

**Management Practices and Firm Performance in
Japanese and Korean Firms
-An Empirical Study Using Interview Surveys-**

August 2009

**Keun Lee
(Seoul National University)
Tsutomu Miyagawa
(Gakushuin University and RIETI)
Shigesaburo Kabe
(Japan Center for Economic Research)
Junhyup Lee
(Seoul National University)
Hyoungjin Kim
(Seoul National University)
YoungGak Kim
(Hitotsubashi University)
Kazuma Edamura
(Institute of Intellectual Property)**

* This paper is a revised version of JCER Discussion Paper No. 120. We thank Professors Mitsuhiro Fukao (Japan Center for Economic Research and Keio University) and Haruo Horaguchi (Hosei University) for their insightful comments. Professors Kyoji Fukao (Hitotsubashi University), Keiko Itoh (Senshu University) and other members of the project entitled 'Productivity and Organizational Capital in East Asian Countries' at the Japan Center for Economic Research, also gave us helpful comments to improve our paper. We also thank Professor Takizawa of Toyo University, and Mr. Kawakami for their excellent research assistance.

Abstract

To compare management practices between Japanese and Korean firms, we conducted interview surveys on organizational and human resource management based on Bloom and Van Reenen (2007). The average management scores resulting from the interview surveys in Japanese firms were higher than in Korean firms. The gap in the scores between Japan and Korea can be explained by more conservative human resource management practices in Korean small and medium sized firms. We regressed some indicators representing management practices on firm performance. Estimation results suggest that in Japan, organizational reform plays a role in improving firm performance, while management practices shown in the interview scores do not affect firm performance directly. In Korea, the measure obtained by factor analysis reflecting human resource management improves firm performance in the whole samples. In addition, the average score as well as the measure obtained by factor analysis affects firm performance in the Korean manufacturing sector.

Keywords: Intangible assets, Management practices, Organizational capital, Human resource management, Factor analysis

JEL classification numbers: D21, L23, M11, M12, M15, M51

Contact: Tsutomu Miyagawa

Faculty of Economics, Gakushuin University

1-5-1 Mejiro, Toshima-ku, Tokyo, 171-8588, Japan

Tel: +81-3-5992-2257

Fax: +81-3-5992-1007

[E-mail: 19990230@gakushuin.ac.jp](mailto:19990230@gakushuin.ac.jp)

1. Introduction

The US economy had marked accelerated economic growth from the late 1990s to the first half of 2000s. At first, many economists and policymakers believed that the rapid growth in the IT industry and IT investment contributed to the acceleration in US economic growth, and many advanced countries encouraged the IT industry and IT investment in their own countries. However, the gaps in rates of economic or productivity growth between the US and other advanced countries have remained intact even in the early 2000s. Since then, many economists have paid attention to the complementary role of intangible assets in productivity growth. That is, they started to believe that without intangible assets, IT assets do not contribute to productivity growth at the firm and aggregated level.¹

Corrado, Hulten and Sichel (hereafter referred to as CHS) (2005, 2006), and estimated the investment in intangible assets at the aggregate US economy level, classifying intangible assets into three categories: computerized information, innovative property, and economic competencies. Following CHS (2006), many researchers in other advanced countries tried to estimate intangible investment.² Comparing the estimation results in Japan with those in the US and the UK, Fukao et al (2009) found the following characteristics of Japanese intangible

¹ Economic Report of the President 2007 wrote 'Only when they (businesses) made intangible investments to complement their IT investments did productivity growth really take off.' (p. 56)

² See Marrano, Haskel and Wallis (2007) for the UK, Hao, Manole and van Ark (2008) for Germany and France, and Fukao et al. (2009) for Japan.

investment.

(1) Investment in computerized information measured as a share of GDP in Japan is almost the same as that in the US and the UK.

(2) Due to the large R&D investment levels in Japan, the ratio of investment in innovative property to GDP in Japan is greater than that in the US and the UK.

(3) As for investment in economic competencies, the investment/GDP ratio in Japan is much smaller than that in the US and the UK.

The third category includes investment in brand equity, firm-specific human capital, and organizational capital. Among these, the investment in firm-specific human capital and organizational capital in Japan is much smaller than that in the US and the UK. However, it is difficult to estimate these investment amounts at the aggregate level and to compare these among advanced countries.³ In addition, these investments depend on management practices at the firm level. Therefore, recent studies on intangible investment have focused on management practices on human resource management and organizational reform at the firm level using micro-data.

Black and Lynch (2005) categorized organizational capital into three components; accumulation in human capital, how employees' voices are reflected in the workplace, and

³ For example, CHS (2006) does not account for the investment in firm specific human capital through on-the-job training while this type of investment is very important in Japanese firms.

organizational design. Bloom and Van Reenen (2007) examined the effects of management practices on firm performance based on interview surveys of plant managers. Management practices were assigned scores based on interview results, and these scores were included as independent variables when they estimated the production function. According to their study, U.S. firms got the highest score of the four countries studied (France, Germany, the UK, the U.S.). They believed that the low score in European firms was partly explained by weak competition and the prevalence of many family-owned firms.

In Japan, Kurokawa and Minetaki (2006), Kanamori and Motohashi (2006), and Shinozaki (2007) examined the effects of organizational reform resulting from IT investment on firm performance by using the *Basic Survey on Business Enterprise Activities* and *IT Workplace Survey*. Their studies suggested that organizational reform resulting from IT investment was partially responsible for improving firm performance.

While our paper also focuses on the effects of organizational reform and human resource management on firm performance, there are three different features from the previous studies in Japan. First, we examined more comprehensive management practices on organizational and human resource management than earlier studies. Second, we studied the effects of management practice on firm performance using not only official surveys but also interview surveys following Bloom and Van Reenen (2007). Third, we compared the interview scores and firm

performances between Japanese and Korean firms.

In the next section, we describe our interview survey. Though our interview survey basically follows Bloom and Van Reenen (2007), we incorporate some questions that were not included in Bloom and Van Reenen (2007) to capture some unique features of Japanese and Korean firms. In the third section, we construct a management score by quantifying the interview results of Japanese and Korean firms, and compare the management practices in firms of the two countries. In the fourth section, using management scores and financial statements in Japanese and Korean firms, we estimate a production function and examine the effects of management practices on firm performance. In the last section, we summarize our studies.

2. The Interview Surveys in Japan and Korea

Why did we conduct the interview survey?

Recently, it has been recognized that qualitative factors in management practices not captured by official surveys are affecting firm performance. At first, many researchers conducted their own mailed surveys to examine these qualitative factors within firms. However, the response rates to the surveys were very low. For example, the response rate to the mailed survey conducted by Ichikowski (1990) -- who tried to examine the effect of human resource management on Tobin's Q or labor productivity-- was only 10%. In the U.S., researchers and statistical agencies have adopted interview surveys to improve the response rate. For example,

the response rate of the interview survey in the National Employers Survey conducted by the National Bureau of Census was 66% in the manufacturing sector and 61% in the non-manufacturing sector. Much of the recent research on human resource management has also incorporated interview surveys. Bloom and Van Reenen (2007) conducted interview surveys by telephone to examine management practices in firm and attained a 54% response rate. Following the above experiences, we also decided to conduct an interview survey.

How did we design our interview survey?

In our research, we followed the interview survey conducted by Bloom and Van Reenen. However, we conducted the survey by meeting the managers of the planning departments of firms face-to-face, while Bloom and Van Reenen (2007) conducted their survey by telephone. The reason why we conducted face-to-face interviews is that we were concerned about low response rates. In Japan and Korea, when we want to ascertain qualitative features in firms, face-to-face communication is a more useful tool than telephone interviews.

Bloom and Van Reenen (2007) classified their eighteen interview questions into four categories; product management, monitoring, the firm's target, and incentives for workers. While their survey was extended to only manufacturing plants, our survey was also extended to firms in the service sector. Thus, we excluded questions about product management, as they would not apply to all firms. Instead, we asked questions about organizational change and

on-the-job training. As a result, we can classify our questions into two categories; organizational capital and human resource management.

The first category covers the first four questions (Questions 1 to 4). In this category, we wanted to examine the managerial vision of the firm, the organizational goals, communication within the firm, and organizational reform. In the remaining questions (Questions 5 to 13) that focused on human resource management, we added a question about on-the-job training (OJT) to the questions in Bloom and Van Reenen (2007), because the effects of OJT in Japanese and Korean firms are considered significant to firm performance. The detailed interview questions are shown in Appendix 1.

