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How Does the Market Value Management Practices? Decomposition of intangible assets

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How Does the Market Value Management Practices? Decomposition of intangible assets*

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Abstract

This paper examines the extent to which firms' management practices are valued in the marketplace using data from an interview survey. We divide firms' market value into tangible and intangible assets, and further decompose the intangible asset value into the components attributable to advertising, research and development (R&D), and management practices. We find that the component attributable to management practice is much smaller than those attributable to R&D or advertising. We also find that, among various management practices, human resource management has a significantly positive impact on Tobin's q. Some management practice variables, however, have significantly negative impacts on Tobin's q, contrary to the findings of Bloom and Van Reenen (2007; 2010; 2012), to which we referred when we conducted the interview survey. This contradiction may be due to differences in our surveying methods and in good management practices between Japan and other countries.

Keywords: Management practice; Intangible assets; Decomposition

JEL classification: L22, M10, M12

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INTRODUCTION

It has been argued that various kinds of intangible assets influence firm performance. Corrado, Hulten, and Sichel (2005; 2009) classified intangible assets into three categories: computerized information, innovative property, and economic competencies. As to computerized information, Brynjolfsson and Hitt (1995), for example, examined the relationship between IT investment and productivity. Many management scholars have examined the impact of innovative property or technological capability on firm performance (Argyres, 1996; Helfat, 1994; 1997; Henderson and Cockburn, 1994). Brand equity, one component of economic competencies, has been studied by marketing scholars (Aaker, 1991; Ito, 2000; Simon and Sullivan, 1993). Moreover, management practice, the other component of economic competencies related to human and organizational capital, was examined recently (Bloom and Van Reenen, 2007; 2010).

It is recognized that such intangible assets are valuable to firms, but they are not publicly revealed enough. According to Yuka Shoken Hokoku-sho (Japanese 10k report) of Canon issued in December 2011, for example, the tangible fixed assets are 750 billion yen, while the intangible fixed assets are 35 billion yen. The latter includes patents, land leaseholds, trademarks, designs, software and so on, which are only some parts of the intangible assets discussed above, but most of the intangible assets are not reported in firm’s balance sheet.

Since firms spend much resource to acquire and accumulate intangible assets, it is

important to know how the market values them. While several researchers have attempted to evaluate technological capability and brand equity by using the investment in R&D and advertising, few studies have evaluated human and organizational capital. Especially, market value of management practices has not been examined, because the investment in improvement of management practices is not usually available.[1]

Therefore, this study tries to know how the market values management practices using the score of the interview survey on management practices for Japanese firms. To do so, we decompose intangible assets estimated using Tobin's q, following Konar and Cohen (2001) and Simon and Sullivan (1993). As Konar and Cohen do in their study on the value of firms' environmental performance, we separate out management practices from the intangible assets of the firm and examine how the market evaluates management practices.

The structure of this study is as follows: In the next section, we explain about our management practice survey and propose our analysis. In the third section, we describe data and variables. In the fourth section, we report the results of estimation, and with the results, decompose estimated value of intangible assets into the components attributable to management practices and others. The final section is discussion about the results and the future research agenda.

[1] Miyagawa, Takizawa, and Edamura (2012) is an exception. They evaluate economic competence using the data on labor costs and expense of organizational reform.

MARKET VALUE OF MANAGEMENT PRACTICE

Management Practice Survey

Following Bloom and Van Reenen (2007), we conducted the interview surveys, "Intangible Assets Interview Survey in Japan" (hereinafter referred to as IAISJ). We interviewed the managers of the planning departments of the listed firms in Japan. We conducted the interview twice. The first interview was done by Intage Inc. between November, 2011 and February, 2012. The second interview was done by Teikoku Databank, Ltd. between July and September, 2012. Consequently, we could accomplish interviews with 402 firms.[2] The composition of the industries of the respondents is described in Table 1.

--- Insert Table 1 around here ---

We asked the questions in ten categories: business environment, production management system, organizational goal/target, human resource management, human resource development, acquisition of human resource, lifetime employment system, industrial relations, decision making and information flow, and organizational reform. We suppose that organizational goal/target, industrial relations, and decision making and information flow are about organizational capital,

[2] The number of the firms we interviewed is 277 for the first interview and 130 for the second interview. Among them, we found two duplicates and three unavailable firm observations, and consequently, we use 402 firm observations.

while human resource management, human resource development, acquisition of human resource are about human capital.

We asked a few questions in each category except for the categories of lifetime employment system and industrial relations, which have only one question. In each question, we have three sub questions, and the more sub questions you answer positively, the more point you get. For example, there are several questions in the category of human resource development. One of the questions, Employee's expertise, is composed of three sub-questions:

(1) "Are employees rotated in a fixed schedule (e.g., once every two or three years)?"

(2) "To improve the expertise of the employees, are they assigned to a set position for a long time?"

