GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
KOBE UNIVERSITY
ROKKO KOBE JAPAN

2005・46

External Equity at Start-up and Post-entry Performance: Evidence from Japan

Kenji Kutsuna
Yuji Honjo

Discussion Paper Series

External Equity at Start-up and Post-entry Performance: Evidence from Japan

Kenji Kutsuna

Graduate School of Business Administration, Kobe University

Address: 2-1 Rokkodai, Nada, Kobe 657-8501, Japan

E-mail: kutsuna@kobe-u.ac.jp

Yuji Honjo

Faculty of Commerce, Chuo University

Address: 742-1 Higashinakano, Hachioji, Tokyo 192-0393, Japan

E-mail: yhonjo@tamacc.chuo-u.ac.jp

Abstract

This paper investigates whether post-entry performance differs between start-up firms, according to the source of finance. In particular, the relationship between the use of external equity and performance is focused upon. Using an original data set of start-up firms in Japan, we examine the impact of start-up financing on firm growth. It is found that start-up firms financed by business angels are more likely to increase sales. On the other hand, it is not found that those financed by banks tend to grow. Also, the use of entrepreneurs' own savings and external financing from founding members and family does not influence post-entry performance.

1. Introduction

Start-up firms are expected to play an important role in promoting economic growth. The emergence of high-growth firms boosts the stagnated economy by enhancing job creation and stimulating innovation (e.g. Birch, 1979; Ace and Audretsch, 1990). When starting businesses, however, entrepreneurs (or firm founders) indeed face difficulty in receiving finance from financial and capital markets, because of the limited operating history (Walker, 1989). Berger and Udell (1998) argued that start-up firms are the most informationally opaque and, therefore, experience great difficulty in obtaining intermediated external finance. Even though start-up firms have high growth potential, external sources of finance often do not provide sufficient funds, because of the information asymmetries between the entrepreneurs and finance providers. This results in severe financial constraints being placed on the start-up. Under the presence of information asymmetries, how firms are financed at start-up is the key to ensuring sustainable firm growth.

Needless to say, banks play a major role as the source of finance for conventional small firms. However, as is often argued, they may be reluctant to provide funds to start-up firms due to risk aversion behaviour. In their place, it is expected that venture capitalists are more willing to provide risk capital. However, the venture capital (VC) industry in some developed countries, including Japan, is not yet fully developed for seed and start-up financing (Jeng and Wells, 2000; Venture Enterprise Center, 2004).[1]

[1] Jeng and Wells (2000) argued that venture capital firms in Japan and Germany are not as actively involved in managing their investments as those in the United States. They also provided evidence that venture capital investment normalized by average gross domestic product (GDP) in Japan is much less than in the United States and Western Europe.

For these reasons, entrepreneurs often depend on informal investors, such as family, friends and business angels, at the very earliest stage for developing business plans or products (Harrison and Mason, 1997; Benjamin and Margulis, 2000; Van Osnabrugge and Robinson, 2000). Under the presence of information asymmetries, informal investors play a more important role as external capital providers of initial funds, as opposed to banks (Peterson and Shulman, 1987; Storey, 1994b).

According to the pecking order approach developed by Donaldson (1961) and Myers (1984), firms use internal money first (personal savings and retained earnings), access external debt next, and lastly seek external equity. Furthermore, many small business owner-managers are strongly opposed to sharing ownership, either with financial institutions or with other individuals, and so depend on founders' own capital or debt financing (Hamilton and Fox, 1998). This may constitute a constraint upon the growth of the business. Previous literature indicates that fast-growth small businesses are willing to share equity (Storey, 1994b). Regarding the relationship between the use of external equity and the effect it has on post-entry performance, there are massive amounts of research on venture capital-backed firms. However, there is little research related to whether angel-backed firms perform well.[2]

This paper explores the impact of start-up financing on post-entry performance. In particular, the paper highlights the difference between start-up firms, according to the source of finance. Using data obtained from the original questionnaire survey, we examine whether start-up financing significantly affects firm growth. The results suggest that start-up firms financed by business angels are more likely to increase sales,

[2] For example, according to Kutsuna and Harada (2004) analysing Japanese start-up firms, no evidence was shown that start-up financial and non-financial support by small business owner-managers tended to enhance the post-entry performance.

while those financed by banks are not found to achieve firm growth. Also, the use of entrepreneurs' own savings and external financing from founding members and family does not influence post-entry performance.

As already mentioned, the emergence of start-up firms is often expected to revitalise the stagnated economy, but indeed, entrepreneurs have various motives for starting up. While some firms pursue high growth at start-up, others do not have any interest in firm growth. From the viewpoint of macroeconomic growth, start-up firms with growth potential play a more important role in stimulating the economy. Understanding what type of start-ups pursues firm growth, therefore, would be a matter of increasing interest for future economic growth.

The remainder of the paper is organized as follows. Section 2 reviews literature on start-up financing and post-entry performance. Section 3 explains data used in this paper. Section 4 shows the estimated results. Finally, concluding remarks are presented.