We quantify the responses to the above questions as follows: In each question, we have three sub questions. If the firm manager responds negatively to the first sub-question, we give the response a 1 and move to the next question. If he responds positively to the first sub-question, we move to the second sub-question. If the manager responds negatively to the second sub-question, we mark a 2 and move to the next question. If he responds positively to the second sub-question, we move to the last sub-question. In the last sub-question, the positive response of the manager is given a 4, while a negative response is given a 3.

Our survey focused on four industries in the manufacturing sector (Electric machinery, Information and communication equipment , Motor vehicle , and Precision machinery) and

three industries in the service sector (Internet-based services and information services, Media activities, and Retail service). In Japan, we obtained our data from 573 firms. As the total sample was 1086 firms, the response rate in Japan was 52.8%. In Korea, we obtained the data of 350 of the sample 591 firms, thus the response rate was 59.2%⁴.

3. Management Practices in Japan and Korea

In this section, we compare the management practices between Japanese and Korean firms based on interview surveys.⁵ Table 1 shows the distribution of firms in Japan and Korea by industry. While the share of manufacturing firms in the total number of firms in Japan is 33.9%, the share of manufacturers in Korea is 84.9%. In particular, the firms in the motor vehicles industry in Korea account for 40% of the total number of firms. In Japan, the share of firms in the retail services is 40.0%.

(Place Table 1 here)

Table 2 shows the distribution of firms in Japan and Korea by size as measured by the number of employees. In Japan, the number of firms with fewer than 10,000 employees in the survey is 563 of the total 573. Of these, 313 are small and medium-sized firms (with fewer than 300 employees). In Korea, the number of firms with fewer than 10,000 is 348 out of the 350, of which 260 are small and medium-sized firms.

⁴ The Japanese survey was conducted from February, 2008 to September, 2008. The Korean Survey was conducted from May, 2008 to July, 2008.

⁵ The results in the Korean interview surveys are based on Lee et al. (2009).

(Place Table 2 here)

As explained in the previous section, we assigned scores to the management practices based on the interview surveys. Figure 1-1 shows the distribution of scores in all firms in Japan and Korea. In Japan, the average score for all firms is 2.73 and the variance is 0.23. Many firms fall between 2.5 and 3.5. In Korea, the average score is 2.33 and the variance is 0.32. The average score and the median value in Korea are lower than those in Japan and the variance of scores in Korea is higher. Most of the Korean firms range from 1.5 to 2.5.

(Place Figure 1-1 here)

However, the difference in the distribution of scores in Japan and Korea may reflect the difference in the industry composition in the samples. Thus, we examined the distribution of scores by industry. Figures 1-2, 1-3, and 1-4 show the distribution of scores in the manufacturing sector, the information-related services sector, and the retail sector respectively.⁶ In Figure 1-2, we find that the average score in the Japanese manufacturing sector is almost the same as the average score in all firms. We also find that the distribution of scores of all firms in Korea is affected by the distribution of scores in the manufacturing sector. While the average scores in the manufacturing and information-related services sectors in Korea are smaller than those of Japan, the average score in the retail sector in Korea is the same.

⁶ The information-related services sector consists of internet-based services and information services, and media activities.

(Place Figure 1-2 to Figure 1-4 here)

We classify our interview questions into two categories: one category consists of questions about organizational capital and the other, questions about human resource management. We show the distribution of scores in organizational capital from Figure 2-1 to Figure 2-4. In both countries, the average score in organizational capital is higher than that of all questions together. The scores in Japan are higher than in Korea. These results imply that the organizational targets are clear to all employees in Japan in more cases than in Korea, or Japanese firms improve their organizational structures more aggressively than Korean firms, because high scores in organizational capital indicate a greater degree of transparency of organizational goals or aggressive organizational reform.

(Place Figure 2-1 to Figure 2-4 here)

We also show the distribution of scores in human resource management in Figures 3-1 to 3-4. The average scores in human resource management are lower than those in organizational capital in both countries. The average scores in Japanese firms are higher than those in Korean firms in all sectors. In Korea, the low score in the manufacturing sector pulls down the score in all firms. As a high score in this category indicates more flexible human resource management, the results imply that Japanese firms are more flexible in their human capital management than Korean firms.

(Place Figure 3-1 to Figure 3-4 here)

As seen in Table 2, the Korean sample consists of more small and medium sized firms than the Japanese sample. Thus, we examine the distribution of average score in both countries by size in Figures 4-1 and 4-2. In Figure 4-1, where the distributions of average scores in firms with more than 300 employees are shown, we find a gap in the average score between Japan (2.81) and Korea (2.57). The median value (2.87) in Japanese firms is also higher than that (2.57) in Korean firms.

(Place Figure 4-1 & 4-2 here)

As for firms with fewer than 300 employees, the peak of the distribution for Japanese firms was at a point higher than the 2.5 mark, while for Korean firms, it was around 2. The difference in the distribution leads to a wider gap in the average score in firms in medium and small sized firms in both countries than that in large firms. In contrast to the relatively high mean in the distribution of Japanese firms (2.64), the mean in Korean firms is 2.25. This gap in the mean can be explained by the difference in the distribution in the average score in human capital. The mean in the average score in human capital in Korean firms is very low (2.00), while the corresponding mean in Japanese firms is 2.45. These results imply that human resource management practices in Korean small and medium sized firms are more conservative

than those in Japan.⁷

4. Do Management Practices Affect Firm Performance?

Using the management scores explained in the previous section, we examine the effects of management practices on firm performance. Following Bloom and Van Reenen (2007) we estimate the following equations:

$$(1) \ln Y_i = \text{const.} + \alpha_1 \ln L_i + \alpha_2 \ln K_i + \alpha_3 \ln M_i + \alpha_4 Z_i + \text{Dummy}_i + \varepsilon_i$$

$$(2) FP_i = \text{const.} + \sum_{j=1}^2 \beta_j W_{ij} + \beta_3 Z_i + \beta_4 E_i + \text{Dummy}_i + u_i$$

Equation (1) is a standard production function including the management practices score (Z). Y is output, L is labor input, K is capital input, and M is intermediate input. Because we have information about recent organizational reforms from the interview survey, we make a dummy variable (Dummy) that indicates that organizational reform was conducted in the past 10 years. We include a cross term between Z and a dummy variable in the estimation. We also include an industry dummy in the estimation. E is the logarithm of employees, which controls the firm size.

In Equation (2), the measure of firm performance (FP) is the dependent variable. We take labor productivity or TFP as a measure of firm performance. TFP is a Tornqvist measure, which

⁷ However, all differences in means in distributions between Japanese firms and Korean firms are not significant.

is expressed as follows.

$$(3) \ln TFP_t = \ln Y_t - s_L \ln L_t - s_K \ln K_t - s_M \ln M_t,$$

where $s_X (X = L, K, M)$ denotes the share of each production factor.

W represents both the capital labor ratio (K/L) and the intermediate input labor ratio (M/L).⁸ We include the same dummy variable as used in Equation (1).

As for Z , we use two types of variables as explanatory variables; one is the average score in each firm and the other is the first factor calculated by factor analysis. If some of the questions focus on a specific management factor in our survey, an average score may overstate that specific management factor. Therefore, using factor analysis, we extract a neutral measure that reflects each management factor evenly and include it in the estimation. The results in factor analysis in Japan and Korea are shown in Appendix 2. Because the Kaiser-Meyer-Olkin measures in Japan and Korea are 0.81 and 0.87 respectively, the application of factor analysis is appropriate in both countries.

4.1 Estimation Results for the Entire Sample

In Tables 3-1, and 3-2, we estimate Equations (1) and (2) using the average score in all questions in the interview surveys in Japan and Korea. Because we have only cross-section data, the estimation method utilized is OLS. In Table 3-1, the average score shows neither the

⁸ When TFP is a dependent variable, we exclude W .

expected sign nor a significant effect on firm performance. Some coefficients in the organizational dummy in Table 3-1 are positive and significant, while they are negative and insignificant in Table 3-2. In Table 3-2, the average score positively affects firm performance. In particular, the coefficient in the average score is positive and significant when TFP is a dependent variable. These results imply that organizational reform contributes to firm performance in Japan and improvements in management practices are positively related to good firm performance in Korea.

