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Arriving at the High Growth Firm

Frédéric Delmar

Stockholm School of Economics
Center for Entrepreneurship and Business Creation
P.O. Box 6501
SE- 113 83 Stockholm
SWEDEN
(+46) 8 736 93 56 Phone; (+46)8 31 27 85 Fax
frederic.delmar@hhs.se

Per Davidsson

Jonkoping International Business School
P. O. Box 1026
SE-551 11 Jonkoping
SWEDEN
(+46) 36 15 64 30 Phone; (+46) 36 16 10 69 Fax
per.davidsson@jibs.hj.se

William B. Gartner

Lloyd Greif Center for Entrepreneurial Studies
Bridge Hall One
Marshall School of Business
University of Southern California
Los Angeles, CA 90089-0801
213-740-0648 Phone; 213-740-2976 Fax
wgartner@marshall.usc.edu

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Please direct all correspondence to William B. Gartner

Arriving at the High Growth Firm

Abstract

This study explores heterogeneity in how firms have achieved high growth. Using the population of all firms in Sweden with more than 20 employees in existence in 1996 (n= 11,748), we analyzed their development for each year of the previous 10 years (1987 to 1996). From this population of all firms in Sweden, multiple criteria were used to define a sample of high growth firms (n = 1,501). Using nineteen different measures of firm growth (such as relative and absolute sales growth, relative and absolute employee growth, organic growth versus acquisition growth, and the regularity and volatility of growth rates over the ten year period) we identified seven different types of firm growth patterns. These patterns were related to firm age and size as well as industry affiliation. Implications for research and practice are offered.

Executive Summary

The focus of this research is to offer a variety of ideas, measures, and empirical facts on how organizations grow. This paper presents evidence that organization growth can be achieved in a number of different ways, and the pattern of firm growth, over time, can look very different across all growth firms. We use a data set that covers all firms in Sweden with more than 20 employees in 1996 tracing their development back to 1987. The data allows us to: assess growth in sales as well as in employment, separate organic from acquired growth, identify new entrants, compare independent firms with firms in company groups, and track their subsequent growth over time. In addition, the paper explores whether there is differential representation of these growth patterns for firms of different demographic affiliation in terms of firm size, firm age, industry, and ownership/governance.

A review of prior academic scholarship on firm growth suggests substantial heterogeneity in a number of factors that characterize this phenomenon. Failure to recognize this heterogeneity appears to have lead to some confusion and conflicts in current theory and research findings. There is variation in the kinds of growth measures used in previous research studies on firm growth. Comparison between studies is difficult as the time frame, the growth indicator, and the growth formula often differ. There is heterogeneity in the choice, validity, and reliability of different growth measures as determined from theoretical and methodological perspectives. Different growth measures and calculations affect model building and theory development differently. Scholars have recognized this as an important issue, and have suggested that research should strive towards one single, or a few possible ways, of calculating growth. We believe that the goal of a "one best way" of measuring growth has diverted researchers from acknowledging that firm growth is fundamentally a multi-dimensional rather

than uni-dimensional phenomenon. **All high growth firms do not grow in same way.** This implies that researchers should measure different forms of growth with different growth measures. We believe that a single growth measure would likely provide knowledge about only one form of organizational growth. We provide evidence that indicates the growth patterns exhibited by organizations are highly heterogeneous, and that multiple measures and methods for exploring organizational growth are important for an understanding of firm growth processes.

Data for this study was created by combining several of Statistics Sweden's (i.e., the official "Bureau of Census") registers, in close cooperation and advice from Statistics Sweden experts. All legal commercial activity is represented, whether run as sole proprietorship, partnership, Limited-Liability Company (LLC), or some other legal form. The unit of analysis is the *firm*. These firms may be independent or part of a company group. Each firm within a company group is a case in the database if it fulfills other criteria for inclusion.

We started with all firms that, in November 1996, were: (a) in the private (non-government) sector, (b) were commercially active in Sweden, and (c) had at least 20 employees. There are 11,748 such firms in Sweden, all of which appear in this data set. Annual data on employment for all firms were compiled for the 1987-1996 period. Start-ups during this period are included if they fulfill the size criterion for the final year. Firms that failed during the period are excluded regardless of their previous size and growth. While the very smallest firms are excluded the data set is primarily comprised of small and medium-sized firms. In order to be selected as a high-growth firm, a firm had to be among the top ten percent of all firms in terms of an annual average in one, or more, of six categories: 1) absolute total employment growth, 2) absolute organic employment growth, 3) absolute sales growth, 4) relative (i.e., percentage) total employment growth, 5) relative organic employment growth, and 6) relative sales growth. There

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were 1,501 firms that met these selection criteria. In order to examine if different growth patterns existed, cluster analysis procedures were utilized to develop a taxonomy of growth patterns. The demographic characteristics of the clusters were then explored. This could be seen as testing the external validity of the clusters, that is, if the clusters do not differ on variables not used in the cluster analysis, they are unlikely to represent distinct empirical categories.

We arrived at a seven-cluster solution. Based on the cluster means from the K-means clustering, the clusters were labeled as follows: *Super absolute growers*, representing 13.5 percent (n = 202) of the high growth population, exhibited impressive absolute growth both in employment (total and organic) and in sales. *Steady sales growers*, representing 12.8 percent (n = 193) of the cases, exhibited negative development in terms of employment, but a strong positive development in absolute sales. *Acquisition growers*, representing 10.0 percent (n = 150) of the cases, had a strong positive development in absolute sales and total employment, but negative development in organic employment. This indicates that growth in employment was mainly achieved by acquiring other firms. *Super relative growers*, representing 16.3 percent (n = 244) of the cases, had the strongest development in relative terms. Firms in this cluster had the highest share of high-growth years. Growth was rapid and concentrated for these firms. *Erratic one shot growers* represented 16.7 percent (n =250) of the cases. These firms were characterized by negative development in absolute sales and employment (total and organic) even though they were included in the high-growth population. These firms exhibit positive relative growth, on average, because of an artifact of how average relative growth was calculated. *Employment growers*, representing 16.0 percent (n = 240) of the cases, were characterized by having negative development in absolute sales and weak positive development in numbers of employees. *Steady over-all growers*, representing 14.8 percent (n = 222) of the cases, were characterized by a

relatively strong development in absolute sales and employment growth (total and organic), but had weaker relative (percentage) development.

An important aspect of this study concerns cluster differences in demographic affiliation. We found that firm size and age, and industry had a strong relationship to differences among the clusters and that ownership (governance) had a moderate relationship to the seven growth patterns.

We believe that this study shows that high growth firms exhibit different growth patterns. These growth patterns are not random. Instead, the patterns of high firm growth are empirically distinct, conceptually comprehensible, and systematically related to demographic affiliation. There is no such thing as a *typical* growth firm. Rather, there are many different types of growth firms with different growth patterns. Recognizing that "high growth" is multidimensional in nature, and that "high growth" can occurs in a variety of ways, is an important insight for researchers and practitioners.

Introduction

The topic of organizational growth as a focus of entrepreneurship scholarship has attracted considerable attention (Collins & Porras 1994; Gundry & Welsh 2001; Kirchoff 1994; Mata 1994; Ostgaard & Birley 1995; Siegel, Siegel & MacMillan 1993; Welbourne 1997). But, research in this area has largely failed to generate cumulative results. One explanation for the failure to achieve a cumulative body of knowledge is that researchers use different firm growth measures (Brush & Vanderwerf 1992; Chandler & Hanks 1993; Davidsson & Wiklund 2000; Delmar 1997; Murphy, Trailer, & Hill 1996; Weinzimmer, Nystron, & Freeman 1998). We offer a different explanation. Previous empirical research on organizational growth has failed to recognize the heterogeneous nature of this phenomenon. Recognizing that researchers have used different measures and methods for analyzing firm growth is just one aspect of the need for a more complicated and comprehensive view of this issue.

