This means that the linkage between actual entrepreneurial experience and interest in angel investment is less in such areas.



Notes: (a) *BUSANG* and *ENTRE*; (b) *BUSANG* and *POTENT*; (c) *BUSANG* and *ENTINT*; (d) *POTANG* and *ENTRE*; (e) *POTANG* and *POTENT*; (f) *POTANG* and *ENTINT*; (g) *ANGINT* and *ENTRE*; (h) *ANGINT* and *POTENT*; (i) *ANGINT* and *ENTINT*.

Figure 8. Spatial analysis results (odds ratio) of each variable based on model III

Table 18 presents the average values (odds ratio) of each variable by region. The results indicate that although the values of (a)-(i) do not have significant differences by regions, regarding *BUSANG*, the odds ratio value of (a) *BUSANG* and *ENTRE* in Hokkaido is higher than the other values, and regarding *POTANG,* the odds ratio value of (e) *POTANG* and *POTENT* in Kyushu/Okinawa is higher than the other values. This indicates that the relationships between actual entrepreneurial experience and angel investment, and between potential entrepreneurs and potential angel investors have slight regional tendency, although the linkage between people who are interested in angel investment and potential entrepreneurs or people who are interested in entrepreneurship have less regional tendency. However, regarding people who are interested in angel investment, those linkages are higher than the linkage between actual entrepreneurial

experience and interest in angel investment.

Table 18. Average values (odds ratio) of each variable based on model III by regions

Region	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Hokkaido	6.32	3.52	2.01	3.09	8.59	5.85	4.50	12.2	11.4
Tohoku	6.19	3.44	1.94	3.09	8.71	5.75	4.75	12.2	11.5
Kanto	6.22	3.50	2.01	3.08	8.73	5.86	4.56	12.3	11.4
Chubu	6.18	3.48	1.95	3.12	8.81	5.83	4.60	12.3	11.5
Kansai	6.16	3.49	2.03	3.07	8.77	5.85	4.56	12.3	11.5
Chugoku	6.24	3.52	1.94	3.11	8.73	5.94	4.51	12.1	11.3
Shikoku	6.31	3.62	2.00	3.11	8.72	5.79	4.57	12.3	11.4
Kyushu/Okinawa	6.22	3.50	2.01	3.13	8.85	5.85	4.55	12.1	11.5

Notes: (a) *BUSANG* and *ENTRE*; (b) *BUSANG* and *POTENT*; (c) *BUSANG* and *ENTINT*; (d) *POTANG* and *ENTRE*; (e) *POTANG* and *POTENT*; (f) *POTANG* and *ENTINT*; (g) *ANGINT* and *ENTRE*; (h) *ANGINT* and *POTENT*; (i) *ANGINT* and *ENTINT*.

7. Conclusions and policy implementation

This study described the characteristics and perceptions, related to starting a business, of individuals who potentially become entrepreneurs and/or angel investors, based on the results of an online survey conducted by our project team from the RIETI. In this study, individuals were categorized by type of entrepreneur as "actual entrepreneurs," "potential serial entrepreneurs," "former entrepreneurs," "potential entrepreneurs," "those with general entrepreneurial interests" or "those without entrepreneurial interests." Similarly, individuals were categorized by type of angel investor as "actual angel investors," "potential angel investors," "ordinary investors," "those with interests in angel investing," "those with interests in ordinary investing," or "those without interests in investing."

The study also indicated that the number of angel investors is much smaller than that of ordinary investors. However, there were certain numbers of potential angel investors and individuals who were interested in angel investing in the sample. It is important to vitalize the entrepreneurial ecosystem that links entrepreneurs with angel investors in order to provide a better understanding of the entrepreneur-angel investor relationship. For example, from our survey's results, we established that, in reality, the percentage of individuals with entrepreneurial and angel investment experience is not trivial. However, while entrepreneurs and angel investors have characteristics in common, they can also be completely different. Considering measures for the relationship between entrepreneurship and angel investing would assist in vitalizing the entrepreneurial ecosystem in a region or country.

The results of this study indicate that former entrepreneurs and individuals without entrepreneurial interests are less likely to have viable opportunities for starting a business in the area where they live. Potential entrepreneurs are more likely to experience the fear of failure, which would prevent them from starting a business. The largest positive impact on angel investors and potential angel investors is from potential serial entrepreneurs. Potential entrepreneurs and individuals with general entrepreneurial interests are more likely to become potential angel investors. The relationship between actual entrepreneurial experience and angel investment is more indispensable than the relationship between potential entrepreneurship and angel investment. Moreover, the linkage between potential entrepreneurs and potential angel investors is more positively associated in specific areas. These findings will assist in vitalizing entrepreneurial ecosystems where entrepreneurs are linked with angel investors for policy implication.

For instance, the results of this study indicate that the relationships between current entrepreneurship and angel investment in Kyushu and Chubu, and the relationships between past entrepreneurial experience and angel investment in Hokkaido and Chubu are deeper than those of the other regions. Some of the reasons are due to national or regional policies for innovation and

entrepreneurship.

One example is that the Ministry of Economy of Trade and Industry (METI), that is spearheading the Japanese government's current efforts to fix its innovative and entrepreneurial problems, launched its "Industrial Cluster Policy" (Ibata-Arens, 2004). The policy aims to enhance the competitiveness of Japan through industrial clusters (the state where industries are agglomerated in broad areas with competitively advantageous industries as the core through the development of a business environment in which new businesses are created one after another) formed by local small- and medium-sized companies and venture businesses utilizing seeds from universities and other research institutions. The policy has 3 stages: 1. First term (2001-2005) Industrial Cluster Launch Period; 2. Second term (2006-2010) Industrial Cluster Development Period; 3. Third term (2011-2020) Industrial Cluster Autonomous Growth Period.

In the first preparation stage since 2001, METI officials searched for new spatial agglomerations of cooperative, complementary related firms in bio, IT, and high-tech manufacturing, and one of the largest regional clusters was Hokkaido (Ibata-Arens, 2004). In the second stage, METI has promoted 18 projects including the Hokkaido IT Innovation Strategy, Hokkaido BioTech Industry Growth Strategy, Kyushu Bio Cluster, Kyushu Recycle and Environmental Industry Plaza, and Kyushu Silicon Cluster.

Another example is that the city of Fukuoka, on Japan's southern main island of Kyushu, is fast becoming a center for startups, and makes an effort to encourage young people to start their own companies. Fukuoka is the first city in Japan to offer a Startup Visa for foreign entrepreneurs and has the highest business formation rate in Japan. Further, Fukuoka City established the popular Startup Cafe to help local entrepreneurs get their companies up and running. These attempts vitalize entrepreneurial ecosystems where entrepreneurs are linked with angel investors.

