Paper no. 2006/07

Board control and corporate innovation: an empirical study of small technology-based firms

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http://www.circle.lu.se/publications
ISSN 1654-3149

WP 2006/07

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Abstract

This paper follows a behavioural perspective on boards and governance in exploring the influence of board control on corporate innovation in small technology-based firms. An analysis of 135 Swedish technology-based firms suggests that board involvement in decision control may influence corporate innovation. The empirical results show that board involvement in strategic decision control is positively associated with process innovation, while board involvement in financial decision control is positively associated with organizational innovation. No association is found between board involvement in decision control and product innovation. Overall, the findings suggest that board involvement in decision control may promote corporate innovation but that different kinds of decision control influence different forms of innovation.

Keywords: boards of directors, corporate innovation, decision control, technology-based firms, small firms

Board Control and Corporate Innovation: An Empirical Study of Small Technology-based Firms

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ABSTRACT

This paper follows a behavioral perspective on boards and governance in exploring the influence of board control on corporate innovation in small technology-based firms. An analysis of 135 Swedish technology-based firms suggests that board involvement in decision control may influence corporate innovation. The empirical results show that board involvement in strategic decision control is positively associated with process innovation, while board involvement in financial decision control is positively associated with organizational innovation. No association is found between board involvement in decision control and product innovation. Overall, the findings suggest that board involvement in decision control may promote corporate innovation but that different kinds of decision control influence different forms of corporate innovation.

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I. INTRODUCTION

Commitment to innovation is becoming increasingly important for the successful development and continued competitiveness of small technology-based firms. Innovation creates opportunities for expansion, growth and profitability (Zahra, Neubaum and Huse, 2000) and is often an important way of achieving competitive advantage (Ng, Pearson and Ball, 1992; O'Gorman, 1997). Failure to commit energy and effort to innovation-intense strategies will on the other hand sooner or later make conservative firms squeezed out of the market by more proactive organizations (Miller and Friesen, 1982; Bettis and Hitt, 1995). A strong commitment to corporate innovation seems consequently crucial for the long-term growth and prosperity of small technology- based firms.

The overall aim of this paper is to explore the influence of board control on corporate innovation in small technology-based firms. Empirical studies support the argument that small firms in general, and technology based firms in particular, can benefit from the external oversight that a governing board can offer, for example by directing the firm towards appropriate innovative strategies, and in allocating resources to areas necessary for responding to changes in the marketplace (Barrow, 2001; Gabrielsson and Huse, 2002). Smaller firms are in this respect often naïve about planning and the development of strategy, sometimes even ignoring essential management activities such as board meetings, performance reviews and strategic discussions (Deakins, O'Neill and Mileham, 2000). An active board of directors could in this respect make sure that business strategies meet predetermined goals and objectives and help small technology-based firms to focus their efforts and commitment to corporate innovation (Barrow, 2001).

However, despite the reported benefits of increased board involvement in small firms, we know very little about whether small technology based firms can actually improve their capacity for innovation by having an active board of directors. Board involvement in strategy development may for example lead to more formalized decision structures, with the risk of reducing the speed and flexibility of organizational decision making. It may

moreover restrain the kind of action-oriented culture that characterizes a favorable environment for entrepreneurial projects. Hence, the actual effects of board control on corporate innovation in small technology based firms remains relatively unexplored, despite its importance for both theory and practice.

The present paper contributes to literature and research in several ways. First, the paper provides empirical results of the effects of board control on corporate innovation in small privately held firms. Studies of the influence of board governance on various firm outcomes have primarily been conducted in large firms (Huse, 2000). There is consequently almost a near void in our theoretical knowledge of the performance effects of board control in small privately held firms. This is surprising since this is a dominant form of economic organization in most developed market economies. A better understanding of how boards can influence the commitment to corporate innovation in smaller firms is therefore of high relevance. Moreover, previous studies have primarily used R&D expenditures as a proxy for corporate innovation. Organizational activities aimed at innovation are however often informally organized in smaller firms, which mean that conventional measures may risk under-estimate their R&D activity (Roper, 1996). Therefore, to better understand the influences of board control on corporate innovation in small technology-based firms this study use conceptualizations of corporate innovation from the corporate entrepreneurship literature (e.g., Huse, 1994; Zahra, 1996; Zahra et al., 2000).