2. Literature review

Berger and Udell (1998) examine the economics of financing small business in private equity and debt markets and show how capital structure varies with firm size and age. Regarding the 'existing' small firms, a large amount of research empirically examines how the financial behaviour of small firms is influenced by size, age, firm type, and business sector, and how financial behaviour influences small firm performance (e.g. Keasey and McGuinness, 1990; Van der Wijst and Thurik, 1991; Hutchinson, 1993; Chaganti, DeCarolis and Deeds, 1995; Chittenden, Hall and Hutchinson, 1996; Reid, 1996, 2003; Michaelas, Chittenden and Poutziouris, 1999; Winker, 1999; Lopez-Gracia

and Aybar-Arias, 2000; Romano, Tanewski and Smyrnios, 2000; Giudici and Paleari, 2000).

On the other hand, investigations of financial constraints at start-up and the determinants of post-entry performance have been relatively few. Among them, however, a line of Cressy's works provide important insights (Cressy, 1995, 1996a, 1996b, 1996c). Using a large random sample of UK start-ups, Cressy (1996b) indicates that business income targets in practice constitute significant motivation for start-up growth, and that human capital represented by age plays no additional role. Cressy (1996c) demonstrates that human capital is the 'true' determinant of survival and that the correlation between financial capital and survival is spurious.

Furthermore, other studies examine the effects of start-up financing on firm characteristics (e.g. start-up size) and on post-entry performance. Scherr, Sugrue and Ward (1993) examine how the characteristics of both owner and firm affect the debt use at start-up. They found that the percentage of the owner's income expected to be derived from the business to be positively associated with external financing (debt use), and the owner's age negatively associated with debt use. Colombo and Grilli (2005) examined the role of external financing in influencing firms' start-up size, and found that bank debt-financed firms are not larger than firms created only through founders' personal savings. Regarding post-entry performance, Storey (1994a), for example, pointed out that the current employment size of new firms strongly related to the personal characteristics of the founder more than whether or not the firm uses bank finance. Åstebro and Bernhardt (2003) examined the survival of new small businesses and bank loans, and argued that there is a positive correlation between having a non-bank loan and business survival. These aforementioned studies, however, have

tended to estimate the effects of bank financing or non-bank financing on post-entry performance. In other words, there is little attention paid to the effects of informal capital, such as business angels.

As discussed, because of the presence of information asymmetries, informal investors play a more important role as external capital providers of initial funds, and finance structure may affect the post-entry performance of start-up firms. Fenn and Liang (1998) pointed out that private equity for rapidly growing small businesses is raised primarily from the organized VC market and the informal market, comprised of high net worth individuals or business angels. That is, the source of finance may be a key determinant for the growth of start-up firms. Following Modigliani and Miller (1958), in a frictionless capital market, the source of finance has no influence on the performance of start-ups. However, the cost of external finance, such as bank financing, often exceeds the opportunity cost of internal finance, such as personal savings of entrepreneurs, and their family and friends.[3] Fu, Ke and Huang (2002) examine the relationship between profitability and financial capital for small firms in Taiwan. When financial capital is further divided into debt and equity, the results show a significantly positive relationship between profitability and equity financing, but a significantly negative relationship between profitability and debt financing.

As mentioned before, many small business owner-managers are strongly opposed to sharing ownership. Furthermore, business angels and venture capitalists have a strict screening process. Thus, angel and VC financing represent relatively small portions of small business finance. Berger and Udell (1998) show that the percentages of angel and

[3] Fazzari, Hubbard and Petersen (1998) proposed the 'financial hierarchy' hypothesis, which demonstrates that the cost of external finance exceeds the opportunity cost of internal finance.

VC finance of total finance are 3.59% and 1.85%, respectively. However, as Cressy and Olofsson (1997) pointed out, owners of younger firms find the added expertise of new equity holders favourable. This result suggests that growth-oriented founders with less management skill (e.g. younger founders, founders with low level of education, and original founders) tend to use external equity.

3. Data

In practice, there are several data sources available to obtain data on start-ups in Japanese industries. Firstly, *Nikkei Venture Business Annual Report* (*Nikkei Venture Business Nenkan*) compiled by a major Japanese newspaper, Nihon Keizai Shimbun, Inc. (Nikkei) provides data on new ventures. The data source, however, does not report the financial sources of initial funds. In addition, the source includes not only start-ups but also small-sized firms with a long history, which are unable to be regarded as start-ups. Secondly, *Survey on Business Start-ups in Japan* (*Shinki Kaigyo Jittai Chosa*) compiled by a government financial institute, the National Life Finance Corporation (NLFC), provides data on start-ups annually.[4] Although the data source reports the financial sources of initial funds, data on employment or sales growth are not constantly obtainable. In addition, the source is restricted to data only on firms financed by the NLFC. The data sources needed to implement our approach are not generally available, and, hence, we attempted to construct an original data set through a questionnaire survey named *Survey on the Management of Start-ups in Japan* (*Wagakuni Start-up Kigyo no Keiei Jittai ni Kansuru Chosa*).

[4] For example, Harada (2003, 2004) and Honjo (2005) investigated new ventures using *Survey on Business Start-ups in Japan*.

