

Full Length Research Paper

The relationship between ownership structure, board characteristics and organization innovation: Evidence from Taiwan listed and over-the-counter firms

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Accepted 17 December, 2010

The purpose of this study is to investigate whether a firm's ownership structure and board characteristics influence its capacity for innovation and organizational performance, based upon the available data for listed and over-the-counter (OTC) firms in Taiwan. This paper uses two basic methods for data collection: data regarding ownership structures and board characteristics were collected from the Taiwan Economic Journal (TEJ), and data regarding organizational innovation and performance were collected through a questionnaire. By employing a hierarchical regression methodology, the study developed the following findings. First, ownership structure has a significant relationship with production, process, management, and marketing innovations, respectively, the primary effects of which are as a consequence of the positive effect of institutional ownership, while the secondary effects result from the negative effect of insider ownership. Second, board characteristics have a significant relationship with production, process, and marketing innovations, respectively. The outcome can be attributed primarily to the positive effect of the proportion of outside directors and supervisors. Finally, this study finds that organizational innovation is the mediator between the corporate governance mechanism and organizational performance. In addition, the implications for future research and practice are discussed.

Key words: Ownership structure, board characteristics, organizational innovation, organizational performance, hierarchical regression, mediating effect.

INTRODUCTION

Innovation is an important element of organizational performance and its pursuit is also a key in achieving a competitive organizational advantage (Alam, 2009a). Furthermore, innovation represents the single most important aspect of best practice to which a firm can aspire in order to become successful (Roberts, 1999). An organization with effective innovation activities can enhance its competitiveness and maintain continuous operation and development (Janssen et al., 2004). If an organization intends to exploit its opportunities to innovate, it needs to invest vast amounts of time, funds, and other

resources (Laursen and Salter, 2006). Although organizational innovation can increase the value both for firms and shareholders, the decision to execute an innovation strategy depends primarily on the firm's corporate-governance mechanism (Alam, 2009b). Therefore, different corporate-governance mechanisms have varying degrees of influence on an organization's innovation activities (Lee, 2005).

A competitive advantage on an organization is channeled through organizational innovation (Hull and Rothenberg, 2008). If an organization wishes to pursue ongoing growth, it must constantly innovate, while also building effective supervisory systems. Thus corporate governance must be regarded as one of the core values of a company's operations (Raad et al., 2010). Most empirical studies demonstrate that ownership

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concentration, managerial shareholdings, and institutional shareholdings are significantly related to the level of a company's research and development (R&D) and innovation activity (Baysinger et al., 1991; Hansen and Hill, 1991; Zahra et al., 2000; Lee et al., 2003). However, while organizations' innovation activities are closely intertwined with corporate governance, there is still a need for adequate related studies to be conducted in Taiwan. In addition, most extant studies use patent output or R&D expenditure to measure organizational innovation (Hill and Snell, 1988; Zahra et al., 2000; Dunn, 2004). However, these metrics cannot comprehensively cover the innovation activities of an organization.

In accordance with the above points, this research focuses on the data for listed and over-the-counter (OTC) firms in Taiwan. The data were collected through the Taiwan Economic Journal (TEJ) database together with the implementation of a questionnaire survey. This paper evaluates organizational innovation based on four dimensions, namely, production, process, managerial and marketing innovations. It also discusses the relationship between the corporate governance mechanism, organizational innovation, and organizational performance. In addition, it addresses in detail whether organizational innovation mediates the relationship between corporate governance mechanisms and organizational performance. This aspect has not been taken into consideration in prior research.

CONCEPTUAL BACKGROUND AND HYPOTHESES

Ownership structure, organizational innovation and performance

An organization's R&D strategy is influenced by different ownership structures (Baysinger et al., 1991). Many empirical studies show that ownership concentration and institutional shareholdings are significantly associated with R&D input (Hansen and Hill, 1991; Lee et al., 2003), and these are also closely intertwined with organizational innovation activity (Kochhar and David, 1996).

The divergence between control and cash-flow rights

Studies reveal that there is a large divergence between control and cash-flow rights for most listed firms in Taiwan (Claessens et al., 2000; Yeh et al., 2001; Chin and Chen, 2006). When controlling shareholders' control rights deviate from their cash-flow rights, the controlling shareholders have more inducements to benefit by expropriating the minority shareholders or failing to act in the best interests of the company (Shleifer and Vishny, 1997; La Porta et al., 1999; Claessens et al., 2000). Chin and Chen (2006) explained that firms with a greater divergence between control and cash-flow rights engage

in fewer innovative activities in regard to the emerging Taiwanese market.

Insider ownership

Shareholders can be divided into two groups; inside and outside shareholders. According to the convergence of interest hypothesis proposed by Jensen and Meckling (1976), the insider's natural tendency is to allocate the firm's resources in their own best interests, which may conflict with those of outside shareholders. As the portion of insider ownership increases, these conflicting interests converge and, hence, the firm's value increases. Some empirical studies find evidence of a positive relationship between the portion of insider ownership and firm performance, which is consistent with the convergence of interest hypothesis (Oswald and Jahera, 1991; Hudson et al., 1992; Vance, 1995; Yermack, 1996).

By contrast, Jensen and Ruback (1983) proposed the conflict of interest hypothesis, which states that when managers control a substantial fraction of the firm, they have sufficient voting power to guarantee employment with an attractive salary. With effective control, managers may engage in non-value maximizing behavior. In addition, to ensure the stability of their own position, managers may oppose projects that are favorable to shareholders. This will result in a firm's performance deteriorating. Fan and Wong (2002) found that the portion of insider ownership is negatively correlated with organizational performance, which is consistent with the conflict of interest hypothesis.

