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# Economic and Managerial Perspectives on New Venture Growth: An Integrated Analysis

*C. Timothy Koeller*
*Thomas G. Lechler*

## 1. Introduction

During the past two decades the behavior and performance of new ventures have been central issues for entrepreneurship research. Empirical efforts, primarily conducted from industrial economic and strategic management perspectives, have identified specific factors related to new venture performance. Despite the volume of these studies, however, researchers continue to seek generally accepted theoretical models to explain the growth of new ventures (see e.g., Tuck and Hamilton, 1993).[1]

A serious conceptual problem facing this research is the need to explicitly represent the specific situation facing new ventures (see, e.g., Low and MacMillan 1988). In contrast, in addressing the determinants of new venture performance, Chrisman, et al. (1998) proposed entrepreneurship as a special case of strategic management. We question whether the application of organizational and economic theory developed to explain the performance of complex, large, or established organizations should be sufficient to model the distinctive characteristics and behaviors of relatively small new ventures. Knight's (1921) definition of the entrepreneur emphasizes the significant uncertainty faced by new ventures, and suggests that researchers examining new venture performance should examine the influence of uncertainty. Stigler (1939) introduced the concept of flexibility to address efficient operations for firms facing uncertain market conditions. Facing considerable Knightian uncertainty, new ventures can therefore be represented as adopting the concept of flexibility in their managerial activities.

This paper attempts to extend existing research by developing a framework that integrates economic and management explanations of new venture growth in the early stages of a venture's life. Our framework is derived from an industrial economic model of firm behavior and performance suggested by Marris (1964) and extended to integrate indicators of the venture's managerial capacity, i.e. managerial processes and activities as enablers of success. Expanding on Stigler's concept, flexibility is integrated into the framework as well to address the uncertainties faced by new ventures during their early development.

The framework developed in this paper is empirically evaluated by examining the growth of independent, high-tech German ventures in their early years of operation (no more than six years old). We consider as determinants of growth economic elements describing firms' technological innovation activities and market activities as well as a new venture's managerial capacity to control and allocate its resources.[2] In specifying these factors we emphasize their relation to flexibility as reflecting the specific situation of new ventures.

## 2. Theoretical framework

The first element of our framework is Marris' model in which growth is featured as an explicit goal of the firm.[3] The second element of our

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*C. Timothy Koeller and Thomas G. Lechler*
*Wesley J. Howe School of Technology Management*
*Stevens Institute of Technology*
*Castle Point on Hudson Hoboken, NJ 07030 USA.*
*E-mail: tkoeller, tlechler@stevens.edu*

framework follows from Penrose's (1959) discussion of the managerial constraints to firm growth, and incorporates aspects of the literature dealing with the strategic management of new ventures. The third element that we will employ is the economic concept of flexibility.

### 2.1. *The marris model*

Marris proposes a steady-state model of firm performance explaining sales growth and profitability. We chose this model because it represents one of the few explicit theoretical analyses of firm growth. The simplifying assumption of a steady-state growth path allows Marris to formulate a long-run equilibrium growth model in which the firm's rate of demand-side growth must balance its rate of supply-side growth, and in which factors can be identified that influence both sides.

The Marris model can be summarized by the expression:

$$f(1/p) = g_D = g_s = \alpha^* p. \quad (1)$$

Expression (1) uniquely determines the firm's equilibrium growth rate and the rate of return on its capital ($p$).[4] This outcome can be shown by plotting the profit rate ($p$) versus the growth rate ($g$), as in Figure 1.

The left side of expression (1) represents the firm's demand-side growth rate ($g_D$) as determined by the extent of product development, including market activities and technological innovation activities. The functional $f$ reflects available market opportunities and the growth of the markets entered by the firm. Improvement of the firm's managerial capacity (e.g., improved information processes), also reflected in the functional $f$, can be expected to moderate the demand-side tradeoff between growth and profitability. The supply-side growth rate ($g_S$) of the firm's capital base is dependent on the extent of internal financing from profits, where the parameter $\alpha^*$ reflects the maximum extent of new investment that can be financed per unit of profitability.[5] The value of $\alpha^*$ is determined by shareholders' interests in avoiding low profits and possible takeover. The point $X$ in Figure 1 corresponds to the firm's maximum, unique steady-state growth rate and profit rate.

This diagram suggests a number of issues. First, the slope of the profit-growth tradeoff curve ($g_D$) can be positive at low growth rates: product development when there is currently very little development (e.g., in newly emerging

