N:o 21 (September 1999)

GROWTH OF THE SMALLEST:
DETERMINANTS OF SMALL FIRM GROWTH
DURING STRONG MACROECONOMIC FLUCTUATIONS

Aki Kangasharju

KANGASHARJU, Aki, 1999. GROWTH OF THE SMALLEST: DETERMINANTS OF SMALL FIRM GROWTH DURING STRONG MACROECONOMIC FLUCTUATIONS. Pellervo Economic Research Institute Working Papers No. 21 (Helsinki September 1999). 20 s. ISBN 952-5299-04-X, ISSN-1455-4623.

Abstract. The present paper investigates the determinants of small firm growth in Finland during the strong economic fluctuations of the years 1988-1995. The paper utilises longitudinal data on 26 057 owner-managers and their associated small firms. Results support the life-cycle effect of a firm, i.e. new firms have higher growth probability than older ones, providing that the firms considered survive. In a similar vein, firms run by younger owner-managers have higher growth probability than those run by older counterparts. Results also indicate that economic fluctuations strongly affect the growth probability of small firms. On the other hand, results indicate that, once corrected for the level effects, the probability of growth was affected by the firm and owner-manager characteristics virtually the same way over the entire business cycle.

Keywords: Small firms, growth, the business cycle

KANGASHARJU, Aki, 1999. PIENYRITYSTEN KASVU: KASVUN TEKIJÄT VOIMAKKAIDEN SUHDANNEVAIHTELUJEN OLOISSA. Pellervon taloudellisen tutkimuslaitoksen työpapereita n:o 21. 20 s. ISBN 952-5299-04-X, ISSN-1455-4623.

Tiivistelmä: Tässä työssä tutkitaan pienyritysten kasvun taustatekijöitä Suomessa vuosina 1988-1995, joita luonnehtivat voimakkaat suhdannevaihtelut. Aineistona käytetään Työssäkäyntitilastosta ja Yritysrekisteristä poimittua otosta, jossa on tietoa 26 057 yrittäjästä ja heidän yrityksestään. Saadut tulokset tukevat ns. elinkaarihypoteesia, jonka mukaan hengissä säilyneiden yritysten joukossa nuoremmilla yrityksillä on korkeampi yrityksen kasvun todennäköisyys kuin vanhemmilla. Samalla tapaa havaitaan, että nuorempien yrittäjien yritykset kasvavat todennäköisemmin kuin vanhempien yrittäjien yritykset. Tulokset myös osoittavat, että suhdanteet vaikuttavat voimakkaasti kasvutodennäköisyyteen. Lamavuosina 1990-1992 yritysten kasvutodennäköisyys oli noin puolet siitä mitä ne olivat vuosina 1988-1990 tai 1993-1995. Toisaalta tulokset osoittavat, että suhdannevaihtelut eivät muuta sitä tapaa, jolla yrittäjän ja yrityksen piirteet vaikuttavat kasvun todennäköisyyteen.

Avainsanat: Pienyritykset, kasvu, suhdannevaihtelut

SISÄLLYSLUETTELO

1. INTRODUCTION

Small and medium-sized enterprises, SMEs, are taking an increasingly larger role in supporting employment growth and economic well-being in Western societies, as the public sector and large enterprises have been losing their employment potential. In Finland, public sector employment grew for several decades until the 1990s when, among other things, a severe economic crisis led to cuts in the public sector. In the meanwhile, employment potential in large enterprises has been decreasing due to the concentration of the firms on their core competence. For example, in manufacturing the employment proportion of large enterprises having more than 500 employees has decreased from 31 % in 1980 to 24 % in 1994.

Against this background, a major question is how small enterprises survive economic fluctuations and how many of the surviving firms grow. It is a well-known fact that the likelihood of failure among smaller firms is clearly higher than among their larger counterparts (see e.g. Agarwal and Audretsch, 1999; Sutton, 1997; and Wagner, 1997). The employment record of the SMEs would improve, if, instead of failure, the SMEs could be assisted to reach a growth path. The present paper asks what the determinants behind firm growth are.

There is no unified theoretical model on firm growth. As an early contributor, Penrose (1959) considers that the growth of a firm is motivated by external opportunities, such as promising demand prospects for the firm's product; and/or internal inducements, such as under utilisation of the existing resources of the firm. On the other hand, external and internal factors also produce obstacles to growth. Development of demand is the major external factor which determines firm's growth. Second, the market actions of competitors and the supply of production factors are typically external to the firm. Third, the features of the local business environment are external particularly to a small firm. Internal growth factors include the features of the firm itself, such as the size and age of the firm; the characteristics of the resources, such as those of the employees and the manager(s); as well as the strategic choices of the firm. To sum up, the internal factors determine the competitiveness of the firm in the market structured by the external factors.

Empirical work has mainly concentrated on the investigation of the effects of certain internal factors on growth. These are the size and age of the firm (see e.g. Sutton, 1997; McCloughan, 1995; and Dunne and Hughes, 1994). A fairly widely-accepted view is that the so-called Gibrat's law of equal proportional growth does not hold, and that smaller and younger firms grow faster than larger and older ones.[1]

A dominant feature of these studies has been that in the data analysed the smallest firms have been under-represented. In contrast, the present paper analyses the very smallest firms of the size of less than 10 employees. As a consequence, the paper analyses determinants of small firm growth other than size.