As a result of these two competing effects, Morck et al. (1988) found evidence of a nonlinear relationship between insider ownership and firm performance for US firms. They reported that the firm's value rose as the board's ownership of the firm increased from 0 to 5%, fell from 5 to 25%, and then rose slowly. The conflict of interest effect dominated the convergence-of-interest effect with insider ownership falling within a range of 5 and 25%.

Institutional ownership

As the proportion of investment by institutional investors in the stock market increases, the influence of institutional investors is no longer confined to the fluctuations in stock prices and trading volumes but extends to the corporate-governance aspect. Compared with individual shareholders, institutional investors have better opportunities, resources, and ability to monitor, discipline, and influence managers. Brickley et al. (1988), Agrawal (1990) and McConnell and Servaes (1990) found that when the proportion of institutional ownership increases, institutional investors have a greater incentive to monitor the behaviors of managers, thereby reducing the agency problem. Subsequently, firm value together with and operational performance will be enhanced. Zahra et al.

(2000) showed that the proportion of long-term institutional investor ownership has a significantly positive impact on the input of both innovative and organizational innovative performance.

Board characteristics, organizational innovation, and performance

The core of the internal corporate-governance mechanism is the board of directors. The responsibility of the board is to maintain the firm's long-term benefit and ongoing productivity and to monitor managers. Thus, board characteristics are closely related to organizational innovation and organizational performance.

Board size

Board size is the number of members on the board. Questions relating to board size regarding firm performance have been a popular line of inquiry among scholars in recent years (O'Connell and Cramer, 2010). Identifying an appropriate board size that affects its ability to function effectively has been a matter of continuing debate from a range of perspectives (Zahra and Pearce, 1989; Eisenberg et al., 1998; Hermalin and Weisbach, 2003; Kiel and Nicholson, 2003). Zahra and Pearce (1989) suggested that large boards may be more useful to firms with a view to providing better monitoring of management. Kiel and Nicholson (2003) and Goodstein et al. (1994) argued that a large board has more knowledge, experience, expertise, and industry background and greater external connections from which to provide advice regarding the firm's operating strategy. Eisenberg et al. (1998), and Hermalin and Weisbach (2003) argued that as the size of the board increases, problems of communication and coordination begin to manifest themselves and it is likely to be the case that factions and conflict will arise among members. Therefore, they have suggested that smaller boards enhance firm performance.

Outside directors and supervisors

Outside directors are independent of the firm's managers and are better positioned to monitor and control managers (Fama and Jensen, 1983). In addition, Morck et al. (1988) and Huson et al. (2001) posited that most outside directors and supervisors are also policymakers in other firms, and as such bring a greater breadth of experience to the firm.

Recently introduced financial regulations constrain some companies in terms of increasing the number of outside directors on the boards and producing estimates of the impact of board independence on effectiveness and performance. In contributing to this debate through their research on corporate-governance systems, Duchin et al.

(2010) suggested that increasing the number of outside directors on the board may not harm performance. Outside directors' and supervisors' academic, financial, and corporate qualifications can influence the innovation intensity of the firm and give it a competitive edge. Furthermore, outside directors can significantly increase performance in relation to the cost of information.

CEO/Chair duality

During the last few decades there has been a controversial debate in academic circles over CEO/Chairperson duality. Some scholars strongly recommend the separation of the CEO/chairperson positions, believing the division of responsibilities enables independent action for the benefit of the board (Coombes and Wong, 2004). As such, this arrangement enables the chairman and other relevant board members to stand up to the CEO to protect the interests of the shareholders without fear of recrimination (Coombes and Wong, 2004). In this sense, Cadbury (1992) suggested keeping the roles of CEO and chairperson of the board separate, whereby the chairperson is responsible for leading the board and acts as the "outside face" of the corporation in association with the investors (Cadbury, 1992; Financial Reporting Council, 2003) in order to ensure that none of them has all the decision-making power regarding overseeing the activities of the organization.

However, this structural context may have the effect of decreasing the board's capabilities to involve the CEO in opportunistic and self-serving behaviors that do not take into account the interest of the corporate shareholders. More importantly, CEO/Chairperson duality can weaken the effectiveness and efficiency of the board to control and monitor functions of the organization, hence increasing the agency cost (Kim et al., 2009).

Previous studies on the issue of CEO/chairperson duality have yielded mixed results. Patton and Baker (1987), Yermack (1996), and Daily and Dalton (1993) opposed CEO/chairperson duality on the grounds that it compromises the monitoring role of the board due to conflicts of interest and increases the agency problem.

Zahra et al. (2000) also argued that CEO/chairperson duality impedes organizational investments in innovative activities. In contrast, Sanders and Carpenter (1998) argued that the concentration of powers in the CEO's position can reduce the asymmetric information problem between boards and managers, giving the CEO full authority to manage firms, thereby enhancing organizational performance.