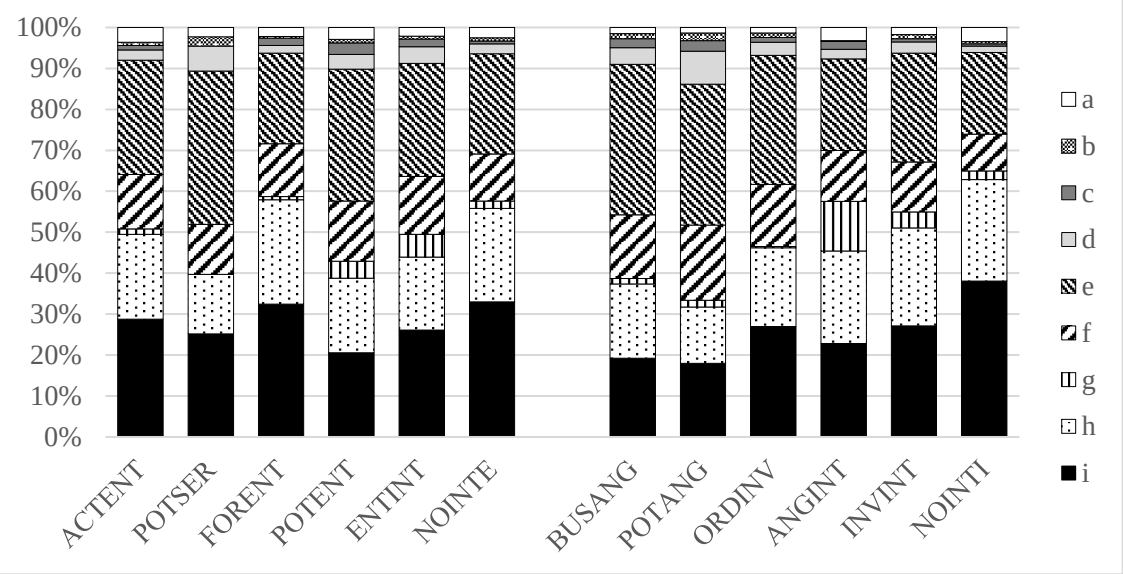
As observed in Figure 4, the relationships between the ratio of the total number of potential entrepreneurs to the number of actual entrepreneurs, and the ratio of the total number of potential angel investors to the number of actual angel investors in such regions as Hokkaido and Kyushu are less biased compared to the other regions. However, the linkage between people who are interested in angel investment and potential entrepreneurs or people who are interested in entrepreneurship is high but with less regional tendency.

Appendix A. Respondent characteristics

A.1. Education status

Looking at the highest level of education by type of entrepreneur (Figure A1), generally, large percentages of respondents in every type had graduated from high school and from a higher educational institution such as a vocational school, technical college, junior college, or college (in liberal arts). Together, these accounted for about 70% of the sample. The percentage of college (liberal arts) graduates was particularly large among "potential serial entrepreneurs" and "potential entrepreneurs." Moreover, the percentages of "potential serial entrepreneurs" with a Master of Science degree and "potential entrepreneurs" who were college students were relatively large in comparison with the other categories.

By type of angel investor (Figure A1), the percentage of college graduates (in liberal arts) was largest among "actual angel investors" and "potential angel investors," and high school graduates accounted for the largest percentage of respondents who were "not interested in investing." Furthermore, the percentages of "potential angel investors" with a Master of Science degree and college students "interested in angel investing" were relatively high in comparison with the other categories.

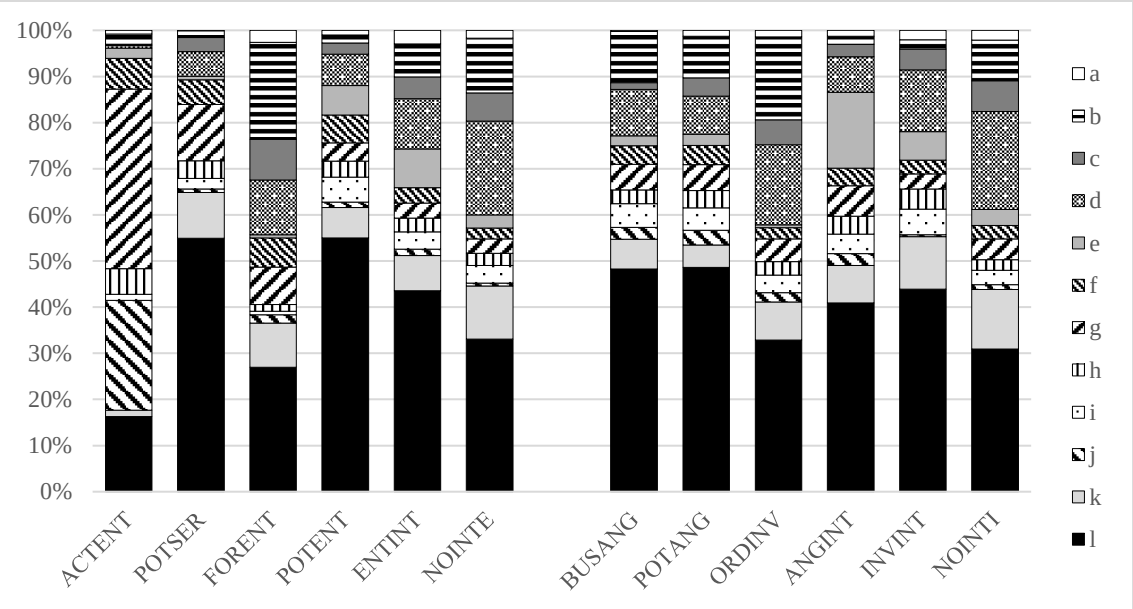


Notes: a. other; b. doctorate; c. master's degree (liberal arts); d. master's degree (sciences); e. bachelor's degree (liberal arts); f. bachelor's degree (sciences); g. college student; h. vocational school, technical college, or junior college graduate; and i. high school graduate.

Figure A1. Education status (*N* = 10,001)

A.2. Types of occupation and industry

Results for the types of occupation and industry by type of entrepreneur are presented in Figure A2 and Table A1. Among the "actual entrepreneurs," the largest percentage for type of occupation was "sole proprietor," followed by "company manager," "full-time company employee," and "freelance professional." As for the type of industry, the percentages of "actual entrepreneurs" involved in "academic research, professional, and technical services" and "lifestyle-related services, entertainment" were relatively large compared to the other categories. In the "potential serial entrepreneur" and "potential entrepreneur" categories, the most frequent occupation was "full-time company employee," accounting for more than 50%. As for type of industry, "manufacturing" accounted for the largest percentage in the two categories and, the percentages were higher than in other categories.