The first objective of this paper is to seek for statistical evidence as to whether differences in the owner-manager characteristics result in differences in firm performance. It is presupposed that the smaller the firm, the more the owner-manager personifies the internal factors, since in larger firms it is harder to point out the effects of one person on the success of the firm. Hence, the most obvious way to study such personification is to analyse small firms.

The present paper provides Finnish evidence on the determinants of small firm growth using a sample of exhaustive longitudinal data from 'Labour Employment Statistics'[2], which include virtually all employed people in Finland. The paper investigates a sample of the individuals who have acted as small firm owner-managers at least once between 1988-1995.[3] From an international perspective the present type of data is rare and of high quality, which should make the analysis both interesting and reliable. An interesting feature of the data at hand is that for each owner-manager it was also linked to information on the sector of the firm and the firm size in terms of the turnover of the firm.[4] Virtually all firms in the data set have less than 50 employees.

Due to the protection of data privacy in Finland, this size information of firms can be obtained as classifications of size class only. Therefore the present paper investigates whether candidate growth factors affect the growth probability, rather than the growth rates of firms. The period of analysis includes the years 1988-1995.

The present paper tests four hypotheses which are derived from the existing literature and deal with the characteristics of firms as well as owner-managers. First of all, there is evidence in favour of the life cycle effect, i.e. for any given size class of firms, younger firms tend to have lower survival rates than their older counterparts, but the growth rates are higher particularly for those young firms that survive (see e.g. Mata, 1994; Mata and Portugal, 1994; Dunne, Roberts and Samuelson, 1989 and 1988; and Evans 1987a and 1987b). The present analysis is confined to the surviving firms,[5] and our first hypothesis is that the growth probability for new firms is higher than that for firms at least one year of age.

The second hypothesis is that the life cycle effect applies also to the age of owner-managers. Younger owner-managers are often more highly motivated than older ones, since they want to test their own abilities. The older ones usually have more realistic views of possibilities, and therefore their firms have reached wanted (or at least suffi-

cient) size more often than those run by younger ones. On the other hand, the firms run by older rather than younger owner-managers are more likely to survive, since the need for risk-taking is lower due to lower motivation for growth, and the possession of higher levels of skills and experience. The hypothesis suggests that firms run by younger owner-managers have higher growth probability than those run by their older counterparts, providing that the firms survive.

Besides the age of owner-managers, there is growing literature on the effects of other owner-manager characteristics on small firm growth (see e.g. Barkham, Gudgin, Hart and Hanvey, 1996; and Storey, 1994, for recent contributions). In Finland, these studies mainly analyse survey data (see e.g. Kivimäki, 1998; and Littunen, 1996). According to this literature, small business owner-managers have several characteristics which affect the success of the firm. Only a few of them are actually measurable characteristics, however. Storey (1994) provides an extensive survey of such studies. The characteristics include age, gender, the level of education, whether the owner-manager is also the founder of the firm, and whether he/she has prior managerial experience. A survey of altogether 18 studies indicates that a successful entrepreneur is middle-aged, relatively well educated, has prior managerial experience, and is not running his or her first firm which has been founded with other entrepreneurs. The gender of the owner-manager does not seem to affect the success of the firm.

The Storey's survey (1994) serves as a source of two other hypotheses. The third hypothesis argues that education matters. It is expected that owner-managers with higher education also have a higher growth probability than those with a lower level of education. Fourth, empirical evidence suggests that there are no differences in the performance of firms run by males and females (see also e.g. Chell and Baines, 1998), although there is some evidence that men are more likely than women to set up a firm (see e.g. Johansson, 1999). The fourth hypothesis is that this finding applies also to Finland.

The second objective of the paper is to investigate the effects of external factors on firm growth. Firstly, it is hypothesised that there are differences in growth probability between firms in different industries, due to the different growth rates of industries. In other words, firm growth probability is partly determined by a factor that is external particularly to small firms. Firms were categorised into manufacturing, construction, wholesale and retail trade, and other services sectors.

Secondly, a look is taken at the effects of economic fluctuations on firm growth and growth factors. The overheating of the Finnish economy in the late 1980s, followed by a severe economic crisis in the early 1990s (GDP dropped 12 % between 1990 and 1993) and a new economic upturn since 1993 (the average annual growth rate of the

GDP was 5 % for several years since 1993), provide a strongly fluctuating macroeconomic environment. The period should therefore be a very informative one for an analysis of the effects of economic fluctuations on firm growth determinants, an issue which has so far hardly been studied in the literature.

Here we will focus on the following questions. First, does the life cycle effect hold over the strongly evolving macroeconomic environment? Second, are the manufacturing and construction sectors more sensitive than the service sectors to changes in the macroeconomic environment? Third, do men and women master the recession equally well, or are there differences? Fourth, does a higher level of education alleviate the negative effects of the recession?

The paper is organised as follows. First, section 2 describes fluctuations both in the whole firm sector in Finland and in the data at hand. An empirical analysis is conducted in section4, while section 4 concludes the paper.

2. THE FIRM SECTOR, 1988-1995

Let us first take a look at the Finnish firm sector as a whole. Figure 1 shows the total number of firms in Finland along with the growth of the GDP, the average number of employees and the average amount of turnover in all firms during 1988-1996. The number of firms grew by 20 000 in the overheated period between 1988-1990. The average annual growth rate of the GDP was 3.2 % during this period. Since new firms are mainly small, the average size of firms decreased in particular when measured by the average number of employees. This overheating phase was followed by the severe recession period, 1990-1993, when the average annual growth rate of the GDP was - 5.1 % (e.g. unemployment rose from 4 to about 18 %). In the present paper we will focus on the early years of the recession, 1990-1992. During this period the average size of firms continued to shrink. The number of firms decreased only by 7 000.

