# Intellectual Capital and Value Creation- Is Innovation Capital a Missing Link?

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**Abstract**

The purpose of the research is to examine the role of innovation capital in the creation of value for business organizations. Taking an intellectual capital (IC) perspective, the paper considers R&D investment and its impacts on the companies' operating, financial, and market performance. To investigate the different components of intellectual capital using financial measures, a modified Value Added Intellectual Coefficient (VAIC$^{TM}$) is used for analysis. Empirical study is conducted on 367 Taiwan semiconductor companies using Pearson correlation and linear multiple regression whereas financial information is generated from a third party database from Taiwan Economic Journal. The result shows that a company's IC in general has a negative impact on its financial and market performance. However, the association between innovation capital which captured by R&D expenditure efficiency (RDE) and companies' operating, financial and market performance is significant. The results provide a different perspective apart from extant research.

**Keywords:** Intellectual capital, Innovation capital, R&D expenditure, Value added, VAIC$^{TM}$, Firm performance

## 1. Introduction

In the last decades academia has drawn attention to the role of knowledge in business development. A general consensus is that organizational capabilities are based on the management of knowledge for it is the source of organizational sustainability and competitive advantage. Given the intangible nature of knowledge, different concepts were proposed in the academia and each try to capture a particular phenomenon. Although successful companies realize that investing in knowledge is essential to their ability to create high value products and services. Identifying, valuing, managing intellectual assets is a very difficult task to business managers. Among the different notions, intellectual capital (IC) has been an interesting expression since FORTUNE magazine first published Thomas Stewart's writing in 1991. It provides a vivid illustration of knowledge management which helps elucidate intangible resources and knowledge assets of organization. From the result of pioneer study it is well perceived that intellectual capital is the lever for organizations to acquire competitive advantage and sustainable performance (Bontis, 1996; Edvinsson and Sullivan, 1996; Prusak, 1998; Ross and Ross, 1997; Stewart, 1991, 1995).

Measuring intellectual capital is difficult. In the last decade various tools are proposed in the studies however the reliability of instrument still largely depends on the industry characteristics and objectivity of information. This study takes on a broader analytical perspective to allow observation of the multiple dimensions of intellectual capital. Furthermore, the sample in this study is mainly within high technology industry whereas R&D represents a significant portion of investment (Chang, 2007). We therefore utilize Pulic's Value Added Intellectual Coefficient (VAIC$^{TM}$) method and to propose a modified version to consider the role of a new component, innovation capital and its effect on company performance.

This paper contributes to the literature in the following aspects. First, it extends our understanding toward the role of intellectual capital in the field of information technology industry by using a reliable source of financial information. Second, instead of using an aggregate measure as proposed by Ante Pulic, the study also examines

the explanatory power of different IC components. A last but not the least, the research draws attention to research activities within this industry and proposes a new IC component to clarify the relationship between R&D and company performance. This is especially evocative to the present debate of whether to write off or capitalize R&D expenditure. This paper is organized in three sections. First we briefly introduce the theoretical and conceptual framework for IC and prior related research are reviewed. Research propositions, sample selection and empirical results are provided in the next. In the last section conclusions and managerial implications are discussed.

## 2. Intellectual Capital and Value Added

### *2.1 Intellectual capital*

The term "Intellectual Capital" (IC) was first published by John Kenneth Galbraith in 1969 (Hudson, 1993), but Stewart (2001a) claimed the first use back to 1958 when he started intellectual capital study with Itami who later published *Mobilizing Invisible Assets* in Japanese in 1980. In general, IC means more than just "intellect as pure intellect" but also a degree of "intellectual action" (Bontis, 1998; Feiwal, 1975). In that sense, intellectual capital is not only a static intangible asset per se, but an ideological process. It is the kind of movement from "having" knowledge and skills to "using" knowledge and skills.

