Education, Experience, and the Cognitive Capacity of Entrepreneurs: Some Econometric Evidence from the Indian Pharmaceutical Industry

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Abstract: The theoretical literature identifies three most prominent dimensions of entrepreneurship. These are responsiveness to emerging uncertainty, discovering and exploiting new opportunities, and decision-making on how to coordinate and direct a firm. The empirical literature, on the other hand, brings out education and past experiences as key determinants of entrepreneurship, but focuses only on the dimension of new opportunities in new ventures. In this paper, we argue that the educational background and past experiences influence all three dimensions of entrepreneurship. Using data of manager-owned small scale enterprises in the Indian pharmaceutical industry, we find concrete econometric evidence that the background and experience not only influence the discovering and exploiting of opportunities but also how an entrepreneur deals with the issues of uncertainty and coordination of existing firms. We argue that the primary reason for such impact lies in the way education and past experiences shape the cognitive capacity of an entrepreneur.

Keywords: entrepreneurship, educational background and past experience, limited cognitive capacity, Indian pharmaceutical industry

JEL-Classification: L20, L65, M13

Paper prepared for
The 32\(^{nd}\) Conference of the European Association of Research in Industrial Economics
Porto, September 1-4, 2005
1. Introduction

The study of entrepreneurship in economic literature remains neglected despite the early Schumpeterian emphasis on the importance of creative entrepreneurs in bringing about technical change and economic development. Subsequent literature on the theory of the firm developed in two dimensions: one testing for the so-called “Schumpeterian hypothesis” of firm-size and technical change (Kamien and Schwartz 1975; Cohen and Levin 1989), and the other becoming preoccupied with issues of transaction costs (Williamson 1975, 1979; Klein, Crawford and Alchian 1978) and property rights arguments (Grossman and Hart 1986). All these dimensions threw inadequate light on owner-managed firms that are mainly guided by the interests and entrepreneurial aspirations of their owners. Recent years have seen a revival in the interests on entrepreneurship and their importance on economic development in general (cf. Shane and Venkataraman 2000), and on the development of firms in particular (Langlois and Robertson 1995; Witt 1998, 2000; Aldrich 1999). These theories seek to put the role of entrepreneurs again in the centre stage of the economic discussion. This stream of research acknowledges the central function that entrepreneurial actions have for the success or failure of firms, and therefore also for the dynamics within industries.

Traditionally, the theoretical and empirical literature on entrepreneurship identifies a number of principal dimensions characterizing entrepreneurial activities. The most prominently discussed dimensions for describing entrepreneurs are their attitude toward uncertainty (Knight 1921), the decision-making on how to organizationally structure, coordinate and direct the firm’s business activities (Coase 1937, Witt 1998), and, obviously, the processes of discovering and exploiting new opportunities.
In this paper, we consider these three entrepreneurial dimensions simultaneously. We offer econometric evidence on how the educational background and past experience affect the three entrepreneurial dimensions. Several empirical studies have shown that the educational background and career experiences influence the entrepreneurial activities (for a review see Helfat and Lieberman 2002). However, this literature primarily focuses on the effect of education and experience on discovering and exploiting new opportunities (Shane 2003, pp. 68). Little attention is given to how an entrepreneur’s background affects the two other entrepreneurial dimensions which are the attitude toward uncertainty and the decision on the coordination of the firm. Using a data set of manager-owned firms in the Indian pharmaceutical industry allows us to empirically examine these issues. Moreover, examining the impact of education and past experiences only on new firm formation or the self employment decision, in our view, assumes a very short term (myopic) impact of education and past experiences on entrepreneurship. Such a perspective tends to preclude the possibility of how education and past experience can have long standing impact on various entrepreneurial dimensions.