Using *Survey on the Management of Start-ups in Japan*, we constructed a sample to estimate the post-entry performance of start-up firms.[5] In the survey, firms founded in the manufacturing and information service industries during 1995-1997 are targeted as start-ups. As a measure for the performance of firms, the growth rates of employment and sales are used.[6] In the survey, we inquired about the numbers of employees and board members both at that time and start-up, respectively. In this paper, employment size is measured by the number of employees plus board members. Some firms do not have any employees, and instead board members often play a role as employees. In the case of firms with no employees (only with board members acting as employees), the growth rate cannot be defined. Therefore, it was necessary to measure employment growth by both employees and board members. The growth rate of employment is defined as the difference of the logarithms of employment sizes between the periods, divided by firm age. On the other hand, we inquired about sales for the preceding three years. The growth rate of sales is defined as the difference of the logarithms between the two years, divided by two. Table 1 shows the growth rates of employment sizes and sales, respectively. On average, the employment growth rate is

[5] For more details on the survey, see Honjo and Kutsuna (2003). The data set of *Survey on the Management of Start-ups in Japan* is composed of 1045 firms, which are joint-stock corporations and privately-limited companies in the manufacturing and information service industries of Japan. However, since some firms had been founded before or after the observation period, 1995-1997, or could not be regarded as founded during the period, they were excluded from the sample. In addition, firms from industries other than the manufacturing and information service industries were excluded. As a result, the number of observations is 848. Furthermore, since all the firms did not necessarily answer all the questions, the number of observations depends on the question.

[6] Although profitability is also used as a measure for performance, in general, questions about profitability tend to be avoided in answering. Thus, we did not inquire about profitability in the survey.

about 7%. Even when deflation has occurred during the period, the sales growth rate is maintained at about 10%.[7]

[Table 1 and Table 2 here]

Table 2 shows which source is used as initial funds in the sample. In Table 2, about 80% of the start-up firms have utilised personal savings. On the other hand, about 10% have used private banks in start-up financing, and the rate of funds financed by private banks is approximately 6% among the initial funds. Among the start-up firms, 6% have utilised business angels, and only 0.8% has used VC firms. As already mentioned, the VC industry in some developed countries, such as Japan, is not fully developed, and the results also imply that VC financing is rare in start-up financing.

4. Empirical results

4.1. Difference in firm growth

We show the difference in firm growth, according to the source of finance. Tables 3 and 4 present the employment and sales growth, respectively, and provide *t*-statistics to show the difference of the source of finance. In Table 3, the employment growth of start-up firms financed by business angels significantly differs from that of the others, indicating that those financed by business angels are more likely to grow. This tendency

[7] There remains, however, the upward bias in the estimation, since exits have been excluded from the sample. Although it was important to control the bias, the survey could not cover exits.

is also found in the sales growth at the 1% significance level. On the other hand, the average and median growth rates of start-up firms financed by venture capitalists are larger than the others, but the difference is not significant, partly because the number of start-up firms financed by venture capitalists is not notably large. When VC financing is included in angel financing, it is found that firms financed by business angels or venture capitalists are more likely to increase employment and sales compared to firms that do not receive such financing, and the difference is fairly significant.

Moreover, financing through entrepreneurs' own savings does not affect firm growth, even when financing from the board members and employees or family of entrepreneurs is included. Furthermore, it is not found that bank financing or public support financing significantly affects firm growth.

[Table 3 and Table 4 here]

In Tables 3 and 4, we also provide the results with the Mann-Whitney z-statistics to take into account a non-parametric test. Even when the non-parametric test is employed, it is found that start-up firms financed by business angels are more likely to increase employment and sales. The results also support the positive relationship between firm growth and angel financing. However, the firms financed only by venture capitalists are not found to grow significantly. As discussed, the ratio of the VC-backed firms is low, and, hence, there is the possibility that the results are brought about due to an insufficient sample size. As a result of our findings, business angels providing initial funds to start-up firms play a significant role in achieving high firm growth. The findings imply that business angels pay more attention to monitoring the growth

potential of start-up firms compared to other individuals.

[Table 5 here]

Moreover, Table 5 presents firms with growth rates in the top 5% or 10%. Table 5 indicates that angel financing contributes to start-up firms with the fastest growth. Angel-backed firms constitute 6.1-6.2% of our sample firms, and also, angel- or VC-backed firms constitute 6.7-6.8% of our sample firms. With respect to the proportion of angel-backed firms and angel- or VC-backed firms among all fastest growing firms, firms financed by business angels constitute a relatively higher proportion among the fastest growth firms. As shown in Table 5, the percentage of angel-backed firms with employment growth in the top 5% and 10% is 5.7% and 8.5%, respectively, and the percentage of angel- or VC-backed firms with employment growth in the top 5% and 10% is 8.6% and 11.3%, respectively. Similarly, the percentage of angel-backed firms with sales growth in the top 5% and 10% is 12.5% and 10.8%, respectively, and the percentage of angel- or VC-backed firms with sales growth in the top 5% and 10% is 12.5% and 13.8%, respectively. Thus, angel financing at start-ups contributes to the creation of fast growth firms, particularly in sales growth.