(3) "Is there a systematic program in place for employees to acquire some expertise?"

If you answer "No" to the first sub-question, you get 1. If you answer "Yes", you move to the second sub-question. If you answer "No" to the second sub-question, you get 2. If you answer "Yes", you move to the third sub-question. If you answer "No" to the third sub-question, you get 3. If you answer "Yes", you get 4.

Consequently, we assign the score from 1 to 4 for each question, depending upon the answers to the three sub questions.[3]

[3] Miyagawa, Lee, Kabe, Lee, Kim, Kim, and Edamura (2010) describe the scoring system of this

Market Value of Management Practice

While there have been various ways to measure the value of the intangible assets, we adopt financial-market based estimation.[4] Following Lindenberg and Ross (1981), the market value of the firm (*MV*) can be divided into the portions of firm value attributable to the tangible (V_t) and the intangible assets of the firm (V_i).

$$MV = V_t + V_i \qquad (1)$$

Dividing the both sides of equation (1) by the tangible asset value give us

$$\left(MV/V_t\right) = 1 + \left(V_i/V_t\right). \qquad (2)$$

The tangible asset value of the firm, V_t, is measured as the replacement cost (*RC*) of the tangible assets of the firm. The left side of equation (2) may then be written as (*MV/RC*) which is by definition Tobin's q. Thus, we obtain

$$q = \left(MV/V_t\right) = 1 + \left(V_i/V_t\right). \qquad (3)$$

To estimate the impact of various factors on the intangible asset value of the firm, the following regression equation is estimated:

$$q - 1 = \left(V_i/V_t\right) = a + \sum bX + \sum cZ + \varepsilon \qquad (4)$$

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interview survey in more detail.

[4] Other than financial-market based estimation, Simon and Sullivan (1993) pointed out five techniques to measure brand equity: estimation based on the conditions of acquisition and divestment, based on the price premium commanded by a product, based on the brand name's influence on customer evaluation, based on brand replacement cost, and based on a brand-earnings multiplier.

Among *X*, we include the factors which affect such components of intangible assets as innovative property and economic competencies. As the factor related to innovative property, we include R&D expenditure. We also include advertising expenditure as the factor related to brand equity, one component of economic competencies. Moreover, as Konar and Cohen (2001) include environmental performance of the firm as the other factor affecting intangible asset value, we include management practice as the other factor related to economic competencies.

Moreover, market valuation is based on expected profitability. Thus, among control variables, *Z*, we include industry concentration ratio. We also control firm size and age.

The management score multiplied by estimated regression coefficient is the contribution of management practices to *Vi/Vt*. Similarly, we calculate the portion of *Vi/Vt* attributable to R&D activity and that attributable to advertising.[5]

DATA AND VARIABLES

Variables of Management Practice

We construct the variables of management practice using the score of the interview

[5] In general, the market value of the firm can be considered a function of the tangible and intangible asset value, and can be represented as $MV=G(V_t, V_i)$. If any interaction between the tangible assets and the intangible assets is expressed by the interaction term between V_t and V_i, the market value can be represented as $MV=V_t+V_i+V_t*V_i$. Then, we obtain $q=(MV/V_t)=1+((1+V_t)/V_t)*V_i$. While the coefficient of V_i is different from that in the model without considering the interaction effect into account, we can estimate the impact of various factors on the intangible asset value of the firm in the same regression. Moreover, when we decompose the three kinds of the intangible asset values using the coefficient estimated by the model with the interaction, the calculated intangible assets value is not V_i/V_t, but $((1+V_t)/V_t)*V_i$..

survey (IAISJ) described above. In the interview, the respondents were required to answer questions on the situation in the latter half of 2000s. To construct the other variables described below, therefore, we collect the financial data of each year from 2005 to 2010. Thus, it is supposed that we have 2412 observations (402 firms X 6 year). However, some of financial data for many years in the past is needed to construct several variables described below, and the data for many firms are missing. Consequently, the number of observations is 373 for the whole sample, 261 for manufacturing industry sub-sample, and 112 for non-manufacturing industry sub-sample.

As for management practice, we use the two types of explanatory variables. One is the first principal component calculated by principal component analysis. We asked various questions about management practices to measure the degree of good management practice. Thus, the first principal component is considered to be a general indicator of good management practice. The equation of component c_j is

$$c_j = \gamma_j (X - \mu) \tag{5}$$

γ_j is orthonormal eigenvector of component j, X is the vector of scores calculated from each question and μ is mean vector of X. We aggregate all the scores into one variable, *pcaq_all*. To compare the components attributable to management practices and to others in decomposition of estimated value of intangible assets, we standardize the variables of

management practices, R&D activity, and advertising. Therefore, we use z score of each variable, which is denoted as *variable name_z* (*pcaq_all_z*, for example). Moreover, we divide the questions into two categories: organizational capital and human resource management. We aggregate the scores in the category of organizational capital into one variable, *pcaq_org*, and aggregate the scores in the category of human resource management into the other variable, *pcaq_human*.