In this paper, we differ from previous work in three aspects. First, we simultaneously consider uncertainty, opportunities, and coordination as distinct dimensions of entrepreneurship. Second, we apply rigorous econometric analysis on how education and past experiences influence not only discovering and exploiting opportunities but all three dimensions of entrepreneurship by introducing a new quantifiable measure of these dimensions. By doing so for already existing firms we argue that impact of education and

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1 We, however, accept the criticism offered by Kirzner’s (1973) perspective of ‘weakly’ new opportunities as opposed to radically new, disequilibrating new opportunities as discussed in Schumpeter (1934).
past experience can have long standing impact on these dimensions of entrepreneurship by shaping their cognitive behavior.

The paper is organized in the following way. In the next section, we provide the conceptual framework to come out with an operational concept of entrepreneurship, and form our hypotheses. Section 3 develops the methodology and discusses the construction of variables. Section 4 briefly discusses the results of our econometric model. Section 5 synthesizes and concludes.

2. Conceptual framework

A theoretical explanation behind formation of entrepreneurial capability in terms of attitude toward uncertainty (Knight 1921), the decision-making on how to organizationally structure, coordinate and direct the firm’s business activities (Coase 1937, Witt 1998), and the processes of discovering and exploiting new opportunities (Schumpeter 1934) implicitly demanded an economic analysis of cognitive behavior of individuals. Recent economic research on the theory of the firm achieves this missing link by emphasizing the importance of the business conceptions (Witt 1998). A business conception defines an entrepreneur’s imagination about the firm’s goals and their achievement. In this sense, the business conception is the result of a cognitive process. This process includes perceiving, analyzing and reflecting on a number of different options, occurring opportunities, and future prospects. During this process an entrepreneur forms an understanding of how to run the firm. Thus, decision-making on the business goals and the coordination of their achievement is a cognitive process, directing an individual to consciously focus, channel, and distribute attention to particular
issues and not to others (Ocasio 1997). By now, it is well established that human beings are limited in their capacity to process information (Simon 1947). Considering this limitation, the cognitive process toward the business conception hinges on the opportunities that an entrepreneur perceived prior to setting up the venture. This process is largely contingent on the entrepreneur’s professional background and experiences. In a nutshell, this approach recognizes that in a complex environment and under limited cognitive capacity, the creation of an alternative business conception depends on a complex set of factors combining individual experiences and subjective understanding. Presumably, the educational background and past experience should play an important role in shaping this cognitive capacity of entrepreneurs.

**Education and past experiences**

For the present study, we are particularly interested in looking at the differential impact of individuals with technical education and experiences on one hand, and with non-technical education and past experiences in trading, on the other hand. As argued by Kingston (1990), “what matters most in trading is what happens outside the trader”, e.g., in the environment. Thus, trading is more a question of “accepting the world as it is” with minimal changes and rearrangements. In contrast, an entrepreneur with a technical background “stands out from the crowd of traders … takes higher risks for higher rewards” (Kingston 1990). More specifically, “if the job of a trader is to fill up “the gap” so that a commodity fetches higher value, the job of an entrepreneur [with technical education and experiences] is to develop a product and bring that commodity into commerce, in the first place” (Kingston 1990).
Indeed, a considerably large body of the empirical economic-sociology literature on Indian entrepreneurship focuses on how cultural background in trading characterized by “attitude to fast turnovers”, “unwillingness to reinvest” lacked motivation toward trial and error based experimentations (McCrorry 1956; Berna 1960). Gorter (1996) and Streefkerk (1985, 1997) note that while many traders have indeed been successful in becoming industrial entrepreneurs, they seemed to have continued with their trading characteristics of expending considerable effort in the aspects of purchasing and marketing compared to an intensive focus on augmenting manufacturing capabilities, and technological change through trial and error. Thus, this literature highlights that the prior experience may have important influence on the way things are done in the current environment.