Notes: a. other; b. retired; c. unemployed; d. housewife/househusband; e. student; f. freelance professional; g. sole proprietor; h. professional (doctor, lawyer, professor, etc.); i. public servant; j. company manager; k. part-time company employee; and l. full-time company employee.

Figure A2. Occupation (*N* = 10,001)

The results for type of occupation and industry by type of angel investor, are also presented in Figure A2 and Table A1. Compared to the types of entrepreneur, differences between categories were, generally, not as large. That said, as for distinguishing characteristics, among the "ordinary investors" the percentages of "retirees" and "housewives/househusbands," and among the respondents "interested in angel investing," the percentage of "students" were comparatively large.

Table A1. Industry by type of entrepreneur and angel investor (%)

	ACTENT	*POTSER*	*FORENT*	*POTENT*	*ENTINT*	*NOINTE*	*BUSANG*	*POTANG*	*ORDINV*	*ANGINT*	*INVINT*	*NOINTI*	All
Construction	10.5	6.0	9.0	5.4	6.5	5.2	4.3	3.4	5.2	7.2	7.6	6.1	5.7
Manufacturing	6.7	18.8	14.1	18.8	17.6	17.8	16.8	19.7	18.9	16.1	16.8	16.1	17.2
Electricity/Gas	1.5	4.3	1.3	0.8	1.2	1.2	3.7	2.5	0.8	1.5	1.7	0.9	1.3
Telecommunications	5.2	7.7	5.8	4.4	6.7	4.8	8.0	5.2	5.2	6.0	5.2	4.4	5.0
Wholesale	3.5	4.3	2.6	3.8	2.2	3.8	4.3	2.9	4.4	2.7	3.3	3.3	3.6
Retail	10.8	8.5	6.4	9.0	6.7	8.8	5.4	5.4	6.6	8.7	7.6	10.9	8.7
Finance	2.9	6.0	1.3	5.6	5.5	4.1	8.0	9.3	6.2	2.4	2.4	2.6	4.2
Rental and leasing	0.3	2.6	1.3	0.2	0.0	0.1	0.6	0.0	0.2	0.0	0.0	0.2	0.2
Academic research, professional and technical services	14.0	9.4	9.6	10.0	7.8	9.0	11.6	10.3	9.9	8.7	10.9	8.4	9.3
Food services	6.4	4.3	7.7	3.8	3.9	3.5	1.4	1.7	3.1	5.7	4.4	4.5	3.8
Lifestyle-related services, entertainment	13.1	6.8	9.6	7.9	8.6	7.7	8.0	6.4	6.9	10.1	6.5	9.2	8.2
Medical and welfare	6.1	12.0	11.5	11.1	13.1	13.3	9.1	12.3	10.9	15.2	14.9	13.4	12.6
Transportation	2.6	5.1	4.5	4.0	4.7	5.6	5.7	5.7	4.7	4.2	4.1	5.6	5.2
Real estate	6.4	3.4	1.9	2.7	2.9	2.1	3.7	4.2	3.7	1.2	1.8	1.7	2.5
Other	9.9	0.9	13.5	12.3	12.7	13.0	9.7	11.1	13.4	10.4	12.9	12.7	12.5
Total	100	100	100	100	100	100	100	100	100	100	100	100	100
N	343	117	156	478	511	4,662	352	407	1,664	335	542	2,967	6,267

Appendix B. Economic and financial decision-making factors

B.1. Mean annual income, savings, other assets, and liabilities

Mean values for annual personal income, annual household income, cash and savings, other assets, and liabilities by type are indicated in Table B1. Annual personal and household incomes were highest in the "actual entrepreneur," "potential serial entrepreneur," "actual angel investor," and "potential angel investor" categories, in that order.

"Ordinary investors" had the most cash and savings, followed by "angel investors," "actual entrepreneurs," and "potential angel investors," in that order. Respondents "interested in angel investing" had the smallest amount of cash and savings, ¥3,050,000. Meanwhile, "actual entrepreneurs" had the most assets outside of cash and savings, followed in order by "former entrepreneurs," "ordinary investors," and "angel investors." "Potential serial entrepreneurs" had the most liabilities, followed in order by "actual entrepreneurs," "potential angel investors," and "angel investors."

Table B1. Mean annual income, savings, other assets, and liabilities (in ¥10,000s)

	Annual personal income	Annual household income	Cash & savings	Other assets	Liabilities
ACTENT	658.62	949.02	1,209.25	1,568.24	392.45
POTSER	605.83	912.50	890.68	951.72	422.08
FORENT	335.92	573.16	1,084.01	1,444.29	105.60
POTENT	464.21	752.73	718.13	744.36	358.91
ENTINT	383.14	679.06	617.73	796.01	299.47
NOINTE	327.84	628.04	807.11	845.30	192.40
BUSANG	574.01	849.52	1,275.94	1,369.69	371.99
POTANG	538.38	801.25	1,146.30	1,306.52	383.90
ORDINV	420.21	716.84	1,327.25	1,372.71	247.41
ANGINT	314.03	658.31	305.10	387.07	215.13
INVINT	309.61	606.38	404.41	384.15	219.12
NOINTI	285.51	582.32	484.42	510.46	162.10
Overall	357.00	654.68	808.39	880.17	219.09
N	8,663	8,200	7,506	6,601	8,441

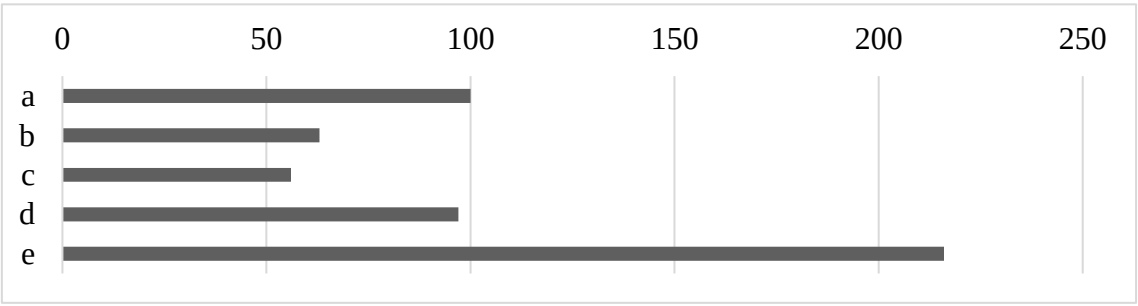
B.2. Amounts investors were willing to invest, their expected rates of return, and types of companies in which angel investors invested

Table B2 indicates the mean amounts that the "angel investors," "potential angel investors," and "ordinary investors" were willing to invest, and their expected rates of return. The mean values for investment amount and expected rate of return were highest for the "potential angel investors." As a rule, "angel investors" invested, on average, ¥3.93 million in start-up companies.