The other type of management practice variable is the factor scores calculated by factor analysis. We suppose that good management practice is composed of several different characteristics, which common factors identified by factor analysis may indicate. Using factor analysis, we extract eight common factors: decision speed, evaluation, human resource development, openness of performance, use of specialists, autonomy, fairness, and team's goal penetration. We use each of the factor scores (*fac1, fac2, fac3, fac4, fac5, fac6, fac7, fac8*) of the eight common factors as a management practice variable. Varimax rotated factor matrices are indicated in Table 2.

--- Insert Table 2 around here ---

Other Variables

To decompose the intangible asset into components stemming from management

practice, advertisement, and R&D activities, we estimate Tobin's q – 1. Following Hori, Saito and Ando (2004), we calculate Tobin's q defined as follows.

$$q = \frac{Average\ stock\ price * Number\ of\ authorized\ \ shares + Interest\text{-}bearing\ liabilities}{Total\ Assets - K\ at\ previous\ year + Replacement\ value\ of\ real\ capital\ stock\ at\ previous\ year} \quad (6)$$

K is tangible assets which are calculated by perpetual inventory method following $K_t = (1-\delta)K_{t-1} + I_t$ except for land. Land price is maintained booked value. δ is depreciation rate.[6]

For R&D activities, we use the natural logarithm of R&D expenditure (*lnrd*), and for advertisement, we use the natural logarithm of advertising expenditure (*lnadv*). As control variables, we include the natural logarithm of number of employees (*lnL*), the natural logarithm of firm age (*lnage*), and four-firm cumulative concentration ratio (*CR4*). Year dummy and industry dummy are also included. Such financial data is collected from securities report by Development Bank of Japan. Definition and summary statistics of the variables are indicated in table 3 and table 4.

--- Insert Table 3 and Table 4 around here ---

Estimation Method

[6] The depreciation rate of building is 0.047, structure is 0.0564, machinery is 0.09489, ship is 0.1470, vehicle is 0.1470 and tool is 0.08838.

For estimating the attribution of each intangible asset to firm value, we use IAISJ and financial data between 2005 and 2010. These data are not panel, but pooled data because the same values of the management score of each firm is applied over the observation period. However, using pooled data may cause a problem of serial correlation as Wooldridge (2001) pointed out. Wooldridge (2001) also suggested that feasible GLS (FGLS) is a way to deal with the problem of serial correlation. Thus, we adopt FGLS as the estimation method.

Process of FGLS is as follows: First of all, we estimate regression of $q-1$ on independent variables, obtain the residuals $\hat{u}$, and take the logarithm of squared $\hat{u}$, $\log(\hat{u}^2)$. Using $\log(\hat{u}^2)$, we estimate regression of $\log(\hat{u}^2)$ on the same independent variables as the first step and obtain the fitted value $\hat{g}$ and exponentiate form of it, $\hat{h} = \exp(\hat{g})$. Finally, we estimate weighted least squares of $q-1$ on the independent variables using weight $1/\hat{h}$.

EMPIRICAL RESULTS

Estimation of q-1

The results from the estimation of equation (4) are indicated in Table 5, 6, and 7. Model (1) and (2) in Table 5 show the results using the first principal component of all the items (*pcaq_all_z*) as a management practice variable, while Model (3) and (4) show the results using the first principal component related to human resource management (*pcaq_human_z*) and that

related to organizational capital (*pcaq_org_z*). Model (1) and (3) are for the whole sample, while Model (2) and (4) are for the manufacturing industry sample.

As indicated in Model (1) and (2), *pcaq_all_z* is significant and positive. Thus, these results suggest that management practice has a significantly positive impact on Tobin's q. As shown in Model (3) and (4), on the other hand, *pcaq_org_z* is negative and it is significant in Model (3), while *pcaq_human_z* is positive and significant. Therefore, these results suggest that among management practices, human resource management and organizational capital have different effects. Management practice associated with human resource management has a positive impact on Tobin's q, while management practice associated with organizational capital has a negative impact on Tobin's q.

Regarding the other variables related to intangible assets, *lnrd_z* and *lnadv_z* are positive and significant in any models of Table 5. Therefore, R&D and advertising expenditures have a positive impact on q and the market value of intangible assets. As to control variables, *lnL* is negative and significant in any models, suggesting that large size in terms of number of employees has a negative impact on q. *CR4* is positive in Model (1) and (2), while negative in Model (3) and (4), but it is significant only in Model (4) . *Lnage* is negative for the whole sample and significant in Model (3), while it is positive for the manufacturing industry sample and significant in Model (2).