(Place Table 3-1 & 3-2 here)

As seen in Section 3, we divide the interview scores into two categories; those in organizational capital and those in human capital. Tables 4-1 and 4-2 show estimation results using the average score in organizational capital. In Table 4-1, the average score in organizational capital shows a negative and significant sign when the dependent variable is output or labor productivity. These results imply that the manifestation of organizational goals or communication within an organization does not contribute to firm performance in Japan. As in Table 3-1, it is organizational reform that improves firm performance in Japan. In Table 4-2, we find similar results to Table 4-1. We find a negative sign on the coefficients in an average score in organizational capital. Organizational reform affects TFP in Korea.

(Place Table 4-1 & 4-2 here)

In Tables 5-1 and 5-2, we show the effects of the average score with respect to human capital on firm performance in Japan and Korea. The results in Table 5-1 are similar to those in Table 3-1. The average score in human capital does not affect firm performance, but organizational reform contributes to improvements in firm performance. The results in Table 5-2 are also similar to those in Table 4-2.

(Place Table 5-1 & 5-2 here)

Finally, we use the first factor of factor analysis using all interview scores on firm performance instead of average score as independent variables in the estimations in Tables 6-1 and 6-2. While the results for Japanese firms (Table 6-1) are similar to the previous results, we find that the first factor affects Korean firm performance significantly when the labor productivity or TFP is a dependent variable (Table 6-2). From the factor analysis in Korea, this measure represents human resource management. These results imply that the measure indicating human resource management in Korean firms contributes to improving firm performance. In Table 6-2, organizational reform also contributes to the improvement in TFP as seen in Table 3-2, 4-2, and 5-2.

(Place Table 6-1 & 6-2 here)

4.2 Estimation Results in the Manufacturing Sector

Using the entire sample, we are unable to find clear evidence that organization and human

resource management within a firm affects the firm's performance. Thus, we focus on manufacturing firms in both countries and conduct similar estimations to those where we used the entire sample. When we conduct the estimation, we include cross terms between the organizational dummy and the average interview score (or first factor of the interview scores) in Equations (1) and (2).

In Table 7-1 using the average score of the whole interview survey in Japan as an independent variable, we obtain different results from those in Table 3-1. While the organizational reform dummy becomes insignificant, the coefficient in the average score is positive and significant in the estimation where TFP is a dependent variable and the cross term is included. The negative and significant sign on the cross term implies that high average scores in organizational reform does not contribute to improvements in productivity. We also find different estimation results in Table 7-2 from those in Table 3-2. Some coefficients in the average score are positive and significant. These results imply that improvements in organizational and human resource management within a firm enhance firm performance in Korean manufacturing firms.

(Place Table 7-1 & 7-2 here)

In Tables 8-1 and 8-2, we conduct estimations including the first factor of the interview survey instead of the average score in Japanese and Korean firms. The estimation results in

Table 8-1 are similar to those in Table 7-1. The coefficient in the first factor is positive and significant when TFP is a dependent variable and the cross term between the organizational reform dummy and the first factor is included as an explanatory variable. On the other hand, the results in Table 8-2 are different from those in Table 7-2. All coefficients in the first factor are positive and significant. Because the first factor in Korean manufacturing firms also represents the degree of human resource management as seen in Appendix 2, this implies that improvements in human resource management in Korean manufacturing firms contribute to better firm performance.⁹

(Place Table 8-1 & 8-2 here)

4.3 Summary of the Estimation Results

In sum, in Japanese firms, the interview score measuring organizational and human resource management does not affect firm performance directly in the estimation using the entire sample. Organizational reform, however does contribute to improvements in firm performance. In the Japanese manufacturing firms, the interview score contributes positively to firm performance. However, its effects are not significant except in the case where TFP represents firm performance and the cross term between the interview score and organizational reform is included.

⁹ When we conducted the estimations in the manufacturing sector, we recalculated the first factor using the sample of manufacturing firms.

In contrast to the Japanese firms, we find clear empirical evidence that when we take the first factor representing human resource management from the factor analysis, the measure contributes to an improvement in Korean firm performance. However, organizational reform does not improve productivity in Korean firms. When we conduct the estimation focusing on the manufacturing firms, we find that the average interview score also affects the firm's performance. In the Korean manufacturing sector, improvements in organizational and human resource management are likely to improve the firm performance.

5. Conclusions

Intangible assets have played a key role in productivity growth in the information age. Among several kinds of intangibles, management skills and human capital are crucial to the improvement in a firm's performance. Bloom and Van Reenen (2007) examined the effects of organizational and human resource management on firm performance using interview surveys conducted in France, Germany, the U.K., the U.S. Following their study, we conducted the interview survey on organizational and human resource management in Japan and Korea.

Following Bloom and Van Reenen (2007), we constructed scores on management practices in each firm based on the interview surveys. For organizational management, firms that have clear organizational targets, better communication amongst employees, and conduct organizational reforms would have a higher score. For human resource management, firms that

evaluate human resources flexibly and strive to keep employees motivated would mark high scores.

The overall average score in Japanese firms is higher than that in Korean firms. Even when we study the average score in the manufacturing firms only (which dominate the sample in the Korean survey) the result is similar to that in all firms. We compared the the average score between Japanese firms and Korean firms by size. We found that the gap in the average score in firms with fewer than 300 employees is higher than that of firms with more than 300 employees. The gap in average scores between Japanese and Korean small and medium sized firms is explained by the difference in the score of human capital between both countries. As a result, we conclude that in Korea, small and medium sized firms are more conservative in human resources management than in Japan.

Using these scores, we examined the effects of management practices on firm performance in Japan and Korea. In Japanese firms, we did not find any direct evidence that management practices contributed to better firm performance. In Korean firms, the first factor representing human resource management has a positive and significant effect on firm performance. The results in Korean firms are consistent with our findings in the score distribution in Korean firms in Section 3. Organizational reform contributes to improvements in firm performance in Japan, while it only affects TFP in Korean firms.

When we conducted the estimations using the sample in the manufacturing firms, some estimation results showed that management practices contribute to improving Japanese firm performance. In Korea, the average interview score as well as the first factor had positive effects on firm performance.

Our study suggests that organizational reform and human resource management are key factors to improving firm performance. When we have the opportunity to conduct further surveys, we will focus on a detailed examination on the above two factors.

References

- Black, S. and L. Lynch (2005), "Measuring Organizational Capital in the New Economy," in C. Corrado, J. Haltiwanger, and D. Sichel (eds.), *Measuring Capital in the New Economy*, The University of Chicago Press, Chicago.
- Bloom, N. and J. Van Reenen (2007), "Measuring and Explaining Management Practices across Firms and Countries," *Quarterly Journal of Economics* 122, pp.1351-1408.
- Corrado, C., C. Hulten, and D. Sichel (2005), "Measuring Capital and Technology: An Extended Framework," in C. Corrado, J. Haltiwanger, and D. Sichel (eds.), *Measuring Capital in the New Economy*, The University of Chicago Press, Chicago.
- Corrado, C., C. Hulten, and D. Sichel (2006), "Intangible Capital and Economic Growth," *NBER Working Paper* No. 11948.
- Fukao, K., T. Miyagawa, K. Mukai, Y. Shinoda, and K. Tonogi (2009), "Intangible Investment in Japan: Measurement and Contribution to Economic Growth," *Review of Income and Wealth* 55, pp. 717-736..
- Hao, J., V. Manole, and B. van Ark (2008), *Intangible Assets in Europe: Measurement and International Comparability*," paper presented at the final conference of EUKLEMS Project held at Groningen.
- Ichikowski, C. (1990), "Human Resources Management System and the Performance of U.S.

Manufacturing Businesses,” *NBER Working Paper* No. 3449.

Kanamori, T. and K. Motohashi (2006), ‘Centralization or Decentralization of Decision Rights?

Impact on IT Performance of Firms,’ *RIETI Discussion Paper Series* 06-E-032.

Kurokawa, F. and K. Minetaki (2006), “How Can IT Raise Productivity Linked with Workplace

Re-organization and Human Capital in Japan?,” (in Japanese), *The Economic Analysis* No.