A more general empirical literature on capabilities and resources has shown that the educational background and pre-entry experience matter for entrepreneurial activities (e.g., Le 1999; Helfat and Lieberman 2002; Shane 2003). This literature argues that the core competencies of entrepreneurs proved to be effective in establishing new firms due to economizing on the previously accumulated knowledge (Shane and Khurana 2000; Klepper 2002; Klepper and Sleeper 2002). But also existing firms are more likely to profitably operate in a new market environment if they have prior knowledge about specific characteristics of the entered market (e.g. Berry 1992). Data from the US generic pharmaceutical industry support these results (Scott Morton 1999). Other studies discuss the possibility of educational background and pre-entry experiences becoming important for the self employment decision and new firm formation by augmenting entrepreneurial judgment capability, and by augmenting the efficiency with which opportunities are
pursued and exploited (Casson 1995, see also Kent et al 1982). So, education and past experiences act through providing better stock of information to individuals (Shane 2000; Burton, Sørensen and Beckman 2002) and reducing uncertainty about an opportunity (Hebert and Link 1988) in so far as decision making regarding formation of new firms are concerned.

**Key dimensions of entrepreneurship**

From the above discussion we conceptualize three key dimensions of entrepreneurship as follows:

(a) attitude toward shared decision-making and interactive behavior

(b) attitude toward uncertainty due to changes in the market environment

(c) Attitude toward new ways of manufacturing products or augmenting manufacturing capability.

**Conceptualizing the hypotheses**

The key argument in this paper is that the educational background and past experiences shape an entrepreneur’s cognition. We then argue that the so formed cognitive capacity of an entrepreneur affects, in turn, the three entrepreneurial dimensions. These are responding to emerging uncertainty in the business environment, discovering new opportunities, and setting up the organizational structure of a firm. In other words, the cognitive capacity of an entrepreneur shaped through the background and experiences influences the two aspects of creating a business conception which are deciding on the business goals, and how to achieve them. The literature primarily focuses
on the first aspect involving the entrepreneurial dimension of discovering new opportunities. Those entrepreneurial dimensions, i.e. coordinating the firm and responding to market uncertainties, relating to the second aspect of a business conception which is how to achieve the business goals are less explored with respect to their dependence on educational background and experiences. The link between capabilities and cognition is, underexplored in the literature with the exception of Langlois (1999). Langlois (1999) emphasizes that entrepreneurs with a particular educational background and past work experiences perceive only a limited set of new opportunities, largely due to limited cognitive capacity of human beings. The new opportunities are closely connected to the core competencies they had accumulated during the previous deployment. In other words, while searching for new business opportunities, entrepreneurs primarily strategize on their core competencies. In this paper, we extend this line of reasoning by arguing that the limited cognitive capacity does not only restrict the search for new opportunities. Rather, specific features of educational background and pre-entry experiences shape an entrepreneur’s long standing cognitive responses towards uncertainty, coordination and augmenting manufacturing capability. We now specify the following hypotheses for our study.

**Attitude toward shared decision-making and interactive behavior**

In our sample we can distinguish between entrepreneurs with a technical background and with a background in trading. An environment open for discussions, for new ideas and for team-based decision-making generally characterizes the work environment in the technical departments within organizations. This environment shapes
the way how technical staff approaches new projects in their work groups. If a member previously affiliated with a technical department or a similar technical unit within the preceding firm starts an own company, we would not only expect that the technological field of the new venture is closely related to the core competencies of the entrepreneur’s prior work unit. But, we would also expect that this entrepreneur chooses an organizational framework with similar characteristics as in the previous work environment. Regarding the coordination of the firm, a venture of a technology-experienced entrepreneur is likely to be more open regarding the integration of other people into the decision processes. Thus, such a company tends to show a higher degree of shared ownership.