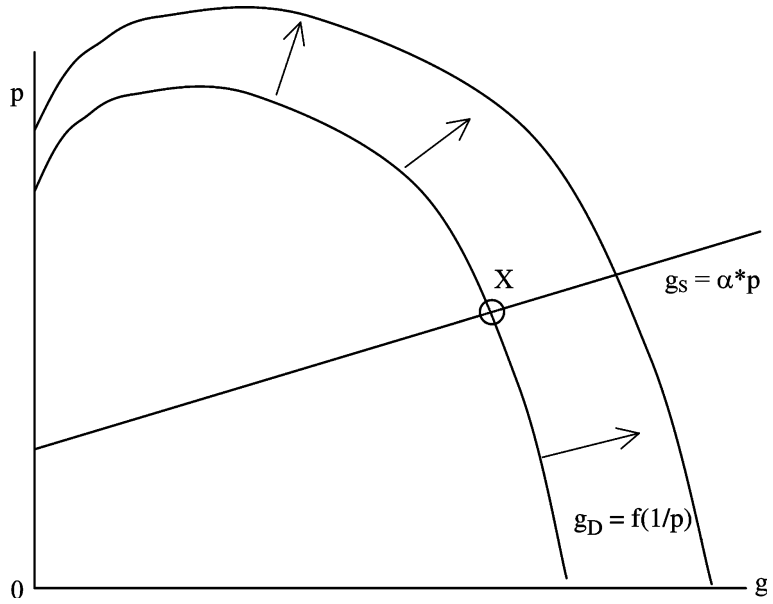


Figure 1. The Marris Model.

markets) may increase both profit and growth rates. The slope of the curve would become negative only after the onset of diminishing returns to product development. Second, if the firm's management is ineffective in generating this maximum growth rate, given the desired profit rate, then the profit-growth tradeoff ($g_D$) curve can be expected to shift inward. An inward shift of the $g_D$ curve could also result from a general decline in market demand, or from entry and mobility barriers within the firm's industry. Conversely, additions to, and improvements of, the firm's managerial resource base should shift this curve outward. Thus, changes in the extent and utilization of the firm's managerial resources can be represented as movements along a supply-side growth locus $g_S = \alpha^* p$.

According to standard accounting principles the term p in Marris' model is influenced by the firm's capital (asset) turnover ratio, measured as output/capital, an indicator of the operating effectiveness of the firm. Relative ineffectiveness of the firm's sales efforts would result in a lower rate of return on capital, $p$, and a reduced growth rate. Furthermore, the term $p$ is also influenced by the profit margin on sales, measured as profit/output, which can be interpreted as an indicator of the firm's operating efficiency. Relative inefficiency of the firm's operations would result in a lower value for p and an inward shift of the profit-growth ($g_D$) tradeoff curve.

### 2.2. *The firm's managerial capacity*

Managerial capacity may be characterized as a firm's stock of knowledge capital regarding its operating and strategic management.[6] This capacity will be developed through the firm's founders, through additions to a firm's management resources, through the organization of managerial activities, and through management's effective processing of evolving information (Jovanovic, 1982). Richardson (1964) also considered the role of managerial capacity in determining growth. However, he limited his discussion to the extent of a firm's managerial personnel. A firm's managerial capacity will also be exhibited through its effective and efficient managerial operating processes and through the alignment of those processes with the firm's strategic objectives.[7] For example, following Alchian and Demsetz (1972) improvements in a firm's information flows permit effective monitoring of production activities.

Hay and Morris have suggested that Penrose's analysis of managerial constraints may suggest useful explanatory factors in a model of firm growth. However, their interpretation of Penrose indicates that additions to a firm's managerial capacity may have two opposing effects on the firm's growth rate. First, a positive effect can result if growing firms require more extensive managerial services. Second, increases to a firm's managerial capacity may create transactions costs; e.g., training and integration of new managers, especially for those new technical managers having relatively little managerial experience in the firm's industry. This can result in operating ineffectiveness, and possibly operating inefficiency as well. If this second effect were to exceed the first we would expect an inward shift of the profit-growth tradeoff curve.

### 2.3. *Flexibility*

As summarized in Figure 1, Marris' model emphasized the *long-run tradeoff* between the profit and growth objectives of the firm. In the case of relatively small new ventures the reality of uncertain and sometimes rapidly changing competitive circumstances requires a focus on *short-run* operating conditions (i.e., demand- and supply-side factors) affecting profit and growth. According to the analyses of Stigler (1939), Mills and Schumann (1985), and Hicks (1931) on "flexible" production systems, firms facing demand uncertainties often avoid substantial fixed cost commitments.[8] Following Langlois and Robertson (1995), large, established firms are likely to have substantial fixed asset positions that provide production cost efficiencies. In contrast, relatively small new ventures will be less able to achieve production scale efficiencies. Instead these firms, relying on lean asset positions will lower transactions costs by adopting less rigid, flexible managerial capacities. As Slater (1980) has suggested, a fast-growing new venture will be expected to use its limited managerial capacity to deal with growth itself, as well as its current cost

efficiencies. In trying to explain inter-firm differences in the growth of new ventures, we therefore anticipate that those firms that have adopted "flexibility" within their managerial capacities, market activities, and technological innovation activities should exhibit relatively high growth rates.

Marris did not consider the concept of economic flexibility. In order to address the uncertain economic reality of new ventures, and to accurately explain their growth, we have integrated the concept of flexibility into the Marris model, as indicated in Figure 1. Increased operating efficiency achieved through flexibility may change the shape of the original profit-growth ($g_D$) tradeoff curve. It now exhibits a positive slope for a greater distance along the curve. This change corresponds to the enhanced opportunities for profit expected from flexible operations. Furthermore, as shown in Figure 1, there may result some general outward shift of the profit-growth ($g_D$) tradeoff curve if flexibility results in improved operating efficiency and effectiveness, which would enhance the firm's ability to increase the growth of demand and its profit rate.