4.2. Use and Impact of angel financing

In this section, we firstly examine what type of firms and entrepreneurs utilise angel financing, including VC financing. As shown in Table 6, independent firms tend to use angel financing more than others such as spin-offs and family businesses.

Similarly, joint-stock corporations tend to use angel financing more than private limited companies. Regarding entrepreneur-specific characteristics, the age of entrepreneurs seems to be negatively related to the use of angel financing in line with Cressy and Olofsson (1997). In addition, highly educated entrepreneurs, such as those who have graduated from university, and original founders of start-up firms may actively use angel financing. Moreover, entrepreneurs who wish to go public tend to use angel financing.

[Table 6 here]

As shown in Tables 3, 4 and 5, the positive relationship between firm growth and angel financing is seen. Business angels and venture capitalists appear to invest in growing industries, such as information technology. On the other hand, post-entry performance, including firm growth, is affected not only by firm-specific characteristics but also by entrepreneur-specific characteristics, since start-up firms tend to be small. In addition, industry-specific characteristics may have an impact on post-entry performance. Therefore, we estimate the relationship between firm growth and angel financing, by controlling the effects of industry growth, and firm-specific and entrepreneur-specific characteristics.

Angel is a dummy variable for firms which are financed by business angels whereas, *Angel&VC* is a dummy variable for firms which are financed by business angels or venture capitalists. Regarding firm-specific characteristics, *Independent* is a dummy variable for independent firms, and *Corporation* is a dummy variable for joint-stock corporations. Regarding entrepreneur-specific characteristics, Ln_*Fage* is

the logarithm of the entrepreneur's age at start-up. *University* is a dummy variable for entrepreneurs who have graduated from university or post-graduate school. *Founder* is a dummy variable for the entrepreneur who is an original founder of the firm. *IPO-oriented* is a dummy variable for entrepreneurs who wish to go public.

In addition to firm-specific and entrepreneur-specific characteristics, the variable *Industry growth*, measured by both employment growth and sales growth, is included in the regression model.[8] *Industry growth* measured by employment growth is used in the regression analysis of employment growth, while *Industry growth* measured by sales growth is used in the regression analysis of sales growth. Each variable is defined as the difference between the logarithms of employment figures and sales during 1998-2000, using the *Census of Manufactures* and *Survey on Specified Service Industries: Information Services*. Finally, two year dummy variables *Cohort 1995* and *Cohort 1996* are included to control macro-economic conditions.

[Table 7 here]

Table 7 shows the relationship between firm growth and angel financing, by using OLS regression models. In order to take into account the heterogeneity of variances, White's (1980) heteroschedasticity-consistent estimator is employed. The descriptive statistics of the variables and the correlation matrix of the independent variables are

[8] While the *Census of Manufactures* covers establishments with 4 or more persons employed, it is conducted on all sized establishments only in 1998, 2000, and 2003 after their foundation years, 1995-1997. Since the effects of small-sized establishments on industry growth cannot be ignored when the post-entry performance of start-up firms are examined, industry growth is measured with data for 1998-2000.

indicated in Appendix. As shown in Table 7, angel financing has a positive impact on sales growth, which indicates that start-up firms financed by business angels are more likely to increase sales. However, the relationship is not found in employment growth.

Regarding employment growth, it is found that firm-specific and entrepreneur-specific characteristics influence firm growth. Independent firms tend to increase employment. The results also show that joint-stock corporations achieve higher employment growth than private limited companies. The legal form of a privately limited company in Japan presumably is introduced under the premise that a privately limited company is not publicly traded but privately held. As expected, the behaviour and strategies of start-up firms are different between the two legal forms, and joint-stock corporations have more intention to achieve growth than those of privately limited companies. The coefficient of Ln_*Fage* is negatively significant, which indicates that young entrepreneurs increase employment. This result is consistent with recent empirical studies showing the negative relationship between firm growth and age (e.g., Heshmati, 2001; Yasuda, 2005). Furthermore, entrepreneurs who have graduated from university or post-graduate school increase employment, and similarly entrepreneurs who wish to go public increase employment. In line with suggestions by Cressy (1996b), the intention to go public (IPO intention) may constitute significant motivation for start-up growth. It is also found that industry growth has a positive impact on employment growth. Regarding sales growth, entrepreneurs with the IPO intention increase sales as well. However, it is found that firm-specific and entrepreneur-specific characteristics apart from the IPO intention do not influence post-entry performance.

With respect to the different impact of bank financing and angel financing on firm performance, there are two possibilities. One possibility is that the difference in impact

of each financing method is due to the difference of 'priority' in their screening and monitoring process. As it is necessary for business angels to harvest their own investment, business angels tend to pay more attention to the growth potential of start-up firms. On the other hand, as it is not necessary for banks to harvest their own investment when making loans, banks seem to be more concerned with the stability of start-up firms, rather than growth potential.

Another possibility is that the difference in impact of each financing method is due to the difference of 'ability' in their screening and monitoring process. As previous literature has pointed out, business angels have high abilities in screening and monitoring start-up firms (e.g. Harrison and Mason, 1997; Benjamin and Margulis, 2000; Van Osnabrugge and Robinson, 2000). On the other hand, banks, in particular Japanese banks have been negative toward start-up financing, and thus banks do not have high abilities in screening and monitoring start-up firms. Furthermore, regarding the difference in impact on employment and sales growth, sales revenue can be seen as a direct measurement of growth for both entrepreneurs and providers of funds, where as changes in employment is a less direct measurement of growth.