In contrast, “accepting the world as it is” (Kingston 1990) and “adjusting to it” characterizes people working as traders. It is worth reemphasizing that perhaps the main, if not the only, source of novelty in trading is to identify a market for an existing good. The premium of a trader, therefore, depends crucially on exploiting the demand supply gap. Conceivably, sharing this information about the access to this demand with others may reduce the premium by potentially increasing the number of suppliers in the market. A trader may, therefore, have incentives to be reluctant in engaging into shared and interactive behaviour. Thus, an entrepreneur formerly working as a trader is likely to be less open regarding the integration of other people into the decision-making processes. Such a company tends to depend more on control and regulation, often reflected in a closed ownership pattern.

Thus, extending the argument by Langlois (1999) that limited cognitive capacity that biases entrepreneurs to search new business opportunities within the range of the
core competencies of their previous work environment, we argue that entrepreneurs are also cognitively limited in choosing their approach towards coordinating a new firm. The ownership structure an entrepreneur implements in a venture tends to carry the same coordinative characteristics, e.g. regarding openness, as the unit environment in which an entrepreneur worked prior to the own entrepreneurial activities. That is because entrepreneurs are cognitively framed according to what they perceived during their professional education and past experiences. Thus, the educational background and the pre-entry experiences regarding the coordination of the previous work unit of an entrepreneur determine the coordinative framework of the entrepreneurial firm with respect to the ownership structure. The higher the degree of openness to new ideas in an entrepreneur’s work environment prior to establishing an own venture, the more open is the entrepreneur to share the ownership. This leads to the following hypothesis.

**Hypothesis 1a:** Entrepreneurs with technical background and experiences are more likely to share the ownership than entrepreneurs with a trading background.

**Attitude toward uncertainty**

Drawing our sample from the Indian pharmaceutical industry under a turbulent phase of readjustment to cope with the challenges of WTO-policies, we argue that education and past experiences of entrepreneurs influence not only their particular ownership structure and interactive behavior but their general strategic action in a changing environment, and therefore their prospect of survival in the new regime in a major way. Entrepreneurs with a technical background may be more forthcoming in
diversifying into “untried” new opportunities. In contrast, the individuals coming from trading background demonstrate strong risk aversion, preference to stable income flow and long standing traits toward exploiting any current environment often at the cost of division of labor, especially in the manufacturing. The firms owned by these individuals are, therefore, expected to score low in terms of adaptive efficiency. A background in trading coupled with a lower educational level is, in contrast, expected to make people more risk averse and late in exploiting and accepting new opportunities. It is more likely that traders can start thinking about reorganization and change only after the change in the external environment has been realized (actualized).

**Hypothesis 1b:** Entrepreneurs with technical background and experiences strategize earlier on possible actions regarding a changing environment than entrepreneurs with a trading background.

**Attitude toward new ways of manufacturing and augmenting manufacturing capabilities**

We re-emphasize the point made earlier that traders are more concerned with existing products than visualizing about developing new products. It has also been argued earlier that there is evidence showing people coming from trading background being unwilling to reinvest in augmenting manufacturing capabilities, and rather focusing more on purchasing and marketing. The people with technical education and background are, on the other hand, generally more concerned with manufacturing activities and technical
upgrading. Past experiences of working in technical departments tend to make them more confident about changing the production organization, and technologies.

**Hypothesis 1c:** Entrepreneurs with technical background and experiences are more likely to adopt new ways of manufacturing and augmenting the quality standards of production than entrepreneurs with a trading background.

**Growth and Entrepreneurship**

The fact that growth and entrepreneurship are related is unquestionable (Witt 1998, Shane 2003). The causality and the direction of impact are, however, problematic. While it may be argued that growth should be taken as a measure for success of entrepreneurship (as in Shane 2003), one could also argue that a high growth is a prerequisite for exploring new “untried” opportunities by smoothing out problems of liquidity. This is especially true if credit market functions in an imperfect manner. Note that our sample comes from India, where capital market functions, at best, imperfectly. We, therefore, focus on the causality running from growth to entrepreneurship. But the choice of a-priori hypothesis remains difficult since a very high growth can also lead to complacency and laid back attitudes in exploring new opportunities.