## 3. Data source

The data used to conduct the empirical evaluation of our theoretical framework were collected to analyze German new venture founder teams and venture performance (Lechler, 2001). The sample consisted of firms with the following general characteristics: no more than six years old; at least two founders; the founders have worked in the firm on a full-time or part-time basis since the firm was founded; each firm was founded as an independent organization; a firm's founders hold a majority equity share in the firm; and the firms are conducting business in technology-driven industries (e.g., software, materials, optics, pharmaceuticals, biotechnology) in which technological know-how is a prerequisite to the firm's success in selling their outputs.[9] Most of the firms in the sample (about 80%) operated in newly emerging markets. The firms were prescreened to guarantee that they met the required characteristics and to engage the firm's founders in the study. For each firm two members of its management team were separately interviewed and administered a questionnaire; multiple respondents were sought to avoid the common problem of method variance associated with a single respondent.

The data used in this paper reflect the characteristics, behavior and performance of these firms during the period 1997–1999. An original sample of 183 German firms was reduced to 159 firms after excluding cases that were not independent new ventures, i.e. those new firms that were joint ventures or that had spun off from previous firms. In addition, we excluded firms that were less than three years old. Table I provides a summary of the age and size characteristics of the firms remaining in our sample.

## 4. Empirical Model Specification

The model that is estimated is of the following general form:

$$\mathrm{GROWTH}_{it} = \mathrm{b}_0 + \mathrm{b}_1\mathrm{MGRL}_i + \mathrm{b}_2\mathrm{MKT}_i + \mathrm{b}_3\mathrm{TECHBASE}_i + \mathrm{b}_4\mathrm{MKTG}_i + u_{it}. \quad (2)$$

This estimating equation is a reduced-form model explaining inter-firm variation in sales growth (GROWTH).[10] Thus, the regressors included in expression (2) reflect both demand-side (MKT and MKTG) and supply-side (MGRL and TECHBASE) factors determining growth.[11] A more comprehensive specification reflecting the two endogenous variables of the full Marris framework would require a system of two simultaneous equations jointly determining firms' growth and profit rates (see e.g., Dobson and Gerrard, 1989). However, unlike the samples of relatively large, established corporations used by Cubbin and Leech (1986) and others to test the Marris framework, the new

TABLE I
Characteristics of the firms in the sample

| Age (Years) | Size (Employees) |
|---|---|
| 3 (42%) | 0–2 (31.7%) |
| 4 (26%) | 3–6 (31.8%) |
| 5 (22%) | 7–10 (15.3%) |
| 6 (10%) | Over 10 (21.2%) |

ventures included in our sample uniformly represent the financial preferences of founder-owners concerning firms' growth and profit goals. Since the distinction between the preferences of managers versus owners, as highlighted by Marris, is far less relevant for new ventures, we assume that there are no significant inter-firm differences in these preferences.[12] Thus, we focus our empirical analysis solely on venture growth. Flexibility is represented in expression (2) through the specification of most of the independent variables.

The four vectors of independent variables included in our model reflect those forces that are expected to cause short-run shifts of the profit-growth tradeoff curve shown in Figure 1: the managerial capacity (MGRL), market activities (MKT), technological innovation activities (TECHBASE), and the extent of overall market growth (MKTG) faced by firm *i*. Ideally, possible lagged effects of some of these forces on growth would be accounted for in our model. We assume that the firm quickly established its market and technological innovation activities, and its managerial capacity, when it was founded. Some of the model's independent variables are similar to factors used in previous empirical analyses of new venture performance, as we will note. In the remainder of this section we will describe the rationale for each of the model's dependent and independent variables. These variables are summarized in Table II.

Growth is a recognized indicator of new venture performance in both the economic and management literatures (see e.g., Cooper and Gimeno-Gascon, 1992). The measure of sales growth (GROWTH) is the absolute growth of sales between the second and third year of the firm's life.[13]

The first vector of independent variables included in the model represents a firm's managerial capacity. Four variables are specified to reflect this factor: management team size (TEAM), the number of years of experience of the firm's founders spent working in a similar industry prior to establishing the new venture (EXPERIENCE), the extent of a firm's formal information processes (INFO), and the presence of patents secured by the firm (PATENTS). The managerial effects attributed to Penrose are likely to be demonstrated within the venture's founding team of owner-managers (TEAM). On the one hand, a larger team of founding managers may contribute, through efficiencies of scale, to effective problem solving and growth (see e.g., Cooper and Bruno, 1977; Teach et al., 1986; Eisenhardt and Schoonhoven, 1990; Doutriaux, 1992), absent the transactions costs suggested by Penrose. On the other hand, larger founder teams could exhibit overcapacity, contributing to higher costs of coordination as suggested by Penrose (see, e.g., Brüderl et al., 1996). Thus, the estimated effect of TEAM on sales growth is not clear.