5. Concluding remarks

This paper investigated whether post-entry performance differs between start-up firms, according to the source of finance. Using an original data set of start-up firms in Japan, we examined the impact of start-up financing on firm growth. As a result, it was found that start-up firms financed by business angels are more likely to increase sales. Angel financing at start-ups positively contributed to a small number of the fastest growth

firms (firms with growth rates in the top 5% or 10%), particularly in sales growth. Based on the analysis regarding the use of angel financing, independent firms, joint-stock corporations, original founders, and entrepreneurs with the IPO intention tend to use angel financing. On the other hand, it was not found that start-up firms financed by banks tend to grow. Furthermore, the use of entrepreneurs' own savings and external financing from founding members and family does not influence post-entry performance. These results are consistent with previous studies such as Storey (1994b), Fenn and Liang (1998), Fu, Ke and Huang (2002) that the use of external equity plays an important role in assisting small firms to achieve high performance.

When we estimate the relationship between firm growth and angel financing, by controlling the effects of industry growth, and firm-specific and entrepreneur-specific characteristics, angel financing has a positive impact on sales growth. However, the relationship is not found in employment growth. Furthermore, it is found that firm-specific and entrepreneur-specific characteristics influence employment growth, while these characteristics apart from the IPO intention do not influence sales growth. The difference in impact on employment and sales growth in addition to accurate measurements of performance as investigated by Murphy, Trailer and Hill (1996) needs to be further examined.

Acknowledgement

This study is in part financially supported by Grant-in-Aid for Exploratory Research 15653022 for the first author, and by Grant-in-Aid for Scientific Research (C)17530191 for the second author, respectively.

[2005.12.1 736]

References

Ace, Z.J. and D.B. Audretsch, 1990, *Innovation and Small Firms*, Cambridge: MIT Press.

Åstebro, T. and I. Bernhardt, 2003, 'Start-Up Financing, Owner Characteristics, and Survival', *Journal of Economics and Business* 55, 303-319.

Benjamin, G.A. and J.B. Margulis, 2000, *Angel Financing: How to Find and Invest in Private Equity*, John Willy & Sons.

Berger, A.N. and G.F. Udell, 1998, 'The Economics of Small Business Finance: the Roles of Private Equity and Debt Markets in the Financial Growth', *Journal of Banking & Finance* 22, 613-673.

Birch, D., 1979, *The Job Generation Process*, Cambridge, Mass: MIT Program on Neighborhood and Regional Change.

Chaganti, R., D. DeCarolis and D. Deeds, 1995, 'Predictions of Capital Structure in Small Ventures', *Entrepreneurship Theory and Practice* 20, 7-18.

Chittenden, F., G. Hall and P. Hutchinson, 1996, 'Small Firm Growth, Access to Capital Markets and Financial Structure: Review of Issues and an Empirical Investigation', *Small Business Economics* 8, 59-67.

Colombo, M.G. and L. Grilli, 2005, 'Start-up Size: the Role of External Financing', *Economics Letters* 88, 243-250.

Cressy, R., 1995, 'Business Borrowing and Control: A Theory of Entrepreneurial Types', *Small Business Economics* 7, 291-300.

Cressy, R., 1996a, 'Pre-entrepreneurial Income, Cash-flow Growth and Survival of Startup Businesses: Model and Tests on U.K. Data', *Small Business Economics* 8, 49-58.

Cressy, R., 1996b, 'Commitment Lending Under Asymmetric Information: Theory and Tests on U.K. Startup Data', *Small Business Economics* 8, 397-408.

Cressy, R., 1996c, 'Are Business Startups Debt-Rationed?', *Economic Journal* 106, 1253-1270.

Cressy, R. and C. Olofsson, 1997, 'The Financial Conditions for Swedish SMEs: Survey and Research Agenda', *Small Business Economics* 9, 179-194.

Donaldson, G., 1961, *Managing Corporate Wealth: The Operation of a Comprehensive Financial Goals System*, New York: Praeger Publishers.

Evans, D.S. and B. Jovanovic, 1989, 'An Estimated Model of Entrepreneurial Choice under Liquidity Constraints', *Journal of Political Economy* 97, 808–827.

Fazzari, S.M., R.G. Hubbard, and B.C. Petersen, 1988, 'Financing Constraints and Corporate Investment', *Brookings Papers on Economic Activity* 2, 141-206.

Fenn, G.W. and N. Liang, 1998, 'New Resources and New Ideas: Private Equity for Small Businesses', *Journal of Banking & Finance* 22, 1077-1084.

Fu, T.W., M.C. Ke, and Y.S. Huang, 2002, 'Capital Growth, Financing Source and Profitability of Small Businesses: Evidence from Taiwan Small Enterprises', *Small Business Economics* 18, 257-267.

Giudici, G. and S. Paleari, 2000, 'The Provision of Finance to Innovation: A Survey Conducted among Italian Technology-based Small Firms', *Small Business Economics* 14, 37-53.