178, pp. 54-95.

Lee, K., T. Miyagawa, S. Kabe, J. Lee, H.Kim., and Y. Kim (2009), “Management Practices and

Firm Performance in Japanese and Korean Firms,” *JCER Discussion Paper* No. 120.

Marrano, M. G., J. Haskel, and G. Wallis (2007), “What Happened to the Knowledge Economy?

ICT, Intangible Investment and Britain’s Productivity Record Revisited,” *Department of*

Economics, Queen Mary University of London Working Paper No.603, Queen Mary

University of London, London.

Miyagawa, T., M. Ozaki, A. Kawakami, and K. Edamura (2008), “Organizational Reform and

Firm Performance in Japan,” (in Japanese), *RIETI Discussion Paper Series* 08-J-062.

Shinozaki, A. (2007), “Effective Reforms with Information Technology: Logit Model Analysis

on Business Process Reengineering, Business Unit Restructuring, and Human Resource

Management,” (in Japanese), *The Economic Analysis* No. 179, pp. 36-54.

Figure 1 – 1 Distribution of Management Scores (All firms)

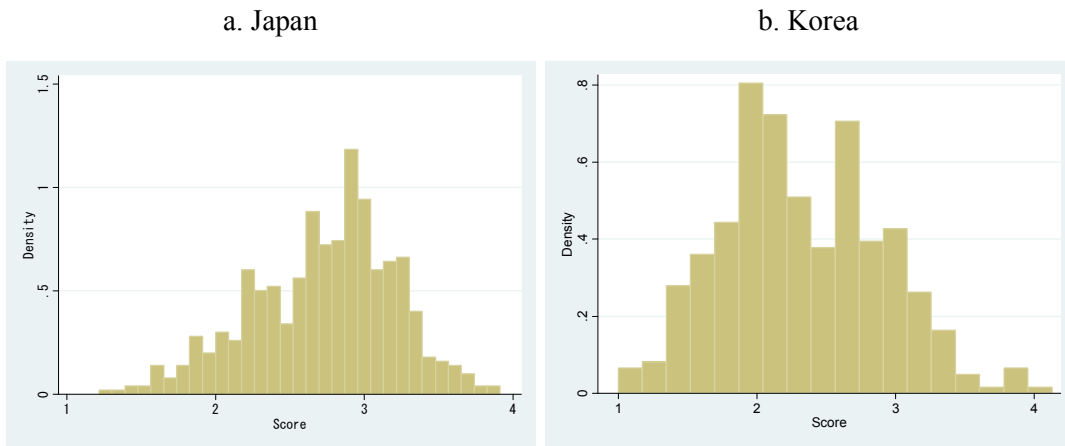


Figure 1 – 2 Distribution of Management Scores (Manufacturing firms)

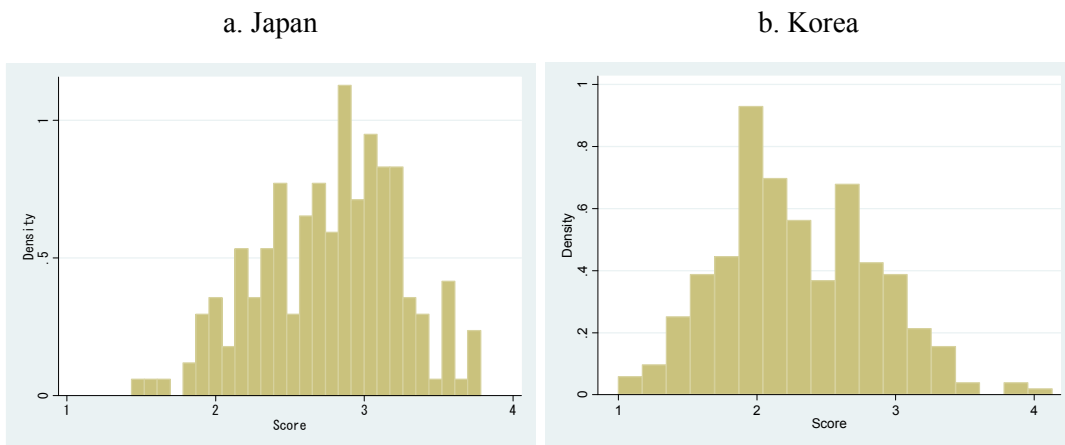


Figure 1 – 3 Distribution of Management Scores (Information-related firms)

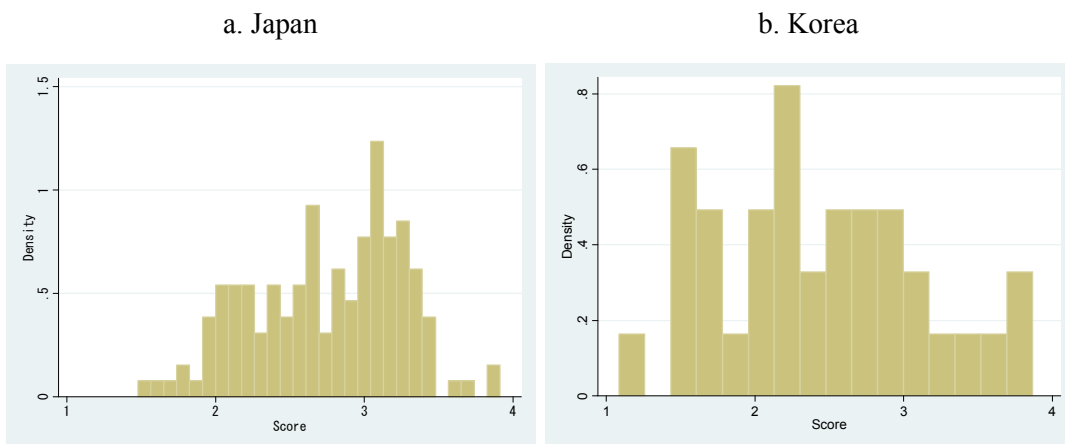


Figure 1 – 4 Distribution of Management Scores (Retail firms)

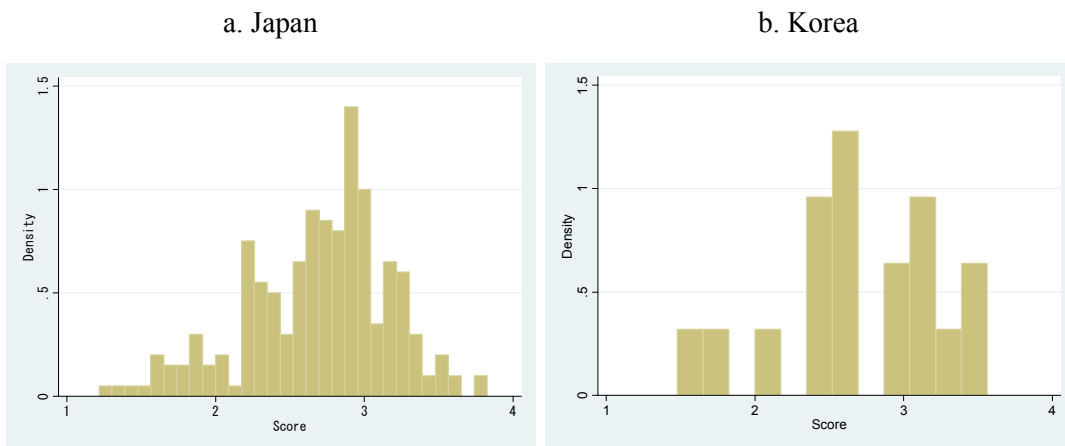


Figure 2 – 1 Distribution of Management Scores in Organizational Capital (All firms)