TABLE II
Summary statistics of the model's variables

| Variables | Number of cases | Missing cases | Mean | Standard Deviation |
|---|---|---|---|---|
| *Dependent* | | | | |
| GROWTH3 (DM × 1000) | 107 | 0 | 0.376 | 0.477 |
| *Independent* | | | | |
| Managerial capacity | | | | |
| TEAM (number) | 107 | 0 | 2.62 | 0.84 |
| EXPERIENCE (years) | 107 | 0 | 21.26 | 19.71 |
| INFO (7-point-likert scale) | 104 | 3 | 3.37 | 1.50 |
| PATENTS (dummy) | 99 | 8 | 0.12 | 0.32 |
| Market activities | | | | |
| TOP5 (%) | 104 | 3 | 62.93 | 27.86 |
| DISTRIB (5-point-scale) | 106 | 1 | 1.68 | 0.99 |
| Innovation activities | | | | |
| TECHBASE (7-point-likert scale) | 99 | 8 | 6.12 | 0.94 |
| Market context | | | | |
| MKTG (4-point-scale) | 107 | 0 | 3.22 | 0.61 |

The management literature suggests that human capital derived from the founders' prior experiences will contribute to the growth and perceived performance of the firm (e.g., Sandberg, 1984; Cooper et al., 1989; Eisenhardt and Schoonhoven, 1990; Shane, 2000). Furthermore, founders' prior experiences may facilitate the new venture's flexible reaction to changing competitive conditions. Barkham estimated a positive effect of founders' managerial skill levels on sales turnover using a sample of new firms in the United Kingdom. Thus, we expect to find a positive estimated effect for the regressor EXPERIENCE.

As noted earlier, formal information processes are expected to provide a particularly effective means of enhancing decisions concerning the allocation of the new firm's limited resources, and of enabling the firm to recognize and respond to changing competitive conditions**.** The variable INFO is a factor consisting of four variables capturing different aspects of a firm's formalized information processes. These are measures indicating that the firm regularly prepared agendas for scheduled meetings, reported meeting outcomes in formal minutes, required that important information flows among employees be documented (e.g., notes, e-mail), and controlled dates and tasks with groupware systems. These component variables were each measured using a seven-point scale ranging from a response of "strongly disagree" to one of "strongly agree" that the component information process is observed in the firm. These variables do not suggest significant investments in fixed resources and, as noted above, can be expected to enhance the venture's ability to flexibly react to changing competitive conditions. It is therefore expected that the regressor INFO will bear a positive relationship to firm growth.

The asset variable PATENTS is a well-known indicator of the technological knowledge capital possessed by a firm. Higher values of this dummy variable (PATENTS = 1 if the firm possessed patents; zero otherwise) would result in movements out along the $g_S$ line in Figure 1, resulting in greater growth. This result is expected to be observed because patents represent a firm's technological output, are a potential enabler of monopoly power, and a source of royalty revenues.

A firm's market activities (the vector MKT in our model) are reflected in two independent variables: the proportion of the firm's sales accounted for by its five largest customers (TOP5), and a five-point quartile measure of the extent to which the firm outsourced its distribution activities (DISTRIB: DISTRIB = 1 if the firm distributes 100% of its output; DISTRIB = 5 if the firm's distribution is 100% outsourced). The variable TOP5 is not consistent with flexible operations because it reflects a firm's reliance on a limited, core customer base. Therefore, it is expected that TOP5 will bear a negative relationship to firm growth. It is expected that the regressor DISTRIB will bear a positive relationship to growth if outsourcing of distribution activities is consistent with successful flexible market activities of new ventures. Anderson and Zeithaml (1984) have suggested that, in emerging markets, distribution channels may be problematic. Most of the firms in our sample were founded in emerging markets. Thus, we expect these technology-driven firms to adopt a flexible response to market uncertainty by outsourcing their distribution activities, and to focus their scarce resources on internal activities (e.g., technological innovation).

The firm's technological innovation activities are represented by a measure of a firm's technology knowledge base (TECHBASE). This variable is expected to bear a positive relationship to the early growth of a new venture. The variable TECHBASE was measured using a seven-point scale assessing a firm's technological potential for developing new outputs and processes. It is expected that this potential will enable the new venture to react quickly and effectively to changing technological opportunities.

The contextual variable MKTG reflects the firm's perception of growth in the market within which it operates (MKTG = 4 if the market is growing strongly; MKTG = 1 if the market is declining strongly). The relationship between this variable and sales growth is unclear. Strong overall market growth may enhance the new venture's prospects for growth, resulting in an outward shift of the profit-growth tradeoff curve, as Marris suggested. However, strong market growth may also indicate significant competition within the market and reduce the new venture's

prospects for establishing a sustainable market niche. This latter result would be particularly likely in an emerging market, where overall market growth will largely reflect the entry of competitors.[14]

## 5. Empirical results

In order to eliminate potential sources of multicollinearity we first performed correlation analyses with variables that we originally considered as being supported by our theoretical framework. These analyses revealed a number of cases of substantial collinearity between potential model variables. They also indicated no significant relationships between growth and a number of potential model variables, e.g., the presence of some formalized operating processes, and the maturity of a firm's market.[15]

Table III reports the results of estimating the model specification using ordinary least squares.[16] Overall these regression results support our theoretical framework: at least one regressor from each of our three vectors of independent variables MGRL, MKT and TECHBASE exhibited a statistically significant estimated regression coefficient. Furthermore, the model explains a statistically significant proportion of the inter-firm variation in growth. These are encouraging results given the limitations and heterogeneities present in our data, including firm-specific and industry-specific variations.