The number of firms started to decline more clearly in 1993, implying that firms adjusted to the recession first by reducing employees. Bankruptcies became more common later. On the other hand, in 1993 the average size of firms started to grow, which together with a decline in the number of firms suggests, that terminating firms were smaller than average, a feature which appeared to be similar among new firms too. The following period, 1993-1995 depicts the recovery period during which the average annual growth rate of the GDP was 4.6 %. In 1996 the growth in the number of operating firms speeded up while the average size of firms started to decline again implying that more small firms were established than incumbents were ceasing operation.
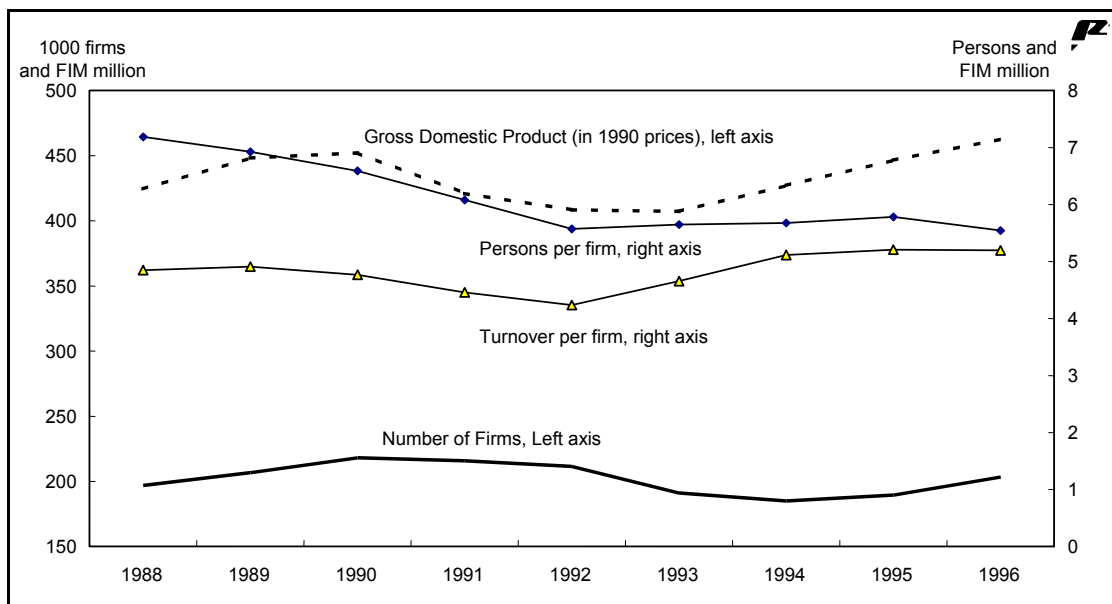

Figure 1. GDP, the number of firms and the average size of firms, 1988-1996.

Let us now turn to our data set. Table 1 shows that in 1995 all 14 697 firms were small. About one per cent of the firms had a turnover of more than FIM 7.5 million and all firms included less than 10 persons (including the owner-manager). Division of the firms into size classes remained stable over the period 1988-1995 (a feature not shown in Table 1).

Table 1.   Firms in the sample according to turnover size classes in 1995.

	Total	Turnover, FIM				
		50 000 – 199 999	200 000 – 499 999	0.5 m - 3.5 m	3.5 m - 7.5 m	Over 7.5 millions
No. of Firms Proportion	14 697	6 630 0.45	5 253 0.36	2 528 0.17	156 0.01	130 0.01

For the analysis, the years 1988-1995 are divided into three periods described above. Table 2 shows summary statistics of the evolution of firms between the turnover classes during those periods.[6] Table 2 shows that the data include altogether 26 057 firms in three years, 1988, 1990 and 1993. For example, 18 % of the total of 6 336 firms in 1988 were not in business anymore in 1990. During this period when the Finnish economy was overheated, 6 % of the firms became smaller (their turnover class dropped), and 14 % grew. During the years of recession, 1990-1992, the proportion of firms which went out of business was only one percentage point higher than during the previous growth period. This accords with the finding above that the number of market exits became more common in 1993. On the other hand, a larger proportion of firms became smaller (the turnover class dropped) and a clearly smaller proportion of firms grew during the period compared with the previous period. During the period of recovery, 1993-1995, the proportion of firms which went out of business was the lowest. 12 % of firms grew during that period, a figure which compares favourably with that for the recession period, but not with that for the overheating period.

Table 2.   The evolution of firms between the turnover classes.

Period		Left the business	Declined	Unchanged	Grew	Total
1988-1990	No. of firms	1 198	402	3 857	879	6 336
	Proportion	0.18	0.06	0.61	0.14	
1990-1992	No. of firms	1 206	933	3 686	353	6 178
	Proportion	0.19	0.15	0.6	0.06	
1993-1995	No. of firms	2 290	1 454	8 271	1 528	13 543
	Proportion	0.14	0.11	0.63	0.12	
All periods	No. of firms	4 694	2 789	15 814	2 760	26 057
	Proportion	0.17	0.11	0.62	0.11	

To sum up, Table 2 indicates that fast-growing small firms are rare; at the most, only 14 % of firms grew as measured by an increase in the turnover size class during any of the two-year periods. Clearly higher proportions of firms exited the market during all periods. Another conclusion is that macroeconomic fluctuations distinctly affect the probability of firm growth. Growth of firms was twice as probable during the economic upturns than during the recession period. The next section analyses how the individual characteristics of owner-managers affect small firm growth, and tests how the effects of the characteristics change along the phases of the business cycle.