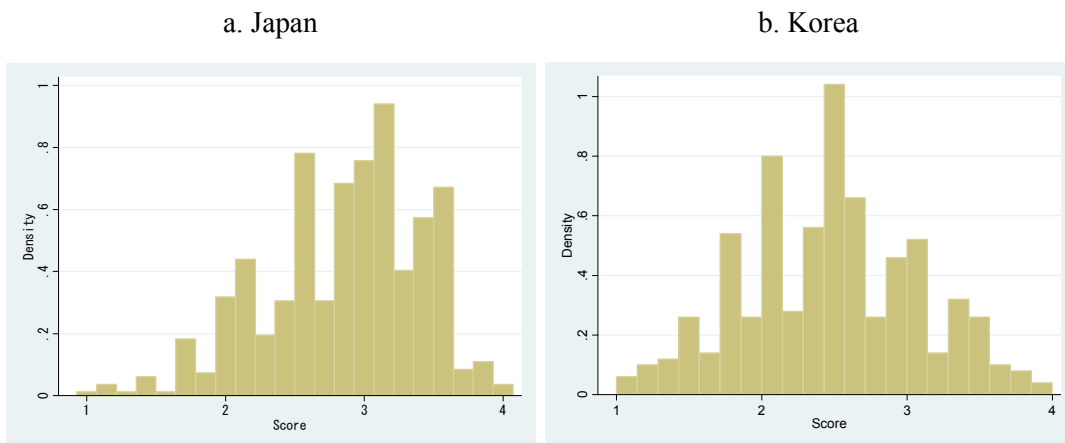
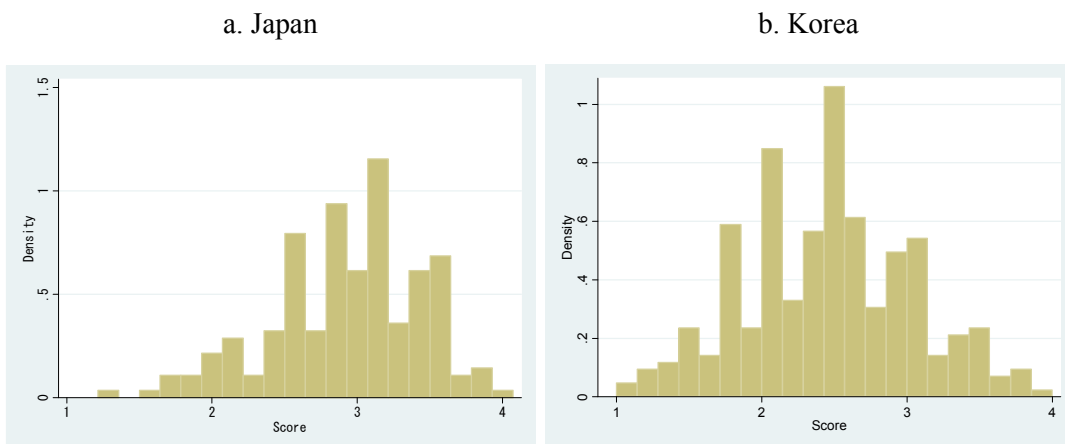


Figure 2 – 2 Distribution of Management Scores in Organizational Capital (Manufacturing firms)



**Figure 2 – 3 Distribution of Management Scores in Organizational Capital
(Information-related firms)**

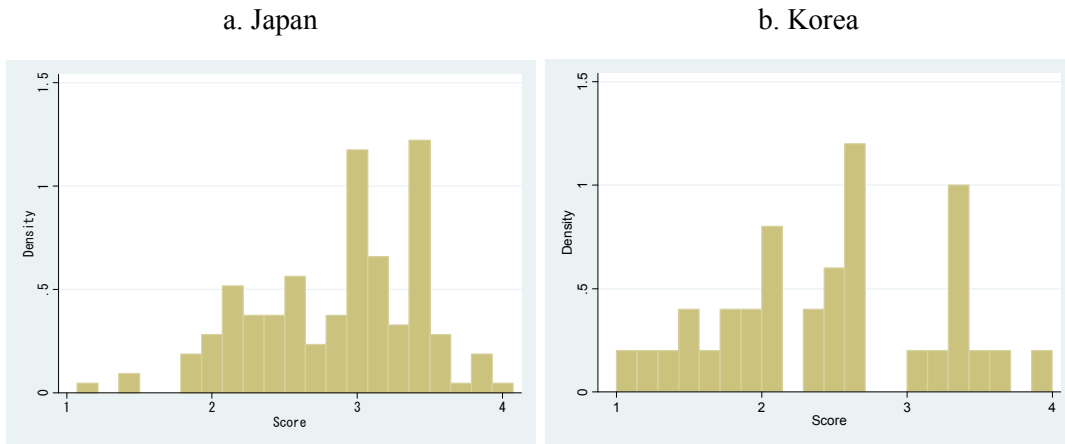


Figure 2 – 4 Distribution of Management Scores in Organizational Capital (Retail firms)

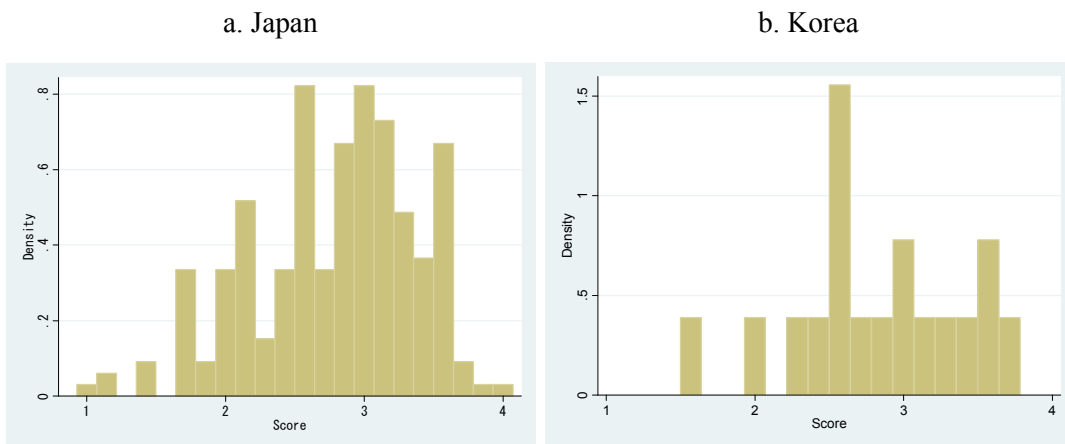


Figure 3 – 1 Distribution of Management Scores in Human Capital (All firms)

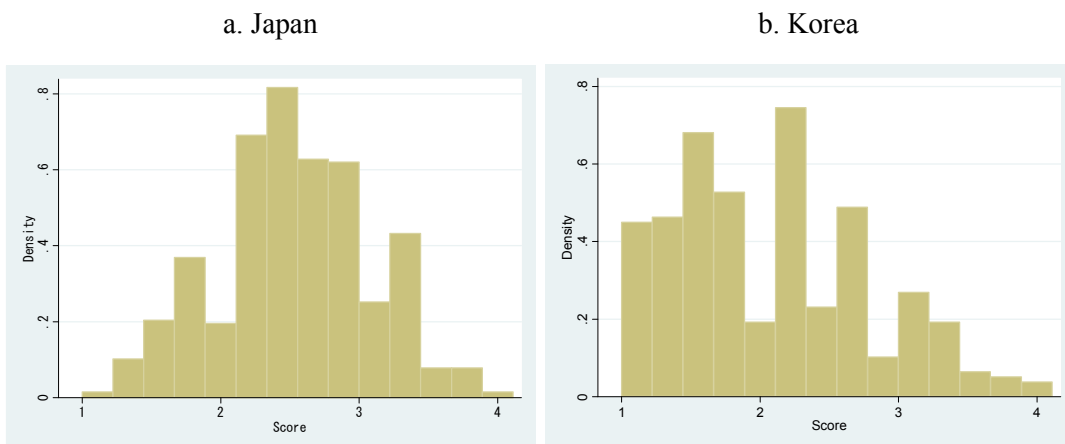


Figure 3 – 2 Distribution of Management Scores in Human Capital (Manufacturing firms)