--- Insert Table 5 around here ---

Table 6 shows the results of the estimation for the whole sample (Model (5) and (8)), manufacturing industry sample (Model (6) and (9)), and non-manufacturing sample (Model (7) and (10)). Since R&D data is not available in many firms in non-manufacturing industries, *lnrd* is not included in each model. As indicated in Model (5), *pcaq_all_z* is positive and significant for manufacturing and for non-manufacturing samples as the results shown in Table 5, while it is positive but not significant for the whole sample. Advertising expenditure, however, is significantly positive for the whole sample and for manufacturing industry sample, but it is significantly negative for non-manufacturing industry sample.

As shown in Model (8), (9), and (10), *pcaq_human_z* is positive and significant for any samples. However, *pcaq_org_z* is negative and significant for the whole sample and for manufacturing industry sample, while it is positive (but not significant) for non-manufacturing industry sample. Therefore, it is a very robust result that management practice associated with human resource management has a positive impact on Tobin's q.

--- Insert Table 6 around here ---

Table 7 shows the results using the eight factor scores as a management practice variable. Model (11) and Model (13) are for the whole sample, Model (12) and Model (14) are for manufacturing industry sample, and Model (15) is for non-manufacturing industry sample.

Factor 1 (decision speed) is negative in Model (11), (12), (13), and (14) and significant except for Model (12), while it is significantly positive for non-manufacturing industry sample in Model (15). These contrasting results are interesting, because they indicate that in non-manufacturing firms, speedy decision making increases Tobin's q, while in manufacturing firms, it decreases Tobin's q. It may suggest that in manufacturing firms, prior consultation with the people concerned is important in decision making process, although it takes time. Such groundwork may smooth the way to a consensus and increase Tobin's q.

Factor 2 (evaluation) is positive in any models and significant except for Model (15). It suggests that good evaluation promotes motivation of employees and firm performance especially in manufacturing firms. Factor 3 (human resource development) is positive but insignificant in the first four models, while it is significantly negative for non-manufacturing industry sample in Model (15). Thus, human resource development does not affect Tobin's q of Japanese manufacturing firms, and it even decreases Tobin's q of non-manufacturing firms.

Factor 4 (openness of performance) is significantly negative in any models except for Model (16). Therefore, openness of performance has a negative impact on Tobin's q. Although it is hard to be interpreted, it may be related to informal channel of information. According to the Varimax rotated factor matrices in Table 2, the factor loading of "Handling when goals have not been achieved" is positive while that of "Non-stylized communication within the organization" is

negative. It suggests that firms with openness of performance do not tend to use informal channel of information. Informal channel of information may be important in the Japanese firms which emphasize a consensus among employees, and therefore, dependence only on formal information channel may lower performance.[7]

Factor 5 (use of specialists) is significantly positive only for non-manufacturing industry sample in Model (15). This suggests that specialists are important to increase Tobin's q in non-manufacturing firms.

Factor 6 (autonomy) is significantly negative in any models. Thus, it is strong evidence indicating that autonomy has a negative impact on Tobin's q. It may suggest that collectivism is more important than autonomy or individualism.

Factor 7 (fairness) is positive for the whole sample and manufacturing industry sample, and significant only when *lnrd* is not included for the whole sample in Model (13). For non-manufacturing industry sample, on the other hand, it is negative but insignificant in Model (15). This is weak evidence suggesting that fairness has a positive impact on Tobin's q.

Factor 8 (team's goal penetration) is positive in any models and significant for the whole sample and non-manufacturing sample. Therefore, this result suggests that understanding

[7] Another possible reason is that firms with poor performance tend to get higher score of the interview survey. We asked about results of checks and handling when goals have not been achieved. Firms with poor performance are likely to answer more sub-questions and get high score, while firms with good performance may stop the first sub-question and get low score because they have achieved their goals.

the goal among the team members increase Tobin's q in non-manufacturing firms.

--- Insert Table 7 around here ---

Decomposition of Intangible Assets

While management practices are not easily observed, the results described above suggest that the market values some of them. In this paper, we suppose that intangible assets are composed of management practices, brand equity (advertising and marketing activity), and technological capability (R&D activity). Thus, we can decompose intangible asset value into the components attributable to management practice, to brand equity, and to technological capability using the results of estimations.

Table 8 indicates the decompositions of intangible asset value (ratio to tangible asset value) into VImp, VIrd, and VIad, the components attributable to management practice, R&D, and advertising, respectively. There are fifteen different ways of decompositions, each of which is calculated using the estimation of each model in Table 5, 6, and 7. When we calculate each component, we use the estimated regression coefficients of the explanatory variables in each model.