**Hypothesis 2:** All three dimensions of entrepreneurship should be significantly influenced by growth.
3. The data and variables

This section discusses the construction of suitable variables and specifies the econometric methodology. For the cross sectional econometric analysis we select small scale enterprises (SSE, henceforth) of the Indian pharmaceutical industry with 42 observations. The sample has been constructed on the basis of primary data and information collected through personal interviews with the owners of the pharmaceutical SSEs and/or the heads of their production units based on a structured questionnaire during a project sponsored by the Department of Science and Technology, Government of India, in the year 2001-2002. These firms are spread across four major cities in India, namely New Delhi, Chennai (Madras), Bangalore and Kolkata (Calcutta). We take advantage of three particular characteristics of this data set. First, all firms in the sample are SSEs, trajectories of which largely revolve around the capabilities and aspirations of owner-entrepreneurs. This makes it very likely that the decisions on the organizational structure and strategic direction reflect mainly the intentions of owners. So, we can presume that the owners purposefully initiated the organizational or strategic features we observe. Second, the entrepreneurs come from very different educational background and past experiences. We are able to distinguish between the two following groups: the first group consists of entrepreneurs with technical education and, in most cases, having past experiences as chemists in other firms. The second group, on the other hand, consists of people having less/non-technical educational background with past experiences as sales or marketing personnel in other firms, or as independent traders of chemicals. A third characteristic of our data set is also worth emphasizing. The data set intends to capture

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2 In the Indian pharmaceutical industry, SSEs are defined by firms with value of plant and machinery worth up to Indian Rupees one crore (Rs 100 lacs or Rs. 10 Million).
the industry in a phase of drastic shakeouts and readjustment to cope with the uncertain future of WTO-led globalization. Our regression results should therefore be interpreted as an attempt to examining various facets of entrepreneurial decision making under an uncertain environment.

**Econometric specification**

Note that all our dependent variables are discrete in nature. We therefore perform maximum likelihood estimation.

\[ Q = X\beta + u \]

Where \( Q \) is the \( n \times 1 \) vector denoting the dependent variable, either binary or multinomial, for \( n \) number of firms, \( X \) is an \( n \times k \) matrix consisting \( k \) explanatory variables, \( \beta \) is the coefficient matrix of order \( k \times 1 \), and \( u \) is the matrix of error terms of the order \( n \times 1 \).

The variables \( Q \) and \( X \) are described below.

**Estimation Method**

The above models represent a set of three independent equations with polychotomous dependent variables. We therefore use probit and ordered probit estimation procedures to estimate these models.

**Dependent variables: Entrepreneurship (Q)**

*Attitude toward shared and interactive behavior (SHARE)*

So far no readymade measure exists for the attitude toward shared and interactive behavior. We use the ownership structure of a firm as a proxy for this variable. Our
ownership variable is a polychotomous variable having 4 categories. The category 1 refers to the public sector firms, i.e. firms owned by the government. Categories 2 to 4 refer to private firms. Among private firms there are two broad groups; proprietorship/partnership firms (PP) are distinguished from limited companies (LTD). While firms under PP are characterized by “unlimited liability”, “consensus rule”, and limited number of members, firms belonging to the LTD category are characterized by rules of “limited liability”, “majority rule” and large number of share holders.

To cast light on the attitude to shared and interactive behavior we highlight on some important differences between the PP and LTD firms, especially related to the number of members and the decision rule. PP firms can have utmost 10 members, and any decision has to follow the rigid “consensus rule”. In fact, the decision to transfer shares of any individual will also have to be ratified by all members (consensus rule). In contrast, LTD companies can have more members. Further, the individuals can transfer their shares at their discretion, or with the approval of a much flexible “majority rule”.