Hamilton, R.T. and M.A. Fox, 1998, 'The Financing Preferences of Small Firm Owners', *International Journal of Entrepreneurial Behaviour & Research* 4, 239-248.

Harada, N., 2003, 'Who Succeeds as an Entrepreneur? An Analysis of the Post-Entry

Performance of New Firms in Japan', *Japan and the World Economy,* 15, 211-222.

Harada, N., 2004, 'Productivity and Entrepreneurial Characteristics in New Japanese Firms', *Small Business Economics* 23, 299-310.

Harrison, R.T. and C.M. Mason eds, 1997, *Informal Venture Capital: Evaluating the Impact of Business Introduction Services*, Woodhead-Faulkner.

Heshmati, A., 2001, 'On the Growth of Micro and Small Firms: Evidence from Sweden', *Small Business Economics* 17, 213-228.

Honjo, Y., 2005, 'The Impact of Entrepreneurial Human Capital on Start-up Financing', unpublished paper.

Honjo, Y. and K. Kutsuna, 2003, 'Survey on Management of Start-ups in Japan (*Wagakuni Start-up Kigyo No Keiei Jittai Ni Kansuru Chos*a.)', IBRCU Working Paper Series, Institute of Business Research, Chuo University, No. 8.

Honjo, Y. and K. Kutsuna, 2005, 'An Empirical Analysis of the Initial Public Offering Intention: Evidence from Start-up Firms in Japan', unpublished paper.

Hutchinson, R.W., 1993, 'The Capital Structure and Investment Decisions of the Small Owner-Managed Firm: Some Exploratory Issues', *Small Business Economics* 7, 231-239.

Jeng, L.A. and P.C. Wells, 2000, 'The Determinants of Venture Capital Funding: Evidence Across Countries', *Journal of Corporate Finance* 6, 241-289.

Keasey, K. and P. McGuinness, 1990, 'Small New Firms and the Return to Alternative Sources of Finance', *Small Business Economics* 2, 213-222.

Kutsuna, K. and N. Harada, 2004, 'Small Business Owner-Managers as Latent Informal Investors in Japan: Evidence from a Country with a Bank-based Financial System',

Venture Capital 6, 283-311.

Lopez-Gracia, J. and C. Aybar-Arias, 2000, 'An Empirical Approach to the Financial Behaviour of Small and Medium Sized Companies', *Small Business Economics* 14, 55-63.

Michaelas, N., F. Chittenden and P. Poutziouris, 1999, 'Financial Policy and Capital Structure Choices in U.K. SMEs: Empirical Evidence form Company Panel Data', *Small Business Economics* 12, 113-130.

Modigliani, F. and M. Miller, 1958, 'The Cost of Capital, Corporation Finance, and the Theory of Investment', *American Economic Review* 48, 261-297.

Murphy, G.B., J.W. Trailer and R.C. Hill, 1996, 'Measuring Performance in Entrepreneurship Research', *Journal of Business Research* 36, 15-23.

Myers, S.C., 1984, 'The Capital Structure Puzzle', *Journal of Finance* 34, 575-592.

Peterson, R. and J. Shulman, 1987, 'Capital Structure of Growing Small Firms: A Twelve Country Study on Becoming Bankable', *International Small Business Journal* 5, 10-22.

Reid, G.C., 1993, 'Financing Structure and the Growing Small Firm: Theoretical Underpinning and Current Evidence', *Small Business Economics* 8, 1-7.

Reid, G.C., 2003, 'Trajectories of Small Business Financial Structure', *Small Business Economics* 20, 273-285.

Romano, C.A., G.A. Tanewski and K.X. Smyrnios, 2000, 'Capital Structure Decision Making: A Model for Family Business', *Journal of Business Venturing* 16, 285-310.

Scherr, F.C., T.F. Sugrue and J.B. Ward, 1993, 'Financing the Small Firm Start-Up: Determinants of Debt Use', *Journal of Small Business Finance* 3, 17-36.

Storey, D.J., 1994a, 'New Firm Growth and Bank Financing', *Small Business Economics* 6, 139-150.

Storey, D.J., 1994b, *Understanding the Small Business Sector*. Routledge, London.

Van der Wijst, N. and R. Thurik, 1991, 'Determinants of Small Firm Debt Ratios: An Analysis of Retail Panel Data', *Small Business Economics* 5, 55-65.

Van Osnabrugge, M. and R.J. Robinson, 2000, *Angel Investing: Matching Start-up Funds with Start-up Companies*, Jossey-Bass Inc.

Venture Enterprise Center, 2004, *Report of Venture Capital Investment in Japan*, VEC (in Japanese).

Walker, D.A., 1989, 'Financing the small Firm', *Small Business Economics* 1, 285-296.

White, H, 1980, 'A Heteroschedasticity-consistent Covariance Matrix Estimator and a Direct Test for Heteroschedasticity', *Econometrica* 48, 817-838.

Winker, P., 1999, 'Causes and Effects of Financing Constraints at the Firm Level', *Small Business Economics* 12, 169-181.

Yasuda, T., 2005, 'Firm Growth, Size, Age and Behavior in Japanese Manufacturing', *Small Business Economics* 24, 1-15.