We argue that firms grow in many different ways and that these patterns of growth, over time, can vary significantly and have different causes. Implicit in this view is a belief that the search for an explanation for why firms grow without knowledge of how firms grow leads to conflicting theories about the causes of firm growth. We argue that firm growth patterns are related to the demographic characteristics of these firms. The view that a firm's growth pattern is dependent on its age, its size and its industry affiliation has been acknowledged in previous theoretical work (Penrose 1959; Stinchcombe 1965), but this view has received little empirical research.

The primary focus of this paper is to provide empirical evidence on firm growth using a variety of firm growth measures and measures of firm demography, such as firm age and size, industry affiliation, and governance (independent firm or part of a larger corporation). Providing

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more heterogeneous and longitudinal empirical evidence on this topic is important for several reasons. First, if firms grow in different ways we can also assume that the reasons leading to growth and the outcome of growth may also be different. Second, expanding the evidence to include information about the demographic profile of each growth firm suggests that these characteristics affect the probability of the type of growth that occurs and how the firm will expand. Third, firm growth is not static in nature. Previous research (often cross-sectional in design) appears to have focused on the occurrence of growth, not on the dynamic evolution of changes, over time, within these growing firms. Cross-sectional evaluation of growth firms is, therefore, problematic. Such analyses preclude the examination of the ordering of the development of each firm, which is important for accurate estimation of how a firm actually achieved growth.

Literature Review

The study of firm growth is, itself, heterogeneous in nature. The variation in measures used in organizational growth studies, the variation in growth indicators, the variation in the measurement of firm growth over time, the variation in the processes by which firm growth occurs (e.g., organic versus acquisition), and the variation in the characteristics of these firms and their environments, are all important features of organizational growth, as a phenomenon. Some of these problems have been identified in previous reviews of the organizational growth literature (Brush & Vanderwerf 1992; Chandler & Hanks 1993; Delmar 1997; Murphy, Trailer & Hill 1996; Weinzimmer, Nystron & Freeman 1998; Wiklund 1998). This section of the paper will attempt to address, in a systematic way, how all of these issues affect the study of firm growth.

<u>Heterogeneity in Firm Growth Measures</u>

A number of scholars have noted that the diversity of measures used in organizational growth studies severely impairs the ability of scholars to accumulate and compare results (Delmar 1997; Murphy, Trailer & Hill 1996; Weinzimmer, Nystron & Freeman 1998). For example, some studies might rely on measuring growth as absolute sales growth measured over a time period of five years (Dunne & Hughes 1996; McCann 1991; Merz & Sauber 1995; Miller 1987), whereas other studies rely on relative employment growth over a time period of three years (Cooper, Gimeno-Gascon & Woo 1994; Donckels & Lambrecht 1995; Peters & Brush 1996; Vaessen & Keeble 1995; Zahra 1993). The choice of *absolute* or *relative growth* is especially important for the relationship between size – and anything correlated with size – and growth. Absolute measures tend to ascribe higher growth to larger firms whereas smaller firms more easily reach impressive growth in percentage (i.e., relative) terms. The implications of the choice between relative and absolute measures is much discussed in the literature and seems to be reasonably well understood by researchers when designing their studies, but frequently forgotten when results are compared with other studies. The issue of time frame has achieved even less attention (Delmar 1997). Comparison between studies is impossible or misleading when the time frame, the growth indicator, and the growth formula differ.

Heterogeneity in the Appropriateness of Specific Firm Growth Indicators

The second, partly overlapping problem concerns the choice, validity, and reliability of different growth measures as determined from theoretical and methodological perspectives (Chandler & Hanks 1993; Weinzimmer *et al*. 1998). Based on extensive reviews of the literature, Ardishvili, Cardozo, Harmon, & Vadakath (1998) and Delmar (1997) arrive at almost identical lists of possible growth indicators: *assets, employment, market share, physical output, profits, and sales.* This article focuses on sales and employment only, for the following reasons. First,

the used of sales and employment measures are the most widely used in empirical growth research (Delmar 1997). Second, these growth indicators are the only ones available in the present study for all of the firms of interest. And, finally, other indicators have some obvious shortcomings that limit their applicability outside of very special contexts. For example, such indicators as market share and physical output can only be compared within industries for firms with a similar product range. Using an indicator such as total asset value is highly related to the capital intensity of the industry, and sensitive to changes over time. And, while profits are an important indicator of success, the relationship of profits to size is only evident in aggregates of firms or over long periods of time for individual firms.

There seems to be an emerging consensus that if only one indicator is to be chosen as a measure of firm growth, the most preferred measure should be sales (Ardishvili *et al. 19*98; Hoy, McDougall, & Dsouza 1992). It is relatively easily accessible, it applies to (almost) all sorts of firms, and it is relatively insensitive to capital intensity and degree of integration. It has been argued that sales are a highly suitable indicator across different conceptualizations of the firm (Davidsson & Wiklund 2000), and also that it is the indicator favored by entrepreneurs themselves (Barkham, Gudgin, Hart, & Hanvey 1996). This is related to another argument, namely that demand and, therefore, sales is a precursor of growth in other indicators, i.e., the nature of the growth process itself points to sales as a natural choice (Delmar 1997; Flamholz 1986).

Sales is not, however, the perfect indicator of growth for all purposes. Sales are sensitive to inflation and currency exchange rates, while employment is not. It is not always true that sales leads the growth process. For high-technology start-ups, and the start-up of new activities in established firms, it is possible that assets and employment will grow before any sales will occur.

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Arguments have been offered that employment is a much more direct indicator of organizational complexity than is sales, and may be preferable if the focus of interest is on the managerial implications of growth (Churchill & Lewis 1983; Greiner 1972). The same line of reasoning about the value employment based measures of growth applies for resource-based and knowledge-based views of the firm (Penrose 1959; Kogut & Zander 1992). If firms are viewed as bundles of resources, a growth analysis ought to focus on the accumulation of resources, such as employees. Furthermore, when a more macro-oriented interest in job creation is the rationale for the study, measuring growth in employment seems the natural choice (Schreyer 1999). Obvious drawbacks of employment as a growth indicator are that this measure is affected by labor productivity increases, machine-for-man substitution, degree of integration and other make-or-buy decisions. A firm can grow considerably in output and assets without any growth in employment.

Using Multiple Growth Indicators for Measuring Heterogeneity in Firm Growth

Because no universally superior growth indicator seems to exist, some scholars advocate composite measures using multiple indicators (Davidsson 1989a) while other scholars advocate using the same explanatory model on several growth measures (Delmar 1997). The reasoning behind multiple-indicator measures is that different indicators of growth (such as change in employees, sales or market share) are attributes of the same underlying theoretical concepts of growth and therefore tend to be correlated. The underlying causes of growth are assumed to be the same, but situational and idiosyncratic factors that cannot be included in the research model may determine the specific form of growth a firm engages in. A multiple-indicator measure can capture this variety of responses to common, underlying causes of growth. The implication of this view is that growth research would only be investigating the overall concept of

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organizational growth. A drawback of this perspective is that the assumption of common causes may be incorrect. Furthermore, relations among dimensions must be well specified in order for a multidimensional construct to work. This is not the case when organizational growth is studied (Law, Wong & Mobley 1998).