A number of our hypotheses were confirmed concerning the effects of the individual determinants of this measure of new venture growth. These results thus generally affirm the empirical relevance of key elements of the Marris framework. The presence of formalized information processes (INFO), outsourced distribution activities (DISTRIB), a technology knowledge base (TECHBASE) and founders' prior experience (EXPERIENCE) all exhibited positive relationships with growth in the early years of the firm's life, as expected. The percentage of a firm's sales accounted for by its largest five customers (TOP5) and managerial team size (TEAM) had negative estimated effects on growth.[17] The results reported for INFO, TECHBASE, DISTRIB and EXPERIENCE are consistent with our general hypothesis concerning the value of flexibility to new ventures. The firm's ability to identify market opportunities, allocate resources, and undertake appropriate market and technological activities under conditions of substantial uncertainty should be enhanced by effective information processes (INFO). A technology base capable of supporting the development of new products and processes (TECHBASE)

TABLE III
Standardized regression results

| | Hypothesized Effect | Growth |
|---|---|---|
| *N* | | 99 |
| $R^2$ | | 0.238 |
| *F* | | 3.20 |
| Independent variables | | |
| Managerial Capacity | | |
| TEAM (number) | ? | −0.224 **(−2.023)*** |
| EXPERIENCE (years) | + | 0.201 **(1.864)** |
| INFO (7-point-likert scale) | + | 0.274 **(2.663)** |
| PATENTS (dummy) | + | −0.047 (−0.467) |
| Market Activities | | |
| TOP5 (%) | − | −0.220 **(−2.256)** |
| DISTRIB (5-point scale) | + | 0.162 (1.598) |
| Innovation Activities | | |
| TECHBASE (7-point-likert scale) | + | 0.201 **(1.967)** |
| Market Context | | |
| MKTG *(4-point scale)* | ? | −0.106 (−1.010) |

* Estimated *t* values shown in bold type represent significant effects at the 10% significance level under a two-tail *t* test.

should improve the venture's ability to effectively and efficiently exploit emerging technology-based market opportunities. The estimated effect of DISTRIB is consistent with the hypothesis that the founders of a technology-driven new venture may be somewhat more focused on supporting the firm's internal core capabilities (e.g., to undertake technological innovation activities) than market activities that can be outsourced, such as distribution. The positive estimated effect of EXPERIENCE confirms Penrose's observation that a greater stock of managerial expertise can be expected to contribute to firm growth. Our result is inconsistent with the findings of Almus and Nerlinger and Florin et al. (2003) indicating no significant effects of variables measuring founders' business skills and experience.

The negative effect of TOP5 may reflect an initial lack of market flexibility of these new ventures. The five largest customers will likely provide a steady revenue flow in the critical first few years of the firm's life. This reliable source of revenue is obviously important to maintaining cash inflows during these years. However, a relatively strong emphasis on a highly focused market, reflected in TOP5, may be inconsistent with the development and exploitation of significant new growth opportunities during the first three years of a venture's life.[18]

The negative effect of TEAM is not consistent with the findings of several recent studies suggesting that ventures created by a team of founders are significantly more successful than those founded by individuals, as noted above. However, those studies compared single-founder ventures with team-founded firms, whereas our study considers the effect on growth of founder team size, per se, where founder teams consisted of at least two members. Our negative estimated effect of team size on new venture growth supports the findings of Kamm et al. (1989). This effect suggests possible transactions costs resulting from larger values of this facet of managerial capacity, as described by Penrose.[19] It may also reflect the fact that many of the founder teams included in our sample were not created with the objective of including the heterogeneous set of management functions that contribute to successful performance (e.g., research, production, distribution). The significant effect of DISTRIB on early sales growth supports this position vis a vis the firm's market distribution activities. As Lechler reported, founder team composition was motivated primarily with the goal of social acceptability among team members.

In contrast to these results, the variables MKTG and PATENTS did not exhibit statistically significant relationships to firm growth. The insignificant effect of the overall pace of growth in a firm's market (MKTG) may reflect the competing hypotheses indicated above: both greater opportunity and competitive limitations appear to accompany prospects for early new venture growth. The insignificant estimated effect of the variable PATENTS may reflect the fact that only about 15% of the firms in the data sample possessed patents; thus, most of the firms in the sample were unable to exploit patents as a source of revenues.