Table 1 Descriptive statistics of firm growth

Growth rate (per year)	Obs.	Mean	Median	S.D.	Min.	Max.
Employment	796	0.073	0.041	0.124	-0.389	0.816
Sales	705	0.099	0.064	0.307	-1.301	1.488

Table 2 Descriptive statistics of start-up financing

	Source of finance	Usage	Ratio	
		Mean	Mean	S.D.
(a)	Personal savings of the entrepreneur	0.809	0.518	0.384
(b)	Loans and investments from founding members who are directors or employees apart from the entrepreneur	0.373	0.143	0.24
(c)	Loans and investments from the family of the entrepreneur	0.148	0.052	0.158
(d)	Loans and investments from business angels	0.059	0.021	0.113
(e)	Loans and investments from private companies	0.114	0.068	0.224
(f)	Loans and investments from venture capitalists	0.008	0.004	0.048
(g)	Loans and investments from commercial banks	0.125	0.066	0.202
(h)	Loans and investments from public financial institutes	0.059	0.026	0.12
(i)	Subsidies from the government and local governments	0.032	0.009	0.064
(j)	Leases, loans and bills for investment	0.042	0.014	0.082
(k)	Others	0.096	0.079	0.026

Note: The number of observations is 761. ‘Usage’ indicates the rate of the firms using the financial source to the sample firms. ‘Financial ratio’ indicates that the rate of funds financed by the source to all the funds in the sample.

Table 3 Comparison of the employment growth rate

Source	Usage	No.	Mean	Median	t-stat.	z-stat.
(a) Entrepreneur	no	139	0.08	0.035	0.254_{w}	-0.736
	yes	580	0.076	0.048		
(a) Entrepreneur + (b) Founding members	no	121	0.085	0.048	0.648_{w}	-0.316
	yes	598	0.075	0.048		
(a) Entrepreneur + (c) Family	no	130	0.083	0.042	0.518_{w}	-0.452
	yes	589	0.076	0.048		
(a) Entrepreneur + (b) Founding members + (c) Family	no	114	0.088	0.052	0.885_{w}	-0.006
	yes	605	0.075	0.048		
(d) Angel	no	675	0.075	0.045	-2.017^{**}	-2.720^{***}
	yes	44	0.114	0.1		
(f) VC	no	714	0.077	0.048	-1.013	-1.065
	yes	5	0.134	0.231		
(d) Angel + (f) VC	no	671	0.074	0.044	-2.343^{**}	-3.010^{***}
	yes	48	0.118	0.108		
(g) Bank	no	630	0.078	0.048	0.639	0.398
	yes	89	0.069	0.052		
(h) Public finance	no	678	0.078	0.048	0.825	0.929
	yes	41	0.061	0.02		
(g) Bank + (h) Public finance	no	607	0.079	0.048	1.04	0.798
	yes	112	0.066	0.045		
(h) Public finance + (i) Subsidy	no	657	0.078	0.048	0.559	0.741
	yes	62	0.068	0.024		

Note: No. indicates the number of observations. T-stat. indicates a statistic for the two-comparison mean test. When the hypothesis that the variances are equal between the two samples is rejected, Welch's formula is used, which is indicated by w. Z-stat. indicates the Mann-Whitney two-sample statistic. *** and ** indicate the 1% and 5% significance level, respectively.

Table 4 Comparison of the sales growth rate

Source	Usage	No.	Mean	Median	t-stat.	z-stat.
(a) Entrepreneur	no	125	0.125	0.074	0.858	1.078
	yes	532	0.099	0.064		
(a) Entrepreneur + (b) Founding members	no	107	0.113	0.064	0.343	0.742
	yes	550	0.102	0.065		
(a) Entrepreneur + (c) Family	no	117	0.119	0.064	0.592	0.74
	yes	540	0.101	0.065		
(a) Entrepreneur + (b) Founding members + (c) Family	no	101	0.105	0.056	0.022	0.36
	yes	556	0.104	0.067		
(d) Angel	no	616	0.095	0.059	-2.891***	-4.150***
	yes	41	0.238	0.207		
(f) VC	no	652	0.104	0.064	-0.165_w	-1.613
	yes	5	0.15	0.323		
(d) Angel + (f) VC	no	612	0.095	0.058	-2.772***	-4.340***
	yes	45	0.226	0.211		
(g) Bank	no	579	0.103	0.071	-0.243	0.766
	yes	78	0.112	0.044		
(h) Public finance	no	616	0.105	0.065	0.37	-0.184
	yes	41	0.087	0.064		
(g) Bank + (h) Public finance	no	554	0.103	0.067	-0.214	0.44
	yes	103	0.11	0.056		
(h) Public finance + (i) Subsidy	no	596	0.102	0.064	-0.539	-0.671
	yes	61	0.124	0.072		

Note: No. indicates the number of observations. T-stat. indicates a statistic for the two-comparison mean test. When the hypothesis that the variances are equal between the two samples is rejected, Welch's formula is used, which is indicated by w. Z-stat. indicates the Mann-Whitney two-sample statistic. *** indicates the 1% significance level.