So far there is no generally accepted taxonomy for intellectual capital. A synthesis from extant literature provides three interrelated constructs (Bontis, 1996; Edvinsson and Sullivan, 1996; Ross and Ross, 1997; Stewart, 1995). Among the three *Human Capital* (HC) comprises the competence, skills, experience, and intellectual agilities of the individual employees (Bounfour, 2002; Brooking, 1996; Edvinsson and Malone, 1997; Ross *et al*., 1997; Stewart, 1997, Sullivan, 2000). *Structural Capital* (SC) includes processes, systems, structures, brands, intellectual property, and other intangibles that are owned by the firm but do not appear on its balance sheet (Bounfour, 2002; Brooking, 1996; Edvinsson and Malone, 1997; Stewart, 1997; Ross *et al*., 1997;). A third construct is S*ocial Capital* (SC) which resides either at the individual or the organizational level. A greater percentage of present research has examined these forms of intellectual capital in isolation. However, looking at any of these subcategories individually would most certainly result in an incomplete account of an organization's intellectual capital (Brooking, 1996; Lev, 2001; Ross *et al*. 1997). Moreover, the property of intellectual capital is not universal and the evolution of intellectual capital is not a common industry phenomenon. It is therefore necessary for researchers to develop an industry-specific measurement tool. Only periodically examine the data collected would improve the strategic use of an organization's knowledge assets.

### *2.2 Modified Valued Added Intellectual Coefficient (M-VAIC$^{TM}$)*

Observing the increased significance of IC in value creation, Pulic (2000, 2002) developed a useful measuring tool namely the Valued Added Intellectual Coefficient (VAIC$^{TM}$). Unlike traditional accounting that focuses on business reporting, Pulic (2000) was interested in the driver of value creation and stated that there are two key resources for added value creation: capital employed (consists of physical and financial capital) and intellectual capital (consists of human and structural capital). VAIC$^{TM}$ has received attention from both academics and in practice for it provides an archetype for peer researchers to build on. For example, Chang (2007) takes R&D and intellectual property into consideration to improve explanatory power in his pilot study of high technology sector. The result leads to the current study and a modified VAIC$^{TM}$ is proposed to include a new intellectual capital component, *Innovation Capital*. Although there are criticisms on the limitations of VAIC$^{TM}$ (Andriessen, 2004), a large number of researchers still adopted VAIC$^{TM}$ in their research (Chen, *et al*., 2005; Chang 2007; Kamath, 2007; 2008; Chan, 2009). A primary reason is that VAIC$^{TM}$ uses data from financial statements and minimize potential data subjectivity from using other instruments.

A basic tenant for VAIC$^{TM}$ is to observe resource efficiency in creating value for the firms. A principle is to calculate the value added (VA) of a firm by subtracting input from output, excluding labor expenses from the input. In financial terms, it is presented as in (1):

$$VA = GM - sgaExp. + LExp. = Operating\ Income + LExp. \quad (1)$$

where VA is value added; GM is gross margin; sgaExp.: selling, general, and administrative expenses; LExp.: labor expenses that Pulic (2000b) calls human capital.According to Pulic (2000b), the value of human capital (HC) and structural capital (SC) is described by the labor expenses and the difference between VA and HC. From this description, HC and SC are denoted as follows:

$$HC = LExp. \quad (2)$$

$$SC = VA - HC \quad (3)$$

HC denotes human capital, SC for structural capital; Pulic states that human capital and structural capital are

reciprocal. The less the participation of human capital, the more structural capital is involved. The next step is to evaluate social capital, and according to Pulic's VAIC, social capital is calculated by the capital employed which equals the book value of the net assets of the firm.

$$SC = CE \text{ (capital employed)} = \text{Book Value of Net Assets} \quad (4)$$

In terms of the new component proposed this study proposed to examine, R&D expenditure is used as a proxy for innovation capital.

$$\text{Innovation Capital} = \text{R\&D expenditure} \quad (5)$$

The study sets out to examine the efficiency of the four IC subcomponents and four indicators (predicting variables) are presented as in the followings:

Human Capital Efficiency HCE = VA / HC
Structural Capital Efficiency SCE = SC / VA
Social Capital Efficiency CEE = VA / CE
Innovation Capital Efficiency RDE = R&D expenditure /Book value of common stock

The objective of this study is to empirically investigate the relationship between IC and company performance. We validate modified VAIC$^{TM}$ by assessing the impact of IC subcomponents individually and collectively using the following criterion for company performance: operating performance (Model 1), financial performance (Model 2 and Model 3), and stock market performance (Model 4). A general hypothesis for this research is better efficiency of a firm's resources would translate into its operating, financial and market performance.