3. EFFECTS OF THE GROWTH FACTORS

Internal growth factors

The growth determinants of firm growth are analysed using logit models. The observations for the surviving firms in each period were pooled together yielding 21 363 observations. The endogenous variable is one for firms which grew in terms of the turnover class in any of the two-year growth periods, and null otherwise.

The regression results are given in Table 1A in the Appendix. In general, the results support the hypotheses formulated. The first specification in Table 1A shows that new surviving firms have higher growth probability than older firms, a finding which supports the first hypothesis.[7] Figure 2 visualises the implied growth probabilities for different types of firms and firms run by different types of owner-managers. Growth probabilities were computed on the basis of the restricted model which is specification 2 in Table 1A. Figure 2 shows that the predicted growth probability for new firms (0.30) is over two times higher than that for older firms (0.12), keeping other features of firms and owner-managers constant.
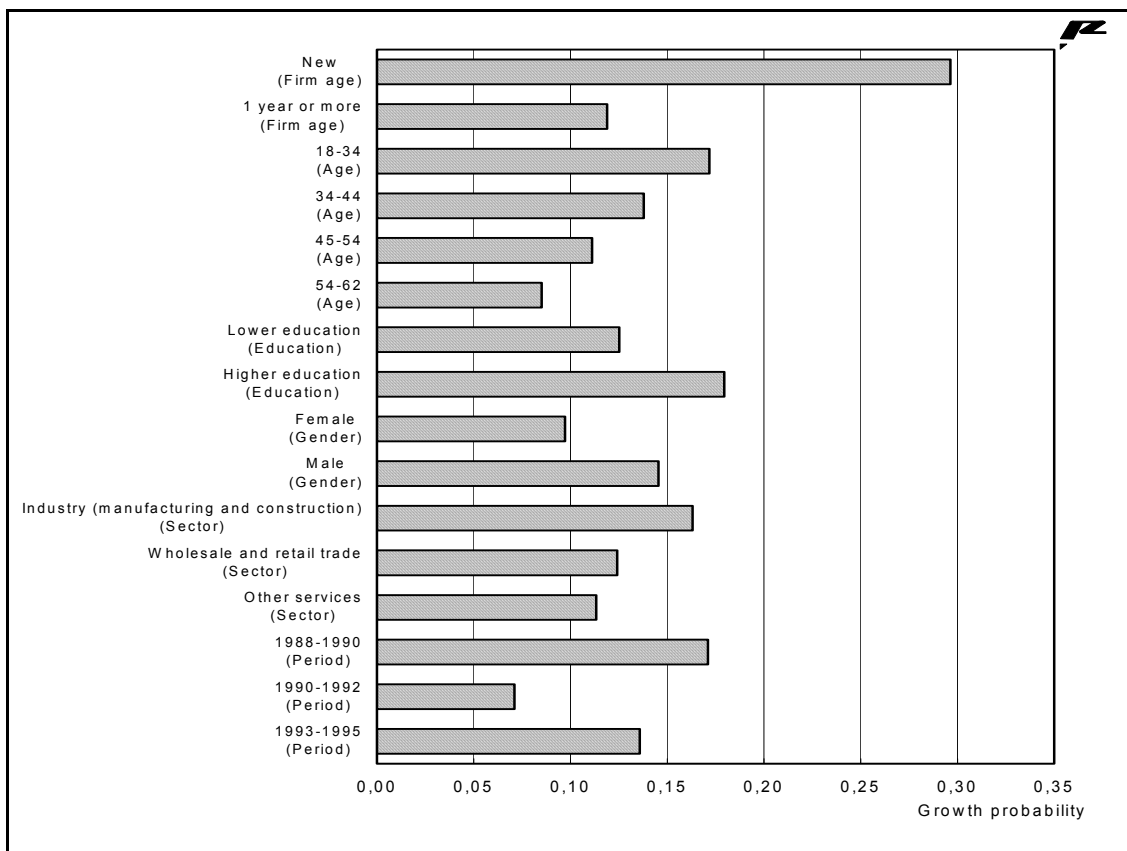

Figure 2. The growth probability of firms by firm and owner-manager characteristics.

As far as owner-manager characteristics are concerned, specification 1 in Table 1A shows that surviving firms run by owner-managers aged from 30 to 34, do not have lower growth probability than their younger counterparts, whereas 35-year-olds and the older do have lower growth probability (individuals between 18 and 29 years of age form the reference age category). This finding supports the second hypothesis. Since some coefficients for the age variables seemed rather similar, tests were conducted to see whether some of the age variables have the same coefficients. It was found that the growth probability for firms run by individuals between 30 and 34 years of age does not differ from that of firms run by individuals between 18 and 29 years of age, and that the coefficients for owner-managers between 35 and 44 years of age could be joined together, as well as those for owner-managers between 45 and 54 years of age. Specification 2 in Table 1A shows the result for the model in which the number of the age variables were restricted to three. Figure 2 shows that growth probability decreases gradually with increasing age. For the youngest group of owner-managers, the firm growth probability is 17.2 %, whereas for the oldest group, it is about one half of that, 8.5 %.