Table B2. Investment amounts and expected rate of return on investment by type of investor

	Investment amount (in ¥10,000s)			Expected return (%)		
	N	Mean	SD	*N*	Mean	SD
BUSANG	408	522.28	819.93	468	16.30	5.52
(Angel investment)	432	（393.57）	（653.56）	—	—	—
POTANG	493	528.80	929.86	533	17.17	4.61
ORDINV	2,442	451.88	802.39	2,838	16.91	4.84

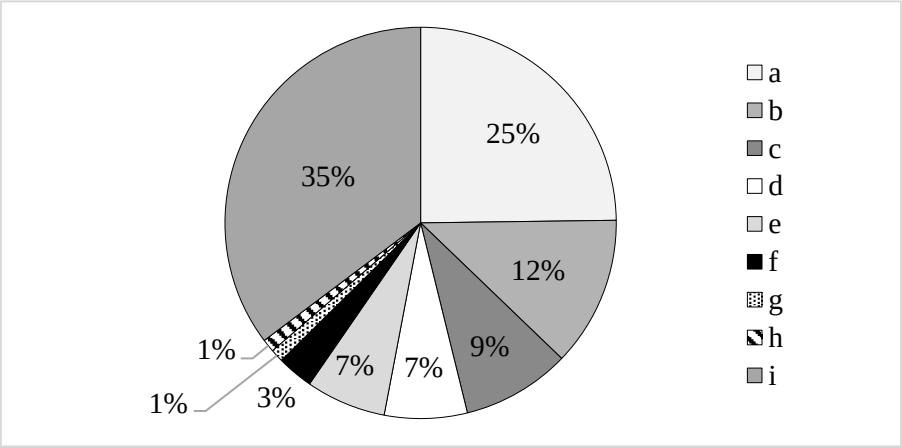
Figure B1 presents the types of companies in which the angel investors invested: "small and medium-sized companies less than 5 years old," "closely held companies with at least one-sixth of their capital coming from outside investors," "companies not belonging to a major corporation (capitalized at ¥100 million or more) or to a company with a special affiliation (subsidiary, etc.) with such a corporation," and "unregistered or unlisted companies." Investments in these four types of companies are based on the fact that these are the conditions that business ventures are required to meet for investments to qualify for the angel tax system: This system enables individuals who invest in eligible business ventures to claim a tax deduction when they make their investment and to pay a lower income tax rate when they sell their shares. Investments in each of these types of companies were less than 100, and the largest number of investments (216) was in companies that did not meet any of the conditions. Although not indicated in Figure B1, there were only four cases of angel investing that met all four conditions.



Notes: a. small and medium-sized companies less than 5 years old; b. closely held companies with at least 1/6th of their capital coming from outside investors; c. companies not belonging to a major corporation (capitalized at ¥100 million or more, etc.) or to a company with a special affiliation (subsidiary, etc.) to such a corporation; d. unregistered or unlisted companies; e. other companies. Horizontal axis: number of angel investments

Figure B1. Types of companies in which angel investors invested (*N* = 468) (multiple responses)

Figure B2 presents the angel investors' shareholding ratios at the companies in which they invested. One percent of these investors held two-thirds of a company's shares, which entitled them to pass extraordinary resolutions at shareholder meetings. Another 1% held between one-half and less than two-thirds of a company's shares, which entitled them to pass ordinary resolutions. Holdings of 3% or more entitled investors to call shareholder meetings and to view the company's books, and 7% of the investors were holders of both between 3% and less than 10% and between 10% and less than one-third of a company's shares. Holders of 1% or more of a company's shares are entitled to submit proposals at shareholder meetings, and 28% of the investors met that threshold at the companies in which they had invested. On the other hand, 37% of the investors held less than 1% of their companies' shares, of which 25% held no shares.



Notes: a. no shareholding ratio; b. shareholding ratio of less than 1%; c. shareholding ratio of 1% to less than 3%; d. shareholding ratio of 3% to less than 10%; e. shareholding ratio of 10% to less than 1/3; f. shareholding ratio of 1/3 to less than 1/2; g. shareholding ratio of 1/2 to less than 2/3; h. shareholding ratio of 2/3 or more; i. unknown.

Figure B2. Angel investor shareholding ratios at the companies in which they invested （*N* = 468）

B.3. Risk aversion

Based on the Becker-DeGroot-Marschak (BDM) method (Becker et al., 1964), to estimate the respondents' risk aversion, the survey asked how much they would pay for a lottery ticket and

insurance, and calculated indicators from their bids.

Specifically, two questions were asked. The first asked for the respondent's certainty equivalent for something with an uncertain payoff: "There is a lottery in which you have a 1 in 100 chance of winning. If you win, you can get ¥1 million. However, if you lose, you get nothing. How much would you pay for a lottery ticket?" The other question asked for the respondent's certainty equivalent for something with an uncertain loss. "You have ¥1 million that you need to keep for 1 year. Let's say that while you are keeping it, you know there is a 1 in 100 chance of the ¥1 million being stolen. If you buy insurance, you will be able to recover the loss if there is a theft. How much would you pay for insurance?"

Table B3 indicates the respondents' bids for the lottery ticket and insurance by type. Overall, the bids for the insurance were higher than those for the lottery ticket. Although the certainty equivalents for the lottery and insurance should, theoretically, be the same, the results suggested that, in fact, the respondents had a greater risk tolerance for loss (Prospect theory).

While the categories with highest bids for the lottery ticket were, in order, from "potential serial entrepreneurs," "actual entrepreneurs," "actual angel investors," and "potential entrepreneurs," the highest bids for the insurance were, in order, from respondents "interested in angel investing," "potential entrepreneurs," "potential angel investors," and "actual entrepreneurs."

Table B3. Lottery ticket and insurance bids (in yen) (*N* = 10,001)

	Lottery ticket		Insurance	
	Mean	SD	Mean	SD
ACTENT	8,768.70	74,657.82	16,720.02	93,017.94
POTSER	8,821.23	45,547.9	14,620.45	52,113.25
FORENT	2,426.24	7,819.63	12,730.26	74,953.17
POTENT	6,702.73	59,253.12	20,899.28	85,458.77
ENTINT	2,605.99	7,557.587	15,706.19	67,944.83
NOINTE	2,625.01	21,867.18	12,131.67	70,291.83
BUSANG	7,443.36	52,459.49	16,689.19	78,574.81
POTANG	5,688.67	45,774.58	19,164.58	94,853.34
ORDINV	4,085.75	36,577.6	12,301.54	73,140.13
ANGINT	4,765.26	46,750.44	24,095.72	101,418.2
INVINT	2,309.55	12,029.59	15,963.83	72,235.48
NOINTI	1,923.13	12,929.98	11,140.84	63,830.67
Overall	3,157.43	28,595.77	13,118.49	71,967.61

Using the above values, based on Cramer et al. (2002), we calculated respondent risk aversion (RA) index using formula (B1).

$$RA = \frac{aZ-p}{(1/2)(aZ^2-2aZp+p^2)} \quad \text{(B1)}$$

Here, Z denotes the prize or loss, a the probability of winning or suffering a loss, and p the respondent's bid. The results of the calculations are indicated in Table B4. Overall, risk aversion related to the lottery (the payoff) was higher than risk aversion related to the insurance (the loss). Risk aversion related to the lottery was highest in the "not interested in investing," "no entrepreneurial interests," "interested in ordinary investing," and "former entrepreneur" categories, in that order. Risk aversion related to the insurance was highest among "former entrepreneurs," respondents "not interested in investing," "ordinary investors," and respondents with "no entrepreneurial interests," in that order.