Organizational innovation and organizational performance

The definition of organizational innovation encompasses great many approaches and incorporates some

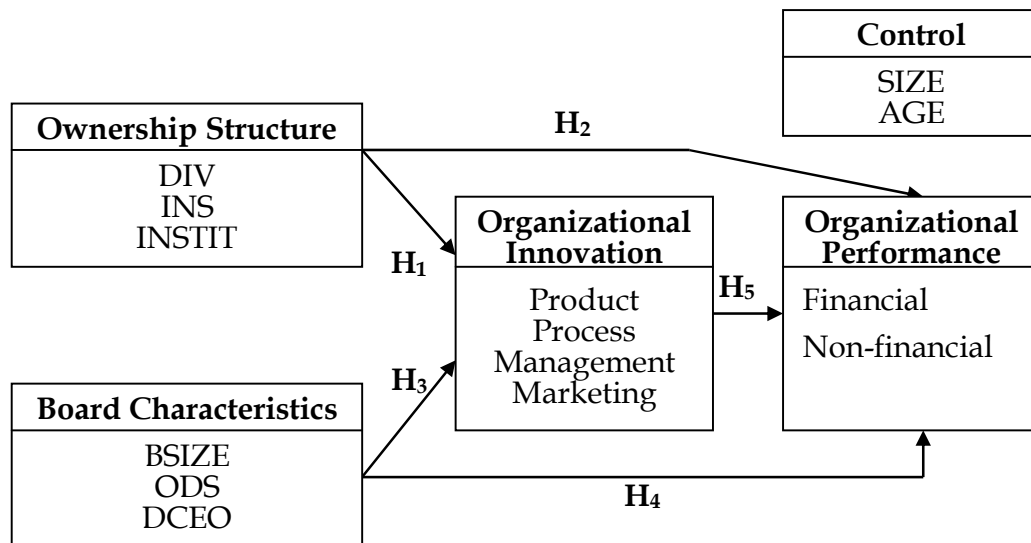


Figure 1. Research framework.

ambiguities (Lam, 2005), as the view of different scholars diverge regarding its use and their perceptions about what “organizational innovation” is. However, in most cases it is associated with research and development (R&D) and the creation of new products. The purpose of organizational innovation is to promote organizational efficiency and the realization of organizational targets and thereby improve or enhance organizational performance (Gopalakrishnan, 2000) and enable the organization “to occupy the competitive high ground of tomorrow” and help managers reshape their industries.

RESEARCH METHODOLOGY

Research hypotheses

Here, we will discuss the development of hypotheses regarding the relationship between ownership structures, board characteristics, organizational innovation and performance. The proposed research framework is shown in Figure 1.

The characteristics of innovative activity are long-term investment, high risk, and uncertainty (Holmstrom, 1989). Because of this, it is difficult to encourage controlling shareholders to incur expenditure on innovative activities. If firms wish to innovate successfully, shareholders or managers must focus their time and efforts on effective management. Therefore, when controlling rights deviate from cash-flow rights, the controlling shareholders have less motivation to manage the firm. However, there is a corresponding increase in motivation to expropriate minority shareholders. Based on the above inferences, this study anticipates that firms with a greater divergence between control and cash-flow rights will have worse organizational innovation and, subsequently, achieve poor organizational performance. For similar reasons, managers may choose a stable rather than a favorable project for shareholders in order to ensure the stability of their own position, and thus this study suggests it is difficult to persuade insiders to support innovative activity. In addition, corporate monitoring by institutional investors forces managers to focus more on organizational innovation and

performance and less on self-serving behavior, so the proportion of institutional ownership is expected to be positively associated with organizational innovation and performance. Therefore, the hypotheses regarding the relationship between ownership structure, organizational innovation and performance are described as follows:

- H_{1.1}: There is a negative influence of the divergence of control and cash-flow rights on organizational innovation.
- H_{1.2}: There is a negative association between the proportion of insider ownership and organizational innovation.
- H_{1.3}: There is a positive association between the proportion of institutional ownership and organizational innovation.
- H_{2.1}: There is a negative influence of the divergence of control and cash-flow rights on organizational performance.
- H_{2.2}: There is a negative association between the proportion of insider ownership and organizational performance.
- H_{2.3}: There is a positive association between the proportion of institutional ownership and organizational performance.

Eisenberg et al. (1998), and Hermalin and Weisbach (2003) argue that as the size of the board increases, problems of communication and coordination begin to manifest themselves and it is likely to be the case that factions and conflicts will arise among members. They therefore suggest that smaller boards enhance firm performance. In this study, it is suggested that larger boards will have a higher incidence of conflict, reducing functional efficiency and effective monitoring. As a result, such boards may delay or hinder organizational innovation projects, and subsequently result in a decrease in organizational performance. In addition, when the proportion of outside directors and supervisors is higher, the board can provide more diverse and specialized advice and enhance the function of monitoring managers. This will increase organizational innovation and performance. Finally, CEO/Chairperson duality makes it easier for the CEO to understand the uncertain factors and sources of innovative activities immediately as organizational innovation has the properties of involving high investment and high risk. Thus, this study proposes that when a single person occupies the roles of CEO and chairperson of the board of a firm, the firm can seize opportunities to innovate immediately and thereby enhance organizational performance.

Therefore, according to the reviews of the literature and discussions, the following hypotheses regarding the relationship

Table 1. Characteristics of the respondents.

Variable		N	Percent
Industry	Electronic	80	67.2
	Biotechnology	11	9.2
	Foodstuff	5	4.2
	Electrical machinery	4	3.4
	Automobile	2	1.7
	Retail	4	3.4
	Others	13	10.9
Firm capital (NT)	Less than 1 billion	14	11.8
	1 to 5 billion	47	39.5
	5 to 10 billion	19	16.0
	10 to 50 billion	24	20.2
	More than 50 billion	15	12.6
Firm age	Less than 1 year	2	1.7
	5 to 10 years	10	8.4
	10 to 15 years	26	21.8
	15 to 20 years	19	16.0
	More than 20 years	62	52.1

between board characteristics, organizational innovation and performance are proposed:

H₃₋₁: There is a negative association between board size and organizational innovation.

H₃₋₂: There is a positive influence of the proportion of outside directors and supervisors on organizational innovation.