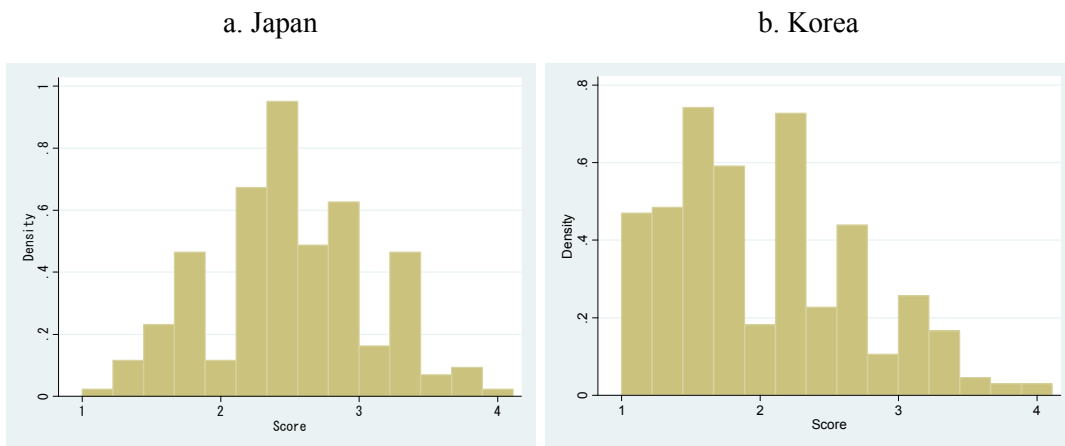


Figure 3 – 3 Distribution of Management Scores in Human Capital (Information-related firms)

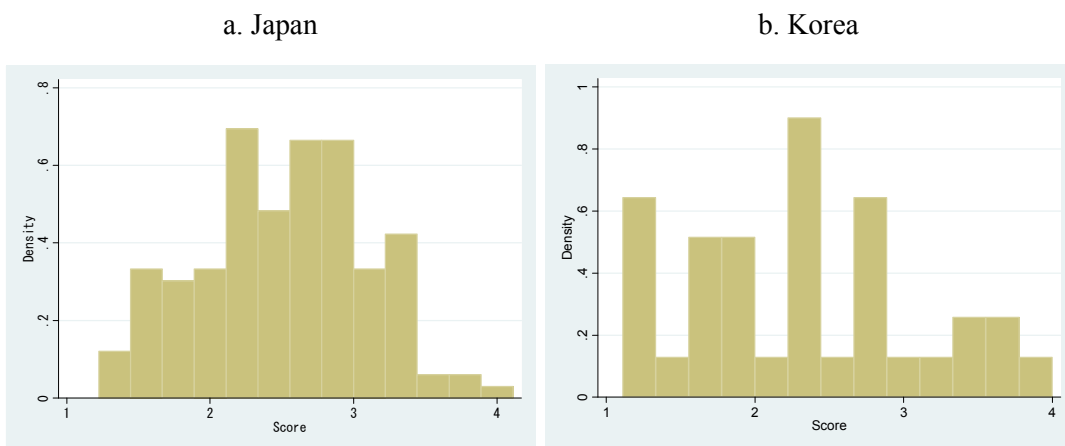


Figure 3 – 4 Distribution of Management Scores in Human Capital (Retail firms)

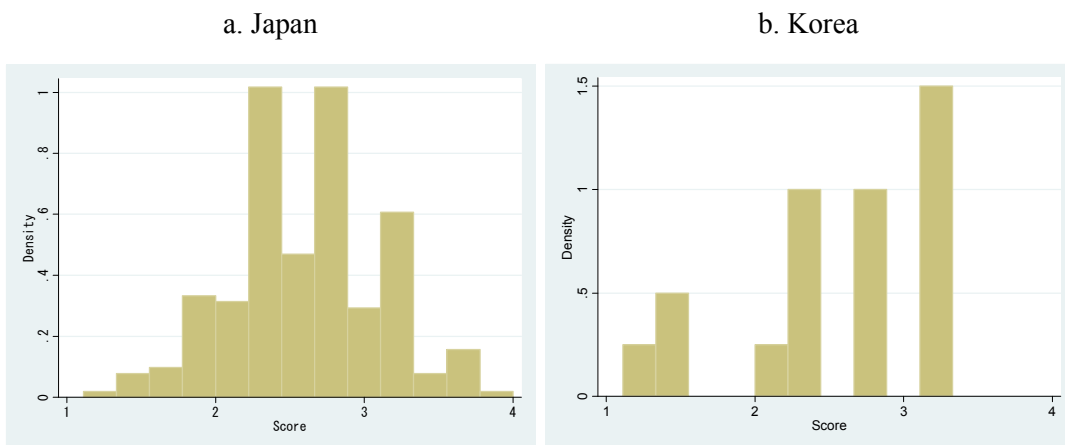
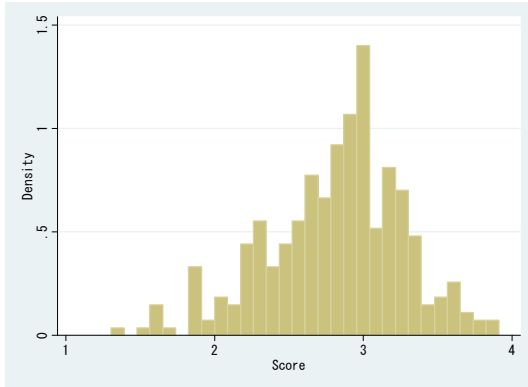


Figure 4 – 1 Distribution of Total Scores of Firms with 300 or More Employees (All firms)

a. Japan



b. Korea

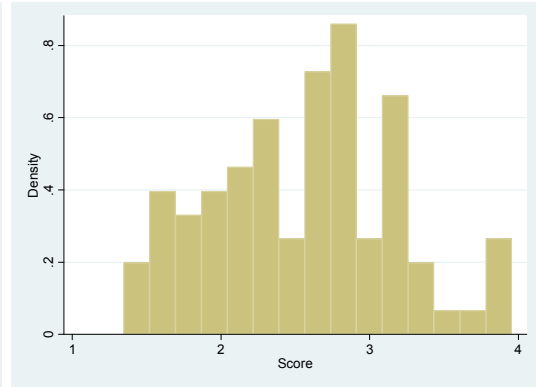
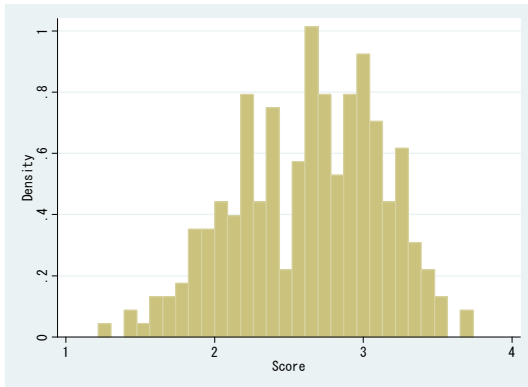


Figure 4 – 2 Distribution of Total Scores of Firms with Fewer than 300 Employees (All firms)

a. Japan



b. Korea

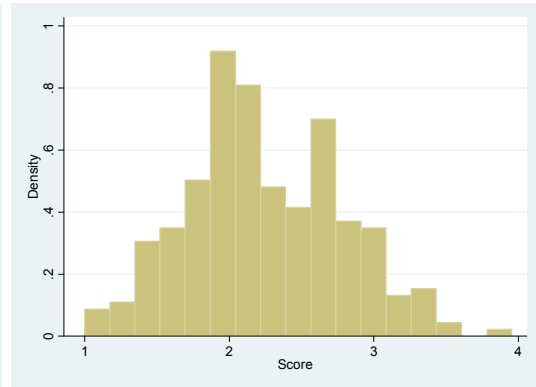


Table 1. The Distribution of Firms in Japan and Korea by Industry

	Japan		Korea	
Industry	Number of Firms		Number of Firms	
Electric machinery	44	(7.7%)	51	(14.6%)
Information and communication machinery	73	(12.7%)	96	(27.4%)
Motor vehicles	52	(9.1%)	140	(40.0%)
Precision machinery	25	(4.4%)	10	(2.9%)
Internet-based services	135	(23.6%)	15	(4.3%)
Information service			11	(3.1%)
Media activities	14	(2.4%)	9	(2.6%)
Retail	230	(40.1%)	18	(5.1%)
Total	573		350	

Table 2. The Distribution of Firms in Japan and Korea by Number of Employee

Industry	Japan						Korea					
	Number of Employee						Number of Employee					
	50-99	100-299	300-499	500-999	1000-	Total	50-99	100-299	300-499	500-999	1000-	Total
Manufacturing	25	63	31	32	43	194	42	180	31	30	14	297
Information related services	43	59	13	17	17	149	5	22	3	0	5	35
Retail	43	80	42	40	25	230	0	11	1	0	6	18
Total	111	202	86	89	85	573	47	213	35	30	25	350