The results also lend support to the fourth hypothesis concerning the level of education and the growth probability. The level of education was divided into three classes. The lowest level includes individuals with no college or university level of education, the middle level includes individuals who have gained intermediate grades (up to 3 years of education after the comprehensive school), and the highest group includes individuals who have gained higher education (at least a college degree, which amounts to a minimum of 4 years of college education). Specification 1 indicates that an intermediate grade of an owner-manager does not improve the growth probability of a firms. The growth probability improves only when a owner-manager has higher education. In specification 2 the owner-managers with higher education is compared to those with lower level of education. Figure 2 illustrates that the growth probability for firms run by an owner-manager with a high level of education is 18 %, whereas that for firms run by an owner-manager with less education is 13 %.

In contrast with our expectations, Table 1A suggests that male owner-managers are more successful in their businesses than females. The growth probability for firms run by females is 10 %, whereas that for firms run by males is 15 %. Below we will investigate whether this result applies to all periods.

External Growth Factors

Turning to growth differences between firms in different sectors, Table 1A suggests that firms in the manufacturing and construction sectors have higher growth probabil-

ity than those in the wholesale and retail trade, the latter of which is the reference branch in the regressions.[8] In contrast, firms in the other services sector have lower growth probability than those in the wholesale and retail trade. It was also tested to see whether the coefficients for the firms in different industries could be restricted to be the same. Wald's test statistics showed that the coefficient of the manufacturing and construction industry is the same. Therefore specification 2 shows the joint coefficient for the sectors. Figure 2 tends to show that although firms in the other services sector have lower growth probabilities than those in the wholesale and retail trade, the difference is rather small in magnitude. The growth probability for firms in the wholesale and retail trade is 12.4 %, whereas that for firms in the other services sector is 11.3 %. The growth probability jumps to 16.3 % for firms in the manufacturing and construction sectors (industry).

The dummies of the distinct periods indicate in Table 1A that there are very strong differences in the growth probabilities of firms in different phases of the business cycle. Figure 2 visualises the firm growth probabilities in each of the three periods. In the overheating period the firm growth probability was as high as 17.1 %, declining in the recession period to 7.1 %, and surging in the recovery period up to 13.6 %.

The Effects of the Business Cycle

Next, we will investigate the effects of the business cycle on the growth probability of different types of firms and firms run by different types of owner-managers. Finally, we will examine whether the growth determining factors alter along the phases of the business cycle. The analysis was conducted using dummies for each period and the gross products of the period dummies and all other variables. Table 2A shows the logit regression coefficients which appeared to be significant at the 10 % level of significance. Figures 3-7, in turn, illustrate the growth probability for different types of firms and firms run by different types of owner-managers in each period.

Figure 3 visualises that new firms tend to have higher growth probability than older ones in each period. Figure 3 also implies that the growth probability for new firms is very much higher than that for older firms and, although the recession strongly decreased growth probabilities, nevertheless, in the recession period the growth probability was slightly higher for new firms than that for older firms in either period of economic upturn. This implies that as a characteristic the new firm variable affected the growth probability more than the business cycle. In contrast, Figures 4-7 show that the effect of the business cycle on growth was larger than that of the other characteristics.
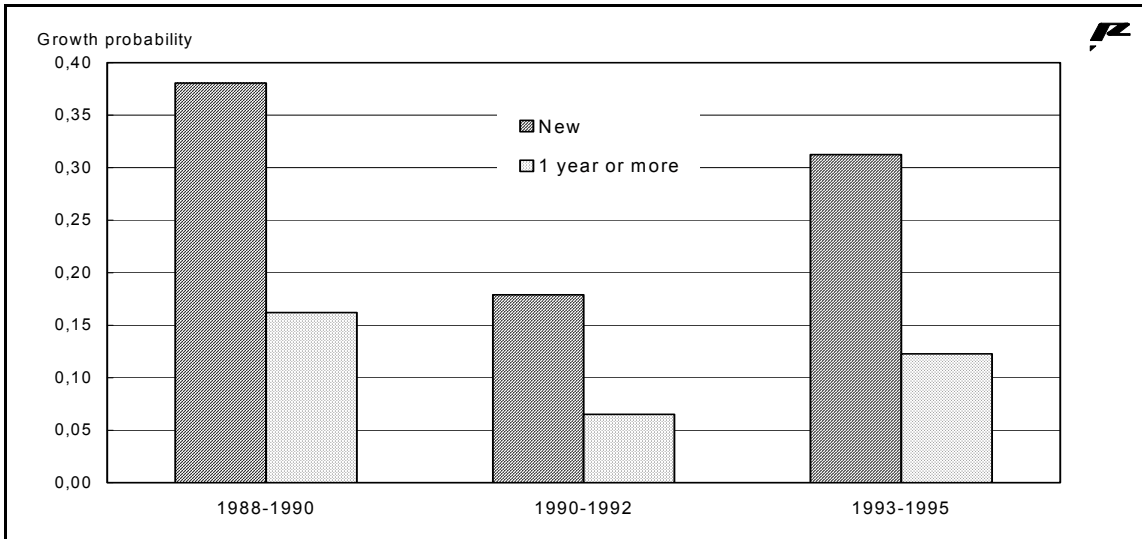
Figure 3.   The growth probability of firms by firm age.

As would be expected, Table 2A and Figure 7 show that firms in the construction sector experienced stronger business cycles than those in the other sectors. The growth probability for firms in the construction sector was higher than that for other sectors in both economic upturns, but lower in the recession. Figure 7 also suggests that industry recovered from the recession earlier than services. During the recession the growth probability for firms in industry (manufacturing and construction combined) was 7.2 % and, for firms in services, 7.0 %, whereas during the recovery period, the growth probabilities were 19.8 % and 11.7 %, respectively.