H₃₋₃: There is a positive association between CEO/Chairperson duality and organizational innovation.

H₄₋₁: There is a negative association between board size and organizational performance.

H₄₋₂: There is a positive influence of the proportion of outside directors and supervisors on organizational performance.

H₄₋₃: There is a positive association between CEO/Chairperson duality and organizational performance.

Finally, organizational innovative activity is closely related to organization performance. It is also proposed that innovation mediates the relationship between corporate-governance mechanisms and organizational performance. If this is the case, any significant relationships observed between performance and corporate-governance variables can be expected to pale into insignificance once organizational innovation is controlled for. This leads to the following hypotheses:

H₅: There is a positive association between organizational innovation and organizational performance.

H₆: The relationships between corporate-governance mechanisms and organizational performance will be mediated by organizational innovation.

Sample and data

This study's population consists of both listed and OTC firms in Taiwan that had gone public prior to January 2005. A total of 750 questionnaires were distributed to 750 firms, with 119 valid

respondent firms, reflecting a valid response rate of 15.9%, of the questionnaires being returned for analysis. The characteristics of the samples are shown in Table 1. Of the total sample, 67.2% of the respondents came from the electronics industry, 9.2% from the biotechnology industry, 4.2% from the foodstuffs industry, 3.4% from the electrical machinery industry, 1.7% from the automobile industry, 3.4% from the retail industry, and 10.9% from other industries. Of the 119 respondent firms, 11.8% of the respondents had capital that was less than NT\$ 1 billion, 39.5% of respondents had capital of between NT\$ 1 billion and NT\$ 5 billion, 16.0% of respondents had capital of between NT\$ 5 billion and NT\$ 10 billion, 20.2% of respondents had capital of between NT\$ 10 billion and NT\$ 50 billion, and 12.6% of respondents had capital of more than NT\$ 50 billion. Of the respondent firms as a whole, 1.7% were less than 5 years old, 8.4% were aged from 5 to 10 years, 21.8% from 10 to 15 years, 16.0% from 15 to 20 years, and 52.1% were more than 20 years old. According to the characteristics of the samples, the samples are deemed to be appropriate for empirical credibility.

Data in relation to corporate governance and the control variables comprised secondary data collected from the Taiwan Economic Journal (TEJ) database, and the data in relation to organizational innovation and organizational performance were obtained using a questionnaire survey. The means of ownership structure, board characteristics and control variables were used in the empirical analysis, and the descriptive statistics for the years 2005-2007 are shown in Table 2.

Operational measures

Ownership structure variables

We followed the procedure established by La Porta et al. (2002) to identify ultimate owners and used the difference between control and cash-flow rights to measure the degree of divergence (*DIV*). Insider ownership (*INS*) was measured as a percentage of stock held by managers and directors. Institutional ownership (*INSTIT*)

Table 2. Summary statistics for selected variables.

Variable	Mean	SD	Min	Mid	Max	N
Ownership structure						
DIV(%)	6.64	11.75	0.00	1.82	75.53	119.00
INS(%)	23.06	15.02	4.96	19.12	89.21	119.00
INSTIT(%)	47.75	23.85	3.49	46.99	98.00	119.00
Board characteristics						
BSIZE	10.07	2.82	6.67	9.67	25.00	119.00
ODS(%)	41.70	17.08	0.00	41.94	86.21	119.00
DCEO	0.31	0.44	0.00	0.00	1.00	119.00
Organizational innovation						
Product	3.71	0.76	1.50	4.00	5.00	119.00
Process	3.45	0.80	1.00	3.50	5.00	119.00
Management	3.31	0.91	1.00	3.50	5.00	119.00
Marketing	3.45	0.88	1.00	3.50	5.00	119.00
Organizational performance						
Financial	3.51	0.81	1.00	3.60	4.80	119.00
Non-financial	3.47	0.76	1.00	3.43	5.00	119.00

This table shows the summary statistics of the ownership structure, board characteristics, organizational innovation, and performance variables. DIV is the difference between control and cash-flow rights, INS is the proportion of insider ownership, INSTIT is the proportion of institutional ownership, BSIZE is board size, ODS is the proportion of outside directors and supervisors, and DCEO is CEO/Chair duality, which takes on a value of 1 if the CEO and chairman are the same person and 0 if otherwise.

was measured as a percentage of stock held by institutional investors. It was found that the mean of *DIV* was small (Mean=6.64%), but its standard deviation was large (SD=11.75%); in some instances as large as 75.53%. The proportion of institutional ownership (Mean=47.75%) was larger than that of insider ownership (Mean=23.06%), implying that institutional investors play very important roles in the Taiwan market. However, the fluctuations in institutional ownership were also huge, ranging from 3.49 to 98%, indicating that institutional investors adopt quite different investment strategies for different firms.

Board characteristics variables

Board size (*BSIZE*) was measured as the total number of directors and supervisors on the board. Outside directors and supervisors (*ODS*) was measured as the percentage of directors and supervisors who were not influenced by the ultimate owners. A dummy variable was used to measure CEO/chairperson duality (*DCEO*), which took on a value of 1 if the CEO and chairperson were the same person and 0 if otherwise. Table 2 indicates that the average number of board members in our sample firms was about 10. While the proportion of outside directors and supervisors was 41.7%, there were firms without outside directors and supervisors. The mean of *DCEO* was 0.31, indicating that the roles of CEO and chairperson of most respondent firms were separate.

Control variables

In addition to ownership structure and board characteristics

variables, two control variables were employed to account for the determinants of organizational innovation, such as firm size and firm age. Firm size was measured as a natural logarithm of firm capital, while firm age was measured as the number of years for which a firm has been in operation.