Table 3-1 Estimation results of the production function (Japanese firms)

	ln Y		ln(Y/L)		lnTFP (Tornqvist index)	
Average score (all scores)	-0.009 [-0.572]	-0.012 [-0.757]	-0.040 [-1.086]	-0.045 [-1.222]	-0.007 [-0.438]	-0.010 [-0.670]
Dummy		0.029 *		0.052		0.034 **
lnK	0.030 *** [4.887]	[1.898]		[1.606]		[2.500]
lnL	0.189 *** [14.570]	[4.836]	0.006 [0.505]	0.009 [0.694]	0.006 [1.171]	0.008 [1.407]
lnM	0.780 *** [69.115]	[14.711]				
ln(K/L)		0.779 *** [69.427]	0.068 *** [5.064]	0.067 *** [5.012]		
ln(M/L)			0.468 *** [19.067]	0.467 *** [19.086]		
Constant	0.990 *** [17.909]	0.979 *** [17.819]	0.623 *** [4.503]	0.603 *** [4.379]	-0.076 [-1.469]	-0.076 [-1.436]
Observations	520	520	520	520	510	510
R ²	0.991	0.991	0.832	0.832	0.006	0.018
Adjusted-R ²	0.991	0.991	0.828	0.829	-0.010	0.000
F value	6328	6027	278	257	1	2

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3-2 Estimation results of the production function (Korean firms)

	ln Y	ln(Y/L)	lnTFP (Tornqvist index)
Average score (all scores)	0.00771 [1.457]	0.00771 [1.457]	0.00777** [2.099]
Dummy			
lnK	0.032 ** [1.991]	0.0323 ** [2.023]	0.00798 ** [2.063]
lnL	0.133 *** [5.535]	0.132 *** [5.549]	-0.0035 [-0.277]
lnM	0.858 *** [41.02]	0.858 *** [41.16]	
ln(K/L)		0.032 ** [1.991]	
ln(M/L)		0.858 *** [41.02]	
Constant	1.498 *** [7.032]	1.498 *** [7.032]	-0.107 ** [-2.200]
Observations	349	349	340
R ²	0.983	0.954	0.083
Adjusted-R ²	0.983	0.952	0.058
F value	1587	390	3

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4-1 Estimation results using the average score with respect to organizational capital (Japanese firms)

	ln Y	ln(Y/L)	lnTFP (Tornqvist index)
Average score (organizational capital)	-0.019 [-1.403]	-0.024 * [-1.744]	-0.007 [-0.560]
Dummy		-0.058 * [-1.933]	-0.066 ** [-2.183]
lnK	0.030 *** [4.959]	0.032 ** [2.098]	0.059 * [1.827]
lnL	0.189 *** [14.730]	0.192 *** [14.908]	0.010 [0.819]
lnM	0.780 *** [69.253]	0.779 *** [69.682]	0.006 [1.188]
ln(K/L)		0.069 *** [5.155]	0.068 *** [5.109]
ln(M/L)		0.469 *** [19.230]	0.467 *** [19.282]
Constant	1.017 *** [19.132]	1.008 *** [19.130]	-0.073 [-1.446]
Observations	520	520	510
R ²	0.991	0.832	0.006
Adjusted-R ²	0.991	0.830	-0.010
F value	6290	278	1
			2

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4-2 Estimation results using the average score with respect to organizational capital (Korean firms)

	lnY	ln(Y/L)	lnTFP (Tornqvist index)
Average score (organizational capital)	-0.0219 [-1.431]	-0.0216 [-1.410]	-0.0142 [-1.489]
Dummy			
lnK	0.0313 * [1.934]	0.0315 * [1.947]	-0.0143 [-1.507]
lnL	0.135 *** [5.606]	0.135 *** [5.612]	0.00385 [0.317]
lnM	0.861 *** [39.99]	0.861 *** [40.03]	
ln(K/L)		0.0269 ** [2.303]	0.0211 ** [2.420]
ln(M/L)		0.0313 * [1.934]	
Constant	1.501 *** [7.303]	1.501 *** [7.319]	-0.1 ** [-2.072]
Observations	349	349	340
R ²	0.983	0.983	0.075
Adjusted-R ²	0.983	0.983	0.052
F value	1803	1678	3

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5-1 Estimation results using the average score with respect to human capital (Japanese firms)

	ln Y	ln(Y/L)	lnTFP (Tornqvist index)
Average score (human capital)	0.013 [0.868]	0.017 [0.499]	-0.001 [-0.091]
Dummy			0.000 [-0.004]
lnK	0.030 *** [4.883]	0.018 [0.549]	0.033 ** [2.392]
lnL	0.187 *** [14.320]	0.002 [0.190]	0.007 [1.211]
lnM	0.780 *** [69.636]		
ln(K/L)		0.068 *** [5.003]	
ln(M/L)		0.467 *** [19.103]	
Constant	0.945 *** [18.172]	0.502 *** [3.826]	-0.074 [-1.643]
Observations	520	520	510
R ²	0.991	0.831	0.017
Adjusted-R ²	0.991	0.828	-0.001
F value	6332	280	1
			2

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5-2 Estimation results using the average score with respect to human capital (Korean firms)

	ln Y	ln(Y/L)	lnTFP (Tornqvist index)
Average score (human capital)	-0.00882 [-0.492]	-0.00882 [-0.492]	0.00631 [0.710]
Dummy			0.00624 [0.701]
lnK	0.0323 ** [2.066]	0.0324 ** [2.078]	0.00243 [0.199]
lnL	0.134 *** [5.621]	0.134 *** [5.628]	0.0216 ** [2.442]
lnM	0.86 *** [40.07]	0.86 *** [40.12]	
ln(K/L)		0.0323 ** [2.066]	
ln(M/L)		0.86 *** [40.07]	
Constant	1.462 *** [7.002]	1.462 *** [7.002]	-0.148 *** [-2.849]
Observations	349	349	340
R ²	0.983	0.953	0.071
Adjusted-R ²	0.983	0.952	0.046
F value	1611	388	3

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6-1 Estimation results using the first factor as an explanatory variable (Japanese firms)

	lnY	ln(Y/L)	lnTFP (Tornqvist index)
The first score (all scores)	-0.003 [-0.740]	-0.010 [-1.257]	-0.001 [-0.357]
Dummy			
lnK	0.030 *** [4.897]	0.030 *** [1.964]	0.035 ** [2.534]
lnL	0.189 *** [14.568]	0.192 *** [4.847]	0.006 [1.150]
lnM	0.780 *** [69.120]	0.779 *** [69.449]	0.008 [1.414]
ln(K/L)		0.068 *** [5.077]	
ln(M/L)		0.468 *** [19.083]	
Constant	0.964 *** [20.984]	0.944 *** [21.076]	-0.079 ** [-2.042]
Observations	520	520	510
R ²	0.991	0.832	0.006
Adjusted-R ²	0.991	0.828	-0.010
F value	6313	277	1
		256	2

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6-2 Estimation results using the first factor as an explanatory variable (Korean firms)

	lnY	ln(Y/L)	lnTFP (Tornqvist index)
The first score (all scores)	0.00771 [1.457]	0.00771 [1.457]	0.00777 ** [2.099]
Dummy		0.0102 * [1.742]	0.00798 ** [2.063]
lnK	0.032 ** [1.991]	-0.013 [-0.661]	-0.0035 [-0.277]
lnL	0.133 [5.535]	0.0244 ** [1.991]	0.0167 * [1.921]
lnM	0.858 [41.02]		
ln(K/L)		0.032 ** [1.991]	
ln(M/L)		0.858 *** [41.02]	
Constant	1.498 [7.032]	1.498 *** [7.032]	-0.107 ** [-2.200]
Observations	349	349	340
R ²	0.983	0.954	0.083
Adjusted-R ²	0.983	0.952	0.061
F value	1587	390	3