Table B4. Risk aversion by type (units: $\times 10^{-6}$) (N = 10,001)

	Lottery		Insurance	
	Mean	SD	Mean	SD
ACTENT	1.41	1.4	0.741	2.19
POTSER	1.13	1.95	0.542	2.57
FORENT	1.56	1.14	1.04	1.71
POTENT	1.39	1.14	0.195	2.61
ENTINT	1.52	1.06	0.386	2.48
NOINTE	1.64	0.994	0.888	2.0
BUSANG	1.22	1.57	0.542	2.43
POTANG	1.38	1.23	0.505	2.35
ORDINV	1.55	1.15	0.915	1.9
ANGINT	1.51	1.15	0.171	2.49
INVINT	1.62	0.799	0.366	2.44
NOINTI	1.69	0.91	0.924	2.01
Overall	1.6	1.05	0.805	2.09

B.4. Discount rate

The survey also included questions related to the respondent's discount rate (also referred to as *expected rate of return*), an indicator of the value that they attach to time. Based on Ikeda et al. (2010), the basic question used was: "Today, you are supposed to receive ¥1 million. What is the

minimum amount you would accept to agree to a delay of one week (seven days)?" Four versions of the question with different delay options (r_1-r_4) were used. The options and results are indicated in Table B5.

Table B5. The four delay options and results for the discount question (*N* = 10,001)

Discount rate	r_1	r_2	r_3	r_4
Delay options	0 or 7 days	90 or 97 days	0 or 90 days	90 or 180 days
Amount	¥ 1 million	¥ 1 million	¥ 1 million	¥ 1 million
Mean (%)	75.87	85.57	90.50	95.17
SD	97.42	100.40	100.06	100.64

Based on these results, the mean discount rate indicator （R） was calculated by standardizing each discount rate using formula (B2).

$$R = \left(\frac{1}{4}\right)\sum_{i=1}^{4}\frac{(r_i - E(r_i))}{\sigma(r_i)} \qquad \text{(B2)}$$

The results are indicated in Table B6. The categories with the highest discount rates were "potential entrepreneurs," "actual entrepreneurs," "actual angel investors," and "potential angel investors," in that order.

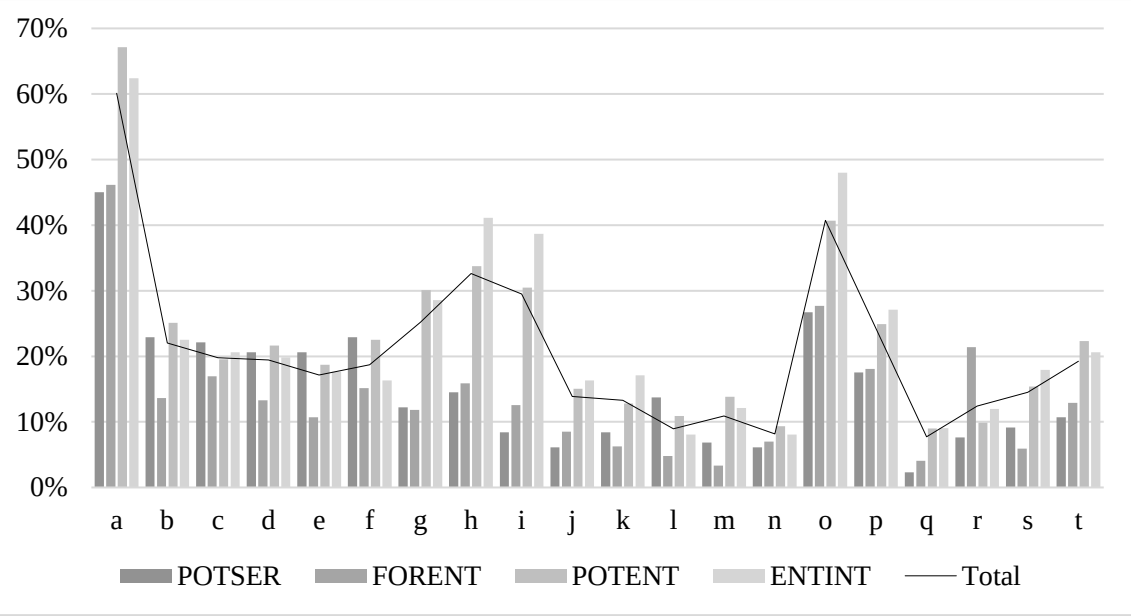
Table B6. Discount rate indicator （N = 10,001）

	Mean	SD
ACTENT	0.0653	0.9073
POTSER	0.0175	0.7770
FORENT	-0.0052	0.8416
POTENT	0.0672	0.8109
ENTINT	-0.0116	0.8019
NOINTE	-0.0069	0.8416
BUSANG	0.0641	0.8684
POTANG	0.0607	0.7905
ORDINV	-0.0486	0.7922
ANGINT	0.0175	0.8057
INVINT	0.0190	0.8015
NOINTI	0.0108	0.8734
Overall	0.0267	0.8387

Appendix C. Factors inhibiting entrepreneurship and angel investing, and measures considered necessary to promote them

C.1. Factors inhibiting entrepreneurship

We tabulated, by type of entrepreneur, the factors that respondents who were not actually involved in running a start-up business believed to prevent them from starting one. Results are presented in Figure C1. Overall, the largest percentages of these respondents indicated that "insufficient personal funds" was a factor, followed by "risks related to failure," "no business ideas," and "no marketing expertise." While there were no large differences between categories, the percentage of respondents who selected "insufficient personal funds" was the largest among "potential entrepreneurs" and smallest among "potential serial entrepreneurs." On the other hand, the largest percentages of respondents who selected "risks related to failure," "no business ideas," and "no marketing expertise" were in the "general entrepreneurial interests" type and the smallest were in the "potential serial entrepreneur" type.

