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Determinants of Growth of Start-ups in the Netherlands

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Summary

Dynamics and growth of firms are considered to be important for enhancing economic growth. Growth is an issue of all times. Especially start-ups are relatively fast growing firms and contribute largely to employment creation. This study examines the determinants of growth of start-ups in the Netherlands. In literature there is a distinction between three dimensions of growth: market/industry, entrepreneurial/managerial and firm-specific. A longitudinal dataset containing ten years of information on start-ups is used for analysis. For each dimension we obtained several determinants of growth. Several determinants have a positive effect on growth in the first five years such as: unfulfilled needs, a partner with an own firm, management and sector experience, a growth objective and networking.

Keywords: start-ups, growth, growth patterns, entrepreneurship.

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1. Introduction

The dynamics and growth of firms are considered to be important for enhancing economic growth and growth is an issue at all times. Growing firms are a stimulus for economic development of nations (Audretsch et al., 2004). Not surprisingly, the growth of firms and growth patterns receive much attention from researchers the last two decades (Bruno et al., 1992; Welbourne et al., 1998; Brown et al., 2001; Delmar et al., 2003; Bosma et al., 2004). Bangma and Verhoeven (2000) found four different types of growth patterns in the Netherlands: fast-growing firms, those growing at the normal rate, stable firms and shrinking businesses. This classification of firms in a growth pattern is not stable over time. Fast growing companies do not go on growing rapidly for years. Even over a short time horizon the dynamics are considerable. Fast-growing firms accounted for almost 44% of employment creation between 1998 and 2002 (Bangma et al., 2005). More importantly Bangma and Verhoeven (2000) note that start-ups in particular show (fast) growth.

From an organizational point of view, growth is an important issue as well. Growth is often seen as an important performance measure that gives insight in the vitality and competitiveness of the company. For start-ups, growth in the first years is often a prerequisite for survival. On a general level, organizations can benefit from growth in many ways, including greater efficiency through economies of scale, increased power, the ability to withstand environmental change, increased profits and increased prestige for organizational members (Philipsen and Kemp, 2003).

Given the importance of growth and growing firms and start-ups, we need to obtain a better understanding of the growth development of start-ups. To date, most studies focus on relatively small number of explanatory variables, use a small number of case

studies, use cross-sectional data or use initial conditions to explain growth (e.g. Romanelli, 1989; Cooper et al., 1994; Bamford et al., 1999; Bosma et al., 2004). In the present study we map the development of start-ups in terms of growth and explain the growth using a large panel dataset of firms that were founded in 1994. In this panel we have the availability of a large amount of (annually collected) information over a period of ten years. Therefore the dataset not only contains information about the initial founding conditions, but also variables (and changes therein) over the lifetime (up to ten years) of the company. The longitudinal data are very valuable. This research is the first initiative towards more comprehensive longitudinal research. It is almost impossible to capture all the variables at one time and also perform an exhausting number of analyses. However, we are aware that the start-up panel offers us many possibilities for profound research. In the present exploratory study we take a closer look at the determinants available in the panel and the way in which they should be constructed for useful analysis. We perform correlation and regression analysis to investigate whether the potential determinants and growth relate to each other. Especially the growth in the first five years can be explained. Important factors are amongst others unfulfilled needs in the market, a partner with an own firm, previous management and sector experience, a growth objective and networking.

The plain of this paper is as follow. Section 2 takes a closer look at the contribution of start-ups to employment growth and the survival rates of start-ups in the Netherlands. Section 3 describes the determinants of growth from a theoretical perspective. The measurement of growth is discussed in section 4 and the data used in this research are described in section 5. Section 6 then presents the results of our analyses. Suggestions for future research are discussed in section 7.

2. Start-ups in the Netherlands

In the Netherlands more than 99% of all firms are SMEs (fewer than 100 employees). Therefore it is not surprising that SMEs contribute enormously to the total level of employment. In 2004 SMEs accounted for approximately 55% of total employment with 5 million jobs (EIM, 2005). The creation of jobs by new firms is often considered to be a solution to the unemployment problem. Persson (2004) argues that in the short run, job creation by new firms and job destruction when companies close are of minor importance, compared to the contribution made by firms already in existence. She reveals that job creation at new firms in Sweden was on average 3.5 per cent of total employment each year, while the creation of jobs at already existing, expanding firms was 7.7 per cent. Van Stel and Storey (2004), in an empirical study for Great Britain, found no significant relationship between start-ups and employment creation in the 1980s. In this section we shall take a closer look at the number of start-ups in the Netherlands, the employment they create and their survival rates.

The number of start-ups gradually increased until 2000 and reached its peak in that year, approximately 54.000 start-ups (see table 1). After 2000, the number of start-ups decreased, mainly as a reaction to the economic recession. However, in 2004 the number of start-ups increased again. Usually pull factors, like new market opportunities, are responsible for positive tendencies in the number of start-ups. This was, however not the case for 2004: push factors, such as (possible) unemployment, resulted in more start-ups. Even in the retail and catering industries the number of start-ups increased although these industries are strongly influenced by the stagnating consumer expenditures.

Please insert table 1 about here

The number of start-ups as a percentage of the number of firms is called the start-up quota. In 2000 the start-up quota reached its peak: 7.5%. From that year on, the start-up quota decreased until 2004 when the start-up quota increased again the result of the large increase in the number of start-ups.

Start-ups create many jobs, but what is their contribution to total employment? In 2000 approximately 54,000 firms were started creating 78,000 new jobs. The employment creation by start-ups in 2004 was 66,700 jobs. On average, start-ups created employment for 1.6 persons in 1997 and for 1.3 persons in 2004, thus the average start-up size decreased over the years. Of the total employment creation, on average 53% of this employment creation between 1994 and 2004 was due to start-ups.