The estimated regression coefficients reported in Table III are standardized (beta) coefficients to permit comparisons of the relative effects on growth of the independent variables reflecting managerial capacity, market activity, and innovation activity. As shown in Table III, the largest effect was found for the variable INFO. The next largest effect was observed for the variable TEAM, followed by TOP5, TECHBASE, and EXPERIENCE. The comparable magnitudes of the estimated beta coefficients further confirm the relevance of the components of our theoretical framework, capturing flexibility, market activities, technological innovation activities, and managerial activities as enablers of new venture growth.

## 6. Conclusions and further research

Empirical research on the performance of entrepreneurial new ventures has been beset by an almost necessary admixture of different conceptual and theoretical perspectives, ranging from the individual entrepreneur to the industry level of analysis. The resulting lack of analytical consensus has limited efforts to develop a theory-based framework that balances management and economic explanations of new venture performance.

In this paper we have attempted to develop a theoretical framework emphasizing the role of

flexibility as a distinctive strategic option of the new ventures. We have also explicitly included managerial capacity as an enabler of new venture growth. Our empirical results, though admittedly exploratory given limitations in our data source (e.g., lack of single-founder firms), generally support the hypotheses derived from our theoretical framework. They confirm the relevance of a balanced approach to entrepreneurial performance, one addressing the importance of technological innovation activity, market activity, and managerial capacity during the early growth of new ventures, as suggested by the Marris model of firm growth. That model was effectively adapted to new ventures by integrating the economic concept of flexibility as a characteristic strategy of these firms.

Our empirical findings concerning the effects of our measures of managerial capacity are, we believe, particularly interesting. They cast some doubt on the premise that larger founder teams will contribute to greater growth. Our results are consistent with aspects of the discussions of Penrose, Richardson and Slater concerning the effects of managerial staffing on growth, and especially for firms adopting a strategy of flexibility in conducting their business.

The empirical analysis reported in this paper would obviously benefit from a data source that was developed to measure the full range of factors derived from our theoretical framework. These factors would capture other potentially relevant aspects of firms' market activities (e.g., advertising intensity) and technological innovation activities (e.g., R&D intensity), as well as industry-level factors. In addition, further analysis of our framework will attempt to control for inter-industry variations by focusing on selected industry sectors where new venture growth has been particularly evident (e.g., business services, information technology-oriented industries). The model may also be extended to evaluate the relevance of inter-firm differences in strategic focus as determinants of early sales growth. Finally, dynamic changes in the estimated effects of the model's independent variables should be examined, including lag effects.

Our results offer new insights contributing to theoretical explanations of new venture growth. In particular, flexibility appears to be an important characteristic for new ventures deserving further development. This concept also provides a useful starting point in differentiating the analyses of the performance of new ventures as compared with established companies.

## Notes

[1] Shane and Venkatraman (2000) also recently reconfirmed the lack of a conceptual framework that would validate "entrepreneurship" as a distinct research discipline.

[2] Recent empirical studies of firm growth have generally focused on the relationship between growth rates and firm age and size (see e.g. Evans, 1987a,b; Hall, 1987. In addition, others have considered the relationship between growth and managerial control (see e.g., McEachern, 1978; Thonet and Poensgen, 1979). Reid (1995) and Dobson and Gerrard (1989) have estimated a tradeoff between profit and growth rates: their analyses did not account for inter-firm variation in managerial strategies (including flexibility), resources, and activities. Furthermore, Mata (1994) reports the significance of firm-fixed effects, suggesting differences in management, in explaining variation in employment growth for a sample of Portuguese manufacturing firms.

[3] Although the Marris model can be interpreted as emphasizing the maximization of a firm's growth rate, in our presentation this extreme interpretation of the managers' objectives is not necessary, or adopted. In addition, the Marris model did not explicitly include uncertainty as a variable or parameter. According to Lintner (1971), 'Marris introduces uncertainty concerning the growth rate ... only as a factor increasing the interest rate at which the future stream is discounted ' (p. 217), which is appropriate when variances of the growth rate are constant over time. Lintner offers a more general analysis in which these variances increase with futurity. However, his qualitative results generally confirm those obtained by Marris.

[4] This representation of the Marris framework follows Hay and Morris (1991).

[5] The firm's capital base includes its financial assets, physical assets, market knowledge created through market activities, technological innovation activities, and managerial capacity.

[6] This characterization is consistent with Chrisman et al.'s suggestion that new venture success will be facilitated by a firm's unique intangible assets, including networks, functional know-how, and patents. It is also consistent with Audretsch's (2004) recent representation of entrepreneurship.

[7] Managerial capacity subsumes many of the characteristics of a firm's strategic absorptive capacity, as recently summarized by Zahra and George (2002). It also incorporates managerial processes fundamental to a firm's effective and efficient operating management.

[8] Carlsson (1989) has provided a useful survey of treatments of flexibility.

[9] Approximately 60% of the firms included in the sample were engaged in software development and production activities. This concentration of activities reflects substantial new venture formation in this industry in Germany during the late 1990s.

[10] Unlike a number of recent studies of small business growth (e.g., Johnson et al., 1999; Roper, 1999; Almus and Nerlinger, 1999) we do not include initial firm size as an independent variable because the data set contains only new ventures for which initial size (sales) was zero.