Organizational innovation

Previous studies have used perceived questionnaires to measure organizational innovation.

Therefore, the findings of such studies have had some shortcomings in terms of measurement because they reflect a certain level of subjectivity in terms of the method used. This paper, however, primarily emphasizes the technical and administrative (Evans, 1966) constructs of innovation borrowed from Weerawardena (2003) to measure organizational innovation, using the four dimensions of product, process, managerial, and marketing innovations.

The means for these four dimensions were 3.71, 3.45, 3.31, and 3.45, respectively, and indicated that most respondent firms put some effort into innovation, especially into product innovation. Cronbach's alpha for the scale was 0.92.

Organizational performance

Following the scale of Govindarajan (1984), organizational performance was measured using two dimensions, namely, financial and non-financial performance.

The means for financial and non-financial performance were 3.51 and 3.47, respectively. Cronbach's alpha for the scale was 0.94.

Data analysis approach

The empirical analysis consisted of a series of OLS regressions and employed the technique of hierarchical regression when entering the governance-mechanism variables, that is, ownership structure

and board characteristic variables. The hierarchical regressions, which are used to examine the relationship between ownership structure, board characteristics, and organizational innovation, can be written as follows:

$$\text{Model 1: } OI_i(\text{or } OP_i) = \beta_0 + \sum_j \beta_j \text{Control}_{i,j} + \varepsilon_i, \quad (1)$$

$$\text{Model 2: } OI_i(\text{or } OP_i) = \beta_0 + \sum_j \beta_j \text{Control}_{i,j} + \sum_k \beta_k OS_{i,k} + \varepsilon_i \quad (2)$$

$$\text{Model 3: } OI_i(\text{or } OP_i) = \beta_0 + \sum_j \beta_j \text{Control}_{i,j} + \sum_k \beta_k OS_{i,k} + \sum_l \beta_l BC_{i,l} + \varepsilon_i \quad (3)$$

where *OI* and *OP* are organizational innovation and performance, respectively, *Control* is the control variable, that is, SIZE and AGE; *OS* is the variable of ownership structure, that is, DIV, INS, and INSTIT; and *BC* is the variable of board characteristic, that is, BSIZE, ODS, and DCEO.

The incremental determinant coefficient¹ (R^2) from Model 1 to Model 2 and from Model 2 to Model 3 can be used to examine the relationship between ownership structure and organizational innovation and between board characteristics and organizational innovation, respectively.

The following equation can be used to test whether the increment R^2 is significant,

$$F_{fm-rm, N-fm-1} = \frac{(N-fm-1)(R_{fm}^2 - R_{rm}^2)}{(fm-rm)(1-R_{fm}^2)}, \quad (4)$$

where N is sample size, fm is the number of independent variables in the full model, rm is the number of independent variables in the reduced model, R_{fm}^2 is the variance explained by the full model, and R_{rm}^2 is the variance explained by the reduced model. In addition, hierarchical regression analysis was used to test the mediating effect of organizational innovation between corporate-governance mechanisms and organizational performance.

EMPIRICAL RESULTS

Relationships between corporate-governance mechanisms, organizational innovation, and performance

Table 3 summarizes the hierarchical regression analyses, which examine the effects of control, ownership structure, and board characteristics variables on organizational innovation and performance. H_1 states that there will be a significant relationship between ownership structure and organizational innovation. The F statistics of R^2

increments from Model 1 to Model 2 regarding the impact on organizational innovation, which are 5.476, 3.183, 5.554, and 9.233 for product, process, management, and marketing innovations, respectively, indicate that the entire ownership structures are significantly associated with all organizational innovation measures. In order to understand which variable of ownership structure affects organizational innovation, Model 2 shows that insider ownership is significantly and negatively related to product ($\beta=-0.352$, $p<0.01$) and marketing ($\beta=-0.226$, $p<0.10$) innovation measures, suggesting that a higher fraction of insider ownership generates worse product and marketing innovation, which partially supports H_{1-2} . The proportion of institutional ownership is significantly and positively associated with the product ($\beta=0.428$, $p<0.01$), process ($\beta=0.351$, $p<0.01$), management ($\beta=0.451$, $p<0.01$), and marketing ($\beta=0.585$, $p<0.01$) innovation measures, which support H_{1-3} . One explanation for this is that corporate monitoring by institutional investors may force managers to focus more on innovative activities and less on self-serving behavior.

H_3 states that board characteristics will be significantly associated with organizational innovation. In Table 3, board characteristics are found to be significantly related to three of the four innovation measures, that is, product ($\Delta F=3.385$, $p<0.05$), process ($\Delta F=3.385$, $p<0.05$), and marketing ($\Delta F=3.137$, $p<0.05$) innovation, but not for management innovation. Model 3 also shows that the proportion of outside directors and supervisors is significantly and positively associated with all innovation measures, supporting H_{3-2} , which implies that outside directors and supervisors will provide more diversely specialized suggestions and enhance the function of monitoring managers.

Furthermore, regarding the influence on organizational performance, the F statistics of the R^2 increment indicate that the entire ownership structures are significantly associated with both the financial ($\Delta F=12.426$, $p<0.05$) and non-financial ($\Delta F=8.193$, $p<0.01$) performance measures. The results in Model 2 also show that insider ownership is negatively correlated with both the financial ($\beta=-0.305$, $p<0.05$) and non-financial ($\beta=-0.313$, $p<0.05$)

¹The determinant coefficient equals $1-(SS_{\text{err}}/SS_{\text{tot}})$, where SS_{tot} is total sum of squares and SS_{err} is the sum of squares of residuals.