Table 5 High growth firms and angel financing

(a) Employment Growth	Growth Rate	No. of Firms	Angel-backed Firms	%	Angel or VC-backed Firms	%
Top 5%	41.1%	35	2	5.7%	3	8.6%
Top 10%	33.8%	71	6	8.5%	8	11.3%
Total	7.7%	719	44	6.1%	48	6.7%

(b) Sales Growth	Growth Rate	No. of Firms	Angel-backed Firms	%	Angel or VC-backed Firms	%
Top 5%	96.6%	32	4	12.5%	4	12.5%
Top 10%	74.1%	65	7	10.8%	9	13.8%
Total	10.4%	657	41	6.2%	45	6.8%

Table 6 Firm and entrepreneur charactersitics and the use of angel financing

	All firms	Angel-backed firms		Angel- and VC-backed	
		No. of firms	%	No. of firms	%
Independent	419	36	8.60%	37	8.80%
Others	342	9	2.63%	13	3.80%
Total	761	45	6.00%	50	6.60%
Joint-stock corporation	506	36	7.10%	39	7.70%
Private limited company	253	9	3.60%	11	4.30%
Total	759	45	5.90%	50	6.60%
Age < 30	173	13	7.50%	14	8.10%
40 <= Age < 50	229	15	6.60%	16	7.00%
50 <= Age < 60	231	13	5.60%	15	6.50%
Age >= 60	80	2	2.50%	2	2.50%
Total	713	43	6.00%	47	6.60%
High-school/college	368	17	4.60%	19	5.20%
University	321	25	7.80%	27	8.40%
Post-graduate	25	1	4.00%	1	4.00%
Total	714	43	6.00%	47	6.60%
Founder	598	43	7.20%	48	8.00%
Successor	152	2	1.30%	2	1.30%
Total	750	45	6.00%	50	6.70%
With the IPO intention	166	15	9.04%	17	10.24%
Without the IPO intention	571	30	5.25%	33	5.78%
Total	737	45	6.11%	50	6.78%

Table 7 Determinants of firm growth (OLS regression)

Variables	Employment		Sales	
Constant term	0.275***	0.274***	0.088	0.090
	(0.082)	(0.082)	(0.258)	(0.259)
Angel	0.012		0.121***	
	(0.015)		(0.041)	
Angel&VC		0.018		0.110**
		(0.016)		(0.050)
Independent	0.028***	0.028***	0.028	0.030
	(0.010)	(0.010)	(0.029)	(0.030)
Corporation	0.056***	0.056***	0.033	0.035
	(0.010)	(0.010)	(0.029)	(0.028)
Ln_Fage	-0.060***	-0.060***	-0.000	-0.001
	(0.020)	(0.020)	(0.064)	(0.064)
University	0.019**	0.019**	0.035	0.036
	(0.010)	(0.010)	(0.026)	(0.026)
Founder	0.005	0.005	-0.024	-0.025
	(0.014)	(0.014)	(0.033)	(0.032)
IPO-oriented	0.056***	0.055***	0.068**	0.066*
	(0.012)	(0.012)	(0.034)	(0.034)
Industry growth	0.833***	0.836***	0.320	0.325
	(0.190)	(0.190)	(0.242)	(0.243)
Cohort 1995	-0.025**	-0.025**	-0.078**	-0.078**
	(0.012)	(0.012)	(0.032)	(0.031)
Cohort 1996	-0.030***	-0.031***	-0.039	-0.038
	(0.012)	(0.012)	(0.032)	(0.032)
Number of observations	647	647	600	600
R-squared	0.185	0.185	0.049	0.049

Note: Figures in parentheses are standard errors. ***, ** and * indicate the 1%, 5% and 10% significance level, respectively.

Appendix Descriptive statistics and the correlation matrix of the independent variables

Variable	Obs	Mean	Std. Dev	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Angel	647	0.065	0.247	0	1	1										
(2) Angel&VC	647	0.071	0.257	0	1	0.952	1									
(3) Independent	647	0.555	0.497	0	1	0.122	0.103	1								
(4) Corporation	647	0.692	0.462	0	1	0.067	0.054	-0.152	1							
(5) Ln_Fage	647	3.829	0.235	3.045	4.317	-0.065	-0.063	-0.253	0.129	1						
(6) University	647	0.490	0.500	0	1	0.056	0.054	-0.124	0.191	0.017	1					
(7) Founder	647	0.794	0.404	0	1	0.103	0.111	0.383	-0.107	0.284	-0.091	1				
(8) IPO-oriented	647	0.229	0.420	0	1	0.066	0.078	0.118	0.243	0.121	0.173	0.113	1			
(9) Industry growth	647	-0.033	0.023	-0.114	-0.004	-0.027	-0.022	0.066	0.029	0.093	0.042	0.111	0.107	1		
(10) Cohort 1995	647	0.314	0.464	0	1	-0.070	-0.070	0.049	-0.011	0.018	-0.030	-0.043	0.005	0.021	1	
(11) Cohort 1996	647	0.345	0.476	0	1	0.047	0.040	-0.018	0.075	0.012	0.018	0.015	0.000	-0.029	-0.490	1