It may not be, therefore, unreasonable to assume that owners of LTD companies are more amenable toward discussion and interaction with others to shape their business conception. They may also be more confident about putting across their business conceptions through shared behavior rather than controls and regulation compared to the PP firms, where ownership is often controlled by single individual or a group of stable friends and family members.

The LTD firms can be further distinguished in terms of the number of share holders. While private limited firms have a lower limit of 2 and an upper limit of 50 share holders, the public limited firms have a lower limit of 7 without any upper limit. Also,
share holders of private limited firms need approval of the majority to transfer their shares, which are done only at the discretion of an individual share holder in a public limited company. Thus, owners of public limited firms, according to our categorization, should be the most risk loving group with the highest inclination toward shared interactive ways of developing business conceptions. In our classification, category 2 refers to public limited companies, category 3 refers to private limited companies and category 4 refers to PP firms.

Moreover, the fact that PP firms adhere to un-limited liability may also reflect their preference for stable income flows and reluctance to engage in risky ventures compared to LTD firms (Carney 1999).

Focus on augmenting manufacturing capability and technical change (GMP)

Recent years have seen a shift in the conception of product quality away from product quality of single products to the concept of “quality organization”. The recent wave of globalization and liberalization under the auspices of the World Trade Organization has only strengthened this move by acknowledging that product standards, technical regulations and certification systems are essential for the effective functioning of modern economies (Hoekman 1995). It is often believed to be imperative to improve product quality through upgradation of manufacturing norms for survival and growth in the post-WTO era. As a result many sectors in India have seen rapid changes in the standards of manufacturing quality through adoption of national and international certification systems, the case of the Indian pharmaceutical industry being no exception (Ray and Bhaduri 2003). However, SSEs have often shown reluctance and inertia in
terms of upgrading their manufacturing norms with only a fraction of them intending to conform to this emerging requirement (Upadhyay et al 2002; e-pharmamail March 14, 2005). We use this variable to measure the thrust on manufacturing capability and technical change in a regime which supports augmenting specialization in manufacturing and technology. This variable is also an ordered polychotomous variable with four categories of Good Manufacturing Norms (GMP). While zero refers to firms with no-GMP norms, categories 1-3 refers to various GMP norms with their increasing thrust on various aspects of quality (1=Indian GMP, 2=GMP of the World Health Organization, and 3=GMP of ISO/USFDA). These aspects are mainly related to quality of raw materials, efficiency, and safety in the production process, and environmental concerns.

_Inclination towards exploring new, uncertain, opportunities (NEWOPP)_

A third aspect of entrepreneurship is her persuasion of “untried” activities under uncertainty and incomplete information (Harper 1996, Wu 1989, Kingston 1990). We measure this variable by the “proposed plan under WTO”. In category zero we have placed firms, who were either unable to specify any plan, or planning to dismantle there current business, or intends to dismantle the job of manufacturing, and focus entirely on the relatively risk free job of marketing and distribution of pharmaceuticals. The other category consists of firms planning to improve their manufacturing facilities to venture into the “untried” business of subcontracting for large firms, venturing into export markets, and/or establish formal R&D units for product development.

_Independent variables (X)_
**Growth rate (GR)**

Due to unavailability of time series data on sales turnover, we measure the growth rate of a firm by the ratio of its current sales turnover and the number of years they are in business (taking the difference between the year 2002 and their years of incorporations). The effectiveness of this measure tends to depend on the assumption that the firms’ current volume of sales is not a result of any random fluctuation.

**Education-Experience (EE)**

This is our key explanatory variable. We take it as a dummy variable which takes the value ‘0’ for owners with non-technical background and/or past experience as traders, and ‘1’ for individuals with technical education and/or past experience as chemists.

**4. The results**

Our regression results are largely in line with the broad hypothetical framework. In all three equations, EE shows significant explanatory capacities along with the growth of firms (GR).