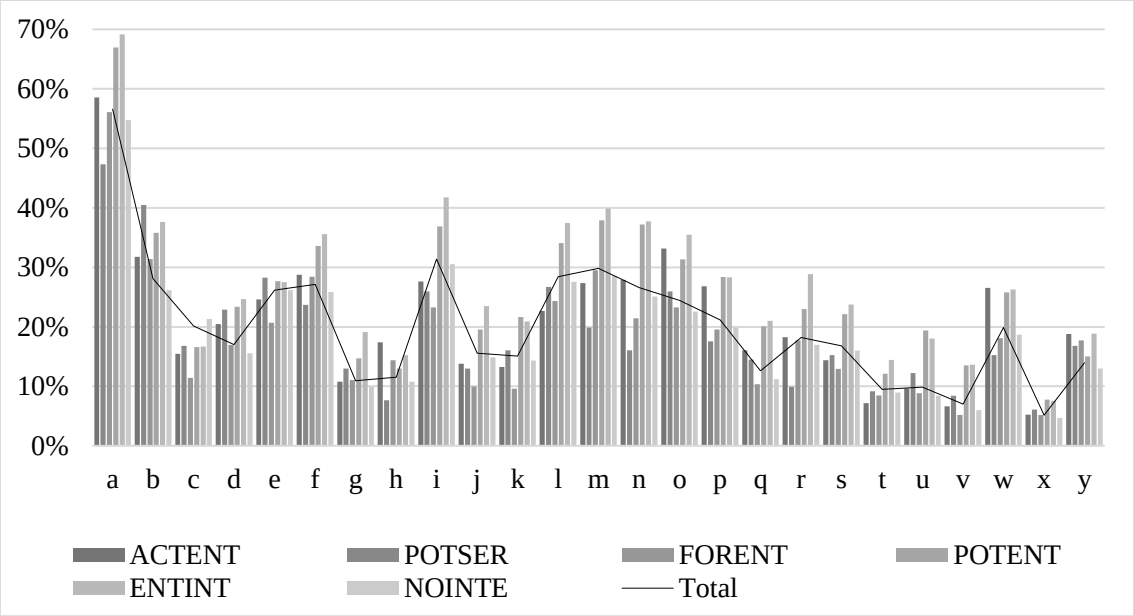


Notes: a. insufficient personal funds; b. sources of external funding; c. employee retention; d. finding customers; e. finding suppliers/subcontractors; f. location; g. insufficient financial, tax, and legal expertise; h. no business ideas; i. no marketing expertise; j. insufficient PC and online skills; k. insufficient product/service-related expertise/technical skill; l. inability to leave current employer; m. current employer prohibits having a second job/side business; n. opposition from friends and family; o. risks related to failure; p. inability to earn sufficient income; q. inability to make time to care for the home, children, elders, etc.; r. concerns about the impact on health/fitness; s. no one to provide advice; t. concern about having enough customers

Figure C1. Factors inhibiting entrepreneurship (in random order; multiple responses)

C.2. Measures considered necessary to promote entrepreneurship

Figure C2 presents the measures that respondents considered necessary to promote entrepreneurship. The most frequently selected were, in order of frequency, "fund-raising support (financing, investments, subsidies, grants, etc.)" followed by "assistance with creating project plans," "expertise and advice on legal requirements and intellectual property," "expert business reviews, assistance and advice," and "provision of facilities and equipment, such as office space (public or private)." Moreover, the measure that "potential serial entrepreneurs" selected most frequently was "provision of facilities and equipment, such as office space (public or private)," and the measures more frequently chosen by "potential entrepreneurs" were related to networking: "customer referrals" and "referrals/networks to find individual investors."



Notes: a. fund raising support (financing, investments, subsidies, grants, etc.); b. provision of facilities and equipment, such as office space; c. services to assist with daily living responsibilities, such as housework; d. funding from acquaintances, friends, and family; e. government-sponsored consulting services; f. public (national, regional) entrepreneurship support programs; g. national research and development projects; h. basic infrastructural services (e.g., transportation and communication); i. assistance with creating project plans; j. entrepreneurship education in elementary and secondary education; k. entrepreneurship education in higher education; l. expert business reviews, assistance, and advice; m. expertise and advice on legal requirements and intellectual property; n. training in management and accounting; o. preferential tax treatment to support new businesses; p. customer referrals; q. referrals/networks to find entrepreneurs and managers; r. assistance and advice related to marketing; s. referrals to specialist professionals such as lawyers and tax accountants; t. assistance and advice related to R&D and prototype development; u. referrals/networks to find individual investors; v. referrals/networks to find institutional investors; w. information regarding subsidies, etc.; x. business contests; y. social and cultural norms that accept and promote entrepreneurship

Figure C2. Measures considered necessary to promote entrepreneurship (in random order, multiple responses)

Table C1 indicates the responses to the survey question on how much more funding the respondent needed to start a business. The overall mean was about ¥13,630,000. The highest amount was in the "general entrepreneurial interests" type, about ¥16,520,000. "Potential entrepreneurs needed about ¥12,050,000, and "potential serial entrepreneurs" needed about ¥10,720,000.

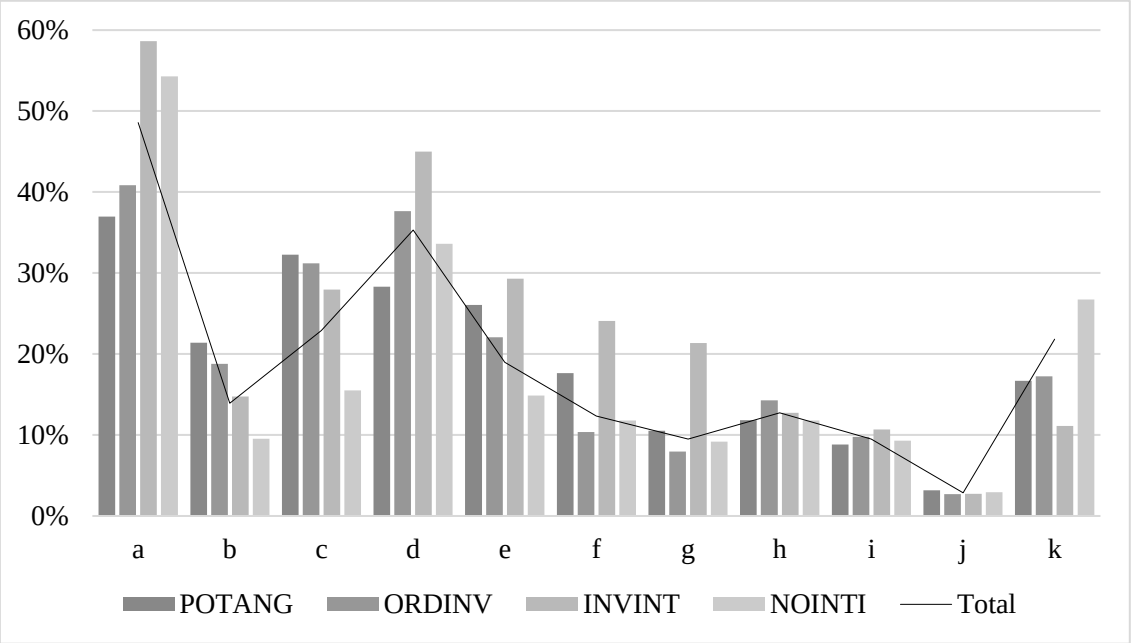
Table C1. Funds needed to start a business (¥10,000s)