Although there appears to be few theoretical arguments to guide the selection of the best model and/or best growth measure, a recommendation to use an array of measures may divert attention from ascertaining whether measure is suitable given the purpose and theoretical background of the study (Davidsson & Wiklund 2000). Different growth measures and calculations affect model building and theory development differently. Scholars have recognized this as an important issue, and have suggested that research should strive towards one single way, or a limited number of ways, of calculating growth (Chandler & Hanks 1993; Delmar 1997; Weinzimmer, *et al*. 1998). We disagree.

Since there appears to be no one best measure of firm growth, as well as no one best composite measure of firm growth, it would be advantageous to explore the use of many different growth measures in a study of firm growth. The use of multiple measures of firm growth would likely provide a more complete picture of any empirical relationships as well as provide a way to test the robustness of any theoretical model to misspecifications in the dependent variable. The use of multiple measures also offers the opportunity to use a measure optimized to the study's specific purposes while allowing comparisons with the results of previous studies using other growth measures.

Heterogeneity in the Regularity of Growth Over Time

One neglected issue in the growth literature has been the issue of *regularity* (or irregularity) of growth over time. Empirical research has usually studied size differences

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between two points in time (Delmar 1997; Weinzimmer *et al. 19*98). This approach ignores the development in-between (and outside of) these two points in time. This in turn creates two potential problems. First, the amount of growth, as measured, may be greatly influenced by stochastic variation (Davis, Haltiwanger & Schuh 1996). For this reason, Weinzimmer *et al.* (1998) recommend multiple-period assessment of size, and using the regression Beta-weight as the measure of a firm's growth rate. The tendency of this measure to smooth out irregularities is an advantage relative to the problem of stochastic influence. A clear drawback of a Beta-weight estimate is that a minimum of fifteen observations is required to properly fit the regression line to time-series data properly (Weinzimmer *et al*. 1998).

Furthermore, smoothing out the growth pattern is in direct conflict with solving the other problem with comparing size at two points in time, namely that the regularity or irregularity of growth over time may be an important topic to study in itself! It is likely that total growth achieved through monotonous, gradual expansion versus large-chunk and oscillating size development may have different causes. These different patterns almost certainly have different implications for management, and possibly also for the long-term performance of the firm. Regularity in firm growth has been largely ignored in empirical growth studies. It has been observed empirically that growth measures tend to have moderate serial correlation over time (Dunne & Hughes 1992, Kumar 1984) and, therefore, "high-growth firms" are a temporally instable population – its members are constantly exchanged (Blixt 1998). Finally, while the literature on firm growth that focuses on "stages-of-development," recognizes that growth patterns are irregular over time, little systematic empirical support has been offered (e.g., Greiner 1972). Chandler & Baucus (1996) is one of the few empirical studies that explicitly focus on the variability of firm growth over time.

Heterogeneity in Organic Growth vs. Acquisition Growth

Another neglected aspect of *how* firms grow is the issue of whether these firms grew by organic growth, growth through acquisition, or a combination of both. This is surprising, as the distinction has crucial implications on the firm level as well as on the societal level. The two types of growth are likely to put different types on demands on managers that try to pursue them, and these paths to growth may also have a differential impact on firm performance. On the societal level, organic growth is more likely to represent genuine job creation than is growth through acquisition, where existing jobs are shifted from one organization to another. Penrose's (1959) book is one of the few places where a more elaborate treatment of these two types of growth can be found. Penrose relates the issue of organic growth vs. acquisition to the previous issue about (ir)regularity of growth over time, suggesting that firms that grow organically will show a smoother growth pattern over time compared to firms that grow mainly through acquisitions (Penrose 1959). She also suggests that organic growth should be more associated with smaller firms, younger firms, and emerging industries whereas acquisition growth is more likely in older and larger firms, and in mature industries (Penrose 1959). Some support for such relationships is found in a few empirical studies (Levie 1997; Wiklund & Davidsson 1999).

Heterogeneity in Firm Demographics

We believe that one possible reason for the conflicting results among firm growth studies is that many theoretical explanations of firm growth and most research designs fail to account for differences in firm size, firm age, type of industry, and type of governance among the firms that are studied. We believe that these four demographic variables are likely to influence how firm growth occurs.

Theories and research on firm size and it is relationship to growth has been developed in the economic literature in context of analyses of firm size distribution (Carroll & Hanna 2000). Most well known is Gibrat's law which holds that growth is proportional to size and the factor of proportionally is random (Gibrat 1931). Gibrat's law has generated a substantial amount of research. Some studies have indicated that growth-rates are independent of size, other studies have indicated that Gibrat's law is applicable only to large organizations (but not to small organizations), and some studies find that growth-rates diminish with increasing size (Dunne & Hughes 1996; Evans 1997; Storey 1995; Sutton 1997, Wagner 1992). Even if we still cannot conclude in which direction firm size affects growth, we can conclude that size may have an effect on growth. A firm will expand differently, dependent on its size.

A more clear relationship is to be found between firm age and growth, where firm growth rates tend to decline with the age of the firm. This result stands independently of whether the sample of firms comes from multiple industries or whether single industries are studied (Barron, West, & Hannan 1994; Sutton 1997).

Industry affiliation is not assumed to be related to firm growth per se, but to the nature of the growth process. Organizational ecologists argue that populations (i.e., industries) are so unique that they can only be studied one at the time (Carroll & Hannan 2000). They indicate that there are a number of industrial and institutional covariates that are unique to each industry and they affect the development of the firms in the studied population. Given this line of reasoning, we would assume that the industry affiliation of a firm will affect its growth pattern.

Regarding ownership, it appears that independent firms are more flexible whereas firms affiliated with a group has access to different and more resources (Barney 1991; Morris & Trotter 1990). Implications for growth are therefore mixed. It is possible the increased flexibility

related to independence leads to a higher probability in identifying opportunities, but a lower probability of exploiting them due to the lack of resources. For firms affiliated to a company, the logic would be the reverse. The increased availability of resources leads to a higher probability to exploit opportunities, but a lower probability of identifying them due to the lack of flexibility. **In summary, previous theory and empirical evidence on the topic of high growth firms depicts substantive variation in how they achieve grow and how research has investigated the phenomenon. The goal of the empirical exploration of the high growth firms studied here, then, is to demonstrate how a recognition of the issues described above will likely identify different types of growth firms by describing how high growth firms grow in different ways.**

Method

<u>Sample</u>

A customized data set for the purpose of analyzing high growth firms was developed in close cooperation with experts at Statistics Sweden (i.e., the official "Bureau of Census"). Data from four different of their registers[1], and ten annual versions of each, were used in the compilation of our data set. All legal commercial activity is represented, whether run as sole proprietorship, partnership, Limited Liability Company or some other legal form.

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[1] We have chosen Statistics Sweden's *Centrala Företags- och Arbetsställeregistret* (CFAR, the Central Register of Enterprises and Establishments) as the basis of our data set. This register comprises data on each enterprise's name, address, legal form, industry, number of establishments, number of employees, entering date, active/inactive, and a few other variables. Applicable variables are available also for establishments.

In order to enhance the quality and usefulness of the study, data from CFAR were combined with two other Statistics Sweden registers, viz. the *Koncernregistret* (the Register of Company Groups) and the *Registret över utlandsägda företag* (the Register of Foreign-owned Companies). This gives additional information that is useful for characterising the firms.