It appears from Table 2A and Figures 3-7 that the business cycle only has a small effect on the partial correlation between the exogenous and endogenous variables. This is particularly true for the variables of a firm's age, an owner-manager's age, and a owner-manager's level of education. For example, the growth probability for new firms is higher than that for older firms regardless of the period concerned, suggesting that the business cycle does not alter the life-cycle effect of the firm. This finding implies that other studies, which have neglected the possible effect of the business cycle on growth determinants, have not suffered from any serious bias due to the arbitrary phase of the business cycle.
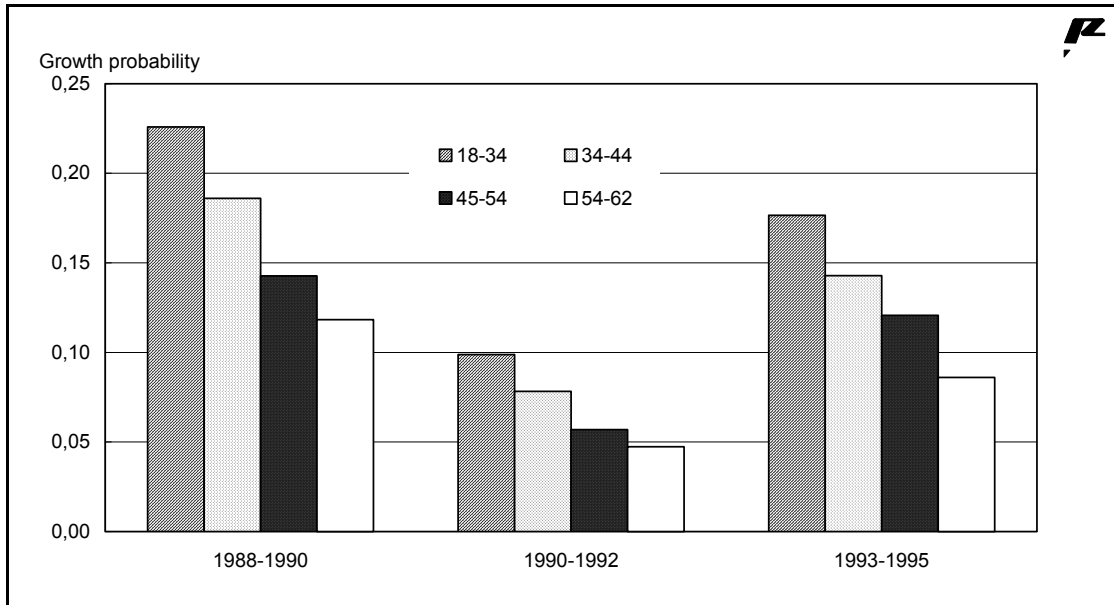
Figure 4.   The growth probability of firms by owner-manager age.

The business cycle seems to alter only one relationship between the explanatory variables and the growth probability. Figure 6 shows that difference in the growth probabilities of firms run by males or females is due to the recovery period. During the first two periods, the growth probabilities for firms run by males or females are at the same level. In contrast, the growth probability for firms run by males rockets from 7 % during the recession period up to 16 % during the recovery period, whereas that for firms run by females stays under 8 % during both of the periods.
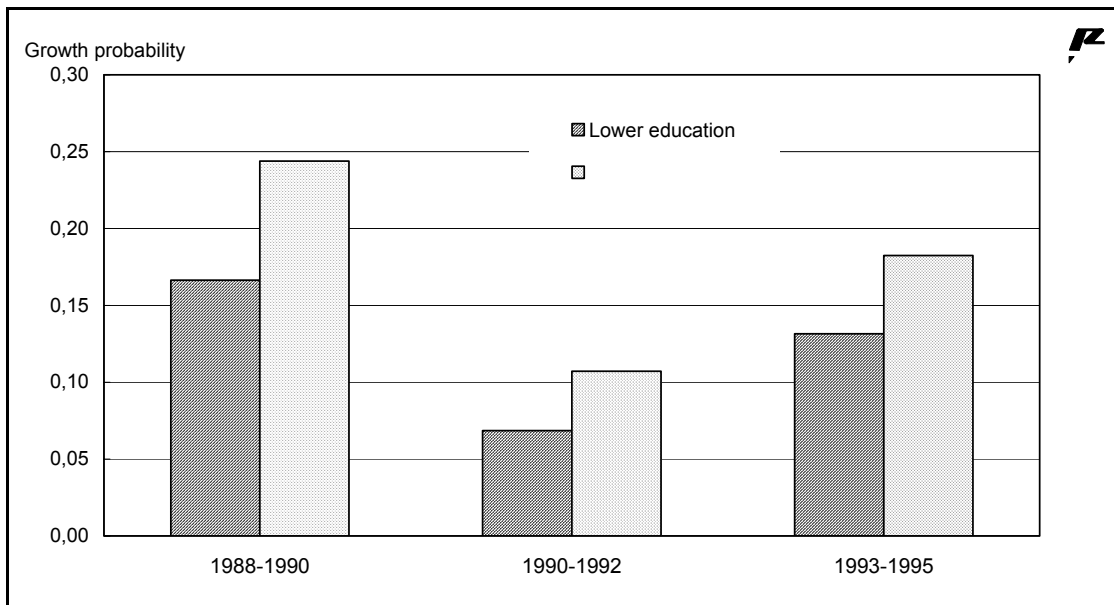

Figure 5. The growth probability of firms by the owner-manager's level of education.