	N	Mean	SD
Potential serial entrepreneurs	120	1,072	1,168.37
Former entrepreneurs	45	1,595.67	1,388.54
Potential entrepreneurs	517	1,205.06	1,202.38
General entrepreneurial interests	366	1,651.89	1,393.04
Overall	1,048	1,362.64	1,295.65

C.3. Factors inhibiting angel investing

Figure C3 presents the results, by type, for the factors that the respondents not actually engaged in angel investing believed inhibit angel investing. Overall, the factors most frequently selected were financial, the most frequent being "insufficient funds," followed by "monetary risk is too high." While large percentages of respondents who were "interested in ordinary investing" similarly selected "insufficient funds" and "monetary risk is too high," a characteristic of this group compared to the other groups, was that higher percentages of those respondents selected "inability to evaluate investment options" and "no means to make investments/lack of understanding of the process" as inhibitory factors.

On the other hand, while, compared to the other groups, the percentage of "potential angel investors" indicating that "insufficient funds" was an inhibitory factor was not particularly large, a comparatively large percentage selected "no contacts with any entrepreneurs."

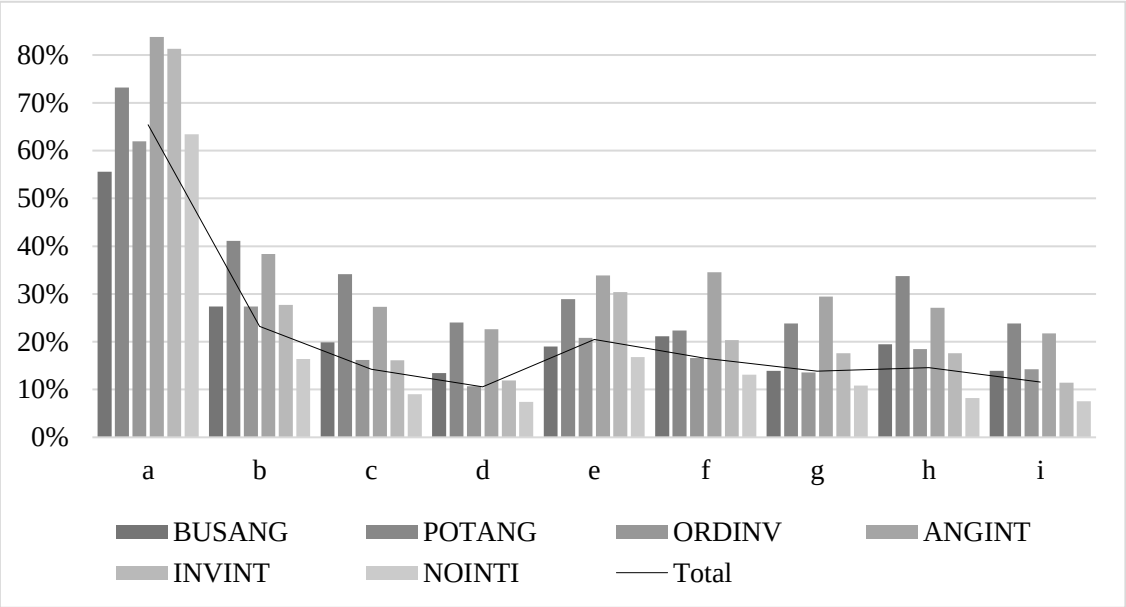


Notes: a. insufficient funds; b. lack of attractive investment options; c. no contacts with any entrepreneurs; d. monetary risk is too high; e. inability to evaluate investment options; f. no means to make investments, lack of understanding of the process; g. no one to ask for advice; h. inability to forecast investment returns; i. dividend income cannot be expected; j. opposition from friends and family; k. no particular reason

Figure C3. Factors inhibiting angel investing (in random order, multiple responses)

C.4. Measures considered necessary to promote angel investing

Figure C4 presents measures that could be considered necessary to promote angel investing. Most respondents selected "an environment that allows even small investments," followed by "tax relief for angel investors." In particular, compared to the other groups, larger percentages of "potential angel investors" and respondents "interested in angel investing" indicated that "tax relief for angel investors" was necessary to promote angel investing.



Notes: a. small investments system; b. tax relief for angel investors; c. referrals/networks to find entrepreneurs; d. referrals/networks to find individual investors; e. investment suggestions and advice from experts; f. opportunities to try out new products and services; g. education/training in angel investing; h. investment proposals; i. access to the business plans of companies that are potential investment options

Figure C4. Measures considered necessary to promote angel investing (in random order, multiple responses)

Table C2 summarizes the responses to questions on how much of a tax deduction (percentage of the investment) the respondent would require to make an angel investment and, at that rate, how much they would invest in one year. The overall means were 32% and ¥2.57 million. The groups indicating the highest deduction rates were the "not interested in investing," "ordinary investors," and "interested in investing" categories, in that order. The groups indicating the largest investments were the "actual angel investors," respondents "interested in investing," and "potential angel investors," in that order. Compared to the ¥3.93 million that angel investors had previously shown to be willing to invest in start-up companies, with a sufficient tax deduction, they indicated they would be willing to invest approximately ¥4.10 million.