## 3. Methodology

### *3.1 Data and sample selection*

The sample companies in this study include all the public listed semiconductor companies on Taiwan Stock Exchange. Financial information of 519 companies spanning from 2000 to 2008 was generated from fiscal annual reports database provided by Taiwan Economic Journal. We also consider the following conditions to ensure the data validity of research. According to Firer and Williams (2003) and Shiu (2006), companies with negative book value of equity, or companies with negative value of HC or SC were excluded from the sample. Companies for which some data were missing (unavailable from the fiscal annual reports in consequence of delisting or any companies' issue) were also excluded. These selection processes further led a final sample of 367 Taiwan semiconductor companies as in Table 1.

### *3.2 Definition of variables*

#### 3.2.1 Dependent variables

To conduct the relevant analysis in the study, five dependent variables of gross profit margin (GPM), return on assets (ROA), return of equity earnings per share (EPS) and (ROE) were used as proxy measure for operating, financial and stock market performance respectively. These variables were defined as following:

- Gross profit margin. Ratio of (Revenue-cost of goods sold) divided by revenue, sued as a proxy measure for operating performance.
- Return on assets. Ratio of earnings before interest and taxes divided by book value of total assets, used as a proxy measure for financial performance.
- Return on equity. Ratio of earnings after interest and taxes divided by book value of total assets, used as a proxy measure for financial performance.
- Earnings per share. Ratio of net income divided by weighted average common shares, used as a proxy measure for stock market performance.

#### 3.2.2 Independent variables

Using Modified Value Added Intellectual Coefficient (MVAIC$^{TM}$) method, four major IC components were selected to measure both independent variables under consideration:

- Human capital efficiency (HCE): the ratio indicates how much value added has been created by one financial unit invested in employees.

Value added (VA) = GM – sgaExp. + LExp. = Operating Income + LExp.
Human capital (HC) = LExp.
HCE = VA/HC

- Structural capital efficiency (SCE): the ratio shoes the contribution of structural capital in value

creation.

Structural capital (SC) = VA – HC
SCE = SC/VA

- Capital employed efficiency (CEE): the ratio presents firms use financial and physical capital into account in order to have a full insight into the totality of VA created by a firm's resources.

Capital employed (CE) = book value of net assets
CEE = VA/CE

- R&D efficiency (RDE): the ratio indicates how much value added has been created by one financial unit invested in R&D.

R&D (RD) = R&D expenditure
RDE = RD/ book value of common stocks

3.2.3 Dummy variables

This research also considers several factors. The sample of the study is mainly with high tech industries and intellectual property right is inevitably an essential part of corporate assets. It is either a product of acquisition or the outcome of R&D investment. We also pay attention to corporate governance and social responsibility for their potential effects on the investment decision and efficient use of intellectual capital. To understand whether the presence of these factors may have effect on the firm performance, we include them as dummy variables in this study.

- Intellectual Property Right (IPR): the value was came from fiscal annual reports (Firm's with IPR, D = 1; otherwise D= 0).
- Corporate social responsibility (SCR): the real events were counted by TEJ Co. Currently, the database only collected negative events, including the problems of environmental and security, information release, labor-capital relations and other illegal events (Firm's with CSR, D = 1; otherwise D= 0).
- Board composition (BC): measured by the fiscal annual reports, including the level of director ownership (firms' level of director ownership > 15%, D= 1; otherwise D= 0), the level of stock pledge (firms' level of sotkc pledge > 50%, D= 1; otherwise D= 0), cross holding (firms with high level of director ownership and high level of stock pledge, D=1; otherwise D= 0) and pyramid structure (firms control more than one company listed on the stock market by stakeholders who control another company listed on the stock market, D= 1; otherwise D= 0).

*3.3 Research models*

To respond to the objective of the research, four different firm performance measures are considered: operating (Model 1), financial (Model 2 and Model 3) and stock market (Model 4) performance models:

$$GPM = \alpha_0 + \alpha_1 HCE + \alpha_2 SCE + \alpha_3 CEE + \alpha_4 RDE + \alpha_5 IPE + \alpha_6 CSR + \alpha_7 CG + \varepsilon_i \quad \text{(Model 1)}$$

$$ROA = \alpha_0 + \alpha_1 HCE + \alpha_2 SCE + \alpha_3 CEE + \alpha_4 RDE + \alpha_5 IPE + \alpha_6 CSR + \alpha_7 CG + \varepsilon_i \quad \text{(Model 2)}$$