The net change in employment is a result of job creation by new firms, job destruction the consequence of exits and growth and shrinkage of existing firms. Table 2 depicts the contribution of each of these groups to the net employment growth as a percentage of total employment (in average annual rates between 1994 and 2004).

Please insert table 2 about here

Table 2 shows that total job creation in the Netherlands was on average 2.7% each year. Job creation by already existing firms was 1.5%. Small start-ups are responsible for the highest rate (4.7%) in net employment growth. Employment creation is fairly constant over time.

Although many entrepreneurs are eager to start-up their own business, many of them will not survive. The first few years, in particular, are extremely difficult. We looked at the survival rates of all firms that started their business in 1994 (see figure 1).

Please insert figure 1 about here

A third of the start-ups exited the market within three years. The second year shows the highest number of exits. Almost 16% of the start-ups quit in the second year. After 10 years approximately 63% of the firms that entered the market in 1994 have exited the market.

Bangma et al. (2005) submit that the survival rates of Dutch firms are constant over time. This is quite remarkable. There seems to be no effect of the economic situation on the survival rate. Neither does there seem to be any effect of the law of large numbers, because some cohorts have more start-ups than other cohorts. The quote of the number of exits related to the number of start-ups is fairly constant. Large differences in survival rates are apparent across industries. Firms in the Netherlands that have the largest chance of survival are firms in the chemical industry and in banking and insurance. Start-ups in the retail, wholesale and the hotel and catering industry are the firms that have the lowest chance of survival.

3. Determinants of growth

Important theories on the evolution and revolution in corporate development and on the growth of firms were developed 40 or more years ago (Gibrat, 1931; Penrose, 1959). Entrepreneurship researchers have indicated that growth is a crucial indicator of venture

success, more crucial than other performance indicators (Covin and Slevin, 1997, Low and MacMillan, 1988). There is a group of researchers who focus on concepts that explain growth, i.e. what are the antecedents of organisational growth? And what are the consequences for the company itself? In this section a short overview is presented of determinants for growth from literature on strategic management and entrepreneurship. Philipsen and Kemp (2003) present an overview of both theoretical and empirical studies on determinants for growth.

Concepts that proved to have an impact on the growth of SMEs can be classified in several groups of resources, such as human capital, the entrepreneur's social capital, financial capital, structure of the company, and market variables (Man et al., 2002; Davidsson, 1991). Other authors of recent studies have proposed that a combination of individual, organisational and market dimensions provide a more comprehensive prediction of venture development and growth than each of the dimensions in isolation (Almus and Nerlinger, 1999; Baum et al., 2001; Covin and Slevin, 1997; Lumpkin and Dess, 2001). However, the examination of these multi-dimension models is limited. In this study, we will build on these multi-dimensional models including variables from the market/industry dimension, the entrepreneurial/managerial dimension and the firm-specific dimension. The next sections take a closer look at each of the three elements.

3.1 Market / industry dimension

The lack of market power and the turbulent nature of newly emerging markets often make SMEs more vulnerable to external influences than larger firms. Barringer et al. (1997) found that fast-growing entrepreneurial firms operate in more munificent environments than slower growing firms, suggesting the positive influence of environmental opportunities. Other authors take a more pro-active approach when

considering the external factors. Slevin and Covin (1995) for example suggest that continuous repositioning is needed if smaller new firms are to anticipate and respond to the action of (larger) competitors. The influence of the environment on a firm's growth cannot be ignored.

Baum et al. (2001) consider that the external factors are dynamism, munificence and complexity. Wijewardena and Cooray (1995) showed the importance of the type of industry and the nature of the competition. Pelham (1999) argued that external factors that influence growth are industry growth, market concentration, value added per employee and the market segment. Lau and Busenitz (2001) emphasised the influence of difficulty in market conditions on firm growth. Difficulties can be caused by problems such as borrowing, operational facilities, competition, policy change and labour. Wiklund (2000) found that environmental dynamism, capital availability and type of industry are relevant for growth in terms of sales and employment.

3.2 Entrepreneurial/managerial dimension

The process of achieving growth is strongly influenced by entrepreneurs or managers. The task of creating organisational capabilities and competencies is seen as one of the functions of the entrepreneur (Gartner and Starr, 1993). De Koning and Muzyka (1998) found that opportunity orientation is an important factor in explaining growth. Eggers et al. (1997) showed that leadership style differs in different stages of organisational growth. According to Davidsson (1991), growth is influenced by the entrepreneur's need for achievement, ability, opportunity and growth motivation. Lau and Busenitz (2001) examined growth intentions of entrepreneurs and found that an entrepreneur's commitment, need for achievement, and social environment are

important, but that a cognitive understanding of the environment also has a deep impact on growth intentions.

Baum et al. (2001) identified three different research domains which focus on the entrepreneur: personal traits and general motives, personal competencies, and situational-specific motivations. Personal traits and general motives are age, education, ambition and ambiguity of the entrepreneur. Ambiguity allows the entrepreneur more latitude to interpret and influence an environment that is not yet settled (Mintzberg, 1973). Individual competencies are the knowledge and capabilities required to perform a specific job (e.g. skills specific for the industry, and opportunity recognition). Situational-specific motivations refer to strategic vision, business goals and self-efficacy. Specific challenging goals lead to higher performance. Also Rauch et al. (2005) found strong support for the relationship between human capital of the business owners and employment growth.