Second, the paper develops constructs to assess boards' actual involvement in decision control. The developed constructs are based on the theoretical work of Fama and Jensen (1983) and Baysinger and Hoskisson (1990). To our knowledge no existing operationalizations of board involvement in decision control exists, which makes the developed constructs interesting for further research in this area. Thus, following a behavioral perspective on boards and governance (Huse, 2005), the paper goes beyond the widespread practice of using board compositional measures as proxies for board behavior. Despite the widespread recognition that decision control represent one of the most fundamental responsibilities of boards (Zahra and Pearce, 1989; Johnson, Daily and

Ellstrand, 1996) there are surprisingly few empirical studies of this type of board behavior (Huse, 2005). Empirical studies have typically not directly assessed board involvement in decision control but rather imputed this behavior from observable board characteristics, such as board size, representation of outside directors or CEO duality (Fiegener, 2005). Our knowledge of to what extent boards are actually involved in various types of decision control activities consequently remains limited. Moreover, our knowledge of its consequences for corporate innovation is even scarcer.

The rest of the paper is structured as follows. The next section presents a literature review, where we define the key concepts used in the study and develop our hypotheses. Then follows the method section where we present the sample and variables used in the study. This is followed by a presentation of the analysis and results. The paper ends with a discussion of the findings together with implications.

II. LITERATURE REVIEW

In this paper we aim to explore the influence of board control on corporate innovation in small technology-based firms. In this section we will first discuss the concept of corporate innovation, followed by a review of studies of boards of directors and decision control. Finally we develop our hypotheses of how board control can be expected to influence corporate innovation in small technology-based firms.

Corporate innovation

Corporate innovation is generally seen as the result of novel and creative combinations of knowledge and resources (Schumpeter, 1934; Penrose, 1959; Prahalad and Hamel, 1990). Often it is associated with the introduction of new products or services in different markets. Innovation is however a broad concept that has been conceived in a variety of ways in previous research. Innovations can for example assume many other forms, such as new production methods or new organizational systems and structures (Damanpour, 1991; Utterbach, 1996). In this study we recognize corporate innovation as a multidimensional concept which consists of a full range of organizational activities that

promote long-term value-creation (Garcia and Callantone, 2002). More precisely, we conceptualize corporate innovation as consisting of product as well as process and organizational forms of innovation (Zahra et al, 2000). Product innovation refers to the introduction of goods or services that are new or substantially improved. Process innovation refers to the implementation of a new or significantly improved production or delivery method within the firm or across a supply chain. Organizational innovation refers to the creation or alteration of business structures, practices, and systems in order to support innovation and creativity.

It is widely acknowledged that sustained competitive advantage in small technology-based firms result from their ability to continuously innovate. The capability to develop and commercialize new products and technologies has for example been associated with improved survival chances and superior performance (McCann, 1991; Keeley and Roure, 1990). Moreover, by adopting new technologies and establishing novel organizational structures and systems small technology-based firms can better improve their methods of production and replenish their competencies (Markman, Balkin and Schjoedt, 2001). As such, successful innovation can be said to represent the very "lifeblood" of small technology-based firms, significantly increasing their ability to compete vigorously, create new revenue streams and renew its operations.

Boards of directors and decision control

The centrality of board decision making in guiding organizational action is an established conception in literature on corporate governance. According to this view the board of directors operates at the apex of the organization with a considerable potential to influence the direction and performance of the enterprise (Mintzberg, 1983; Zahra and Pearce, 1989). One of the most fundamental ways for boards to influence the direction and performance of the enterprise is through "decision control", encompassing involvement in board activities such as performing high-level reviews of strategic plans, evaluating past decisions, and monitoring executive and firm performance (Fama and Jensen, 1983; Baysinger and Butler, 1985; Johnson et al., 1996; Fiegener, 2005). Hence, by being involved in decision control the board can add value to the firm by providing

external oversight, assist the CEO in determining objectives, and in bringing special expertise in matters of strategic importance.

Effective board control ought to cover aspects that are relevant for the existence of an organization and the means by which it achieves success and growth. Fama and Jensen (1983) discuss a theoretical base for board involvement in strategic decision making where the purpose is to reduce agency costs and maximize the value creative potential of the enterprise. In their discussion Fama and Jensen (1983) argue that managers should be involved in initiating and implementing corporate strategies, while the board of directors should be involved in ratifying these decisions, and then to continuously monitor the implementation and performance of the decisions. The initiation and implementation of strategic decisions is in their framework called decision management (a managerial task), while the ratification and monitoring of strategic decisions is called decision control (a task for the board of directors). By doing this, boards of directors can delegate decision management to agents with valuable relevant knowledge (the executive managers) while limiting their potential self-interest behavior in situations where their goals may be in conflict with the long-term development of the firm.