Table 3. Results of hierarchical regression analysis on organizational innovation and performance.

Dependent variable		Organizational innovation												Organizational performance					
		Product			Process			Management			Marketing			Financial			Non-financial		
Independent variable		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Control	SIZE	-0.024 (-0.263)	-0.289** (-2.599)	-0.125 (-1.001)	0.174* (1.935)	-0.024 (-0.219)	0.116 (0.914)	0.065 (0.737)	-0.145 (-1.362)	-0.042 (-0.343)	-0.051 (-0.549)	-0.338*** (-3.149)	-0.171 (-1.419)	0.014 (0.151)	-0.341*** (-3.260)	-0.237* (-1.963)	0.087 (0.934)	-0.223** (-2.046)	-0.036 (-0.298)
	AGE	-0.177* (-1.933)	-0.116 (-1.245)	0.04 (0.383)	-0.185** (-2.055)	-0.123 (-1.311)	0.011 (0.106)	-0.311*** (-3.525)	-0.225** (-2.509)	-0.125 (-1.232)	-0.127 (-1.371)	-0.034 (-0.374)	0.113 (1.133)	-0.064 (-0.648)	0.091 (1.034)	0.181* (1.814)	0.031 (0.331)	0.137 (1.495)	0.281*** (2.781)
Ownership structure	DIV		0.064 (0.515)	0.074 (0.609)		0.034 (0.273)	0.040 (0.326)		-0.049 (-0.404)	-0.046 (-0.385)		-0.071 (-0.589)	-0.061 (-0.517)		0.146 (1.243)	0.153 (1.299)		0.071 (0.577)	0.080 (0.676)
	INS		-0.352*** (-2.702)	-0.286** (-2.217)		-0.213 (1.622)	-0.156 (-1.185)		-0.119 (-0.949)	-0.076 (-0.602)		-0.226* (-1.798)	-0.158 (-1.264)		-0.305** (-2.490)	-0.262** (-2.101)		-0.313** (-2.448)	-0.233* (-1.845)
	INSTIT		0.428*** (3.705)	0.459*** (3.999)		0.351*** (3.016)	0.364*** (3.122)		0.451*** (4.060)	0.451*** (4.009)		0.585*** (5.241)	0.607*** (5.462)		0.638*** (5.864)	0.650*** (5.857)		0.552*** (4.863)	0.541*** (4.826)
Board characteristics	BSIZE			-0.086 (-0.883)			-0.080 (-0.804)					-0.062 (-0.645)			-0.121 (-1.284)			-0.080 (-0.848)	-0.212** (-2.225)
	ODS			0.321*** (3.138)			0.278*** (2.674)					0.210** (2.090)			0.290*** (2.925)			0.176* (1.781)	0.258** (2.578)
	DCEO			0.006 (0.069)			-0.047 (-0.508)					-0.074 (-0.835)			-0.011 (-0.124)			-0.009 (-0.103)	-0.119 (-1.352)
Model summary	R ²	0.031	0.154	0.226	0.071	0.143	0.198	0.105	0.220	0.254	0.017	0.211	0.273	0.004	0.251	0.275	0.008	0.185	0.260
	Adj. R ²	0.015	0.117	0.169	0.055	0.105	0.139	0.090	0.185	0.200	0.000	0.176	0.220	-0.013	0.218	0.222	-0.009	0.149	0.206
	F-stat	1.187	4.121***	4.008***	4.414**	3.775***	3.387***	6.801***	6.373***	4.678***	1.027	6.038***	5.164***	0.258	7.589***	5.213***	0.465	5.137***	4.828***
	≥R ²	0.031	0.123	0.071	0.071	0.072	0.054	0.105	0.115	0.034	0.017	0.193	0.062	0.004	0.247	0.024	0.008	0.177	0.075
	≥F	1.871	5.476***	3.385**	4.414**	3.183**	2.490*	6.801***	5.554***	1.665	1.027	9.233***	3.137**	0.258	12.426***	1.189	0.465	8.193***	3.700**

This table reports the standardized regression coefficients, t-statistics (in parentheses), and model summary statistics of the hierarchical regression analysis. *, **, and *** indicate statistical significance at the 10, 5, and 1% levels, respectively.

performance measures, suggesting that a higher fraction of insider ownership will result in worse organizational performance, which partially supports H₂₋₂. The proportion of institutional

ownership has a significantly positive relationship with both financial (β=0.638, p<0.01) and non-financial (β=0.552, p<0.01) performance measures, which supports H₂₋₃. In addition, all the

board characteristics are only significantly related to non-financial performance (ΔF=3.700, P<0.05). The proportion of outside directors and supervisors is significantly and positively

associated with both financial ($\beta=-0.176$, $p<0.10$) and non-financial ($\beta=-0.258$, $p<0.05$) performance measures, which supports Hypothesis 4-2. Board size is significantly and negatively associated with non-financial performance ($\beta=-0.212$, $p<0.05$), which supports H₄₋₁.

The mediating effect of organizational innovation

Here the procedures outlined by Baron and Kenny (1986) are applied to examine H₆, which states that organizational innovation mediates the relationships between the corporate governance mechanisms and organizational performance. The steps are as follows: (1) The control variables are entered into the model as block one, followed by the corporate-governance variables which are entered into the model as block two, and then regress on the organizational innovation variable. (2) The control variables are entered into the model as block one, followed by the organizational innovation variable which is entered into the model as block two, and then regress on the organizational performance variable. (3) The control variables are entered into the model as block one, followed by the corporate governance variables which are entered into the model as block two, and then regress on the organizational performance variable. (4) If steps (1)-(3) produce significant models, the control variables are entered into the model as block one, followed by the organizational innovation variable which is entered into the model as block two, and the corporate governance variables which are entered into the model as block three, and then regress on the organizational performance variable.