3.3 Firm-specific dimensions

The resource-based view of the firm shows that the internal factors of the firm are important for its performance. Rangome's study (1999) points out the importance of innovation, production and market-management capabilities. Lee et al. (2001) found that technological capabilities and financial resources were important predictors of a venture's growth. Furthermore, Baum et al. (2001) reported that a new venture's internal capabilities are the primary determinants of the venture's performance. Firm characteristics identified by the authors are age and size of the firm; endogenous internal factors here are strategy, available resources, financial situation, products, working methods, cooperation, profitability and innovative behaviour. Entrepreneurial

processes put forward by Lumpkin and Dess (2001) are innovation, risk taking, proactiveness and aggressiveness.

Almus and Nerlinger (1999) introduced five factors of firm-specific characteristics that influence growth: age, size, liability, networks and diversification of products. Research by Wijewardena and Cooray (1995) again draws attention to age and the size of the firm. The authors further examined the influence of capital intensity, export orientation, advertisement expenditure, research and development expenditure and the number of skilled workers relative to the total number of employees. Autio et al. (2000) wrote that learning new capabilities helps firms to compete effectively, and to survive and grow. The accumulation of knowledge through learning constitutes a driving force in the development and growth of young firms (Penrose, 1959; Spender and Grant, 1996).

4. Measurement of growth

As we have seen in the previous sections, growth is multidimensional in nature allowing different attributes (for example sales, personnel value and capital) of the firm to change during growth. The studies mentioned in chapter 3 use different measurements for growth. In this chapter we take a closer look at this topic.

According to Penrose (1959) the size of a firm should be measured according to the present value of the resources (including personnel) used for its own productive purposes. This proved almost impossible in practice. Garnsey et al. (2006) argued that Penrose was somewhat sceptical of measuring firm attributes that are unique to individual firms. These attributes may not be reducible to any common denominator and

are therefore unsuitable for quantitative treatment. But Penrose (1959) recognized the need to measure the growth performance of fixed assets.

Garnsey et al. (2006) stated that a firm's growth can be measured in terms of inputs (investment funds, employees), in terms of the value of the firm (assets, market capitalization, economic value added) or outputs (sales revenues). They argued that many new studies on new venture growth cite funds invested at various stages, but these track the 'burn rate' of investment funds rather than the growth of productive resources. Sales figures (turnover) have to be adjusted for inflation, and are affected by vertical integration (how much of final sales is produced internally or brought in). Profits are expressed in various ways and are often influenced tax and accounting systems. This creates comparison problems. Valuation of the firm's assets is a composite indicator of growth. This includes tangible assets, for example production equipment and buildings, and a valuation of intangible assets, the firm's expertise and reputation. Especially the valuation of intangible assets is difficult.

In empirical literature the possible indicators for measuring growth are: assets, employment, market share, physical output, profit and sales (Ardishvili et al., 1998; Delmar, 1997). The most commonly used growth indicators according to Delmar's study (1997) are employment and sales. Employment figures are used because they offer standardized, comparable data about the rate and direction in which a firm has been expanding. In Bennett and Robson (1999) for example the relative employee and turnover growth measures are investigated. Almus and Nerlinger look at the growth in the number of employees between 1989 and 1997. Baum et al. (2001) measure growth in terms of employees, but also in annual sales and profit. Davidsson (1991) uses growth of employees and sales as the dependent variable in his analysis. Beal (2000)

focuses on the growth of sales and profits only. Chandler and Hanks (1994) examine the growth of market share, cash flow and sales. In our study, we will focus on employment growth. This measure is suitable for comparing firms of different industries, is not influenced by inflation etc. Furthermore it builds on a large stream of previous empirical research on firm growth (Delmar, 1997).

5. Data

Many empirical research studies on new firms have a retrospective character. Entrepreneurs are asked about their activities and the firm performance some years after the start of their firm. According to Schutjens and Stam (2003) this leads to two problems. First, the reasons for the closure or migration of the new firms that did not survive can no longer be ascertained, since by definition the research population will consist only of those entrepreneurs that did survive. The second problem is that memory problems can be quite substantial, especially when the firms are some years old. It may be hard to remember the exact reasons for specific firm strategies after a few years. The 'Start-up panel: cohort 1994' was founded by EIM Business and Policy Research (hereafter EIM) to avoid these problems and to analyse the major changes in the early life stages of start-ups. We use this panel for our empirical analyses. The population in this panel consists of firms in the Netherlands that started their business in 1994. First, we give a description of the start-up panel in section 5.1 and then we present the relevant variables in section 5.2.

5.1 The start-up panel

Data was collected in the ‘Start-up panel: cohort 1994’. In this year EIM started to work with a representative panel of firms that were registered as independent start-ups in 1994. Almost 2,000 firms, started in the first part of 1994, were interviewed on various aspects concerning the start of their business. The start-ups have been followed ever since 1994. The main themes have remained the same over the years and cover subjects such as characteristics of the firm and entrepreneur, finance and investment, bottlenecks, strategy and goals, market and environment, realisation versus expectation. Now we have ten years of valuable information at our disposal.

Approximately 12,000 addresses were selected in 1994. The business-owners were called and asked whether they would like to participate in a research on start-ups. Almost 3,000 business-owners were interested. They all received a questionnaire by mail. A total of 1,938 completed questionnaires were returned. A year later, in 1995, the participants were approached again. This time almost 1,750 business-owners expressed their interest to participate in the research and 1,007 completed questionnaires were returned. This procedure was used until 1999 and since then computer assisted telephone interviewing (CATI) was used to gather information. In 2000 current but also previous participants that could be traced, were phoned resulting in 670 completed interviews. In figure 2 the number of participants in the panel between 1994 and 2004 is depicted. In 2004, ten years later, there were still 435 participants in the panel.