Theory and research in corporate governance generally emphasize the problems of conflicts of interests between shareholders and executive managers in large publicly held corporations. Small firms are in this respect often contrasted as small and non-complex organizations characterized either by decision making and residual risk bearing residing in one and the same person, or with close relationships between owners and managers (Fama and Jensen, 1983; Schulze et al, 2001). The close relationship between ownership and management is considered to naturally align the interests about growth opportunities and risk, which in turn reduces the need to maintain "costly" governance mechanisms to monitor managerial and firm performance. Small firms are hence not assumed to have any problems of conflicting interests that can reduce the value creative potential of an enterprise. This widespread assumption has however recently been challenged by several researches. Owner-managers may for example lack either the time or the vision to take calculated risks and make necessary long-term investments to stimulate entrepreneurial

projects (O'Gorman, 2000). They may also have difficulties in securing alternative employment as their firm-specific skills may have less value elsewhere (Schulze et al, 2001). Owner-managers may moreover have access to superior information regarding the resources and performance of the enterprise and can consequently take advantage of this information asymmetry for their own purposes, which in turn can cut back the returns for other stakeholders (Markman et al., 2001). Owner-managers may in this respect take decisions that do not maximize the long-term value of the firm due to the un-diversified nature of their human and financial capital, and instead choose to divert resources to projects or goals with shorter payback periods. Non-economic preferences and self-control problems could hence lead to managerial decisions and actions that do not advance the common (economic) good (Schulze et al, 2001). These potential problems may in turn lead to demands for increased board oversight in technology-based small firms.

Board control and corporate innovation

Small technology-based firms must continually develop and exploit new sources of competitive advantage in order to create new asset combinations that are valuable and unique. A major challenge for corporate boards is thus to direct attention towards the exploration of new possibilities and alternatives that sustain or even enhance the long-term competitive position of the firm (Taylor, 2001). However, the choice to organize such efforts can be subject to severe tensions between competing demands for short-term cash generation and long-term value creation. Technology-based firms base their activity mainly on the exploitation and refinement of advanced technological knowledge (Autio and Yli-Renko, 1998), while corporate innovation instead requires a strong emphasis on the exploration of new possibilities and alternatives. There is consequently a risk that this tension works in favor for the refinement and extension of existing competencies and technologies, where exhibiting returns are more certain. This, in turn, may prevent the discovery of new innovative opportunities, and at the same time stifle the potential for future exploitation (March, 1991; Levinthal and March, 1993; Holmqvist, 2004).

In this paper, we recognize the board of directors as a potential decision making body with the discretion to deploy organizational resources and initiate innovative projects. Research on organizational control systems generally recognizes two types of control that may impact the innovative potential of an enterprise: financial and strategic controls (e.g., Hoskisson and Hitt, 1988; Baysinger and Hoskisson, 1990; Hitt, Hoskisson and Ireland, 1990). Financial controls are clear and unambiguous, which provides an opportunity to agree on objective performance standards well in advance of any performance evaluation. The use of objective financial criteria related to the organizational budget simplifies evaluation procedures. It also introduces a high degree of discipline into the control process and can to some extent enhance precision in decision making. However, performance assessments based on objective financial criteria's are often unable to account for information that is difficult to quantify, and are also often based on short-term rather than long-term performance dimensions. These factors may hence be particularly beneficial to firms that do not have as salient a need to encourage creativity and innovation (Barringer and Bluedorn, 1999).

Strategic controls are on the other hand based on strategically relevant criteria related to markets, customers and products, as opposed to objective financial information. As such, this type of performance assessment highlights the need to recognize the long-term dimensions of business enterprise, such as reviewing product/service quality controls and customer satisfaction criteria, and also the need to be responsive to the natural environment, to the individuals it employs and to the community in which the firm operates (Wing and Dewhirst, 1992). Strategic controls also facilitate an organizational climate with more open reporting of firm data and increased willingness to share sensitive information, which in turn can provide a more constructive alternative to traditional hierarchical control. Hence, as strategic controls are more capable of facilitating innovation and creativity (Barringer and Bluedorn, 1999), they can be expected to be more consistent with supporting entrepreneurial processes.