The unit of analysis in this data set is the *firm*. These firms may be independent or part of a company group. Each legal company within a company group is a case in the database if it fulfills other criteria for inclusion. A firm may have one or several establishments. A common problem with firm-level analyses with register data is the change of the numerical code when a firm changes ownership, industry classification, or region. This makes many "going-concerns" appear as closures and corresponding start-ups, which are normally not tracked. We have overcome this problem by not accepting the numerical code as the sole criterion for tracking over time. Instead, we have tracked surviving establishments or groups of establishments, because the numerical codes for establishments are more stable over time in the original registers. When a similar group of establishments appears in two subsequent annual versions of the original register we regard that as a continuing firm, regardless of whether the firm's code is identical for the two years involved[2]. This tracking of establishments is what makes it possible to separate acquired from organic growth.

We started with all firms that, in November 1996, were: (a) in the private (non-government) sector, (b) were commercially active in Sweden, and (c) had at least 20 employees. There are 11,748 such firms in Sweden. We track the development of these firms annually back to 1987. Start-ups during this period are included if they fulfill the size criterion for the final year. Firms that terminated their operations during the period are excluded. Although the very

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[2] More specifically, for us to accept at t1 that firm A_{t0} is the same unit as firm B_{t1} the following has to apply: i) at least 50% of the former employment in A is now found in B; and ii) this same employment constitutes at least 50% of B's total employment. This criterion is programmable and can establish unique links in the great majority of cases. Because of mergers and splits the above criteria do not always lead to a unique and satisfactory solution. In these cases the two foremost business register experts at Statistics Sweden used a manual procedure for deciding, according to their best collective judgment, which of several links should be used, or neither. For any individual year 0.7% was the maximum fraction of cases for which a link was accepted on the basis of manual inspection rather than fulfilling both of the "50%" criteria

smallest firms are excluded the data set is primarily comprised of small and medium-sized firms (See Table 1).

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Put Table 1 About Here

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Annual data on employment (full time equivalents in November) were compiled for all firms. Data on sales were also gathered, but these were not complete for all firms in the data set. For manufacturing firms with more than 20 employees, and service firms with more than 50 employees, there are no missing values. The problem for our purposes, then, is missing data for non-manufacturing firms in the size brackets of up to 20-50 employees. As Statistics Sweden collects sales data on samples of that subpopulation, we have satisfactory data for parts of it: 7,472 firms had information on sales. From this group of firms with sales information, 5,540 firms fulfilled the following criteria and were kept for further analysis:

(a) Balanced data on both employment and sales changes, i.e., the same number of observations for each single case for sales and for employment.

(b) Less than four missing values over time for sales data. This was an ad hoc judgment, but it was judged that analyzing time series with more than three missing values would lead to a higher than acceptable level of uncertainty. If a missing value appeared between two values it was replaced by the average value of the two known values, based on the observation that sales (level) measures showed high serial correlation (varying between 0.8 and 0.9). If a missing value appeared in the beginning or at the end of the time series,

the value was estimated as the average sale per employee for the years with complete data.[3]

(c) The company had been registered for at least three years (earliest start in 1994). As a consequence, all firms exhibited at least two time-periods of change.

As can be seen in Table 1, the sub-population fulfilling these criteria tended to be larger and in the manufacturing industry compared to the population of all firms.

For this article, the focus was on the "high growth" part of this population of 5,540 firms (cf. Penrose 1959, p. 7). In order to be selected as a high-growth firm, we set the criterion that a firm had to be among the top ten percent (cf. Storey 1998) of all firms in terms of "annual average" on one, or more, of six growth indicators 1) absolute total employment growth, 2) absolute organic employment growth, 3) absolute sales growth, 4) relative (i.e., percentage) total employment growth, 5) relative organic employment growth, and 6) relative sales growth. *Absolute* growth refers to annual change in numbers of employees or monetary units, whereas *relative* growth refers to annual percentage change in employees or sales. *Organic* growth is total growth less additions that came with units that were acquired by the firm this particular year. Our data allow dividing total growth into its organic vs. acquisition parts only for employment and not for sales.

The selection criteria were met by 1,501 firms. The distribution of firms and how many criteria they fitted are displayed in Table 2. The correlations among the six growth categories are displayed in Table 3.

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Put Tables 2 and 3 About Here

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[3] Out of the 5,541 cases, 711 had one missing value on sales, 541 had two and 513 had three.

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The absolute majority (66.9 percent) fit only one or two criteria. While more than one

third (34.2 percent) of the firms included in the final data set fit at least three of the six criteria,

only 2.5 percent of the high-growth firms fulfill all six criteria. The results from these tables

indicate that we are dealing with a heterogeneous group of expanding firms. As has been noted

in previous organizational growth studies (Chandler & Hanks 1993; Davidsson & Delmar 1997)

the growth measure most commonly celebrated in the popular press (e.g., in the *Inc.* 100 and *Inc.*

500), relative sales growth, is not correlated to any of the other organizational growth measures!

<u>Variables</u>

Growth variables. The first group of variables is the growth measures needed to fulfill

the main purpose of the study. A description of the nineteen variables in six different classes that

were computed to examine different growth patterns is provided in Table 4.

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The first growth category (Category 1 in Table 4) is composed of the six variables

previously used as the criteria to form the population of high-growth firms studied in this work.

These are indicators of the average pace of growth. As this is measured separately for sales, total

employment and organic employment a firm's profile across these six measures is indicative not

only of how fast it grows, but also tells a lot about how it grows. The original variables were re-

scaled into monotonously increasing 10–point scales.

Categories 2 through 5 (a total of eleven indicators) concern aspects of the regularity (or

consistency) of growth over time. The reason for forming several different categories of

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variables reflecting this aspect is that different original variables (absolute vs. relative) lend themselves to different types of transformations. Category 2 measures the number of growth years and high growth years achieved during the period, in relation to the numbers of years in existence in the data set. Our goal was to distinguish between modest continuous growth vs. rapid and concentrated growth. Category 3 measures the variation around the mean growth for the individual firms. The standard deviations show whether the growth pattern is uniform or erratic (comprising large positive and negative changes in relation to the mean). Category 4 addresses the duration of a firm's growth development. A high value here indicates frequent changes in the growth trend. Category 5 captures more extreme forms of irregularity in growth, as when the bulk of the growth over the period was achieved during a single year. These variables were constructed as the highest growth achieved during a single year compared to the maximum size achieved by the firm during the measurement period. Maximum size was used because using end size led to extreme values in cases where the firm has subsequently shrunk considerably.

The purpose of the variables in Category 6 was to describe different types of growth. It was noted in the literature review that it is possible for a firm to achieve growth in sales without a matching growth in the number of employees, and that a growing business can choose to expand organically or via acquisitions. After ranking all firms on their absolute sales growth, total employment growth, and organic employment growth, we computed two indicators: a) rank for sales growth relative to rank for total employment growth, and b) rank for total employment growth relative to rank for organic employment growth. It may appear that having just two indicators for dominant type of growth could be too little. However, what type of growth

dominates for each firm is reflected also in each firm's relative position on other growth indicators, especially those in category 1.

Method of analysis

Cluster analysis procedures were utilized to develop a taxonomy of growth patterns. Since these procedures are not based on probabilistic statistics, there is rarely one single best solution to a clustering problem. Furthermore, one does not have specified test characteristics to guide selection of particular set of clusters from several alternative solutions. Issues concerning the validity and stability of cluster solutions are of great importance (Hair, Anderson, Tatham, & Black 1995; Milligan 1996; Punj & Stewart 1983).