Note that this result appears although the analysis controls for other growth determining factors. For example, Table 3 indicates that during the recovery period the difference in the growth probability between males and females appears in each industrial sector. Therefore, it is concluded that for some reason beyond the reach of the data at hand, male owner-managers recovered from the recession sooner than their female counterparts. Another conclusion is, that with the exception of the recovery period, we found evidence in accordance with the findings in the literature that there are no differences in the success of firms run by males and females (see Chell and Baines, 1998; and Storey, 1994).

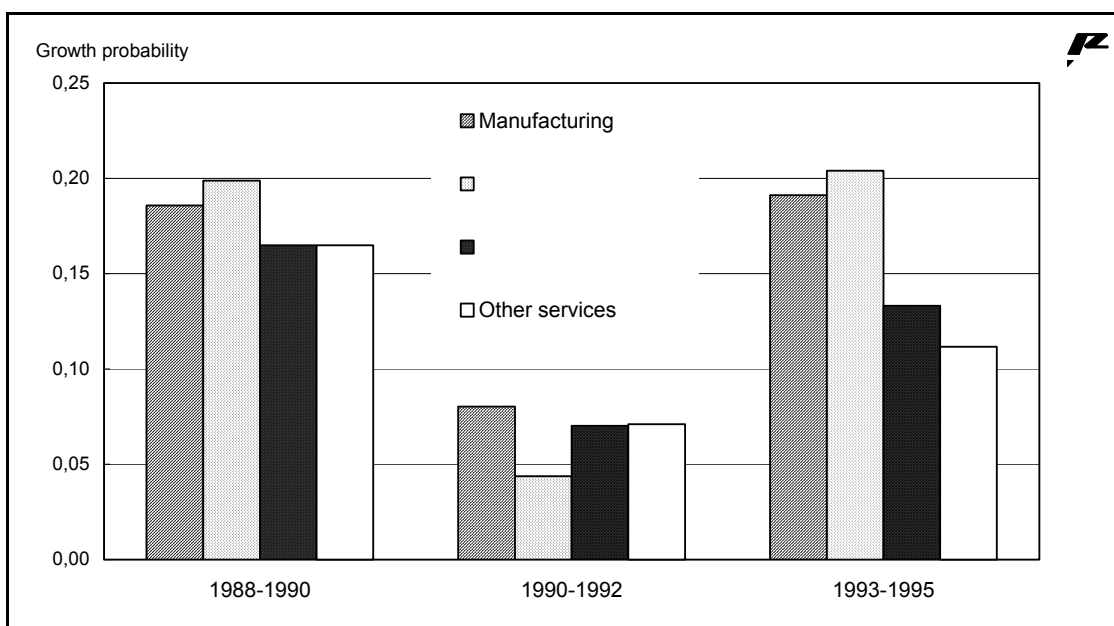Figure 6.   The growth probability of firms by gender.

Figure 7. The growth probability of firm by sector.

Table 3. Growth probability of firms by industry and the gender of the owner-manager.

	1988-1990	1990-1992	1993-1995
Industry (manufacturing and construction)			
Males	0.211	0.074	0.203
Females	0.138	0.077	0.098
Wholesale and retail trade			
Males	0.167	0.073	0.140
Females	0.164	0.074	0.106
Other services			
Males	0.167	0.055	0.143
Females	0.176	0.086	0.065

4. CONCLUSION

This paper analysed the determinants of small firm growth in different phases of the business cycle. Results indicated that fast growing small firms are rare; even in the two-year period when the economy was overheated, only 14 % of firms could raise the turnover class. During the recession the proportion dropped to as low as 6 %.

The paper found evidence on behalf of the life-cycle effect on firm growth. New firms tend to grow more often than older ones, providing that their firms survived the two-year period. Evidence was also found to support another type of life-cycle effect. Results indicated that firm growth probability decreases with the increasing age of the owner-manager, providing again that the firm survives. In addition, higher education was shown to positively affect growth probability.

These findings imply that in order to prevent business failures, which is more common among younger than older firms, and to promote small firm growth, first, entrepreneurial education for young owner-managers is called for, and second, academic entrepreneurship should be encouraged.

There is one caveat in the analysis. Due to data privacy legislation, the turnover data are classified into categories. As a result, information was lost and, instead of growth rates, the analysis used a categorised variable. Since the results were largely in accordance with those obtained in other studies, it seems that the categorisation of the growth variable did not bias the results.

REFERENCES

Barkham, R., G. Gudgin, M. Hart and E. Hanvey (1996). The Determinants of Small Firm Growth: An Inter-Regional Study in the UK 1986-90. Regional Studies Association, Regional Policy and Development 12, Jessica Kingsley Publishers, London.

Chell, E. and S. Baines (1998). Does Gender Affect Business 'Performance'? A Study of Micro businesses in Business Service in the UK. Entrepreneurship & Regional Development, 10, 117-135.

Dunne, P. and A. Hughes (1994). Age, Size, Growth and Survival of the U.K. Companies in the 1980s. The Journal of Industrial Economics, XLII, 2, 115-140.

Dunne, T., M.J. Roberts and L. Samuelson (1989). Patterns of Firm Entry and Exit in U.S. Manufacturing Industries. Rand Journal of Economics, 19, 4, 495-515.

Dunne, T., M.J. Roberts and L. Samuelson (1989). The Growth and Failure of U.S. Manufacturing Plants. Quarterly Journal of Economics, CIV, 4, 671-698.