Please insert figure 2 about here

Throughout the years only 23% of our panel participants survived. It is necessary to taken into account that some firms refused to participate in the panel in later years and that other firms were hard to trace because they stopped their economic activities, went bankrupt or simply moved. In the end the first problem mentioned by Schutjens and Stam (2003) could not be avoided entirely in this panel. Stam et al. (2005) used the start-up panel: cohort 1994, but also included cohort 1998, cohort 1999 and cohort 2000 in their study on renascent entrepreneurship, entrepreneurs that have a stated or revealed preference for starting a new firm after firm exit. They traced the firms that did not survive within one year subsequent to the closure of the business, and a number of characteristics were recorded in a survey. At the end of 2004 they had placed calls to 510 ex-entrepreneurs that had closed their business in a previous decade. Ultimately they collected data from 240 respondents on several variables reflecting entrepreneurial experience, current occupations, and entrepreneurial intentions. Their non-response analysis revealed that there are no significant differences between the non-respondents and respondents, with the exception of age: respondents tend to be older than non-respondents, which suggests that renascent entrepreneurs (as these tend to be relatively young) were undersampled. Stam et al. attribute this response bias to the higher mobility of younger people, which makes it harder to trace them via telephone surveys. Fifty-seven percent of the interviewed entrepreneurs were renascent entrepreneurs. The other 43% were considered to be one-night stands: ex-entrepreneurs that have not stated or revealed a preference for starting a new firm.

5.2 Sample characteristics

On average the entrepreneurs in our panel were 38 years old in 1994. The youngest entrepreneur was 19 years old and the oldest 61 years old. There are more male

participants in the panel than females, almost 75% of the panel members are men. Approximately 27% of the participants in the panel have a bachelor or master degree.

The distribution of start-ups across industries in the panel is: manufacturing and construction (15%), wholesale (9%), retail (18%), catering industry and transport (11%), business services (21%) and other services (27%). It should be noted that our data are not a representative sample of start-ups of the business population in 1994 in the Netherlands as a whole.

The average firm size in 2004 was 3.8 persons. In 1994 the average employment creation of a start-up in the panel was 1.6 persons. According to the Dutch definition of SMEs all firms should have fewer than 100 employees. None of the firms in the panel has grown so rapidly since 1994 that it has become a large firm. In fact 60% of the panel participants did not have any employees at all in 2004. We also looked at the growth patterns identified by Bangma and Verhoeven (2000). Table 3 presents the growth patterns of the firms in the panel for the periods 1995-1999 and 2000-2004.

Please insert table 3 about here

More firms grew between 1995 and 1999 than between 2000 and 2004: 34.2% versus 21.6%. The start-ups in the panel are more eager to grow in their early years and for some firms it is also necessary to grow to gain sufficient scale economies.

5.3 Variables

The start-up panel contains approximately 2,500 variables. Growth is measured by the number of employees. We look at the growth in two periods: 1995 to 1999 and 2000 to 2004. We define growth as:

$$G_{1995-1999} = \ln(1999) - \ln(1995) \quad (5.1)$$

$$G_{2000-2004} = \ln(2004) - \ln(2000) \quad (5.2)$$

We also computed the EIM growth rate developed by Bangma and Verhoeven (2000). They use a combination of absolute and relative growth in employment. This growth rate is related to the Birch growth rate. However the EIM growth rate reduces the impact of absolute growth compared to the Birch growth rate. The EIM growth rate was also computed for the periods 1995-1999 and 2000-2004. Therefore we have:

$$GR_{1995-1999} = |\text{empl}_{12-31-1999} - \text{empl}_{01-01-1995}|^{0.25} \times (\text{empl}_{12-31-1999} - \text{empl}_{01-01-1995}) / \text{empl}_{01-01-1995} \quad (5.3)$$

$$GR_{2000-2004} = |\text{empl}_{12-31-2004} - \text{empl}_{01-01-2000}|^{0.25} \times (\text{empl}_{12-31-2004} - \text{empl}_{01-01-2000}) / \text{empl}_{01-01-2000} \quad (5.4)$$

Not all variables in the database are important for this research and it was necessary to select the relevant variables for our purpose. For instance, as all business-owners started their business in 1994 tenure is not a relevant variable in our study. In chapter 3 we described three main determinants of growth market/industry determinants, entrepreneurial/managerial determinants and firm-specific determinants and we looked for these determinants in the panel. It should be noted that our analysis is ad hoc. As a result not all specific items that belong to a determinant can be found in the panel.

Although we made use of a longitudinal data set some questions were only asked once. In 1994, for example, the entrepreneurs were asked about their previous sector experience. Other questions were available for a period of some years or for the whole

period of ten years. We constructed new single variables for these multi-year questions. For example, when covering a period of years entrepreneurs were asked whether they had joined an association of entrepreneurs. If the entrepreneur had joined such an association we assigned the value one to the entrepreneur and otherwise we assigned the value zero. There were other variables for which we counted the number of years in which a certain activity was carried out. We know exactly how many years the company exported or performed R&D activities and we used the number of years of export and of R&D activities for our analyses. We are aware that the method used has some limitations. These limitations are discussed in the section future research. The reason for constructing the variables was to be able to keep our analysis as simple as possible and to get a first glimpse on the determinants of growth. The database has so many data points, therefore it is impossible to capture all data and analysis at one time. Eventually we had 113 (constructed) variables at our disposal.

The (constructed) variables were standardized and a factor analysis was performed to reduce the number of variables. Factor analysis resulted in 36 determinants. The relevant variables are presented in table 4, 5 and 6. Market/industry determinants are captured by four variables. These variables describe the type of industry, competition, unfulfilled needs and growth potential.