Based on the discussion above, we expect boards who are highly involved in strategic decision control to also be highly committed to corporate innovation. For boards who are

highly involved in financial decision control we expect the opposite relationship. This leads to the following two hypotheses:

H1: Board involvement in financial decision control is negatively associated with corporate innovation in technology-based firms.

H2: Board involvement in strategic decision control is positively associated with corporate innovation in technology-based firms.

III. METHOD

Data collection

To design an appropriate sample we selected firms in three technology-based industry sectors: manufacturing of electronic machines and components, manufacturing of electronic communication equipment, and manufacturing of optics/medicine/photo. We then followed the standard definition for small firms in the European Union as having between 10 and 50 employees. We only selected privately held firms, and excluded proprietorships and partnerships as they are not legally required to have a board of directors. Our selection criteria led to an initial sample of 451 technology-based firms. Mail addresses to the firms were collected from SCB's (Statistic Sweden's) register over Swedish companies. The questionnaires were mailed in early spring 2000, and were addressed to the CEO. A control question was included in the questionnaire to verify that it was the CEO that answered the questions. After two reminders we received 135 responses, which correspond to a response rate of approximately 30%.

Sample description

The firms in our final sample represent a broad cross-section of technology-based firms. The mean age of the firms in our sample was 24.8 years. The average total sales in 1999 were 30.5 million SEK, which corresponds to approximately 3.37 million EURO. The mean number of employees was 24.5 (median 20). About one third (36.3%) of the firms

operated mainly on the Swedish domestic market, while about one fifth of the firms (18.9%) could be considered international firms with more than 3/4 of their sales derived from export activities. In nearly 2/3 (62%) of the firms was the founder still active in an executive position (primarily as the CEO), or as a board member. In about 2/3 of the firms were executive managers also major owners, controlling 51% or more of the total stock. The average level of executive ownership was 69.2%.

The mean size of the board was 3.7 board members (median 3.3). About 1/5 of the firms (19.4%) had less than three board members[1], while approximately half of the firms (49.2%) had four or more board members. The maximum number was seven board members. The average number of outside board members (board members who are neither employed as managers nor family members or relatives to the CEO) was 1.5 (median 1). About 43.3% of the firms had no outside board members, while 43.7% of the firms had two or more outside board members.

Measures

Survey data were used to construct measures of corporate innovation and board decision control as follows:

Corporate innovation

Responses to survey items were used to construct measures of corporate innovation. Using a 5-point scale, respondents rated their firm's actual emphasis on each item. To develop measures for innovation, 12 survey items were subjected to factor analysis with varimax rotation. These survey items were taken from Huse (1994). The factor analysis produced three significant factors: product innovation (4 items), process innovation (5 items), and organizational innovation (3 items). Each factor has an eigenvalues over 1 and, together, the three factors explained 70.0% of the variance. Based on the analysis, we created innovation measures using multi-item indices where average scores of the items in each of the three factors were used in the analyses. Each innovation index had an

[1] Swedish Company Law requires firms to have at least three registered board members. Privately held firms can however circumvent this requirement and choose to have 1-2 board members, if at least one substitute director is registered.

acceptable Cronbach α ranging between .78 and .90. Detailed report of the factor analysis can be found in the appendix in table 3.

Board decision control

In line with our frame of reference, board involvement in decision control was divided into two dimensions: financial decision control and strategic decision control. These items were based on the theoretical work of Fama and Jensen (1983) and on the discussion in Baysinger and Hoskisson (1990). A 5-point scale consisting of 6 items was developed to gauge board involvement in financial and strategic decision control respectively. A factor analysis using varimax rotation was conducted to validate the two scales. The items loaded significantly on the expected factors with eigenvalues exceeding 1.0, and combined these two factors explained 68.0 % of the variance. This procedure led to that financial decision control was measured as the mean of 3 items (α =.75), and strategic decision control was measured as the mean of 3 items (α =.76). Detailed report of the factor analysis can be found in the appendix in table 4.

Control variables

Three variables were included as statistical controls in the analysis because of their potential impact on corporate innovation in technology-based firms: 1) environmental dynamism, 2) firm age, and 3) past firm performance.