Evans, D.S. (1987a). The Relationship Between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries. The Journal of Industrial Economics, 35, 4, 567-581.

Evans, D.S. (1987b). Tests of Alternative Theories of Firm Growth, Journal of Political Economics, 95, 4, 657-674.

Geroski, P.A. (1999). The Growth of Firms in Theory and in Practice. CEPR Discussion papers 2092.

Geroski, P.A., S.J. Machin and C.F. Walters (1997). Corporate Growth and Profitability. The Journal of Industrial Economics, XLV, 2, 171-189.

Johansson, E. (1999). Self-Employment and Liquidity Constraints: Evidence from Finland. Scandinavian Journal of Economics, forthcoming.

Kivimäki, E. (1998). Uusien yritysten synty, kasvu ja työllisyysvaikutukset: tutkimus Espoon, Kauniaisten, Kirkkonummen ja Siuntion alueelta vuoina 1994 ja 1995 (in Finnish). Työministeriö, Työpoliittinen tutkimus, 195.

Littunen, H. (1996). Uusien yritysten menestymiseen vaikuttavat tekijät: Piirreteoreettisen ja kontingenssiteoreettisen lähestymistavan empiiristä koettelua (in Finnish). University of Jyväskylä, Centre for Economic Research in Central Finland, Julkaisuja 137.

Mata, J. (1994). Firm Growth During Infancy. Small Business Economics, 6, 27-39.

Mata, J. and P. Portugal (1994). Life Duration of New Firms. The Journal of Industrial Economics, XLII, 3, 227-245.

McCloughan, P. (1995). Simulation of Concentration Development from Modified Gibrat Growth-Entry-Exit Process. The Journal of Industrial Economics, XLIII, 4, 405-433.

Penrose, E. (1959). The Theory of the Growth of the Firm. Oxford University Press, New York.

Storey, D.J. (1994). Understanding the Small Business Sector. International Thomson Business Press, London.

Sutton, J. (1997). Gibrat's Legacy. Journal of Economic Literature, XXXC, 40-59.

APPENDIX

Table 1A. Results for the firm growth probability, 1988-1995.

Explanatory Variables	(1)	(2)
Firm age (New firm)		
At least one year old	-1.041***	-1.054***
Sector (Wholesale and retail trade)		
Manufacturing	0.183***	0.211***
Construction	0.251***	0.211***
Other services	-0.147***	-0.150***
Owner-manager's age (18-29 years old)		
30-34	-0.118	
35-39	-0.225***	-0.183***
40-44	-0.269***	-0.183***
45-49	-0.409***	-0.394***
50-54	-0.526***	-0.394***
55-62	-0.752***	-0.694***
Education (Comprehensive school)		
Intermediate grades	0.027	
Higher education	0.574***	0.558***
Gender (Male)		
Female	-0.420***	-0.419***
Period (1988-1990)		
1990-1992	-1.033***	-1.034***
1993-1995	-0.314***	-0.302***
Constant	-0.203**	-0.247***
N	21 363	21 363
$Chi^2(15)$	806.25***	800.79

Note: *** denote statistical significance at the 0.01 percent level and ** denote statistical significance at the 0.05 percent level. The reference group of each variable is given in brackets.

Table 2A.   Results for the firm growth probability in each period.

Explanatory Variables	1988-1990	1990-1992	1993-1995
Firm age (New firm)			
At least one year old	-1.044***	-1.044***	-1.044***
Sector (Wholesale and retail trade)			
Manufacturing	0.126*	0.126*	0.359*
Construction	0.282***	-0.501***	0.282***
Other services			-0.175**
Owner-manager's age (18-29 years old)			
30-34			
35-39	-0.197***	-0.197***	-0.197***
40-44	-0.197***	-0.197***	-0.197***
45-49	-0.507***	-0.507***	-0.507***
50-54	-0.507***	-0.507***	-0.507***
55-62	-0.713***	-0.713***	-0.542*
Education (Comprehensive school)			
Intermediate grades			
Higher education	0.593***	0.593***	0.593***
Gender (Male)			
Female			-0.787***
Constant	-0.372***	-1.360***	-0.506***
N=21 363 Chi^2(14)=891.73***			

Note: *** denote statistical significance at the 0.01 percent level, ** denote statistical significance at the 0.05 percent level, and * denotes statistical significance at the 0.10 percent level. The reference group of each variable is given in brackets.

Endnotes

[1] Geroski (1999) and and Geroski, Machin and Walters (1997) found, however, that firm growth follows a random walk and conclude that Gibrat's law is, roughly speaking, an accurate description of the process of corporate growth.

[2] Statistics Finland compiles the data.

[3] In the data an individual is considered as an owner-manager of a firm in a given year, if he or she paid the entrepreneurial insurance fee in that year, had more entrepreneurial income than income from a salary or wages (regardless of the insurance) or owned at least one half of the firm he or she was running (regardless of the two previous conditions).

[4] The source of this information is Business Register compiled by Statistics Finland.

[5] We do not have to worry about sample selection bias induced by different failure probability of different sized firms, since all firms in the data are small.

[6] The number of firms in the final period is over two times higher than that for other two periods due to the sample selection procedure and a renewal in the system of the turnover tax in 1991. This does not bias the results, since the analysis follows individual owner-managers and their firms.

[7] A firm is new if it existed in the year t, but not in the year t-1.

[8] Note that the data do not include owner-managers of agricultural farms.