Table C2. Tax deductions on angel investments

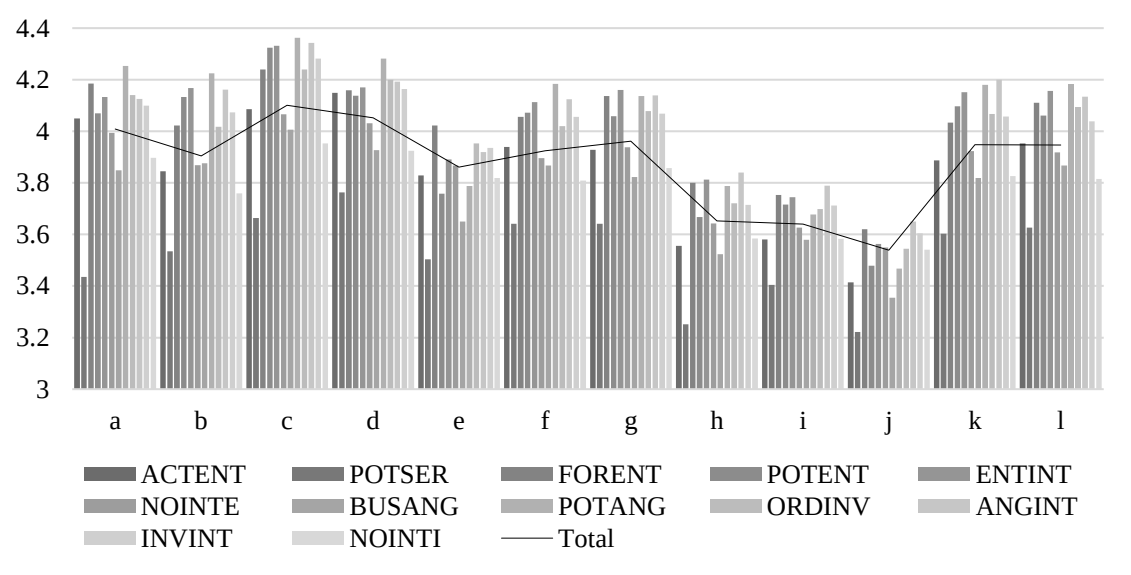
	How much of tax deduction would you require to make an angel investment?			How much would you invest annually at that rate? (in ¥10,000s)		
	N	Mean	SD	*N*	Mead	SD
BUSANG	323	30.91	12.78	341	410.57	731.02
POTANG	457	31.13	13.28	475	261.74	493.36

ORDINV	1,597	32.14	13.36	1,802	221.12	336.71
ANGINT	350	31.17	13.08	378	210.40	305.84
INVINT	454	31.20	13.26	523	234.96	282.69
NOINTI	1,495	33.30	13.18	1,798	278.86	344.13
Overall	4,676	32.16	13.25	5,317	257.02	388.74

C.5. Important factors for business ventures

Figure C5 summarizes, by type of entrepreneur and investor, the responses to questions regarding the importance of various factors for business ventures, rated on a 5-point scale. While, overall, "novelty" was rated highest in importance, the "actual entrepreneurs" and "potential serial entrepreneurs" rated "the personal character and capabilities of the founder(s)" as the highest. Further, while the "actual entrepreneurs" considered "technical capability" as important, "technical capability" for the "potential serial entrepreneurs" was not that important, compared to other factors.

All investors, regardless of type, considered "novelty" as the most important factor, followed by "the personal character and capabilities of the founder(s)." Of all the factors, "organizational structure" was considered as the least important in all categories.



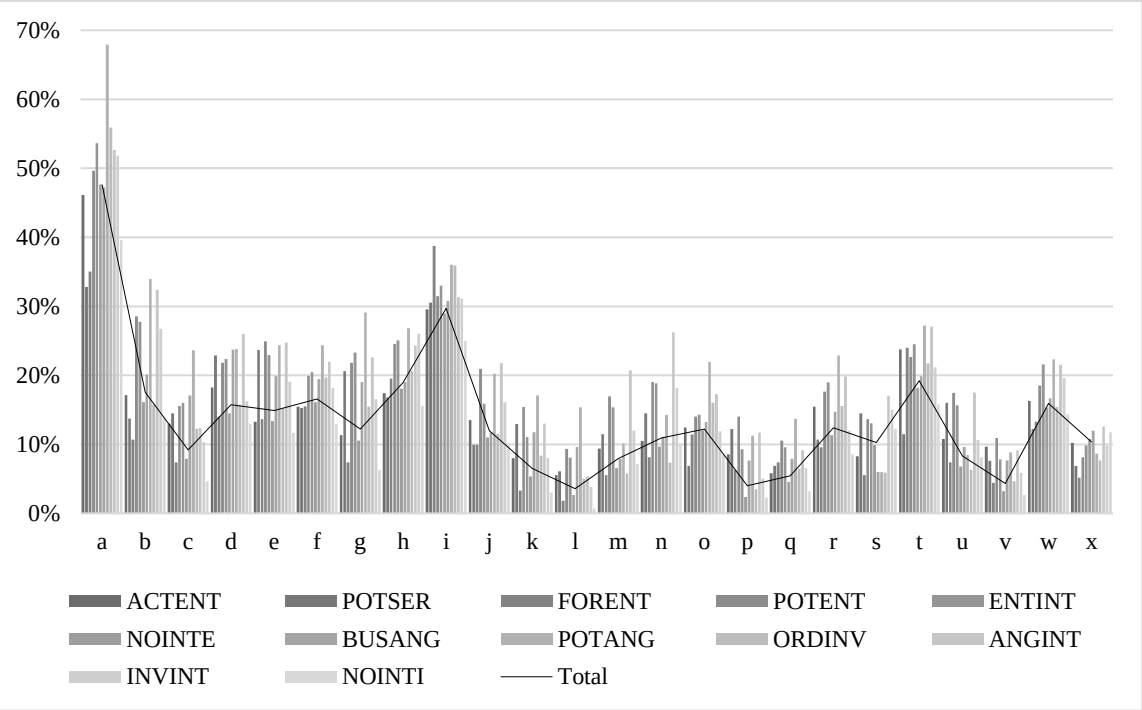
Notes: a. technical capability; b. novelty; c. ingenuity; d. the personal character and capabilities of the founder(s); e. financial health; f. uniqueness of products and services; g. marketing; h. supporter/startup incubator roles; i. socioeconomic environment; j. organizational structure; k. project plans/business plans; l. business/market growth potential

Figure C5. Important factors for start-up companies by type of entrepreneur and investor

(*N* = 10,001)

C.6. Areas of interest

Figure C6 presents the means for responses to whether the respondent was interested in each area (1) or not (0) by type. Overall, the field of business that respondents in all categories were most interested in was "artificial intelligence (AI)," followed by "senior services," "agriculture," and "tourism/inbound tourism." The type of entrepreneurs that were most interested in "senior services" were "former entrepreneurs." As indicated in Figure 8, in this type alone the majority of respondents were aged 50 or older.



Notes: a. artificial intelligence (AI); b. virtual reality (VR) ; c. robotics; d. drones; e. distribution and logistics; f. energy; g. Internet of things (IoT); h. healthcare; i. senior services; j. education; k. finance; l. Fintech; m. web development; n. application development; o. biotechnology; p. consulting; q. sharing economies; r. information technology (IT); s. fashion and household goods; t. agriculture; u. restaurants; v. real estate; w. tourism/inbound tourism; and x. sports

Figure C6. Areas of interest by type of entrepreneur and investor (in random order, multiple responses)

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