Growth of New Technology-Based Firms: Which Factors Matter?

Matthias Almus


1. Introduction

During the past decade, small and medium-sized companies in general and New Technology-Based Firms (NTBFs) in particular have attracted growing interest from academics and politicians. One indicator of this interest is government expenditure on new technology-based firms. In Germany, federal funding for indirect promotion of NTBFs has risen from 45.9 million DM in 1991 to almost 82 million DM in 1993 (BMBF, 1996, p. 97). Similarly, the amount of venture capital provided by direct-investment and venture capital schemes of the Federal Ministry for Education, Science, Research and Technology (BMBF) has increased from about 10 million DM in 1989 to more than 458 million DM in 1997.

Public awareness of NTBFs arose in the early eighties, when several traditional industries faced severe problems and some fast growing new industries began to emerge. NTBFs have thereafter been regarded as an answer to ongoing structural changes; they are seen as an important source of new employment and important promoters of technological change and innovation in the German economy. The creation of such firms has been stimulated by public policies, such as the pilot scheme for the “Promotion of New Technology-based Firms” initiated by the Federal Ministry of Research and Technology (Kulicke et al., 1993; BMBF, 1996). Conclusions upon the appropriateness of the various policy initiatives are very limited. Most of the evaluations carried out have neglected control groups, therefore the derived results and implications are often less meaningful (Nerlinger, 1998).

While it is acknowledged that large numbers of jobs are created in small and medium-sized firms (SMEs), it should also be recognized that many jobs are lost by the closure of smaller firms (Davis et al., 1996; Gerlach and Wagner, 1997; Caves, 1998). The current debate focuses on the contribution NTBFs have made to employment, to technological innovation and to the diffusion of new technological knowledge. Some argue that new companies of this kind are rare, so their contribution to overall employment and national technological performance is marginal (Berndts and Harmsen, 1985; Sternberg, 1988), but others suggest that NTBFs are much more important, being the primary source of new employment and the engine of technological change and economic growth (Kulicke et al., 1993). However, the debate about the potential of NTBFs and other small firms for employment creation started long ago with the work of David Birch in the late 1970s (Birch, 1979), and since then it has become clear...
that the expectations of employment creation by NTBFs and other small firms as the solution for high unemployment has been exaggerated. Presently, the debate is more concentrated on the role of NTBFs and small firms in innovation than on employment.

Existing literature concerned with NTBFs only provides partial answers to the question of NTBFs’ contributions to economic development, employment and technological performance (Storey and Tether, 1996). The major reason is that the empirical results derived vary considerably due to methodological differences as well as differences in the data base used and the study aims (Butchart, 1987; Breheny and McQuaid, 1988). This also holds for East and West Germany, where comparatively few empirical investigations have been conducted and which, at the same time, are limited to specific samples or regions (Nerlinger, 1998).

The purpose of this paper is to shed more light on the growth determinants of innovative firms founded between 1989 and 1996 in West Germany. Based on theoretical approaches, hypotheses on the influence of exogenous determinants are formulated. Due to the comprehensive unique database used in the analyses, firm-specific and founder-specific factors as well as external characteristics are available. Their influence is examined in multivariate analyses taking into account potential selection biases. In order to simplify the evaluation of the empirical results, comparisons with non-innovative firm foundation are carried out.

2. Theoretical models on the growth of NTBFs

A solid theoretical model for the explanation of growth of young firms as well as of NTBFs does not yet exist (Fritsch, 1990; Bruender et al., 1991). With respect to NTBFs, various existing theoretical concepts on the growth of firms have to be used and combined with further aspects which are particularly relevant for NTBFs (Nerlinger, 1998). This applies for growth theories (e.g. “theory of the firm”, “minimum efficient size”) as well as for organizational ecological approaches, in which the focus is mainly on the survival and failure of organizations rather than on the growth of firms.

The approach of the “theory of the firm” assumes a U-shaped form of the long-term average costs, i.e. costs increase with firm size up to an “optimal size” and then start to decrease (Williamson, 1981; Fritsch, 1990). A similar argument holds for the approach of the “minimum efficient size”, assuming a minimum size which is required for a profitable production (Scherer and Ross, 1990; Audretsch, 1994). Therefore, the growth of firms can be regarded as an adjustment to the (minimum) efficient size which may vary between industries and with time.

Numerous industrial economic approaches analysing the determinants of growth are based on the learning theoretic model derived by Jovanovic (1982), assuming that on the one hand new firms only receive information about their effectiveness after their market entry and that on the other they are able to learn from previous periods and experiences. When firms become older they gain more and more information on their performance and their a priori unknown effectiveness, influencing decisions about future output levels including a possible closure (Frank, 1988; Jovanovic and McDonald, 1990; Ericson and Pakes, 1995). According to Jovanovic (1982) and Ericson and Pakes (1995), the effectiveness of firms is determined by various factors including, e.g. its ability to innovate, the human capital of founder(s) and employees as well as the location and structure of the industry.

Life-Cycle-Models applied by Markussen et al. (1986), Phillips et al. (1991) as well as Oakley (1993) are based on the idea that firms (and respectively their products) pass various development stages. The foundation of the firm takes place in the first stage, assuming that the decision to become self-employed has already been made. During this phase, also describe as innovation phase (Rees and Stafford, 1980; Markussen et al., 1986), the (innovative) product or process is developed up to its market launch suitability (Picot et al., 1989; Kulicke et al., 1993). After the (successful) market launch, first revenues are achieved and firms begin to expand their production and increase the number of employees (Rees and Stafford, 1986; Kazanjian, 1988). This growth phase lasts until demand is satisfied or a new or improved product/process replaces the “old” innovation.

Organizational ecology approaches analyse the survival and failure of firms and the relevant