Please insert table 4 about here

There are 15 variables available in the panel as entrepreneurial/managerial determinants of growth.

Please insert table 5 about here

And finally, 23 variables are focusing on the firm determinants of growth.

Please insert table 6 about here

6. Results

In this section we analyse which determinants actually have an effect on the growth of start-ups. First we performed a correlation analysis and then we performed regression analysis.

6.1 Correlation analysis

A correlation analysis was performed to find which determinants influence growth. Correlation analysis is the statistical tool that we can use to describe the degree to which one variable is linearly related to another. Correlation analysis is frequently used in conjunction with regression analysis to measure how well the least squares line fits the data. Correlation analysis can also be used in its own, however, to measure the degree of association between two variables. Only the significant correlations (on a 1% level and a 5% level) are presented in table 5.

Please insert table 7 about here

There are several determinants that have a positive relation with growth in the period 1995 to 1999. One market/industry determinant appears to have a significant

correlation with growth between 1995 and 1999: unfulfilled needs. This is not strange at all. Entrepreneurs starting their business in a market where needs are unfulfilled have more space to expand their business. Three entrepreneurial/managerial determinants show positive correlation with growth in the period 1995 to 1999. Entrepreneurs with previous management experience and previous sector experience are more likely to grow than those without experience. Experience has a positive relation with the early stage growth. Entrepreneurs willing to accept higher risks show higher growth rates in their first years after start-up. Four firm-specific determinants correlate with growth in the period 1995-1999. First of all the highest positive correlation occurs between growth and the ambition to expand the business. This phenomenon is in line with our expectations. Firms that clearly set the goal to expand their business are more likely to grow than other firms. If an entrepreneur perceives growth barriers this has a positive effect on firm growth. Apparently the entrepreneur puts more effort into survival and growth should he perceive the existence of growth barriers. Organizational learning is also an important aspect. A firm realizes higher growth if it is informed by its own employees, but business relations have a negative impact on growth. The correlations on the growth rate show similar results to growth. The only differences are that previous management experience and risk attitude do not correlate with the growth rate, but self-control does show a significant correlation.

When we examine the determinants of growth for the period 2000 to 2004 we find only two significant correlation coefficients. During this period being open to change has a negative effect on growth. Also a strategy of high prices negatively influences growth. It is not surprising that only two determinants correlate with growth, because we have already seen that fewer firms grew between 2000 and 2004. Openness to

change also correlates with the growth rate for the period 2000 to 2004. It appears that entrepreneurs benefited in this period if they had set up a business plan before start-up. Knowledge acquisition by employees correlates significantly with the growth rate.

6.2 Regression analysis

Next a regression analysis was performed. Regression analysis depicts the relation of the effect. Tests shows that multicollinearity is not an issue in our regression analysis. Because we have 43 independent variables at our disposal we show only the significant coefficients at a 5% and 10% level. The results of the regression analysis of growth and the growth rate in the period 1995-1999 is presented in table 6. The R-square for growth equals 0.314 and for the growth rate it equals 0.241. Both regression models are significant.

Linear regression with growth over the period 1995 to 1999 as a dependent variable, resulted in 13 significantly related determinants. Remarkably, educational level has a negative coefficient. This means that firms with highly educated entrepreneurs tend to grow on average slower. It is possible that these entrepreneurs are self-employed and have no ambition to grow at all. Should the entrepreneur's partner own a firm this has a positive influences on the growth of the firm. Moreover this variable shows the highest coefficient. This potentially has to do with a role modelling function and/or experiences can be shared. Entrepreneurial determinants with positive coefficients are previous management experience, previous sector experience and risk attitude. Firm-specific determinants that influencing growth in a positive way are the ambition to expand, perceived growth barriers, challenge as start-up motive, networking and knowledge acquisition through employees. On the other hand knowledge acquisition via buyers and

suppliers and other firms have a negative coefficient. It looks as if these relations know a lot about running a business, but lack market knowledge.

Please insert table 8 about here

Table 6 also shows the results of the regression analysis when the growth rate is used as dependent variable. Again educational level has a negative coefficient. But it is not the only variable that relates negatively to the growth rate. Family with business experience, the ambition of improvement and knowledge acquisition via buyers and suppliers have negative coefficients.

A few years later, when the start-ups have matured there will possibly be other determinants that influence growth. Therefore, we also performed regression analysis for growth and the growth rate between 2000 and 2004. The regression analyses were found to be insignificant. The R-squares are also low. The results in table 7 should be interpreted very carefully.

Please insert table 9 about here

The results depict that there are several determinants of growth. The determinants differ over time. In other words, growth in the first five years after start-up is determined by other factors than is growth in a more mature phase of the lifecycle.

7. Conclusion and future research

7.1 Conclusion

In this exploratory study we make a first attempt to explain growth of start-ups based on a longitudinal dataset. In the previous sections we saw that our dataset contains a great deal of valuable information and allows us to distinguish several determinants of growth in all three dimensions: market/industry, entrepreneurial/managerial and firm-specific. The results show that constructs from all three dimensions are important in the explanation of growth. Especially the growth in the first five years can be explained. Determinants that are important for the growth of start-ups are unfulfilled needs, previous management and sector experience, a partner with an own, a growth objective and networking. For later periods it is much harder to explain the growth of these start-ups. The firms might have changed a lot. Many characteristics have lost their explaining power.

7.2 Directions for future research

We made use of the start-up panel for our analyses. In this study we look only at the respondents that survived in the panel over a period of ten years from which we obtained a considerable amount of information. We still have more information that is not used in this study. We are aware of the fact that, during the past few years, many of our respondents have withdrawn from the start-up panel, we have information for many respondents covering five or eight years. In our future research we utilise this information. One aspect we wish to investigate is whether firms still in the panel differ from those that dropped out. A Cox survival analysis will be a useful tool.