In the light of these issues, we used a four-step approach to the cluster analysis. The first step consisted of the selection of the variables to be included in the cluster analysis. Based on the arguments presented previously, we selected the nineteen growth variables as our clustering base. As cluster methods are sensitive to outliers, we reduced the variation in the variables (e.g., dividing the variance into ten equal groups or censoring the variation). Standardized variables were used (z-scores).

The second step was to divide the population into a try-out sample and a hold-out sample. The try-out sample was used to assess the optimum number of clusters. The hold-out sample was used to validate the results from the try-out sample (cf. Hair et al 1995; Milligan 1996). To determine the number of clusters, we used hierarchical clustering with Ward's method and Euclidean distances. The number of clusters can either be assessed: (a) empirically by examining the changes in the agglomeration schedule, or (b) theoretically by paying attention to ease of interpretation. Based on the agglomeration schedule from this initial clustering, the optimal number of clusters should be in the range from four to seven. However, we extended the

maximum number of groups for further consideration to nine clusters. The centroids from this range of cluster solutions were then saved, to be used in the validation phase.

The purpose of the third step was to find and validate the most stable solution. The hold-out sample was used and a K-means clustering was performed using the centroids from the try-out sample as a base. A second clustering using hierarchical clustering with Ward's method was then performed. The first clustering was then compared to the second clustering. The Lambda statistic was used in a cross tabulation to assess the level of agreement between the two cluster solutions. The highest stability was achieved with a seven cluster solution, generating a Lambda of 0.73. We concluded that this seven-cluster solution was optimal from both theoretical and empirical standpoints. The cluster solution was stable across samples and easy to interpret.

Finally, in the fourth step the seven-cluster solution was extracted on the complete high-growth population. It was first extracted by hierarchical clustering with Ward's method and the centroids were saved. The centroids were then used to extract the K-means clusters, which were used as the final results and the basis for the interpretative analysis.

The overall purpose of the four steps was to find a stable cluster solution and thereby secure its internal validity. The demographic characteristics of the clusters were used to test of the external validity of the clusters. That is, if the clusters do not differ on variables outside of the cluster analysis, they are unlikely to represent distinct empirical categories. Bivariate analyses were used for the demographic contrasts. We chose to use and report significance tests, although the analyses are on a slightly biased census (due to incomplete sales data - see Table 1) rather than on a probability sample. Interpretations focus on the size of the differences, not on significance.

Results

<u>Cluster analysis</u>

As noted above, the most satisfactory cluster solution identified seven different clusters. This solution exhibited the highest stability (measured here as maximizing Lambda) and internal validity, and was also the most easily interpretable. A final seven-cluster solution on the basis of all cases (n =1,501) was then developed. The means for each cluster on the nineteen growth indicators are displayed in Table 5.

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Put Table 5 About Here

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Based on the cluster means from the K-means clustering and the cluster sizes the clusters were labeled as follows:

1. *Super absolute growers*, representing 13.5 percent (n = 202) of the high growth population. These firms exhibited very high absolute growth both in employment (total and organic) and in sales. They also have strong relative development. The cluster does not stand out markedly in either direction as regards the regularity of growth.

2. *Steady sales growers*, representing 12.8 percent (n = 193) of the cases. This cluster exhibited strong positive development in absolute sales, but negative development in terms of employment. It gets the highest rank when development in total sales is put in relation to development in employment. The low relative growth indicates that this group consists of large firms. The development over time in sales was characterized by slow positive development with few high-growth years.

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3. *Acquisition growers*, representing 10.0 percent (n = 150) of the cases. The development of this cluster resembles that of cluster one (Steady absolute growers) with the distinctive exception of growth in organic employment. More precisely, the firms in this cluster had strong positive development in absolute sales and total employment, but negative development in organic employment. This indicates that growth in employment was mainly achieved by acquiring other firms, so they were not great creators of genuinely new jobs. Furthermore, the growth momentum for this group, in relative figures, was slower compared to cluster one, which is reflected also in the numbers of growth years and high growth years.

4. *Super relative growers*, accounting for 16.3 percent (n = 244) of the cases. This group of firms represent (along with cluster one) those that most consistently appear as "high growth firms" across different growth criteria. If cluster one represented the highest growth in absolute figures, this cluster represents the highest growth in relative terms. Firms in this cluster had the highest share of high-growth years. Furthermore, they had a high standard deviation in sales growth indicating an uneven development compared with the other clusters reported so far.

5. *Erratic one shot growers*, representing 16.7 percent (n =250) of the cases. Even though they qualified for inclusion in the high-growth population, these firms are characterized by having negative development in absolute sales and employment (total and organic). The reason is that they exhibit positive relative growth, on average, because of an artifact of how average relative growth was calculated. Relative growth was calculated as an average growth rate over the period. This measure could, therefore, identify as "high growth firms" those firms that have a year with strong positive development and a following year with an equally

dramatic negative development[4]. Oscillating development around a relatively low minimum level, then, is likely to characterize many of the firms in this cluster. This is also revealed in a large one-shot increase and a high standard deviation in sales.

6. *Employment growers*, representing 16.0 percent (n = 240) of the cases. This cluster is characterized by showing relatively more growth in employment than in sales. According to some indicators the development of sales may even be negative. This is a surprising pattern. There is probably more than one explanation behind it. First, we find that many of these firms appear to be "receivers" of the outsourcing efforts of other large firms. Hence, these firms may be subcontractors or service providers who take over more and more operations from their large customers while at the same time they are subject to pricing pressures. Another group of firms that would end up in this cluster are those that engage in backward integration. They then decrease their purchases through increasing internal employment, making employment growth without sales growth possible. A third explanation is temporal. Some firms that first grew rapidly in sales and employment may later face severely falling demand. If the cutting of personnel lags the decline in sales, the annual average growth would still be high for employment but not for sales.

7. *Steady over-all growers*, representing 14.8 percent (n = 222) of the cases. This cluster is characterized by relatively strong development in absolute sales and employment growth (total and organic), but weaker relative development. From that perspective this cluster was quite similar to cluster one (Super absolute growers), but with weaker development. Growth in numbers of employees was mainly achieved organically, and in many cases during a short

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[4] For example, a firm may grow from 100 employees in year one to 200 employees in year two (a factor 2.0 change), and in year three retract to 95 employees (a factor 0.48 change). Over the period the firm would in total have lost five employees, but show an average growth rate of 1.24.

period as this cluster had the highest value on one-shot growth in organic employment. This group was further characterized by relatively few high-growth years, despite a large share of growth years. In combination with low standard deviations and low duration values, these factors indicate a smooth and stable development over time in total growth despite the irregular development of organic employment growth.

As previously noted this clustering solution is satisfactory since it is easily interpretable and exhibits a high degree of stability, consequently satisfying criteria for internal validity. In line with our suspicion, the high-growth population was highly heterogeneous, even concealing firms that had contracted during the measurement period after first achieving substantial growth. We found differences in growth patterns related to absolute vs. relative growth; growth in sales and employment; but also the duration of growth, i.e., if it was achieved over a longer or shorter time period and if changes in growth rates were frequent or not. Only two of the seven clusters (cluster one and four) could be labeled as "high growth firms" according to most of the criterion commonly used to describe "high growth firms." We believe that these results demonstrate the importance of definitions and measurements for understanding and explaining firm growth.

Table 6 provides additional insights into the character and contributions of the different groups of firms that the clusters represent. It should be noted that this information has to be interpreted with some care, as the differences between 1987 and 1997 are compounds of growth and entry effects. It should also be noted that the distributions within clusters five (*Erratic one shot growers*) and six (*Employment growers*) were highly skewed. That is, the means of these clusters were severely affected by outliers. To only report the mean would therefore distort the descriptions of these clusters.