For the hypothesis regarding attitude toward shared and interactive behavior (model-1, table 1) we dropped 3 public sector government owned firms on the assumption that the ownership structure of these firms are independent of the educational background of owners. It is, however, interesting to note that all 3 public sector firms in our sample chose to employ a person with technical educational background at the helm of their affairs. Our ordered probit estimation shows that EE is significant at the 5% level with the expected sign. GR also appears with the expected sign, but significant only at the 10% level.
To gain some further insights into the decision making process regarding ownership structure we carry out a multinomial logit analysis with the same set of observations (table 2). Interestingly, while EE significantly explains the choice of opting for private limited companies over proprietorship/partnership, the choice of public limited companies are explained by the GR. Both variables are significant at the 10% levels respectively. Moreover, the overall explanatory capability of our models seems impressive with chi square statistics being significant at the 5% levels on both occasions.

The model-2 (table 3), again estimated by ordered probit method, confirms our hypothesis regarding the “Focus in augmenting manufacturing capability and technical change (GMP)”. EE is positive and now significant at the 5% level demonstrating that owners with technical background and/or education prefer to opt for stronger manufacturing capabilities compared to the other group. The other explanatory variable GR remains significant at the 1% level. The chi square statistics is significant at the 1% level.

The confirmation of our hypothesis regarding NEWOPP (table 4), however, contingent upon controlling for the ownership structure. When estimated without controlling for ownership only the GR turns out to be positive and significant at the 5% level. In the revised estimation, controlling for RE (RE taking 0 for proprietary/partnership firms, 1 otherwise), EE becomes positive and significant at the 10% level, while growth remains significant at the 5% level.\(^3\) It may be worth emphasizing in the light of model 1 that the revised model 3 together with the model 1 now forms a recursive simultaneous equation system, which can still be estimated by the single equation method without running into

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\(^3\) Excluding government owned firms from the estimation does not change the sign or the strength of EV. Growth, however, becomes significant only at the 10% level in the new equation. The chi square remains significant at the 5% level.
any endogeneity problems. We, however, checked for the possible problems of
multicolinearity between GR, RE and EE. With the highest pairwise correlation existing
between GR and RE equal to only 0.36, we conclude that the model does not suffer from
any multicolinearity problems either. The Chi square is significant at the 1% level.

5. Discussion and Conclusions

This paper provides new insights into the issue of entrepreneurship in economic
literature by providing an operational measure of some key dimensions of entrepreneurial
capability. The growth of firms appears to have a significantly positive impact on all
three entrepreneurial dimensions. This can be explained by the fact that all firms belong
to SSEs, where complacency effect has still not set in. In the light of imperfectly
functioning capital markets, therefore high growth encourages entrepreneurs to explore
new untried opportunities and reinvest in augmenting manufacturing capability. The
results of our multinomial logit analysis of model 1 also show that high growth perhaps
also encourages public offering of shares.

More importantly, the paper finds econometric evidence to support our key
hypotheses that technical education and background positively influences the key
dimensions of entrepreneurial capability, even in the long run. Owners with technical
education and background seem to be more confident about their business conceptions
and open toward shared decision-making compared to owners with a trading background.
The former group also performs significantly better in exploring new opportunities and in
building up complex manufacturing capabilities.
This paper also provides some new insights into the role of prior knowledge. While the entrepreneurship literature primarily argues that the educational background and past experience matter for the founding process of a new venture, it does not say much about the long-term consequences of prior knowledge in those companies. Studies in the economics literature, on the other hand, highlights the prior knowledge, not of a single entrepreneur, but of the entire firm (e.g., Berry 1992; Scott Morton 1999). Our evidence shows that the entrepreneurial experience matters not only for the new venturing process but also for the long-term development. What goes beyond the scope of this paper is, however, to empirically disentangle which of the effects is dominating under which conditions.