Environmental dynamism. The first control variable measures the dynamism in the operating environment of the firm. Environmental dynamism refers to the continuity of changes in the firm's environment (Zahra, Neubaum and Huse, 1997). These changes can arise from many sources, including complex technological development as well as changes in the regulatory or competitive landscapes. Highly dynamic environments are generally expected to encourage innovation and entrepreneurial behaviour, but also to intensify rivalry by encouraging new firm entry into the market (Miller, 1983; Covin and Slevin, 1989). We therefore expect dynamic environments to be positively associated with corporate innovation. The perceived level of dynamism was measured by the mean

of 5 items on a Likert-type scale (α = .71). These items were taken from Zahra et al. (1997).

Firm age. The second control variable was firm age. This variable was included as younger firms are more likely to innovate than older firms (Acs and Preston, 1997). Hence, we expect a negative association between firm age and the firm's commitment to take an entrepreneurial orientation. Firm age was measured as the number of years that has past since the firm was founded.

Past firm performance. Finally we included a control variable that measured the firms' past performance. When a firm performs well it creates slack resources that may be used for innovation and new venturing activities (Cyert and March, 1963; Zahra et al., 2000). The measure we used was return on sales (ROS), the firm's total sales divided by its equity.

IV. ANALYSIS AND RESULTS

As we have metric dependent variables and several metric or dichotomous independent variables multiple regression analysis can be expected as an appropriate statistical technique (Hair et al., 1998). Table 1 presents means, standard deviations and correlations among the variables used in the regression analyses. Table 2 presents the regression analysis.

Table 1. Means, standard deviations and correlations

	Mean	Std.dev	1.	2.	3.	4.	5.	6.	7.
1. Product innovation	3.29	.96	-	-	-	-	-	-	-
2. Process innovation	3.04	1.0	.59**	-	-	-	-	-	-
3. Organizational innovation	3.55	.79	.43*	.55**	-	-	-	-	-
4.Strategic decision control	3.31	.93	.16	.25**	.18	-	-	-	-
5. Financial decision control	3.77	1.00	-.01	.16	.25**	.17	-	-	-
6. Environmental dynamism	3.05	.66	.30*	.35**	.23*	.09	-.01	-	-
7. Firm age	24.8	17.8	.13	.16	.00	.04	.00	-.19*	-
8. Past firm performance	-.54	30.3	-.05	-.15	-.07	-.04	-.17	.03	-.23*

**. Correlation is significant at the .01 level (1-tailed)

*. Correlation is significant at the .05 level (1-tailed)

Table 2. Regression analysis

	Product innovation	**Process innovation**	**Organizational innovation**
	β	β	β
Environmental dynamism	.29**	.40**	.22*
Firm age	.13	.16	.00
Past firm performance	-.03	-.11	-.04
Financial decision control	-.04	.12	.25*
Strategic decision control	.15	.18*	.10
R^2	.13	.26	.14
Adj R^2	..08	.22	.10
F (F-sign)	2.9*	6.9**	3.2**

The table reports partial standardized coefficients (β), multiple R, R^2, adjusted R^2 and significance level * $p < .05$, ** $p < .01$

As can be seen in table 2 our regression model only show minor support for the hypotheses developed in the literature review. Our first hypothesis was that board involvement in financial decision control is negatively associated with corporate innovation. In this case, we did not find any association between financial decision control and product or process innovation. Moreover, contrary to our initial expectations

we found a positive association between board involvement in financial decision control and organizational innovation. Hypothesis 1 was consequently not supported.

Our second hypothesis was that board involvement in strategic decision control is positively associated with corporate innovation. In this case, we did not find any association between strategic decision control and product innovation. Neither could we found any association between strategic decision control and organizational innovation. However, the results from our analysis show that board involvement in strategic decision control is positively associated with process innovation. Hypothesis 2 was consequently partly supported.

Table 2 also shows that the statistical control variable environmental dynamism have a positive and significant association with all innovation measures. This finding corresponds to previous studies that have found that the external environment is a main predictor of a firm's innovative behavior (Miller, 1983; Zahra, 1996). Moreover, it indicates that firms in dynamic environments tend to put a significantly higher emphasis on innovation-intensive strategies to meet the complexity of rapid change that these firms face. The level of environmental dynamism should hence be taken into account in future studies of corporate innovation in small firms, as the external environment seems to frame the actions the firm is aiming to undertake (Boyd, Dess and Rasheed, 1993).