Although the start-up panel contains a great deal of information it is quite possible that not all determinants of growth have been covered. Variables such as personal traits like locus of control, ingenuity, affiliation need, tolerance for ambiguity or need for power are not contained in our database. It may also be assumed that these personal traits influence some of the exogenous variables. The distinction between ‘exogenous’ and ‘endogenous’ variables in a model is a subtle and sometimes controversial complication (Greene, 1997). This subject is widely discussed in literature for example Zellner (1979), Granger (1969) and Engle et al. (1983). When considering the growth of start-ups, as in our study, it is possible to argue that many explanatory variables are potentially endogenous. If this is the case then the ordinary least squares method (OLS) produces a biased and inconsistent estimator for the parameters in the model. In the present study we paid no attention to this phenomenon. In future research we should consider alternative estimation methods. All the consistent and efficient estimation methods in general use can be placed under the umbrella of instrumental variable estimators (Greene, 1997), for example two-stage least squares or general methods of moments.

Some questions on the panel questionnaire were asked only once, whereas others were repeated each year for several years. As described in section 5.3 we constructed single variables. In this way, we had cross-sectional data at our disposal. It could be argued that this looks a lot like data mining and information is lost. Additionally we are not making optimum use of the longitudinal nature of our database. In econometrics datasets like the start-up panel are called panel data. A panel data set contains repeated observations about the same units (individuals, households, firms), collected over a number of periods (Verbeek, 2004). The availability of repeated observations allows us

to specify and estimate more complicated and more realistic models than a single cross-section or a single time series would do. In other words, the fundamental advantage of a panel data set over a cross section is that it will allow the researcher far greater flexibility in modelling differences in behaviour across individuals (Greene, 1997). Panel data allows the identification of certain parameters or questions without the need to make restrictive assumptions. Several studies on panel data have been written in the last few years: Wansbeek (2001), Baltagi and Summey (2002), Woolridge (2002), Arellano (2003), Hsiao (2003), Frees (2004), Baltagi (2005). We refer to these studies for an extensive review of panel data analysis. However, we give a brief discussion of some elements of panel data analysis when considering our start-up panel. Two types of effects can be considered from panel data: the individual effects and the time effects. There are two ways to deal with these effects: one way is to take them as fixed parameters to be estimated: the fixed effects models and the other way is to take them as random variables: the random effects models. Whether to treat the individual effects as fixed or random is not an easy question to answer (Verbeek, 2004). A useful test was developed by Hausman (1978). In future research we should test whether fixed or random effects are more appropriate for our panel. Instrumental variables can also be added to panel data.

We measured growth for two periods: 1995 to 1999 and 2000 to 2004. In our further analysis we need to focus on growth in other periods too. About 60% of all firms in the panel showed no growth at all. In our analysis we included growing and non-growing firms. It is quite possible that the determinants of growth of start-ups will differ if we consider growing firms only. It is possible to make this distinction by using a tobit model and this is a useful tool when using panel data. One disadvantage of a tobit model

for our future research is that shrinking firms are not included in the analysis at all. A fixed effects or random effects model also allows us to include growing and shrinking firms.

In this study we measured growth by using the number of employees (business-owner is included). We considered the relative growth by taking the difference of the natural logarithms of the number of employees in two periods and the EIM growth rate. In future research we intend to use more measures of growth. First of all we want to measure growth in terms of turnover. When the firm starts many entrepreneurs do not work fulltime in their firm. Of the 435 participants in the start-up panel 20% of the entrepreneurs worked fewer than 10 hours, almost 34% worked 10 to 40 hours at the time of the start-up and all the other entrepreneurs worked over 40 hours a week. A year later only 11% worked fewer than 10 hours. Our suggestion is to use the number of hours worked by the entrepreneur(s) and their employees. We have to check whether such a measure is feasible. The respondent is asked about the number of hours worked every year, but there is a lack of information about the hours worked by business partners and employees.

It is our opinion that our future studies will prove to be very interesting for scientific research, but also for policy making. The variables applying to the environment of the firm will be most interesting for policy makers. The government is able to make policy only on environmental matters. It is impossible for the government to develop policy to change an entrepreneur's character and it is hard to do anything about the internal organization of a firm. The results of the regression analysis indicate that the environmental variables have almost no effect on the growth of the firm. In our future research we intend to pay more attention to the possibilities for policy-making.

8. References

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Table 1 – Number of start-ups and start-up quota, 1994-2004

<i>Year</i>	<i>Number of start-ups</i>	<i>Number of firms</i>	<i>Start-up quota</i>
1994	39,100	583,200	6.7%
1995	41,500	604,800	6.9%
1996	39,600	626,500	6.3%
1997	40,100	647,100	6.2%
1998	42,000	667,000	6.3%
1999	47,200	689,600	6.8%
2000	53,800	717,700	7.5%
2001	47,300	734,700	6.4%
2002	42,600	744,900	5.7%
2003	40,600	748,100	5.4%
2004	48,300	760,900	6.3%

Table 2 – Net employment growth and its components in the Netherlands, 1994-2004, average annual rates as a per cent of total employment

	<i>Small firms (0 -< 10 employees)</i>	<i>Medium-sized firms (10-< 100 employees)</i>	<i>Large firms (>= 100 employees)</i>	<i>Total</i>
employment creation rate	7,3%	1,3%	0,0%	2,7%
start-ups (entry)	4,7%	0,1%	0,0%	1,6%
new subsidiary companies	2,7%	1,1%	0,0%	1,0%
employment destruction rate	4,5%	1,5%	0,5%	2,0%
employment change existing firms	-0,4%	2,6%	2,0%	1,5%
net employment change	2,4%	2,3%	1,5%	2,2%