$$ROE = \alpha_0 + \alpha_1 HCE + \alpha_2 SCE + \alpha_3 CEE + \alpha_4 RDE + \alpha_5 IPE + \alpha_6 CSR + \alpha_7 CG + \varepsilon_i \quad \text{(Model 3)}$$

$$EPS = \alpha_0 + \alpha_1 HCE + \alpha_2 SCE + \alpha_3 CEE + \alpha_4 RDE + \alpha_5 IPE + \alpha_6 CSR + \alpha_7 CG + \varepsilon_i \quad \text{(Model 4)}$$

## 4. Empirical results

*4.1 Descriptive Statistics*

Table 2 presents the range, minimum, maximum, means, standards deviations, variance, skewness and kurtosis values of all the variables. The mean for EPS is 3.690 indicating that investors generally earn the real price from the sample companies' potential value that was not show in the financial statements. The comparison among HCE, SCE, CEE and RDE values suggest that during the period of 2000~2008, the sample companies were generally more effective in creating value added from their IC (the mean of HCE and SCE is 1.458, 0.252 respectively) than from financial capital employed (CEE = 0.051). Besides, IT companies may focus on investing in R&D to maintain its competitive advantages (RDE = 0.030). The findings suggest that, in the knowledge-based economy, the companies increase shareholders' value the maximized created from the intellectual resources than that created by physical or financial resources.

*4.2 Correlation analysis*

Correlation coefficient analysis is the initial statistical technique used to analyze the association between the dependent and independent variables. Table 3 shows the findings from Pearson pair wise analysis which indicate that the HCE index is significantly negatively associated ($p < 0.01$) with financial performance (ROA), and also, SCE index is significantly negatively associated ($p < 0.05$) with financial performance, both shown in ROA and

ROE, and also significantly negatively associated ($p < 0.01$) with stock market performance. In operating performance, only CEE index is significantly positively associated ($p < 0.05$).

Finally, it is interesting to notice that the new IC component – RDE index is significantly positive correlated ($p < 0.01$) with operating performance (GPM), stock market performance (EPS) and financial performance (ROA and ROE).

*4.3 Linear multiple regression results*

4.3.1 Operating performance model

Table 4 exhibits the results of the regression coefficient for all explanatory variables, using operating performance (GPM) as the dependent variable. The adjusted $R^2$ is 0.101 for the whole sample, indicating that the model is able to explain about 10 percent of the variance in the dependent variable for the whole sample. In the table shows that the capital employed efficiency (CEE) and R&D efficiency (RDE) have a significantly positive association with operating performance while human and structural capital are not. The results confirm that the capital invested in firms' research and development, especially in Semiconductor, plays a major role in reducing production costs. Moreover, this finding agrees with the previous studies conducted by Deeds (2001), Lev and Sougiannis (1996), Chauvin and Hirschey (1993) and Chang (2007) who found a positive effect of RDE on firms' performance and eventually, the technology absorption capability has a positive correlation with market value added.

Moreover, the results indicate that intellectual property right (IPR) and corporate social responsibility (CSR) have a significantly positive/negative association with operating performance, respectively. The major function of IPR is to bring specific resources into a company by establishing ownership rights over the others and then eliminating the imitators. However, contrary to theoretical expectations, the result presents a negative association between CSR and operating performance. The reason is that a negative sign on CSR dues to the fact that the index generated from the database are negative news, such as, for example, the delay information for releasing to the public. Last, there is not significant association among operating performance and the variables of a board composition.

4.3.2 Financial performance models

Table 5 and 6 show the results of regression coefficient for all explanatory variables, using financial performance (ROA and ROE) as the dependent variable, respectively. The adjusted $R^2$ is 0.097 and 0.082 for the whole sample, indicating that the model is able to explain about 9 and 8 percent of the variance in the dependent variable for the whole sample, respectively.