[11] Dean and Meyer (1996) have suggested that the extant management literature has focused on the supply side of entrepreneurship (e.g., entrepreneurial characteristics) and has neglected relevant demand-side factors (e.g., innovation and market activities).

[12] Therefore, unlike McEachern, Thonet and Poensgen, and Cubbin and Leech we have not included regressors reflecting inter-firm differences in manager vs. owner control of the firm because all of the firms in the data sample were controlled by their owner–managers.

[13] Barkham (1994) used sales turnover in year three as the dependent variable in examining the influence of entrepreneurial characteristics on firm size.

[14] We recognize that the ordinal variables MKTG, DISTRIB, INFO, and TECHBASE may impart measurement and specification errors to our estimated results. However, given the potentially large unexplained firm-specific and industry-specific variations in our data source, we expect these additional sources of error to be relatively modest.

[15] The results of the correlation analysis are available from the authors.

[16] Homoscedasticity of the model's error term is a result of the modest variation in the sizes of the firms comprising the data sample. The sample size reported in Table III reflects the omission of firms exhibiting missing observations for some of the model's variables.

[17] The probability value of the estimated coefficient for DISTRIB is 0.06 under a one-tail *t* test.

[18] Johnson et al. found no significant effect of a variable similar to TOP5 within their model of employment growth in services in the northern United Kingdom.

[19] Almus and Nerlinger's results obtained using a sample of high-tech German firms found no significant effect for a variable measuring the extent to which a firm was founded by a team.

## References


Alchian, A.A. and H. Demsetz, 1972, 'Production, Information Costs and Economic Organization'. *American Economic Review* **62**, 777–795.

Almus, M. and E.A. Nerlinger, 1999, 'Growth of New Technology-Based Firms: Which Factors Matter?' *Small Business Economics* **13**, 141–154.

Anderson, C. and C.A. Zeithaml, 1984, 'Stage of the Product Life Cycle, Business Strategy, and Business Performance'. *Academy of Management Journal* **27**, 5–24.

Audretsch, D.B., 2004, 'Economic Growth and National Security: A View from Europe'. Manuscript presented at the G-8 Pre-Summit Conference on *Security, Prosperity and Freedom: Why America Needs the G-8*, Indiana University, Bloomington, June 3–4.

Barkham, R.J., 1994, 'Entrepreneurial Characteristics and the Size of the New Firm: A Model and an Econometric Test'. *Small Business Economics* **6**, 117–125.

Brüderl, J., Preisendörfer P. and R. Ziegler, 1996, *Der Erfolg neugegründeter Betriebe*, 2nd Edition, Berlin.

Carlsson, B., 1989, 'Flexibility and the Theory of the Firm'. *International Journal of Industrial Organization* **7**, 179–203.

Chrisman, J.J, Bauerschmidt A. and C.W. Hofer, 1998, 'The Determinants of New Venture Performance: An Extended Model'. *Entrepreneurship Theory and Practice* **22**, 5–29.

Cooper, A.C. and A.V. Bruno, 1977, 'Success Among High-Technology Firms'. *Business Horizons* 20 (April), 16–22.

Cooper, A.C. and F.J. Gimeno-Gascon, 1992, 'Entrepreneurs, Processes of Founding and New Venture Performance', in Sexton, D.L. anf Kasarda J.D. (eds.), *The State of the Art in Entrepreneurship*. Coleman Foundation, Boston, MA: PWS-Kent.

Cooper, A., Woo, C. and W. Dunkelberg, 1989, 'Entrepreneurs' Perceived Chances for Success'. *Journal of Business Venturing* **4**, 317–332.

Cubbin, J. and D. Leech, 1986, 'Growth versus Profit Maximization: A Simultaneous-Equations Approach to Testing the Marris Model', *Managerial and Decision Economics* **7**(2), 123–138.

Dean, T.J. and G.D. Meyer, 1996, 'Industry Environments and New Venture Formation in U.S. Manufacturing: A Conceptual and Empirical Analysis of Demand Determinants', *Journal of Business Venturing* **11**, 107–132.

Dobson, S. and B. Gerrard, 1989, 'Growth and Profitability in the Leeds Engineering Sector'. *Scottish Journal of Political Economy* **36**(4), 334–352.

Doutriaux, J., 1992, 'Emerging High-Tech Firms: How Durable are Their Comparative Start-Up Advantages?' *Journal of Business Venturing* **7**(4) 303–322.

Eisenhardt, K. and C. Schoonhoven, 1990, 'Organizational Growth: Linking Founding Team, Strategy, Environment and Growth among U.S. Semiconductor Ventures, 1978–1988', *Administrative Science Quarterly* **35**(3), 504–529.

Evans, D., 1987a, 'Tests of Alternative Theories of Firm Growth'. *Journal of Political Economy* **95** (4), 657–674.

Evans, D., 1987b,. 'The Relationship Between Firm Growth, Size, and Age: Estimates for 100 Manufacturing Industries'. *Journal of Industrial Economics* **35(**4) (June), 567–581.