Figure 1 – Survival rates of start-ups cohort 1994

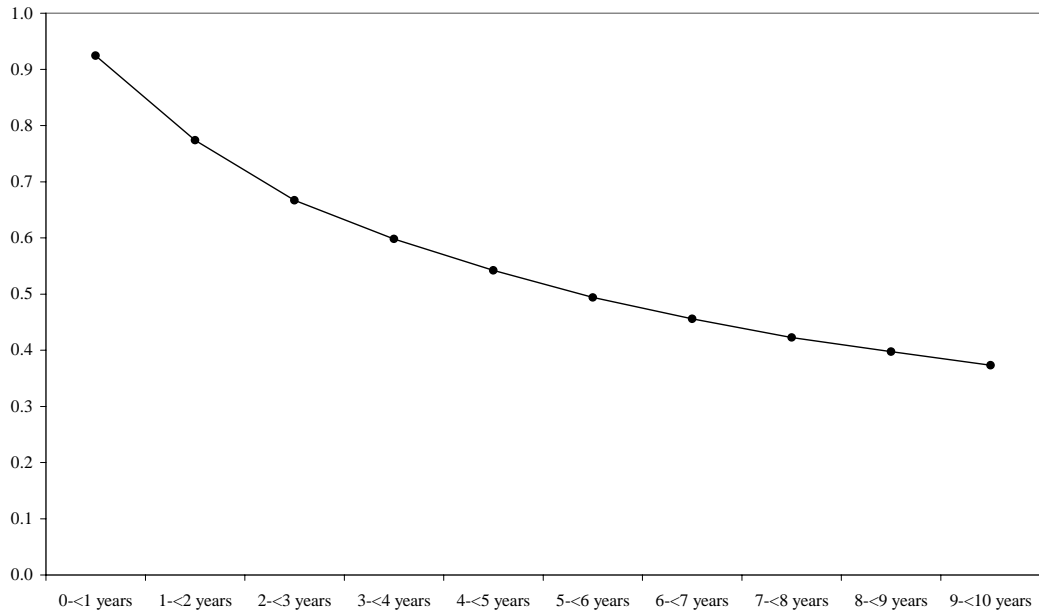


Figure 2 – Number of participating firms in the 'Start-up panel: cohort 1994', 1994-2004

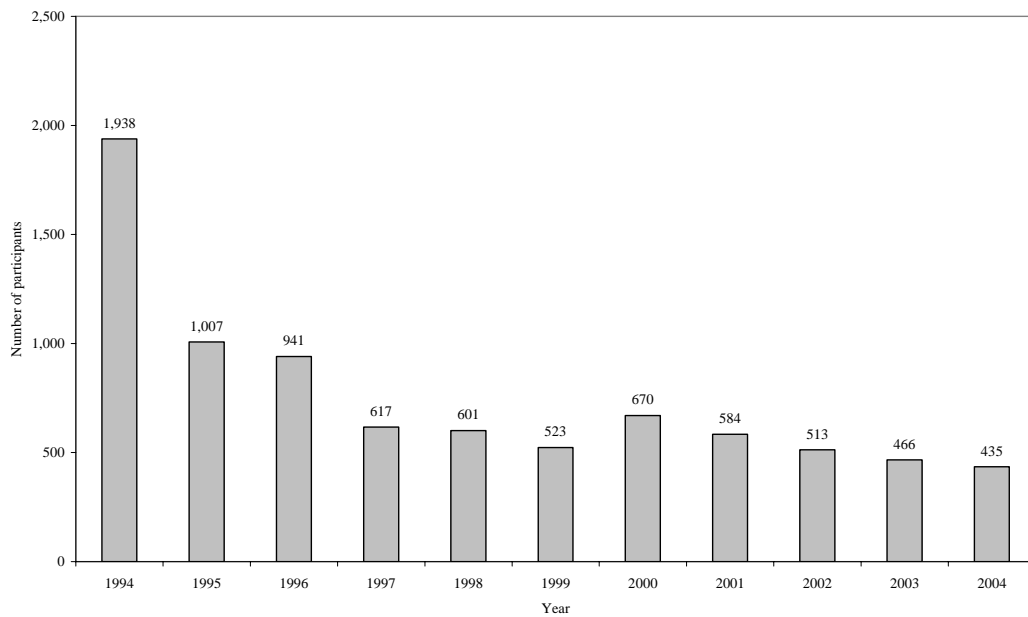


Table 3 – Growth patterns of participants in the start-up panel

	<i>1995-1999</i>	<i>2000-2004</i>
fast-growing firms (growth rate ≥ 1.5)	13.7%	4.0%
firms growing at the normal rate ($.05 \leq$ growth rate < 1.5)	13.7%	17.6%
stable firms ($-.05 <$ growth rate $< .05$)	66.1%	58.4%
shrinking firms (growth rate $\leq -.05$)	6.5%	20.0%

EIM growth rate is: $|\text{empl}_t - \text{empl}_{t-4}|^{0.25} \times (\text{empl}_t - \text{empl}_{t-4})/\text{empl}_{t-4}$.