As clusters one, three and seven, i.e., *Super absolute growers, Acquisition growers,* and *Steady over-all growers* stand out in this respect both on a per firm basis and in the aggregate, it is safe to conclude that these three clusters are by far the categories that add most to increases in employment. Each of these categories increased their employment base by over 40,000 people. However, while the growth of clusters one and seven was more balanced it is reasonable to assume that the role of *Acquisition growers* in the economy is that of restructuring rather than genuine job creation. This illustrates the importance of matching the definition and measurement of "high growth" with corresponding theory and policy. For example, if policies aimed at job creation were based on studies of firms that are *Acquisition growers,* the decisions taken are very likely to be sub-optimal for increasing total growth in employment.

It is also interesting to note that firms in cluster two (*Steady sales growers*), and five (*Erratic one shot growers*) actually decreased in total numbers of employees during this period. This is particularly notable as we are dealing only with surviving firms that are defined as high-growth firms according to at least one of the six growth criterion, and as we also allow entry during the period. As noted previously, these two clusters were characterized by sales expansion. Their growth patterns suggest substantial gains in efficiency at the firm level, but losses in employment at the macro level. Whereas the sales growth of *Steady sales growers* is impressive in comparison to other clusters, the median sales growth of *Erratic one shot growers* is high only in relation to their own shrinking employment base.

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Demographic contrasts

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The demographic characteristics of the clusters were used to test of the external validity of the clusters. That is, if the clusters do not differ on variables outside of the cluster analysis, they are unlikely to represent distinct empirical categories. In addition, organizational growth patterns are likely to be the outcome of different strategies and different environmental constraints. That is, associations between demographic affiliations on the one hand, and type of growth pattern on the other may explain what caused the firms to follow different growth paths. In terms of theoretical development as well as sample construction and measurement our study is more ideal for the purpose of identifying and validating types of growth firms than for explaining why firms end up with a particular type of growth. While suggestive, our results concerning the latter issue should be regarded as tentative.

We cross-tabulated all demographic variables against cluster membership, which was regarded as the dependent variable. The magnitude of the relationship was measured with the Lambda statistic when the independent variable was measured with an ordinal scale, and with the Eta statistic when the independent variable was measured with an interval scale. Four different demographic control variables are present in the data set: *size* (six size classes), *industry* (fourteen industries), *firm age* (number of years in the register, consorted at ten years), and *governance* (affiliation with a company group versus independent). In most of the analyses we chose to collapse data into more aggregate categories than those indicated within the parentheses above (i.e., SMEs versus large firms). As noted earlier, the primary role of the demographic variables is to provide an external criterion for assessing whether the types of growth firms that we identified earlier are meaningful categorizations.

As small and medium-sized firms (having less than 250 employees) dominate the data set, the firms were divided into size classes. When combining the information from the central

tendency measures, as well as from the cross tabulation, it was concluded that size was significantly related to cluster membership (cross tabulation: Eta for 1987 = .20; sign = .000 and for 1996 = .24; sign=.000). Examining the effect of size for the first year (1987) and for the last year (1996), we found that cluster two (*Steady sales growers*) was dominated by very large firms. Cluster three (*Acquisition growers*) and seven (*Steady over all growers*) also had a substantial share of larger firms. Note that these three groups had the highest increase in total employment (cf. above). All other clusters were dominated by small and medium sized firms, having less than 50 or less than 250 employees respectively. These clusters had a median size below 50 employees during the first year. Overall, this analysis indicated a clear relationship between firm size and the type of growth pattern. High growth firms of different sizes tend to grow in different ways.

The age of the firm was significantly related to cluster membership (Eta= .10; sig. = .000). This was indicated in Table 6 by the differential share of firms created during the measurement period. A majority of the firms (63 percent) included in this sample were created before or during 1987. There were large variations among the clusters. In cluster four (*Super relative growers*) 71 percent of the firms were created during the measurement period, whereas in cluster three (*Acquisitions growers*) only 15 percent of the firms were created during the same period. We conclude that age had a substantial impact on the different growth patterns. However, clusters dominated by small firms also had a high share of new firms, so there is some risk of confounding[5].

Substantial differences were also found when we investigate industry affiliation (Lambda = .086: sign. 000). Cluster one (*Super absolute growers*) and four (*Super relative growers*)

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[5] With respect to growth rate, Evans (1987) provides convincing evidence that age and size have separate effects.

resembled each other in that they were both found in knowledge intensive industries. Cluster one had an over-representation of manufacturing industries (e.g., high technology and technology oriented manufacturing) while cluster four was more dominated by professional services (e.g., business and information technology consultants, advertising, education and health care). These industries are new or growing. These firms appear to be the outcome of newly created markets (such as information technology) or were previously state monopolies being deregulated (education and health care). Cluster two (*Steady sales growers*) and three (*Acquisition growers*) had a high representation of firms in traditional industries such as pulp, steel, and other manufacturing; cluster three also included many construction and retail firms. Traditional, low technology, and stagnant industries characterize these two clusters. Their growth patterns are either characterized by acquisitions or sales growth without employment growth, pointing to outsourcing and a growth in the concentration of firms in these industries. Firms in cluster five (*Erratic one shot growers*) and six (*Employment growers*) were predominantly found in low technology service industries such as retail, hotel and restaurants and other services. Firms in cluster seven (*Steady overall growers*) were primarily found in manufacturing industries. In summary, there were differences among clusters regarding industry affiliation. These differences appear to be explainable in terms of knowledge intensity, newly created markets versus traditional industries, and manufacturing versus service sectors.

For independent vs. company group status, the directional measures indicated small differences (Lambda =.034; sign. = .071) whereas association measures pointed to significant differences (Chi-square = 134.7; sign .000). Cluster two (*Steady sales growers*), three (*Acquisition growers*) and seven (*Steady over-all growers*) were heavily dominated by firms in company groups (93, 87, 86 percent respectively, to compare with the over-all proportion of 75

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percent). The largest share of independent firms, 39 percent (over-all percent: 25), was found in cluster four (*Super absolute growers*). Hence, while there seems to be some relationship between company group affiliation and growth pattern, none of the clusters was dominated by independent firms.

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Put Table 7 About Here

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Table 7 offers a descriptive summary of the growth patterns of the seven different clusters as well as their demographic characteristics. We found that the seven clusters differed not only in their growth patterns, but also in their demographic affiliation. Furthermore, firm size and age, industry, and ownership (governance) had significant relationships with growth patterns. Some of the differences are of considerable magnitude, supporting the meaningfulness of dividing the sample of high-growth firms into the different categories identified in the cluster analysis. In relation to previous research, these results largely support a view that organic growth is more associated with young and small firms, and that acquisition growth is more common among larger and older firms, and firms in stagnant or low-tech industries.

Discussion and Conclusion

The primary finding is that high growth firms do not grow in same way. Recognizing the heterogeneity that exists in measures of firm growth, how firms grow, and the demographic characteristics of these growth firms, is an important conclusion for scholars and practitioners. Based on the very low correlation among the six growth measures, and the finding that few firms

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meet more than one high growth criterion, we conclude that what a "high growth firm" is, conceptually and operationally, is very dependent on the growth measure used.