Model 2 of Table 5 shows that the structural capital efficiency (SCE), capital employed efficiency (CEE) have a significantly negative association with financial performance while only CEE has a significantly negative association with financial performance in Model 3 (Table 6). The negative sing on SCE and CEE may be due to the fact that the capital employed (especially in physical investment) may generate additional expenses for companies and finally, it could reduce the net profit in the end of the year. However, R&D efficiency (RDE) has a significantly positive association with financial performance both in Model 2 (Table 5) and Model 3 (Table 6). No doubt, in Taiwan, industrial capabilities have been and are being supported by comprehensively designed endeavors on the infrastructure development, investment level, and R&D especially in the high-tech companies (Lee and Pecht, 1997). Comparing to Tsai and Wang (2004) findings, the results support that investment in R&D by semiconductor companies has had an impact on their competitive advantage and the higher ROA is consistent with higher investment in research and development. The data in Table V and VI also show that pyramid structure has significantly positive correlation with financial performance. This result may imply that semiconductor companies' financial performance may influenced by its relative companies.

4.3.3 Stock market performance model

Table 7 shows the results of regression coefficient for all explanatory variables, using stock market performance (EPS) as the dependent variable. The adjusted $R^2$ is 0.084 for the whole sample, indicating that the model is able to explain about 8 percent of the variance in the dependent variable for the whole sample. Table 7 shows that structural capital efficiency (SCE) and capital employed efficiency (CEE) have a significantly negative association with stock market performance while R&D efficiency has a significantly positive association with EPS. Similar to the results of the correlation analysis, the results reported in Table III shows that SCE and CEE have negative association with stock market performance. Furthermore, the results show that intellectual property efficiency (IPE) has significantly association with stock market performance. The finding implies that there are intellectual capital items other than human capital, structural capital, social capital and R&D (e.g.

patents, brands name) (Canibano *et al*., 2000) and it may direct or indirect influence on companies' performance (Bollen, *et al*., 2005). For the control variables, the results indicate that the level of stock pledge and cross holding have positively association with stock market performance while pyramid structure negatively associated with EPS.

## 5. Discussion

Due to the traditional accounting method imperfectly measure the intangible assets, the study adopts MVAIC method to empirically analyze the relationship of IC components and companies' operating, financial, and stock market performance. By taking sample from Taiwan listed semiconductor companies from 2000-2008, the findings have several important implications. First, the results show a significantly positive association between the capital employed efficiency (CEE) and the companies' operating performance while human capital efficiency (HCE) and structural capital efficiency (SCE) are not significant. This indicates that traditional IC components were not play a major role in reducing the companies' production costs anymore. Additionally, the results show that traditional IC components have a negative association with the companies' financial and stock market performance. The findings subvert the prevailing understanding that human capital, structural capital, and social capital were the significant roles in creating value for stockholders as well as for other stakeholders. However, the association between R&D expenditure efficiency (RDE) and the companies' operating, financial, and stock market performance is positively significant in Taiwan semiconductor industry. This indicates that Taiwan semiconductor companies perceive R&D as a source of "value creation" when they outsourced the most parts of manufacturing in overseas market. Finally, the results show that intellectual property rights (IPRs) has a significantly positive association with the companies' operating and stock market performance. The findings indicate that IPRs remain importance for the companies' competitive advantages through its significant role in value creation. Nevertheless, the results seem to indicate a positive association between the board composition and the companies' performance.

## 6. Implications

The results of the study have several practical implications. The major one is that the VAIC method allows managers to measure their IC and to benchmark against the competitors in the same industry. However, especially in high-tech industry, the VAIC measure may not enough to value the companies performance in terms of value added of their intangibles. Synthesizing the literatures (Bounfour, 2002, 2003; Edvinsson and Malone, 1997; Moristsen *et al*., 2001; Ross *et al*., 1997), the study added R&D expenditure into the VAIC method showing the better explanation in the management of the knowledge-based economy. Additionally, the results are coherent with Taiwan semiconductor companies' real situation on the role of IC in value creation.

## 7. Limitation and Recommendation

This research is not without its limitations. First, the impact direction among intellectual capital, R&D expenditure, and intellectual property rights were still remains "problematic". From managerial point of view, the discussion does not contribute to the debate of how a company could increase its performance by intellectual capital interactions. Furthermore, intellectual property rights and IP-management may leverage companies' performance, and it cannot be ignored in the context of intellectual capital. Second, given that findings from the present study is adopted in the specific industry, future study should be undertaken to examine the cross industries. Finally, the results related to the impact of dummy variables on dependent variables are mixed and not significant in most cases. Additional research should give more attention on dummy variables and could eventually introduce other factors that provide better explanation, if the necessary data were to be available.