Table 4 – Variables in the analysis: market / industry determinants

<i>Variable description</i>	<i>Type</i>
MARKET / INDUSTRY DETERMINANTS	
Type of industry	Dummies
Competition	Continuous (factor scores)
Unfulfilled needs	Continuous (factor scores)
Growth potential	Continuous (factor scores)

Table 5 – Variables in the analysis: entrepreneurial / managerial determinants

ENTREPRENEURIAL / MANAGERIAL DETERMINANTS	
Gender	Boolean
Education (university degree)	Boolean
Family with business experience	Boolean
Partner has an own company	Boolean
Age of the entrepreneur	Continuous
Previous management experience	Continuous (factor scores)
Previous experience in entrepreneurship	Continuous (factor scores)
Previous sector experience	Continuous (factor scores)
Openness for change	Continuous (factor scores)
Openness for experience	Continuous (factor scores)
Risk attitude	Continuous (factor scores)
Leadership abilities	Continuous (factor scores)
Customer orientation	Continuous (factor scores)
Start-up motives: pull (opportunity)	Continuous (factor scores)
Start-up motives: push (unemployment/bad income)	Continuous (factor scores)

Table 6 – Variables in the analysis: firm specific determinants

FIRM-SPECIFIC DETERMINANTS	
Growth objective	Continuous (factor scores)
Ambition: improvement	Continuous (factor scores)
Firm autonomy	Continuous (factor scores)
Ambition: less employees	Continuous (factor scores)
Ambition: cut back	Continuous (factor scores)
Perceived growth barriers	Continuous (factor scores)
Research and development (R&D)	Continuous (factor scores)
Networking	Continuous (factor scores)
Export	Continuous (factor scores)
Own financial resources	Continuous (factor scores)
Market orientation: external	Continuous (factor scores)
Customer orientation: price stunts	Continuous (factor scores)
Formalisation: business plan before start-up	Continuous (factor scores)
Formalisation: business plan after start-up	Continuous (factor scores)
Strategy: service and quality	Continuous (factor scores)
Strategy: high prices	Continuous (factor scores)
Knowledge acquisition: buyers and suppliers	Continuous (factor scores)
Knowledge acquisition: employees	Continuous (factor scores)
Knowledge acquisition: trade fairs	Continuous (factor scores)
Knowledge acquisition: other firms	Continuous (factor scores)
Information search: literature and experts	Continuous (factor scores)
Information search: customers/suppliers	Continuous (factor scores)
Information search: research institutes	Continuous (factor scores)

Table 7 – Correlations between growth and its determinants

<i>Determinant</i>	<i>G₁₉₉₅₋₁₉₉₉</i>	<i>GR₁₉₉₅₋₁₉₉₉</i>	<i>G₂₀₀₀₋₂₀₀₄</i>	<i>GR₂₀₀₀₋₂₀₀₄</i>
MARKET/INDUSTRY DETERMINANTS				
Unfulfilled needs	0.124**	0.129**		
ENTREPRENEURIAL/MANAGERIAL DETERMINANTS				
Previous management experience	0.102*			
Previous sector experience	0.137**	0.111*		
Openness for change			-0.184**	-0.101*
Risk attitude	0.114*			
FIRM-SPECIFIC DETERMINANTS				
Growth objective	0.296**	0.187**		
Firm autonomy		0.099*		
Perceived growth barriers	0.130*	0.095*		
Formalisation: business plan before start-up				0.106*
Strategy: high prices			-0.101*	
Knowledge acquisition: buyers and suppliers	-0.110*	-0.116*		
Knowledge acquisition: employees	0.158*	0.198**		0.116*

* Correlation is significant at the 0.05 level.

** Correlation is significant at the 0.01 level.

Table 8 – Results of regression analysis for growth and growth rate, period 1995-1999

<i>Determinant</i>	<i>G</i> ₁₉₉₅₋₁₉₉₉ (<i>R</i> ² =0.314)		<i>GR</i> ₁₉₉₅₋₁₉₉₉ (<i>R</i> ² =0.241)	
	<i>Coefficient</i>	<i>Significance level</i>	<i>Coefficient</i>	<i>Significance level</i>
MARKET/INDUSTRY DETERMINANTS				
Competition			0.200	0.064
Unfulfilled needs	0.078	0.001	0.346	0.001
ENTREPRENEURIAL/MANAGERIAL DETERMINANTS				
Education level	-0.127	0.046	-0.559	0.059
Family with business experience			-0.641	0.018
Partner with own firm	0.287	0.024	1.124	0.057
Previous management experience	0.056	0.017		
Previous sector experience	0.062	0.007	0.223	0.039
Risk attitude	0.051	0.028		
FIRM-SPECIFIC DETERMINANTS				
Growth objective	0.149	0.000	0.430	0.000
Ambition: improvement			-0.206	0.051
Firm autonomy			0.195	0.061
Perceived growth barriers	0.067	0.002	0.241	0.019
Start-up motives: pull (opportunity)	0.044	0.049		
Networking	0.046	0.038	0.199	0.056
Export			0.176	0.096
Strategy: high prices			0.175	0.088
Knowledge acquisition: buyers and suppliers	-0.045	0.040	-0.206	0.044
Knowledge acquisition: employees	0.081	0.000	0.446	0.000
Knowledge acquisition: trade fairs	-0.045	0.042		

Table 9 – Results of regression analysis for growth and growth rate, period 2000-2004

<i>Determinant</i>	<i>G₂₀₀₀₋₂₀₀₄ (R²=0.134)</i>		<i>GR₂₀₀₀₋₂₀₀₄ (R²=0.127)</i>	
	<i>Coefficient</i>	<i>Significance level</i>	<i>Coefficient</i>	<i>Significance level</i>
Age	-0.296	0.041	-1.143	0.097
Openness for change	-0.088	0.000	-0.209	0.050
Ambition: improvement			0.175	0.091
Formalisation: business plan before start-up			0.231	0.023
Strategy high prices	-0.048	0.022		
Knowledge acquisition: employees			0.245	0.014