Among firms that can be labeled as high growth firms, their growth patterns differ not only in pace, but also in content and regularity. However, when different aspects of growth are combined systematically, a finite number of empirically distinct and conceptually meaningful growth patterns can be identified (out of an infinite number of theoretical possibilities). Firms do not end up with particular growth patterns at random. Instead, "how firms grow" is systematically related to characteristics of these firms and their environments: such as their age, size and industry affiliation. We have empirically demonstrated that the phenomenon of the high growth firm is heterogeneous. There appears to be some kind of order in how a firm grows, and therefore, a potential for gaining a deeper understanding of how high firm growth occurs.

Theoretical Implications

We believe that the primary value of this study is the insight that future firm growth research would benefit by recognizing differences in firm growth patterns: firm growth is not a uni-dimensional but a multi-dimensional phenomenon. Recognizing this insight will require future research to construct appropriate samples and measures. It is our belief that researchers who want to contribute to an understanding of the nature of firm growth may follow either of two research strategies. The first research strategy would be to continue to focus on a narrow aspect of growth, using a single measure of growth, or a population of high growth firms defined by a single criterion. Relative to past research, however, such efforts would have to be much more careful and consistent in their design and execution. The purpose of these studies and their theoretical perspective needs to be matched with the sample and growth indicator, and – importantly – the generalizations and implications have to be restricted to the domain to which

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they actually apply. And yet, there is the risk that a reduction to a single aspect of growth will not suffice. The non-studied aspects of growth may blur the results, or the domain to which the results can be generalized may be too narrow to be practically meaningful. To the extent that different forms of growth have common underlying causes, using a composite measure or a multidimensional construct of growth may be an improvement.

The causes and consequences of growth may also be different for different forms of growth. Different forms of growth, then, have to be analyzed separately. Yet, with the exception of historical studies, it is not possible at the design stage to know exactly what aspects of growth firms are going to exhibit. This points to the other main strategy for future research on firm growth, which would be to openly acknowledge the complexity of the phenomenon to be studied, and to accept the challenge such an insight implies. It is very likely that factors such as strategies, entrepreneurial motivation, management team composition, organizational form, financial structure, and various aspects of relative environmental munificence are differentially related to different forms of growth. This calls for comprehensive studies of firm growth, using an array of theoretical tools and an adequate spectrum not only of growth measures, but also measures of potential causes and consequences of growth. Designing and executing such studies is no doubt challenging, but to continue to pretend that growth is a simple and uni-dimensional phenomenon is not a productive way to deal with that challenge.

Practical Implications

We believe this study should have some value for practitioners. For managers, the results of the cluster analysis suggest that there are many different ways that a firm might pursue growth, dependent (more or less) on its demographic characteristics. Yet, the far-from-deterministic relationships with the firm demographic variables would imply that business

managers might enjoy considerable freedom of choice as far as growth is concerned. But, the systematic relationships give reason for managers to consider that some growth strategies appear to be more compatible with resources, goals and environmental constraints than are other growth strategies. The results may help owners and managers of businesses question the validity of prescriptive advice about firm growth that may be based on over-simplified, uni-dimensional views of this phenomenon. A high relative growth rate in sales (the criteria celebrated in Inc. Magazine) is just only one aspect of how firm growth may occur, and this type of growth appears to be appropriate, only, for certain kinds of firms in certain situations. Does the focus on this one criteria of firm growth in many popular business publications distract attention from other forms of growth? Prior research has shown that many small business managers are reluctant to expand their firms (Davidsson 1989b; Wiklund, Davidsson, Delmar, & Aronsson 1997). A more careful look at these different types of growth patterns may reveal growth options that are not in conflict with other important goals of these manager(s) or other important stakeholders.

Limitations of the study

The data used in this study have some weaknesses. Sales data were only available for half the population of firms. Thus, we were no longer dealing with a census but a sub-population that is somewhat biased towards larger firms and towards the manufacturing sector. It should also be noted that, by design, this study focused on firms that were in existence at the end of the measurement period. The study, therefore, focused on the growth history of surviving firms, at a particular moment in time, rather than all growth firms that may have been in existence during the measurement period. Given that the primary research issues revolved around the differences in the measurement of organizational growth, and the recognition of a diversity of organizational

growth processes, the study of the growth histories of surviving firms was thought appropriate. This study can, therefore, describe ways that established high growth firms have achieved high growth. The study cannot specify whether certain processes of growth may have led to the failure of some firms along the way.

With respect to the fact that we included only firms that had achieved a size of 20 employees or more at the end of the period we would argue that in terms of employment growth a firm cannot be a high-growth firm – i.e., a member of our target population – for extended periods of time without reaching that size. However, with respect to growth in sales this censoring of employment-wise smaller firms is a limitation.

There are forms or aspects of growth that our data did not capture. For example, if a firm first grows as an independent unit and then grows further by adding new firms (i.e., if a company group is formed) our data set does not count these firms as one unit of analysis. This is a potentially important form of growth that should be considered in the design of future studies. (cf. Levie 1997; Shulman, Rangan, & Streeter 1998). Likewise, we lack data on an issue that has attracted a lot of attention in research on large corporations but which is largely ignored in research on growth of young and small firms, that is, the extent to which growth is achieved through penetration or diversification. Finally, we have deliberately refrained from offering any causal explanations for why firms end up with different growth patterns. However, this would be an interesting topic for future research.

Conclusion

This study shows that identifying a high growth firm depends on the measurements used. To focus, for example, on relative sales growth percentage as the only criteria for selecting a high growth firm will likely ignore a substantial number of firms that, by other measures, are,

indeed, high growth firms. The "high growth firm" is a heterogeneous phenomenon.

Recognizing that "high growth" is multidimensional in nature, that "high growth" can be

achieved in a variety of ways, and that it is related to the demographic characteristics of the firm

are important insights for researchers and for practitioners.

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TABLE 1

The distribution of the (sub-) population of firms across firm size classes and industries

	The entire population (N= 11,748)	The sub-population with sales data available (n=5,540)
Firm size class (Number of employees)		
20-49	64.4 %	41.8%
50-249	29.4%	47.5%
250-499	3.1%	5.5%
500- 2 499	2.6%	4.6%
2 500+	0.4%	0.6%
Industry classification (Number of firms)		
Manufacturing	43.9%	57.7%
Service	56.1%	42.3%

TABLE 2

Number of "high growth" criteria met by firms included in the final data set

Number of "high growth" criteria fitted	Frequency	Percent of firms in sample
1	621	41.4%
2	367	25.5%
3	249	16.6%
4	138	9.2%
5	88	5.9%
6	38	2.5%
Total	1,501	100.0%

TABLE 3

Correlations of Growth Measures

Pearson Correlations (n = 1,501)

	Variable	Mean	S.d.	1	2	3	4	5	6
1	Absolute total employment growth	6.10	59.83	1.00					
2.	Absolute organic employment growth	2.26	41.71	.68 (.00)	1.00				
3.	Absolute sales growth (K SEK)	40,954.54	232,624.14	.09 (.00)	-.08 (.00)	1.00			
4.	Relative total employment growth (%)	146.30	249.11	.06 (.03)	.086 (.00)	-.036 (.17)	1.00		
5.	Relative organic employment growth (%)	143.76	247.93	.05 (.056)	.09 (.001)	-.04 (.14)	.99 (.00)	1.00	
6.	Relative sales growth (%)	532.74	6410.82	-.01 (.887)	.01 (.984)	-.01 (.758)	-.01 (.97)	-.01 (.98)	1.00