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Table 1. Sample selection procedure

| | Firm-years |
|---|---|
| Initial companies listed on TSE market during 2000~2008 | 519 |
| Deleting companies with negative book value | 111 |
| Deleting missing data on selected variables and off-market companies | 4 |
| Deleting companies with negative HC or SC value | 37 |
| Final sample | 367 |

Note: Table 1 outlines the sample selection procedures in the study. After deleting companies with negative book value, off-market firms, missing data on the selected variables and negative HC or SC variables in a current year, the final sample consists of a total of 367 firm-year observations. The missing data generally happens in the value of selected intellectual capital variables.

Table 2. Descriptive statistics for selected variables

| | Range | Min | Max | Mean | Std. Devi. | Vari. | Skew | Kurtosis |
|---|---|---|---|---|---|---|---|---|
| HCE | 6.417 | 1.000 | 7.417 | 1.458 | .694 | .481 | 5.421 | 35.244 |
| SCE | .865 | .000 | .865 | .252 | .161 | .026 | 1.044 | 1.776 |
| CEE | .201 | .003 | .203 | .051 | .042 | .002 | 1.320 | 1.229 |
| RDE | .292 | .000 | .292 | .030 | .034 | .001 | 2.461 | 11.414 |
| GPM | 94.100 | 2.230 | 96.330 | 30.805 | 15.916 | 253.317 | 1.407 | 4.306 |
| EPS | 50.700 | -9.200 | 41.500 | 3.690 | 4.853 | 23.551 | 3.157 | 16.195 |
| ROE | 177.080 | -84.270 | 92.810 | 17.566 | 17.493 | 305.992 | -.315 | 4.905 |
| ROA | 145.610 | -62.310 | 83.300 | 13.252 | 13.031 | 169.803 | -.102 | 6.254 |

**Note:** Variable are define as follows: HCE is the ratio indicates how much value added has been created by one financial unit invested in employees; SCE is the ratio shoes the contribution of structural capital in value creation; CEE is the ratio presents firms use financial and physical capital into account in order to have a full insight into the totality of VA created by a firm's resources; RDE is the ratio indicates how much value added has been created by one financial unit invested in R&D; GPM is the ratio of (Revenue-cost of goods sold) divided by revenue, sued as a proxy measure for operating performance; ROA is the ratio of earnings before interest and taxes divided by book value of total assets; and ROE is the ratio of earnings after interest and taxes divided by book value of total assets, used as a proxy measure for financial performance; EPS is the ratio of net income divided by weighted average common shares, used as a proxy measure for stock market performance.

Table 3. Correlation analysis of selected variables (n = 367)

| Variables | GPM | EPS | ROA | ROE |
|---|---|---|---|---|
| HCE | .000 | -.044 | -.096* | -.079 |
| SCE | .000 | -.092* | -.169** | -.142** |
| CEE | .273** | -.039 | .034 | .009 |
| RDE | .279** | .141** | .232** | .215** |

**Note:** ** Correlation is significant at the 0.01 level and * at the 0.05 level, respectively; variables are defined follows: HCE is the ratio indicates how much value added has been created by one financial unit invested in employees; SCE is the ratio shoes the contribution of structural capital in value creation; CEE is the ratio presents firms use financial and physical capital into account in order to have a full insight into the totality of VA created by a firm's resources; RDE is the ratio indicates how much value added has been created by one financial unit invested in R&D; GPM is the ratio of (Revenue-cost of goods sold) divided by revenue, used as a proxy measure for operating performance; ROA is the ratio of earnings before interest and taxes divided by book value of total assets; and ROE is the ratio of earnings after interest and taxes divided by book value of total assets, used as a proxy measure for financial performance; EPS is the ratio of net income divided by weighted average common shares, used as a proxy measure for stock market performance.