In other words, the key finding of our paper is that the educational background and pre-entry experiences shape an entrepreneur’s long standing cognitive attitude toward shared and interactive behavior, augmenting manufacturing capability and exploring new untried opportunities. Differences in education and past experiences, therefore, not only influence the current choices regarding formation of new firms as highlighted in the literature. But it also shapes their long standing future strategic choices through forming two different attitudes toward various dimensions of entrepreneurship in the face of a changing environment.
## Appendix

Table 1: Ordered Probit Estimation, Dependent variable “SHARE” (model 1)

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>‘z’ values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td></td>
</tr>
<tr>
<td>EE</td>
<td>-0.948**</td>
</tr>
<tr>
<td></td>
<td>(-2.17)</td>
</tr>
<tr>
<td>GR</td>
<td>-0.302*</td>
</tr>
<tr>
<td></td>
<td>(-1.84)</td>
</tr>
<tr>
<td>Chi Square</td>
<td>11.69**</td>
</tr>
</tbody>
</table>

Note: ‘Z’ values are in parentheses  
*** denotes significance at 1 % level  
** denotes significance at 5% level  
* denotes significance at 10% level

Table 2: Multinomial Logit Estimation, Dependent variable “SHARE” (model 1)

<table>
<thead>
<tr>
<th>Category</th>
<th>Explanatory variable</th>
<th>‘z’ values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public LTD</td>
<td>Constant</td>
<td>-3.636**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.49)</td>
</tr>
<tr>
<td></td>
<td>EE</td>
<td>1.915</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.4)</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>0.841*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.84)</td>
</tr>
<tr>
<td></td>
<td>Chi Square</td>
<td>9.42*</td>
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</tbody>
</table>

<table>
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<tr>
<th>Category</th>
<th>Explanatory variable</th>
<th>‘z’ values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private LTD</td>
<td>Constant</td>
<td>-2.047**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-2.49)</td>
</tr>
<tr>
<td></td>
<td>EE</td>
<td>1.738*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.95)</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>0.28</td>
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<tr>
<td></td>
<td></td>
<td>(0.69)</td>
</tr>
</tbody>
</table>

Note: PP firms are the comparison group  
‘Z’ values are in parentheses  
*** denotes significance at 1 % level  
** denotes significance at 5% level  
* denotes significance at 10% level
Table 3: Ordered Probit Estimation, Dependent variable “GMP” (model 2)

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>‘z’ values</th>
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<tr>
<td>Constant</td>
<td>0.756**</td>
</tr>
<tr>
<td></td>
<td>(1.99)</td>
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<tr>
<td>EE</td>
<td>0.456***</td>
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<td></td>
<td>(2.79)</td>
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<tr>
<td>Chi Square</td>
<td>12.65***</td>
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</tbody>
</table>

Note: ‘Z’ values are in parentheses
*** denotes significance at 1 % level
** denotes significance at 5% level
* denotes significance at 10% level

Table 4: Probit Estimation, Dependent variable “NEWOPP” (model 3)

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>‘z’ values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.725*</td>
</tr>
<tr>
<td></td>
<td>(-1.96)</td>
</tr>
<tr>
<td>RE</td>
<td>-0.731</td>
</tr>
<tr>
<td></td>
<td>(-1.16)</td>
</tr>
<tr>
<td>EE</td>
<td>0.892*</td>
</tr>
<tr>
<td></td>
<td>(1.84)</td>
</tr>
<tr>
<td>GR</td>
<td>0.841**</td>
</tr>
<tr>
<td></td>
<td>(2.2)</td>
</tr>
<tr>
<td>Chi Square</td>
<td>13.95***</td>
</tr>
</tbody>
</table>

Note: ‘Z’ values are in parentheses
*** denotes significance at 1 % level
** denotes significance at 5% level
* denotes significance at 10% level
References


Klepper, Steven and Sleeper, Sally (2002), Entry by Spinoffs, Papers on Economics & Evolution, #0207, Max Planck Institute for Research into Economic Systems, Jena.