V. DISCUSSION OF FINDINGS

This study has explored the influence of board control on corporate innovation in small technology-based firms. Corporate innovation was conceptualized as consisting of product, process and organizational forms of innovation. Board control was conceptualized as board involvement in the ratification and monitoring stages of strategic decisions (Fama and Jensen, 1983). Based on literature and research on organizational control (e.g., Hoskisson and Hitt, 1988; Baysinger and Hoskisson, 1990; Hitt et al., 1990), we further divided decision control into two dimensions: financial and strategic decision control. A review of literature and research suggested a negative association

between board involvement in financial decision control and corporate innovation. We also expected a positive association between board involvement in strategic decision control and corporate innovation. Statistical analysis of a sample of 135 Swedish small technology-based firms showed only partial support for our initial hypotheses. There was no association between board involvement in financial control and product and process innovation. There was however a significant positive association between financial control and organizational innovation, which was contrary to what we expected. Moreover, we did found a positive association between board involvement in strategic decision control and process innovation. However, we did not find any significant association between board involvement in strategic decision control and product or organizational innovation. The overall findings show that board involvement in decision control has an impact on corporate innovation in small technology-based firms, but that different kinds of decision control influence different forms of corporate innovation. A more detailed discussion of the findings will now follow to develop the discussion of the empirical results together with suggestions for future research.

Financial board control and corporate innovation

The main problem of applying financial principles and methods of assessment and control to innovation is often seen as that of dealing with the unknown (Wilson, 1975; see also McGrath and Macmillan, 1995). There was however no support for our first hypothesis that higher board involvement in financial control should be negatively associated with corporate innovation. On the contrary, we found a positive association between financial board control and organizational innovation. The result is very interesting, not at least as financial controls generally are expected to discourage a creative and innovative organizational culture (Barringer and Bluedorn, 1999). Hence, contrary to what we expected, by being involved in financial decision control boards in small technology-based firms seem to play an important role in influencing the design of organizational systems aimed to support innovative activities.

In planning financial controls for innovation it has been argued that "petty accounting" should be avoided (Wilson, 1975; Kaplan and Norton, 1996). Our choice of a rather

broad conception of financial control, encompassing board involvement in the ratification and monitoring stages of decisions related to the organizational budget, liquidity, equity and ownership, may explain parts of the result. Increased board involvement in this kind of financial control may here instead generate increased potentialities for slack resources, which in turn can be put on human resource policies and administrative structures aimed at stimulating organizational learning and experimentation (Hill and Stewart, 2000). Another potential explanation for our findings can be that the problems of allocating different proportions of the organizational budget across different departments and multiple product lines that exist in large diversified corporations (Bower, 1986) may not be so apparent in small technology based firms. Small firms have for example a less complex organization than larger diversified corporations, and they usually also operate in fewer product markets and in more local geographic areas (O'Gorman, 2000). This means a slimmer organization with a more narrow focus, which can make it easier to decide how to allocate resources to promote organizational systems that encourage innovation and creativity among employees. However, these are merely speculations which provide several avenues to explore the nature of the control and organizational innovation in future research.

Strategic board control and corporate innovation

Strategic controls are generally expected to encourage corporate innovation (Hoskisson and Hitt, 1988; Hitt et al., 1990; Barringer and Bluedorn, 1999). Accordingly, our second hypothesis was that increased board involvement in strategic control is positively associated with corporate innovation. In our regression model there was only partial support for this hypothesis. What we found was a positive and significant association between strategic board control and process innovation. The findings imply that boards in small technology-based firms can play an important role in influencing the development of novel production and operation strategies aimed at making the organization's production as effective and efficient as possible. Hence, boards that are highly involved in strategic control facilitate new process technology to enhance the business process and ultimately competitive advantage and profitability.

Our findings may cast some interesting light on the role of the board in supporting the innovation process in small technology-based firms. A high emphasis on process innovation could intuitively be expected as an alternative to product innovation. For example, while launching new products can put a firm ahead of its competitors and enable the charge of premium prices, the development of novel process technologies may instead lead to lower costs due to gains in productivity, material utilization and output reliability (O'Gorman, 2000). However, as can be seen in the correlation matrix, product and process innovation are highly correlated with each other in our sample (r = .59). This means that the development of new products most often go hand-in-hand with investments in new process technology development. Small technology based firms that renew or diversify their product ranges may hence also need to update process technology to be able to make the different types of new products. The board of directors seems in this respect to promote the introduction of new products by overseeing that the production equipment will support the introduction of the new product range.