--- Insert Table 8 around here ---

As indicated in Table 8, when we use the results of estimation using the first principal

component, VIrd is positive. VIad is positive for the whole sample and for the manufacturing industry sample, while it is negative for the non-manufacturing sample (the models used are (7) and (10)). VImp is negative when the model with *pcaq_all_z* for the manufacturing sample (the models used are (2) and (6)), while it is positive when the other eight models are used. As far as the value of each intangible asset is positive, the value of VImp is much smaller than that of VIrd and VIad, and VIrd is larger than VIad. Regarding VImp, non-manufacturing firms have larger value than firms in manufacturing firms. Regarding VIad, firms in the manufacturing industries have the largest value.

More strangely, any values of estimated VImp are negative when we apply the results of estimation using the factor score (Model (11) through (15)). This is partly because some variables of management practices have negative impacts on q-1. We will discuss a little on this negative value of VImp in the next section.

DISCUSSION AND CONCLUSION

This paper examines the relationship between the score of management practices and the market value of the firms in Japan. The objective of this study is to know how the market values management practices affecting intangible assets of the firm.

Some of management practice variables have a significantly positive impact on q-1.

Management practice associated with human resource management has a significantly positive coefficient in all the models, and the score of such factors as evaluation, and team's goal penetration has a significantly positive coefficient in most models. On the other hand, management practice associated with organizational capital and some other factors have either insignificant or negative coefficients. Probably because of their negative coefficients, the component of intangible asset value attributable to management practice is much smaller than the components attributable to R&D or to advertising. Moreover, it is even negative in some cases.

However, it is reasonable in some sense, because management practices as firms' routines are difficult for outsiders to observe. It is consistent that causal ambiguity is one of the intangible barriers to imitation. When a firm's distinctive capabilities involve tacit knowledge, they are difficult to articulate as an algorithm, formula, or set of rules, and therefore, it is not observable or imitable (Rumelt, 1984; Reed and DeFillipi, 1990). Because of this, it is argued that intangible assets can be the sources of sustainable competitive advantages (Villalonga, 2004).

Some researchers develop similar argument on the uniqueness of strategy. Uniqueness in strategy is a necessary condition for creating economic rents and should be positively associated with firm value. However, uniqueness in strategy heightens the cost of collecting and analyzing

information to evaluate a firm's future values, and therefore, capital markets systematically discount uniqueness in the strategy choices of firms (Litov, Moreton, & Zenger, 2012). Among intangible assets, technological capability and brand equity, on the other hand, are relatively easy for outsiders to observe, because R&D and advertising expenditures are publicly revealed.

We find management practice associated with organizational capital and some of factors significantly negative in estimation of q-1. As Bloom and Van Reenen (2007; 2010; 2012) suggested, however, high score of management practice means good management practice, and therefore, the variables should not be significantly negative.

We consider two possible reasons for such contradiction: difference in the way of the survey and difference in good management practice across the countries. While Bloom and Van Reenen (2007) conducted the survey to the plant manager of manufacturing, we did so to the managers of the planning departments. That is, while they asked on management practices of manufacturing plants, we asked on management practice of firms as a whole. Some management practices distinctively good for manufacturing plants, however, may not be so for non-plant establishments or organization as a whole. Therefore, this difference in the way of the interview may be the reason for the different results.

Suppose the item on training, for example. It is asked if training on an occupational ability (manufacturing, sales, etc.) is regularly executed in the interview. High score of this item

may result in high performance at the plant level, but may not do so at the company level. Instead of such training, training on leadership, strategy formulation, and finance, or education in MBA program may be relevant.

The other reason may be related to the difference in management style among the countries (Aoki, 1988; 2010). For example, speedy decision making is usually considered a good management practice, while ground work, which slows down decision making, is regarded a bad management practice. In the U.S. firms with hierarchical coordination mechanism, people only have to report to their boss, and do not need prior consultations with many people. Therefore, speedy decision making without long ground work may increase productivity and firm performance. In Japanese firms with horizontal coordination mechanism, on the other hand, people need to consult with many people ex ante to reach a consensus. Decisions without a consensus may not be implemented smoothly, and therefore decrease firm performance.

That is, good management practices which lead to high firm performance are different between in Japan and in other countries. We need analysis of individual management practices in more detail to know the reason for the different results.

Thus, there are two future research agenda: examining industry difference in the effects of management practices and refining the survey to capture good management practice for high performance of Japanese firms. While there are many problems other than the future research

agenda pointed out above, this study is the first attempt to measuring and decomposing the market value of intangible assets using the data of interview survey on management practices.