Florin, F., Lubatkin M. and W. Schulze, 2003, 'A Social Capital Model of High-Growth Ventures'. *Academy of Management Journal* **46(**3), 374–384.

Hall, B., 1987, 'The Relationship Between Firm Size and Firm Growth in the US Manufacturing Sector'. *Journal of Industrial Economics* 35(4) (June), 583–606.

Hay, D.A. and D.J. Morris, 1991, *Industrial Economics and Organization: Theory and Evidence,* 2nd Edition. Oxford: Oxford University Press.

Hicks, J.R., 1931, 'The Theory of Uncertainty and Profit'. *Economica* **32**(May), 170–189.

Johnson, P., Conway, P., and P. Katterman, 1999, 'Small Business Growth in the Short Run'. *Small Business Economics* **12**, 103–112.

Jovanovic, B., 1982, 'Selection and the Evolution of Industry'. *Econometrica* **50**(3) (May), 649–670.

Kamm, J., Shuman, J., Seeger, J. and P. Nurick, 1989, 'Are Well-Balanced Entrepreneurial Teams More Successful?', in Brockhaus R.H., Churchill N.C., Katz, J.A., Kirchoff, B.A. Vesper, K.H. and W.E. Wetzel (eds.), *Frontiers of Entrepreneurship Research 1989 – Proceedings of the 1989 Babson College Entrepreneurship Research Conference*, Wellesley, MA: Babson College.

Knight, F.H., 1921, *Risk, Uncertainty and Profit*. Boston: Houghton Mifflin Co.

Langlois, R.N. and P.L. Robertson, 1995, *Firms, Markets and Economic Change: A Dynamic Theory of Business Institutions*. London: Routledge.

Lechler, T., 2001, 'Social Interaction: A Determinant of Entrepreneurial Team Venture Success'. *Small Business Economics* **16**, 263– 278.

Lintner, J., 1971, 'Optimum or Maximum Growth Under Uncertainty', in R. Marris and A. Wood (eds.), *The Corporate Economy: Growth, Competition, and Innovative Potential*. Cambridge, MA: Harvard University Press, pp. 172–241.

Low, M.B. and I.C. MacMillan, 1988, 'Entrepreneurship: Past Research and Future Challenges'. *Journal of Management* **14**(2), 139–161.

Marris, R., 1964, *The Economic Theory of 'Managerial' Capitalism*, The Free Press of Glencoe.

Mata, J., 1994, 'Firm Growth During Infancy', *Small Business Economics* **6**, 27–39.

McEachern, W.A, 1978, 'Corporate Control and Growth: An Alternative Approach', *Journal of Industrial Economics* **26**(3) (March), 257–266.

Mills, D.E. and L. Schumann, 1985, 'Industry Structure with Fluctuating Demand', *American Economic Review* **75**(September), 758–767.

Penrose, E, 1959, *The Theory of the Growth of the Firm*, Oxford: Oxford University Press.

Reid, G.C., 1995, 'Early Life-Cycle Behaviour of Micro-Firms in Scotland', *Small Business Economics* **7**, 89–95.

Richardson, G.B., 1964, 'The Limits to a Firm's Rate of Growth', *Oxford Economic Papers* **16**(March), 9–23.

Roper, S., 1999, 'Modeling Small Business Growth and Profitability', *Small Business Economics* **11**, 11–24.

Sandberg, W.R., 1984, 'The Determinants of New Venture Performance: Strategy, Industry Structure and the Entrepreneur', Ph.D. dissertation, University of Georgia.

Shane, S., 2000, 'Prior Knowledge and the Discovery of Entrepreneurial Opportunities', *Organization Science* **11**(4), 448–469.

Shane, S., and S. Venkatraman, 2000, 'The Promise of Entrepreneurship as a Field of Research', *Academy of Management Review* **25**, 217–226.

Slater, M., 1980, 'The Managerial Limitations to the Growth of Firms', *Economic Journal* **90**(September), 520–528.

Stigler, G.J., 1939, 'Production and Distribution in the Short Run', *Journal of Political Economy* **47**(3) (June), 305–327.

Teach, R.D., Tarpley F.A. and R.G. Schwartz, 1986, 'Software Venture Teams', in R. Ronstadt, J.A. Hornaday, R. Peterson and K.H. Vesper (eds.), *Frontiers of Entrepreneurship Research 1986 – Proceedings of the 1986 Babson College Entrepreneurship Research Conference*, Wellesley, MA: Babson College, 546–562.

Thonet, P.J. and O.H. Poensgen, 1979, 'Managerial Control and Economic Performance in Western Germany', *Journal of Industrial Economics* **28**(1)(September), 23–37.

Tuck, P. and R.T. Hamilton, 1993, 'Intra-Industry Size Differences in Founder-controlled Firms', *International Small Business Journal* **12**, 12–22.

Zahra, S.A. and G. George, 2002, 'Absorptive Capacity: A Review, Reconceptualization, and Extension', *The Academy of Management Review* **27**(2), 185–203.