Board involvement in financial vs. strategic decision control

An additional issue that can be worth mentioning is that there is no significant correlation between board involvement in financial and strategic decision control. This implies that most boards are not equally involved in financial and strategic control. Rather, we can expect that the actual involvement in financial vs. strategic board control will mirror the concerns and interests of the dominant coalition, or at least represent some compromise among competing coalitions (Cyert and March, 1963; Mintzberg, 1983). What is interesting is that although it is well accepted in contemporary theories of organizations that bargaining and trade-offs characterize organizational decision making, it seems less well recognized that negotiating processes also characterizes major decisions of boards of directors. Rather, most organizational and economic theorists have viewed corporate boards as guided by a rational optimizing decision-making behavior untouched by political processes in and around the boardroom (Ocasio, 1999). In a behavioral perspective, however, the position of the board in allocating attention and resources cannot always be regarded as non-problematic (Huse, 2005). Instead, in any business organization various coalitions of actors can be expected to compete for influence over

decisions and allocation of resources such as the organizational budget (Cyert and March, 1963; Bower, 1986). Hence, the emphasis on various forms of decision control in the boardroom can be described as a matter of trade offs between the often-competing goals and objectives of organizational actors. How various coalitions in and around the boardroom actually influence board involvement in financial vs. strategic decision control is however a largely unexplored issue, which deserves further scholarly attention.

VI. CONCLUSIONS

The increasing globalization of markets and rapid technological progress has exerted concurrent pressures for small technology-based firms to increase their profits by devoting resources to corporate innovation. A growing body of research suggests that a strong and vigilant board can have a significant impact on a firm's innovative activities (Hill and Snell, 1988; Baysinger et al., 1991; Zahra, 1996; Zahra et al., 2000). Following this stream of research, the aim of this paper has been to explore the influence of board control on corporate innovation in a sample of small technology-based firms. Overall, the findings suggest that board involvement in decision control may promote corporate innovation, but that different kinds of decision control influence different forms of corporate innovation. Hence, the findings indicate that the board of directors can be seen as a potential resource that can promote corporate innovation in small technology-based firms by bringing discipline and rigor to the strategic planning process.

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APPENDIX

Table 3. Factor analysis of innovation measures

Items[1]	*Product innovation*[2]	*Process innovation*[2]	*Organizational innovation*[2]
Being the first company in the industry to introduce new products	**.75**	.43	.09
Creating new products for fast market introductions	**.68**	.36	.24
Creating new variations to existing product lines	**.78**	-.07	.20
Increasing the revenue from new products less than 3 years old	**.73**	.35	.06
Being the first company in the industry to introduce new technology	.21	**.84**	.14
Being the first company in the industry to introduce technological improvements	.24	**.78**	.27
Creating innovative technologies	.14	**.84**	.23
Investing heavily in cutting edge process technology-oriented R&D	.14	**.68**	.36
Developing radically new technology	.27	**.76**	.20
Developing systems that encourage initiatives and creativity among employees	.14	.20	**.80**
Encouraging innovation in the organization	.11	.30	**.84**
Supporting an organizational unit that drive innovation	.19	.20	**.72**
Eigenvalue	1.36	5.83	1.22
% of variance explained	11.30	48.56	10.15
Cronbach	.81	.90	.78

[1]Items follow a 5-pointscale (1 = very low emphasis vs. 5 = very high emphasis)

[2]Absolute loadings of .50 or higher are significant

Table 4. Factor analysis of board control measures

Items[1]	*Financial control*[2]	*Strategic control*[2]
Involvement in the ratification and monitoring stage of strategic decisions related to…		
…the organizational budget	**.75**	.18
…equity capital and ownership	**.84**	-.08
…liquidity and finance	**.86**	.09
…marketing	.32	**.76**
…customers	-.05	**.87**
…products	.01	**.77**
Eigenvalue	2.41	1.69
% of variance explained	40.15	28.16
Cronbach	.75	.76

[1]Items follow a 5-point scale (1 = very low emphasis vs. 5 = very high emphasis)

[2]Absolute loadings of .50 or higher are significant

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