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Table 1: Industry Composition of the Responding Firms

Industry	**# of Respondents (Firms)**
Foods	26
Chemical	19
Pharmaceutical	10
Metal	37
Machinery	42
Electric Machinery	45
Automotive	17
Other Manufacturing	76
Sub Total (Manufacturing)	272
Construction	21
Wholesale and Retail	27
Restaurant	19
Real Estate	10
Transportation	5
Information Service	25
Other Service	23
Sub Total (Non-manufacturing)	130
Total	402

Table 2: Varimax Rotated Factor Matrices

Question	Factor							
	1	2	3	4	5	6	7	8
	decision speed	evaluation	HR development	openness of performance	use of specialists	autonomy	fairness	team's goal penetration
Time of groundwork in new business development	.766	.011	.005	-.035	.006	.074	.025	-.016
Time of groundwork in business exit	.726	.065	.016	.161	-.088	-.035	-.065	-.028
Handling employees that perform well	.069	.579	.005	.195	-.085	.056	.033	.098
Handling when goals hyave been achieved	.027	.489	.103	.119	.040	.180	.066	-.124
Schemes to improve motivation	-.004	.326	.157	.121	.168	.115	.118	.101
Handling employees that perform poorly	-.028	.296	.125	.055	.250	-.006	-.052	.060
Nurturing human resources through training	-.083	.195	.601	.044	.133	.031	-.021	.133
Nurturing human resources through OJT	.030	.037	.460	-.013	.072	.249	.106	.088
Sharing information on corporate strategy	.087	.037	.363	.157	-.092	-.013	-.049	-.166
Evaluating the interpersonal skills of the managers	-.013	.333	.353	.066	.216	.020	.093	.291
Handling when goals have not been achieved	.012	.182	.127	.600	.050	.081	.084	-.008
Permeation of achievement of goals and performance	.027	.093	.026	.479	-.035	.011	.101	.027
Non-stylized communication within the organization	-.039	-.037	-.005	-.256	-.083	-.033	.035	-.069
Employees' expertise	.018	-.004	-.035	.112	.619	.136	.024	-.091
Utilization of foreign employees	-.046	.047	.059	-.006	.259	-.039	.035	.071
Checks on goal achivement and performance	.076	.153	.018	.172	-.089	.535	-.004	.069
Securing good manpower	.090	.217	.106	-.050	.132	.274	-.161	-.031
Relationship between management and employees	-.097	.031	.133	.017	.124	.250	.093	.092
Setting target levels	-.019	.079	.032	.089	.063	.018	.601	.009
permeation of team's goal	-.043	.056	.093	.292	.023	.202	.000	.441

Table 3: Definition of Variables

Variables	Definition
V	Tobin's q minus 1
pcaq_all	First component of principle component analysis using questions 4, 5, 6
pcaq_human	First component of principle component analysis using all questions
pcaq_org	First component of principle component analysis using questions 3, 8, 9
fac#	#th factor score using all scores
lnrd	Logarithm of R&D expenditure
lnadv	Logarithm of advertising expenditure
lnage	Logarithm of firm age
CR4	4 firms consentration ratio
lnL	Logarithm of number of employees

Table 4: Summary Statistics

	All Industries			Manufacturing		
	Observations	Mean	Std. error	Observations	Mean	Std. error
V	269	0.02	1.00	241	−0.08	0.58
lnrd	269	13.37	1.95	241	13.64	1.80
lnadv	269	12.64	1.91	241	12.76	1.87
lnage	269	3.98	0.49	241	4.01	0.45
CR4	269	0.09	0.23	241	0.10	0.24
pcaq_human	269	0.09	1.39	241	0.04	1.39
pcaq_org	269	−0.04	1.20	241	−0.07	1.15
pcaqall	269	0.06	1.51	241	−0.01	1.47
fac1_1_mean	269	0.05	0.88	241	0.01	0.89
fac2_1_mean	269	−0.17	0.72	241	−0.26	0.68
fac3_1_mean	269	0.10	0.77	241	0.07	0.76
fac4_1_mean	269	−0.01	0.68	241	−0.02	0.68
fac5_1_mean	269	0.08	0.64	241	0.13	0.63
fac6_1_mean	269	0.08	0.65	241	0.11	0.64
fac7_1_mean	269	−0.06	0.64	241	−0.06	0.64
fac8_1_mean	269	−0.07	0.58	241	−0.04	0.58
year2	269	2006.93	1.47	241	2006.95	1.47

	Non-Manufacturing(concluding lnrd)			Non-Manufacturing		
	Observations	Mean	Std. error	Observations	Mean	Std. error
V	28	0.91	2.46	112	0.29	1.49
lnrd	28	11.07	1.66	28	11.07	1.66
lnadv	28	11.63	1.96	112	12.56	2.01
lnage	28	3.72	0.74	112	3.61	0.54
CR4	28	0.01	0.01	112	0.01	0.05
pcaq_human	28	0.56	1.24	112	0.23	1.41
pcaq_org	28	0.21	1.55	112	−0.04	1.30
pcaqall	28	0.61	1.78	112	0.25	1.62
fac1_1_mean	28	0.35	0.67	110	−0.09	0.81
fac2_1_mean	28	0.59	0.55	110	0.37	0.69
fac3_1_mean	28	0.30	0.87	110	0.15	0.83
fac4_1_mean	28	0.12	0.74	110	−0.03	0.61
fac5_1_mean	28	−0.36	0.60	110	−0.32	0.51
fac6_1_mean	28	−0.21	0.67	110	−0.08	0.57
fac7_1_mean	28	−0.02	0.69	110	0.05	0.54
fac8_1_mean	28	−0.24	0.60	110	−0.11	0.67
year2	28	2006.79	1.47	112	2007.06	1.49