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Table 4. Linear multiple regression results for operating performance

| Variable | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | 24.742 | 2.599 | | 9.520 | .000 |
| HCE | .241 | 2.325 | .011 | .104 | .917 |
| SCE | 2.873 | 9.305 | .029 | .309 | .758 |
| CEE | 61.725 | 24.154 | .163 | 2.555 | .010* |
| RDE | 80.333 | 30.264 | .170 | 2.654 | .008*** |
| IPE | 2.975 | 1.641 | .093 | 1.814 | .071* |
| CSR | -7.096 | 3.495 | -.101 | -2.030 | .043** |
| The level of director ownership | -9.389 | 8.665 | -.068 | -1.084 | .279 |
| The level of stock pledge | 2.859 | 5.372 | .029 | .532 | .595 |
| Cross Holding | -2.442 | 1.686 | -.076 | -1.449 | .148 |
| Pyramid Structure | -2.149 | 1.985 | -.057 | -1.083 | .280 |
| n | 367 | | | | |
| Adj. $R^2$ | 0.101 | | | | |
| $F$ | 5.127*** | | | | |

**Note**: Significant at ***1, **2 and *10 percent levels, respectively.

Table 5. Linear multiple regression results for financial performance

| Variable | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | 14.548 | 2.133 | | 6.821 | .000 |
| HCE | 1.011 | 1.908 | .054 | .530 | .597 |
| SCE | -15.489 | 7.636 | -.191 | -2.028 | .043** |
| CEE | -51.167 | 19.822 | -.165 | -2.581 | .010*** |
| RDE | 112.037 | 24.836 | .290 | 4.511 | .000*** |
| IPE | 1.874 | 1.346 | .072 | 1.392 | .165 |
| CSR | -.813 | 2.868 | -.014 | -.284 | .777 |
| The level of director ownership | -3.712 | 7.111 | -.033 | -.522 | .602 |
| The level of stock pledge | 5.377 | 4.409 | .067 | 1.220 | .223 |
| Cross Holding | 1.055 | 1.383 | .040 | .763 | .446 |
| Pyramid Structure | -4.422 | 1.629 | -.145 | -2.715 | .007*** |
| n | 367 | | | | |
| Adj. $R^2$ | 0.097 | | | | |
| $F$ | 4.938*** | | | | |

**Note**: Significant at ***1, **2 and *10 percent levels, respectively.

Table 6. Linear multiple regression results for financial performance

| Variables | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | 19.321 | 2.887 | | 6.694 | .000 |
| HCE | .821 | 2.583 | .033 | .318 | .751 |
| SCE | -16.138 | 10.335 | -.148 | -1.562 | .119 |
| CEE | -78.779 | 26.826 | -.189 | -2.937 | .004*** |
| RDE | 151.250 | 33.612 | .292 | 4.500 | .000*** |
| IPE | 2.169 | 1.822 | .062 | 1.191 | .235 |
| CSR | -.268 | 3.881 | -.003 | -.069 | .945 |
| The level of director ownership | -3.462 | 9.624 | -.023 | -.360 | .719 |
| The level of stock pledge | 5.868 | 5.967 | .055 | .983 | .326 |
| Cross Holding | 1.774 | 1.872 | .050 | .947 | .344 |
| Pyramid Structure | -5.673 | 2.204 | -.138 | -2.574 | .010*** |
| n | 367 | | | | |
| Adj. $R^2$ | 0.082 | | | | |
| *F* | 4.282*** | | | | |

**Note**: Significant at ***1, **2 and *10 percent levels, respectively.

Table 7. Linear multiple regression results for stock market performance

| Variables | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | 3.408 | .800 | | 4.260 | .000 |
| HCE | .706 | .716 | .101 | .987 | .324 |
| SCE | -5.049 | 2.864 | -.167 | -1.763 | .079* |
| CEE | -20.880 | 7.436 | -.181 | -2.808 | .005*** |
| RDE | 28.170 | 9.316 | .196 | 3.024 | .003*** |
| IPE | 1.506 | .505 | .155 | 2.982 | .003*** |
| CSR | -.924 | 1.076 | -.043 | -.859 | .391 |
| The level of director ownership | -3.917 | 2.667 | -.094 | -1.468 | .143 |
| The level of stock pledge | 2.860 | 1.654 | .096 | 1.730 | .085* |
| Cross Holding | 1.039 | .519 | .106 | 2.002 | .046** |
| Pyramid Structure | -1.674 | .611 | -.147 | -2.739 | .006* |
| n | 367 | | | | |
| Adj. $R^2$ | 0.084 | | | | |
| *F* | 4.356*** | | | | |

**Note**: Significant at ***1, **2 and *10 percent levels, respectively.