The relationship between the corporate-governance variables and the organizational performance variable should be significantly weaker (partial mediation) or non-significant (full mediation) when the organizational innovation variable is included in the regression equation. Therefore, if full mediation is found to exist, the effect of corporate-governance variables on organizational performance would be mediated or altered by organizational innovation.

Table 4 presents the results of our hierarchical regression analysis, which is used to examine the mediating effect of organizational innovation. In the first step, control variables and corporate-governance variables were entered into the regression equation. The standardized regression coefficient results show that insider ownership ($\beta=-0.193$, $p<0.10$), institutional ownership ($\beta=0.556$, $p<0.01$), and the proportion of outside directors and supervisors ($\beta=0.320$, $p<0.01$) have a significant impact on organizational innovation. Condition (1) for mediation is therefore achieved for the variables of insider ownership, institutional ownership, and the proportion of outside directors and supervisors. The proportion of institutional ownership ($\beta=0.556$) is most influential among these corporate-governance variables. In addition, the variables of divergence between control and cash-flow

rights, board size, and CEO/Chairperson duality are not significantly associated with organizational innovation. In the second step, the control variables and organizational innovation were entered into the regression equation. The results from the analysis show that organizational innovation ($\beta=0.810$, $p<0.01$) is significantly and positively associated with organizational performance and meets condition (2), which also supports H₅. In addition, control variables and the organizational innovation variable explained 61.9% of organizational performance. The results of step 3 show that institutional ownership ($\beta=0.632$, $p<0.01$) has a significant and positive influence on organizational performance at the 0.01 level. There were significant influences of insider ownership ($\beta=-0.263$, $p<0.05$) and the proportion of outside directors and supervisors ($\beta=0.228$, $p<0.05$) on organizational performance at the 0.05 level. The variables of insider ownership, institutional ownership, and the proportion of outside directors and supervisors also satisfied condition (3).

According to the aforementioned analyses, insider ownership, institutional ownership, and the proportion of outside directors and supervisors meet both conditions (1) and (3).

Finally, in step 4, control variables, corporate governance and organizational innovation were entered into the regression equation. The influence of insider ownership and the fraction of outside directors and supervisors on organizational performance became non-significant. Thus, organizational innovation fully mediated the relationship between insider ownership and organization performance and between the fraction of outside directors and supervisors and organizational performance. In addition, the relationship between institutional ownership and organizational performance is still significant ($\beta=0.225$, $p<0.01$), but the relationship is weaker. Therefore, organizational innovation partially mediates the relationship between institutional ownership and organizational performance, and this supports H₆.

The findings reveal that organizational innovation is significant in promoting the realization of organizational targets and enhance organizational performance, especially in Taiwan, which concentrates on the development of the high-tech electronics industry. In addition, the corporate-governance mechanism has a significant influence on a firm's innovative activities. Therefore, firms can execute their innovation strategies using changes in the ownership structure or board characteristics, and consequently enhance the organization's future performance.

MANAGERIAL IMPLICATIONS AND LIMITATIONS

The essential and primary goal of a corporation is to increase the wealth or value of its shareholders. With this in mind, this research can serve as a guideline for

managers to better understand the ownership structure, board characteristics, organizational innovation, and organizational performance within their corporations. It is important to note that corporate managers cannot rely solely on patent output or R&D expenditure to measure organization innovation (Hill and Shell, 1988; Zahra et al., 2000; Dunn, 2004), as these metrics do not fully encompass the innovative activities of an organization; however, a firm's governance systems can be regarded as the firm's operational core. This paper gives direction to managers regarding the role of innovation within the firm and industries in terms of competitiveness, continuous operation and development (Janssen et al., 2004). In addition, national and firm cultures influence a firm's R&D and innovation strategies (Nakata and Sivakumar, 1996; Jones and Davis, 2000; Lin, 2009). This paper focuses on the innovative activity of the emerging Taiwan market and provides information to managers in relation to how corporate-governance mechanisms affect a firm's innovation strategies in the Taiwan market.

Managers should bear in mind that, based upon current study in Taiwan's emerging market, firms with divergent control and cash-flow engage in limited innovative activities and achieve poor performance. On the one hand, innovation requires long-term investment, high risk, and uncertainty (Holmstrom, 1989); on the other hand, for these reasons, managers and shareholders may feel reluctant to get involved in such high-expenditure activities. This paper thus provides information to managers and shareholders interested in innovation, suggesting that they dedicate their time and energy to changing the firm's management at different levels.

Current research identifies an important issue for managers regarding the various relationships between board size and organizational efficiency due to differences in culture (Zahra and Pearce, 1989; Eisenberg et al., 1998; Kiel and Nicholson, 2003; Hermalin and Weisbach, 2003). For that purpose, managers will be cognizant that boards with a large number of members have more experience and industry background knowledge to adopt different perspectives regarding the organizational operating plan (Kiel and Nicholson, 2003). Furthermore, most outside directors and supervisors are board members of other firms' management teams and as such bring greater contributions and specialized experience to firm growth (Morck et al., 1988; Huson et al., 2001). However, managers and shareholders should be aware that as the size of the board increases, coordination and communication become quite complex (Hermalin and Weisbach, 2003). For that reason, recommending a smaller board will enable the organization to improve its performance, while larger boards may serve to hamper organizational innovative activities and result in organizational underperformance because of the huge administrative and bureaucratic costs (Irwin et al., 1998).