Table 5: Determinants of Tobin's q (1)

	(1)	(2)	(3)	(4)
pcaq_all_z	0.056 **	0.078 ***		
	(2.09)	(2.96)		
pcaq_hum_z			0.103 ***	0.099 ***
			(3.34)	(3.17)
pcaq_org_z			−0.082 **	−0.049
			(−2.44)	(−0.91)
lnrd_z	0.166 ***	0.201 ***	0.197 ***	0.220 ***
	(3.09)	(4.55)	(4.07)	(2.80)
lnadv_z	0.127 **	0.145 ***	0.112 **	0.095 **
	(2.41)	(3.53)	(2.41)	(2.40)
lnL	−0.142 ***	−0.190 ***	−0.148 ***	−0.176 *
	(−2.72)	(−3.76)	(−3.00)	(−1.92)
CR4	0.020	0.038	−0.028	−0.109 *
	(0.34)	(0.68)	(−0.53)	(−1.74)
lnage	−0.121	0.089 **	−0.188 *	0.039
	(−1.49)	(2.30)	(−1.86)	(0.72)
_cons	1.280 **	0.587	1.440 **	0.698
	(2.36)	(1.44)	(2.33)	(0.91)
Observtations	269	241	269	241
F-Statistics	27.048	11.474	23.604	13.466
Prob>F	0.000	0.000	0.000	0.000
R-sq	0.364	0.228	0.415	0.195
adjusted R-sq	0.326	0.190	0.378	0.153

Note) Estimation method is GLS. Asterisks *. **. *** indicate that the coefficient is significant with significance level of 10%, 5%, 1%, respectively. Industry dummy and year dummy are included but not reported. t-statistics is in italic.

Table 6: Determinants of Tobin's q (2)

	(5)	(6)	(7)	(8)	(9)	(10)
pcaq_all_z	0.017	0.055 **	0.122 *			
	(0.80)	(2.14)	(1.87)			
pcaq_hum_z				0.080 ***	0.089 ***	0.176 **
				(2.99)	(3.45)	(2.43)
pcaq_org_z				−0.082 ***	−0.080 **	0.010
				(−2.62)	(−2.04)	(0.11)
lnadv_z	0.092 **	0.172 ***	−0.135 *	0.069 **	0.171 ***	−0.135
	(2.31)	(5.00)	(−1.70)	(2.03)	(5.66)	(−1.53)
lnL	−0.012	−0.049 *	0.055	0.004	−0.018	0.071
	(−0.49)	(−1.79)	(0.59)	(0.17)	(−0.68)	(0.79)
CR4	0.050	0.015	0.759	−0.001	−0.057	0.752
	(0.78)	(0.28)	(1.08)	(−0.01)	(−1.23)	(1.03)
lnage	−0.394 ***	−0.116	−1.112 ***	−0.492 ***	−0.137	−1.252 ***
	(−4.32)	(−1.49)	(−4.13)	(−5.32)	(−1.49)	(−5.07)
_cons	1.330 ***	0.475	4.096 ***	1.662 ***	0.395	4.366 ***
	(2.96)	(1.14)	(4.19)	(3.80)	(0.84)	(4.31)
Observtations	373	261	112	373	261	112
F-Statistics	14.535	7.431	8.142	11.868	9.889	9.042
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000
R-sq	0.285	0.148	0.584	0.236	0.167	0.641
adjusted R-sq	0.253	0.113	0.519	0.200	0.131	0.580

Note)

Estimation method is GLS. Asterisks *. **. *** indicate that the coefficient is significant with significance level of 10%, 5%, 1%, respectively. Industry dummy and year dummy are included but not reported. t-statistics is in italic.

Table 7: Determinants of Tobin's q (3)