TABLE 4

Variables used in the cluster analysis

Category	Description	Interpretation
1)	*Average growth rate measures:*	
	Average annual change in…	A large value indicates the firm achieved a high absolute growth (scaled 1-10)
a)	absolute total employment	
b)	absolute organic employment	
c)	absolute sales	
	Average annual change in…	A large value indicates the firm achieved a high relative growth (scaled 1-10)
c)	relative total employment	
e)	relative organic employment	
f)	relative sales	
2)	*Regularity of growth I:* The relative number of growth and high-growth years The relative share of years that can be characterized as either growth years or high growth years in relation to the total measurement period. It is measured as:	A large value indicates the firm exhibited either growth or high growth during the majority of the measurement period
a)	growth years in relative total employment	
b)	growth years in relative sales	
c)	high-growth years in relative total employment	
d)	high-growth years in relative sales	
3)	*Regularity of growth II:* Standard deviation of growth over time Standard deviation of relative change. It is measured as:	A large value indicates high dispersion around the mean, i.e. the growth pattern is highly disruptive or volatile
a)	s.d. of relative total employment	
b)	s.d. of relative sales	
4)	*Regularity of growth III*: Duration of development The relation between the number of both positive and negative changes in growth in relation to the numbers of in existence in the data base. It is measured as:	A high value indicates tendency of frequent changes in growth rate
a)	absolute employment	
b)	absolute sales	
5)	*Regularity of growth IV:* One-shot growth: The share of the highest single growth in relation to the maximum size achieved during the period. It is measured as:	A large value indicates that the firm's total growth was mainly achieved during one period. Maximum size is used as the denominator as it diminishes problems with size dependency and a smaller end size compare to the maximum size.
a)	absolute total employment	
b)	absolute organic employment	
c)	absolute sales	
6)	*Dominant type of growth*:	

Ranking total employment growth to organic employment growth or sales growth	
The relation between sales and employment growth when ranked	A large value indicates high growth in sales in relation to growth in total employment (scaled 1-10)
The relation between organic employment and employment growth when ranked	A large value indicates high organic growth in relation to growth in total employment (scaled 1-10)

TABLE 5
Means describing the characteristics of the different clusters

Variable	Cluster							
	1	2	3	4	5	6	7	Total
1) Average growth rate measures:								
a) Absolute emp. change	25.43	-37.45	29.49	11.29	-6.87	4.03	21.73	6.10
b) Absolute org. emp. change	21.46	-33.73	-10.32	11.11	-2.09	5.83	15.89	2.26
c) Absolute sales change (SEK)	86.04	117.10	93.33	10.82	-3.52	-41.86	71.16	40.95
d) Relative emp. change	1.39	0.98	1.13	2.50	1.01	1.89	1.08	1.46
e) Relative org. emp. change	1.34	0.98	1.02	2.46	1.01	1.89	1.07	1.44
f) Relative sales change	1.48	1.27	1.30	4.58	22.48	1.13	1.13	5.33
2) Regularity of growth I: The relative number of growth and high-growth years								
a) Share growth years in relative emp.	0.72	0.25	0.39	0.67	0.41	0.58	0.56	0.52
b) Share growth years in relative sales	0.69	0.63	0.61	0.57	0,48	0.38	0.70	0.57
c) Share high growth years in relative emp.	0.40	0.03	0.17	0.48	0.11	0.35	0.13	0.25
d) Share high growth years in relative sales.	0.32	0.06	0.17	0.43	0.27	0.12	0.05	0.21
3) Regularity of growth II: Standard deviation of growth over time								
a) S.d. relative employment	0.69	0.12	0.39	2.90	0.22	2.00	0.17	1.00
b) S.d. relative sales	0.85	0.70	0.71	7.92	63.17	0.75	0.17	12.23
4) Regularity of growth III: Duration of development								
a) Trend duration of employment change	0.29	0.46	0.43	0.42	0.47	0.46	0.32	0.41
b) Trend duration of sales change	0.28	0.34	0.37	0.37	0.44	0.41	0.28	0.36
5) Regularity of growth IV: One-shot growth								
a) One-shot growth in employment	0.29	0.04	0.20	0.36	0.14	0.30	0.14	0.22
b) One-shot growth in org. employment	0.47	-16.16	0.25	0.34	5.19	0.29	6.68	-3.60
c) One-shot growth in sales	0.32	0.17	0.24	0.45	0.37	0.09	0.17	0.27
6) Dominant type of growth: Ranking total employment to organic employment and sales								
a) Rank sales vs. emp.	0.91	39.18	1.01	0,70	2.02	0.57	1.02	5.96
b) Rank org. emp. vs. emp.	1.01	1.67	0.45	1.03	1.36	2.57	1.16	1.37

TABLE 6

Size in number of employees and number of firms included in the different clusters 1987-1996

Cluster	1	2	3	4	5	6	7	Total
Mean employment size of firms								
1987	145	1196	477	29	135	78	373	390
1996	283	815	735	80	64	66	513	326
Relative change	196%	68%	154%	280%	48%	84%	138%	115%
Median employment size of firms								
1987	43	592	159	17	44	28	146	80
1996	132	415	272	48	40	44	233	91
Relative change	307%	70%	171%	282%	91%	157%	160%	114%
Total employment								
1987	15,207	185,375	61,038	2,053	25,501	8,363	67,867	365,404
1996	57,233	157,302	110,271	19,445	16,050	15,763	114,072	490,136
Relative change	376%	85%	181%	947%	63%	188%	168%	134%
Mean sales of firms (SEK)								
1987	119,378	1,397,472	453,950	43,948	197,159	144,895	442,148	451,326
1996	736,666	2,368,413	1,223,263	98,873	136,291	88,822	1,042,223	733,037
Relative change	617%	170%	270%	225%	69%	61%	236%	162%
Median sales of firms (SEK)								
1987	37,785	684,605	149,162	10,323	28,862	32,366	170,195	87,233
1996	205,665	1,132,519	547,245	39,674	59,742	34,042	468,157	143,981
Relative change	544%	175%	366%	384%	206%	105%	270%	165%
No. of firms								
1987	105	155	128	72	189	108	182	939
1996	202	193	150	244	250	240	222	1,501
Relative share of firms created during the period	48%	20%	15%	71%	24%	55%	18%	37%

Note: Eight SEK corresponded to one USD in 1996.

TABLE 7

Summary descriptive of the seven growth patterns

Cluster	Name	Growth pattern	Demographic characteristic
1	Super absolute growers	Exhibited high absolute growth both in sales and employment	Dominated by small and medium sized firms. Found in knowledge intensive manufacturing industries
2	Steady sales growers	Rapid growth in sales and negative development in employment	Almost totally dominated by large firms. Found in traditional industries such as pulp, steel and other manufacturing. Dominated by firms affiliated with company groups.
3	Acquisition growers	Resembles cluster one but has negative organic employment growth. Growth is achieved by acquiring other firms	Large firms are over represented. Dominated by older firms (i.e., firms created before 1987). Found in traditional industries such as pulp, steel and manufacturing. Dominated by firms affiliated with company groups.
4	Super relative growers	Has a very strong but somewhat erratic development of both sales and employment	Dominated by small and medium sized firms. 71% of the firms created during the period of observation. Found in knowledge intensive service industries. A high representation of independent firms.
5	Erratic one shot growers	Has on average negative size development, with exception of one single very strong growth year	Dominated by small and medium sized firms. Found in low technology service industries.
6	Employment growers	Growth is relatively stronger in employment than in growth	Dominated by small and medium sized firms. Found in low technology service industries.
7	Steady over-all growers	Resembles cluster one, but has weaker development	Larger firms are over represented. Found in manufacturing industries. Dominated by firms affiliated with company groups.