This study also has some limitations. As this research focuses on listed and OTC firms in Taiwan, the results cannot be generalized to other industries having different

structures. It would thus be interesting to compare the data and results for overseas firms in both developed and developing countries. It is also believed that researchers should endeavor to adopt a multidimensional approach to performance measurement when examining the kinds of questions raised in this study. Future research in this field should attempt to study profitability and firm size in order to link these concepts to innovative activities and organizational performance. Finally, future research should focus on exploring and identifying the role of organizational culture and organizational structure with regard to innovation, competitiveness and performance.

CONCLUDING REMARKS

The motivation for the current study arises from the lack of empirical investigation regarding the impact of corporate-governance mechanisms on organizational innovation in an emerging economy such as Taiwan. Based upon the data collected through the TEJ database and a survey of 119 Taiwanese firms, a hierarchical regression approach was used to examine the relationships between corporate-governance mechanisms, organizational innovation and organizational performance. In addition, this paper tested whether organizational innovation mediates the relationship between corporate-governance mechanisms and organizational performance.

The results of the empirical analyses are as follows (as summarized in Table 5):

- (1) Ownership structure has a significant relationship with production, process, management and marketing innovation, respectively. The effects primarily arise from the positive effect of the portion of institutional ownership and the negative effect of the fraction of insider ownership, which are consistent with Zahra et al. (2000) and Jensen and Ruback (1983), respectively.
- (2) Board characteristics have a significant relationship with production innovation, process innovation, and marketing innovation, respectively. These effects mainly arise from the positive effect of the proportion of outside directors and supervisors, which is consistent with Fama and Jensen (1983), Morck et al. (1988), and Huson et al. (2001).
- (3) Organizational innovation has a positive effect on organizational performance.
- (4) Organizational innovation is the mediator between the corporate-governance mechanism and organizational performance, implying that corporate governance exerts an indirect influence on organizational performance through organizational innovation.

In conclusion, the present study provides a better understanding of the relationships between corporate-governance mechanisms, organizational innovation, and organizational performance. Overall, the results suggest that corporate governance influences organizational performance through organizational innovation.

Table 4. Examination of the mediating effects of organizational innovation.

Independent variable	Dependent variable	Organizational innovation		Organizational performance	
		Step 1	Step 2	Step 3	Step 4
Control	SIZE	-0.067 (-0.565)	0.013 (0.233)	-0.148 (-1.237)	-0.099 (-1.195)
	AGE	0.009 (0.091)	0.173*** (2.913)	0.242** (2.444)	0.236*** (3.439)
Ownership structure	DIV	-0.002 (-0.021)		0.125 (1.068)	0.126 (1.566)
	INS	-0.193* (-1.672)		-0.263** (-2.116)	-0.121 (-1.396)
	INSTIT	0.556*** (5.094)		0.632*** (5.736)	0.225*** (2.655)
Board characteristics	BSIZE	-0.103 (-1.105)		-0.152 (-1.623)	-0.077 (-1.182)
	ODS	0.320*** (3.289)		0.228** (2.321)	-0.006 (-0.089)
	DCEO	-0.038 (-0.446)		-0.066 (-0.759)	-0.038 (-0.629)
Innovation	Organizational innovation		0.810*** (13.645)		0.732*** (11.001)
Model summary	R ²	0.298	0.619	0.285	0.661
	Adj. R ²	0.246	0.609	0.233	0.633
	F-stat	5.823***	62.390***	5.491***	23.652***
	≥R ²				0.285
	≥F				121.018***

This table reports the standardized regression coefficients, t-statistics (in parentheses), and model summary statistics of the hierarchical regression analysis. *, **, and *** indicate statistical significance at the 10, 5 and 1% levels, respectively.

Table 5. Research hypotheses and empirical results.

Research hypotheses			Expected relationship	Empirical results
Ownership structure	1-1	There is a negative influence of the divergence between control and cash-flow rights on organizational innovation.	—	
	1-2	There is a negative association between the proportion of insider ownership and organizational innovation.	—	—
	1-3	There is a positive association between the proportion of institutional ownership and organizational innovation.	+	+
	2-1	There is a negative influence of the divergence between control and cash-flow rights on organizational performance.	—	

Table 5. Contd.

	2-2	There is a negative association between the proportion of insider ownership and organizational performance.	–	–
	2-3	There is a positive association between the proportion of institutional ownership and organizational performance.	+	+
Board characteristics	3-1	There is a negative association between board size and organizational innovation.	–	
	3-2	There is a positive influence of the proportion of outside directors and supervisors on organizational innovation.	+	+
	3-3	There is a positive association between CEO/Chair duality and organizational innovation.	+	
	4-1	There is a negative association between board size and organizational performance.	–	
	4-2	There is a positive influence of the proportion of outside directors and supervisors on organizational performance.	+	+
	4-3	There is a positive association between CEO/Chair duality and organizational performance.	+	
Innovation	5	There is a positive association between organizational innovation and organizational performance.	+	+
	6	The relationships between corporate governance mechanisms and organizational performance will be mediated by organizational innovation.	Mediator	Significant

ACKNOWLEDGEMENTS

The authors would like to sincerely thank and express appreciation for the helpful comments, kind support, suggestions and excellent advice for improvements from Kemo Badiane, Gobi Ganar, and Suryappa Jayappa Pawar. Interviewee and questionnaire respondents are also gratefully thanked for dedicating time to answering questions.

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