	(11)	(12)	(13)	(14)	(15)
fac1_z	−0.053 *	−0.032	−0.060 **	−0.060 *	0.212 **
	(−1.72)	(−0.95)	(−2.36)	(−1.70)	(2.51)
fac2_z	0.097 **	0.096 ***	0.098 ***	0.119 ***	0.181
	(2.47)	(2.66)	(3.29)	(3.55)	(1.54)
fac3_z	0.036	0.047	0.039	0.042	−0.154 **
	(1.14)	(1.34)	(1.54)	(0.99)	(−2.10)
fac4_z	−0.114 **	−0.139 **	−0.106 ***	−0.121 **	−0.127
	(−2.42)	(−2.42)	(−2.86)	(−2.23)	(−1.03)
fac5_z	−0.008	0.036	−0.017	−0.029	0.410 *
	(−0.21)	(1.09)	(−0.65)	(−0.87)	(1.95)
fac6_z	−0.070 **	−0.043 *	−0.071 **	−0.068 **	−0.529 *
	(−2.04)	(−1.75)	(−2.35)	(−2.30)	(−1.96)
fac7_z	0.017	0.015	0.047 *	0.029	−0.096
	(0.59)	(0.53)	(1.86)	(0.92)	(−0.70)
fac8_z	0.077 **	0.041	0.079 ***	0.031	0.233 *
	(2.30)	(1.31)	(2.90)	(1.07)	(1.88)
lnrd_z	0.182 ***	0.169 ***			
	(3.04)	(3.05)			
lnadv_z	0.109 **	0.085	0.097 ***	0.111 *	0.336 **
	(2.39)	(1.55)	(2.77)	(1.93)	(2.56)
CR4	−0.117 *	−0.084	0.003	−0.027	−0.231 **
	(−1.96)	(−1.37)	(0.12)	(−0.83)	(−2.50)
lnage	−0.005	−0.184 ***	−0.021	−0.121 **	−4.699 *
	(−0.06)	(−3.63)	(−0.28)	(−2.24)	(−1.83)
lnL	−0.328 ***	0.044	−0.387 ***	−0.093	−1.143 ***
	(−2.69)	(0.84)	(−3.52)	(−1.07)	(−3.76)
_cons	2.154 ***	0.410	1.233 **	0.268	8.338 ***
	(3.04)	(0.77)	(2.41)	(0.57)	(5.37)
Observtations	269	241	371	261	110
F-Statistics	17.189	9.381	16.335	5.739	33.088
Prob>F	0.000	0.000	0.000	0.000	0.000
R-sq	0.435	0.230	0.417	0.181	0.699
adjusted R-sq	0.385	0.167	0.378	0.124	0.623

Note) Estimation method is GLS. Asterisks *. **. *** indicate that the coefficient is significant with significance level of 10%, 5%, 1%, respectively. Industry dummy and year dummy are included but not reported. t-statistics is in italic.

Table 8: Decomposition of Intangible Assets

Decomposition of V	Used Model	Obs	Mean	Std. Dev.	Min	Max
VIad	(1)	269	0.010	0.108	−0.247	0.229
VIrd	(1)	269	0.014	0.150	−0.474	0.362
VImp	(1)	269	0.001	0.050	−0.091	0.124
VIad	(2)	241	0.019	0.120	−0.270	0.262
VIrd	(2)	241	0.041	0.167	−0.572	0.437
VImp	(2)	241	−0.001	0.068	−0.127	0.173
VIad	(3)	269	0.009	0.095	−0.218	0.202
VIrd	(3)	269	0.016	0.178	−0.562	0.430
VImp	(3)	269	0.003	0.096	−0.263	0.189
VIad	(4)	241	0.012	0.078	−0.176	0.171
VIrd	(4)	241	0.045	0.183	−0.626	0.479
VImp	(4)	241	0.000	0.089	−0.236	0.160
VIad	(5)	373	0.012	0.078	−0.206	0.165
VImp	(5)	373	0.000	0.016	−0.028	0.038
VIad	(6)	261	0.025	0.141	−0.319	0.309
VImp	(6)	261	−0.005	0.049	−0.089	0.122
VIad	(7)	112	−0.012	0.124	−0.208	0.303
VImp	(7)	112	0.016	0.117	−0.186	0.245
VIad	(8)	373	0.009	0.059	−0.155	0.125
VImp	(8)	373	0.003	0.080	−0.217	0.184
VIad	(9)	261	0.025	0.140	−0.319	0.309
VImp	(9)	261	0.000	0.085	−0.235	0.177
VIad	(10)	112	−0.012	0.125	−0.209	0.303
VImp	(10)	112	0.022	0.175	−0.311	0.356
VIad	(11)	269	0.009	0.093	−0.212	0.197
VIrd	(11)	269	0.015	0.165	−0.519	0.397
VImp	(11)	269	−0.030	0.160	−0.367	0.461
VIad	(12)	241	0.011	0.070	−0.158	0.153
VIrd	(12)	241	0.035	0.141	−0.483	0.369
VImp	(12)	241	−0.032	0.160	−0.398	0.394
VIad	(13)	371	0.007	0.050	−0.132	0.106
VImp	(13)	371	−0.006	0.153	−0.304	0.548
VIad	(14)	261	0.016	0.091	−0.207	0.201
VImp	(14)	261	−0.044	0.158	−0.392	0.329
VIad	(15)	110	0.024	0.310	−0.754	0.518
VImp	(15)	110	−0.121	0.646	−1.111	1.826