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7-1 Estimation results of the production function (Japanese manufacturing firms)

	lnY	ln(Y/L)	lnTFP (Tomqvist index)
Average score (all scores)	0.016 [0.896]	0.013 [0.277]	0.014 [0.919]
Average score × Dummy			
Dummy	0.007 [0.416]	-0.015 [-0.342]	0.010 [0.615]
lnK	0.021 * [1.661]	0.036 * [1.889]	0.027 *** [5.248]
lnL	0.188 *** [8.129]	0.036 * [1.889]	0.027 *** [5.162]
lnM	0.808 *** [52.837]	0.064 * [1.931]	0.026 *** [5.141]
ln(K/L)		0.064 * [1.938]	
ln(M/L)		0.524 *** [16.076]	
Constant	0.722 *** [13.815]	-0.059 [-0.390]	-0.254 *** [-5.153]
Observations	180	180	177
R ²	0.997	0.898	0.180
Adjusted-R ²	0.997	0.893	0.170
F value	11360	189	7

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7-2 Estimation results of the production function (Korean manufacturing firms)

	lnY	ln(Y/L)	lnTFP (Tomqvist index)
Average score (all scores)	0.0236 [1.474]	0.0361 * [1.770]	0.0151 [1.171]
Average score × Dummy	0.0949 *** [2.866]	0.0949 *** [2.866]	0.019 [1.248]
Dummy	-0.0816 * [-1.958]	-0.0816 * [-1.958]	-0.0418 [-1.496]
Dummy	0.142 [1.476]	0.142 [1.476]	-0.0101 [-0.705]
lnK	0.00824 [0.376]	0.00855 [0.393]	0.0183 ** [2.337]
lnL	0.153 *** [4.757]	0.15 *** [4.771]	0.0179 ** [2.357]
lnM	0.868 *** [35.82]	0.869 *** [36.28]	
ln(K/L)		0.00824 [0.376]	
ln(M/L)		0.868 *** [35.82]	
Constant	1.548 *** [5.973]	1.535 *** [6.036]	-0.154 *** [-3.337]
Observations	296	296	287
R ²	0.981	0.981	0.059
Adjusted-R ²	0.981	0.98	0.039
F value	1469	1283	2
		320	3

Note 1. Robust t statistics in parentheses.

2. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 8-1 Estimation results using the first factor as an explanatory variable (Japanese manufacturing firms)

	lnY	ln(Y/L)	lnTFP (Torqvist index)
The first score (all scores)	0.004 [0.996]	0.003 [0.261]	0.003 [0.922]
The first score × Dummy		0.007 [0.630]	0.007 [2.036]
Dummy		-0.019 [-0.718]	-0.018 [-1.892]
lnK	0.006 [0.377]	-0.016 [-0.353]	0.010 [0.587]
lnL	0.021 * [1.664]	0.036 * [1.878]	0.027 *** [5.205]
lnM	0.188 *** [8.133]	0.036 * [1.888]	0.027 *** [5.145]
ln(K/L)	0.808 *** [53.063]	0.064 * [1.928]	0.026 *** [5.130]
ln(M/L)	0.765 *** [15.424]	0.064 * [1.957]	-0.216 *** [-5.802]
Constant	0.765 *** [15.710]	0.525 *** [16.082]	-0.216 *** [-5.930]
Observations	180	180	177
R ²	0.997	0.898	0.180
Adjusted-R ²	0.997	0.893	0.151
F value	11622	167	7

Note 1. Robust t statistics in parentheses.

2. * significant at 10%. ** significant at 5%. *** significant at 1%.

Table 8-2 Estimation results using the first factor as an explanatory variable (Korean manufacturing firms)

	lnY	ln(Y/L)	lnTFP (Torqvist index)
The first score (all scores)	0.0116 * [1.938]	0.0116 * [1.938]	0.00672 * [1.757]
The first score × Dummy	0.013 ** [1.974]	0.013 ** [1.974]	0.00707 * [1.779]
Dummy	-0.0245 [-1.178]	-0.0245 [-1.178]	-0.0063 [-0.511]
lnK	0.00814 [0.374]	0.00814 [0.374]	0.0168 ** [2.100]
lnL	0.15 *** [4.717]	0.15 *** [4.735]	0.0168 ** [2.099]
lnM	0.867 *** [36.22]	0.867 *** [36.37]	0.0168 ** [2.099]
ln(K/L)		0.00842 [0.374]	
ln(M/L)		0.867 *** [36.22]	
Constant	1.632 *** [6.285]	1.632 *** [6.363]	-0.108 ** [-2.416]
Observations	296	296	287
R ²	0.981	0.981	0.064
Adjusted-R ²	0.981	0.981	0.044
F value	1457	1317	3

Note 1. Robust t statistics in parentheses.

2. * significant at 10%; ** significant at 5%; *** significant at 1%.

Appendix 1. Questionnaire

About the scoring

Quantitative accompanying information

1. Permeation of management principles (vision)

- 2 Does your company have management principles that it has upheld for many years?
 - 3 What kind of schemes are in place to have those management principles shared by all employees? (For example, announcing them at the morning assembly, or making them portable by writing them on cards or such like.)
 - 4 Are the management principles also supported by parties such as external partners or the shareholders?
- 2. Implementation of organizational goals**
- 2 Are there specific numerical goals on multiple levels that go beyond being just a vision or a slogan, regardless of the level of the goals (such as company-wide or divisional or sectional goals)?
 - 3 Are the goals of each division adjusted in each division to ensure consistency between divisions?
 - 4 Is consistency maintained between these goals and the goals of the management principles or of the long-term company-wide goals?

2-1. Implementation of organizational goals (setting target levels)

- 2 For example, are the settings for the divisional or sectional target levels simply given to you from the division or section above you? Or are they given to you while considering the opinions of your division or section?
- 3 Are the target levels appropriately set as non-binding challenges?
- 4 Are target levels checked to ensure there is fairness between divisions or sections? Please give an example of how they are checked. ()

2-2. Implementation of organizational goals (permeation of goals)

- 2 Do all employees know about the goals?
- 3 If goals exist on various levels (such as company-wide, divisional and sectional goals), do all employees understand the level of priority of the goals? ()
- 4 Do all employees accept the target levels? Please give an example if possible. ()

2-3. Implementation of organizational goals (degree to which goals are achieved, checks on performance)

- 2 Are checks made to see how far goals have been achieved? Please give an example of how such checks are made. ()
- 3 Are such checks made on a periodic basis rather than being made as necessary? And how frequently are such checks made? ()
- 4 Are additional checks made that are decided by the section or department involved itself, rather than just being fixed checks?

2-3-1. Implementation of organizational goals (permeation of degree to which goals are achieved, and results of checks on performance)

- 2 Are the results of such checks made openly available within your division?
- 3 Are the results of such checks made openly available within not only your division but also between relevant divisions?
- 4 Are adjustments made to ensure that the degree to which goals have been achieved at different divisions is fairly compared? (for example, utilizing common scales such as overtime hours?)

- 2-3-2. Implementation of organizational goals (results of checks - handling when goals have not been achieved)
 - 2 Is a meeting consisting of managerial staff and employees promptly held as soon as it is known that the goals were not achieved? ()
 - 3 After investigations, are points to revise spread throughout the division, and are measures for handling the failure to achieve the goals promptly implemented? (In this case, exclude personnel matters.) ()
 - 4 Are problematic issues and countermeasures made thoroughly known throughout the relevant division, and if necessary, other divisions? Please give an example if possible. ()
- 2-3-3. Implementation of organizational goals (results of checks - handling when goals have been achieved)
 - 2 When goals are achieved are investigations made so that those goals renewed on a continuous basis or so that higher goals are set? ()
 - 3 How long is it between the setting of higher goals and the operation / implementation of those goals? ()
 - 4 Are these measures institutionalized on a company-wide level? ()

3. Non-stylized communication within the organization

2 Are measures and activities other than stylized meetings used to increase informal communication? (for example, informal meetings consisting only of key personnel)? Please give an example. ()

3 Are informal meetings held between divisions? ()

4 Are informal meetings held with persons of various ranks? ()

4. Implementation of organizational reform

2 Has your company undergone any organizational reforms in the last ten years? ()

When did it occur? ()

3 Did your company use a consulting company at that time? ()

How much did it cost? ()

4 Did you determine the results of the reform in a quantified manner? ()

By what percentage did profits increase or by what percentage were costs reduced? ()

4-1. Period of organizational reform or strategic change

2 Did it take time to implement the organizational reform over one year? How many years were spent including preparation period? ()

()

3 Why was the organizational reform necessary? Was it to do with the leadership of the top management? ()

4 During the organizational reform, did the mid-level management also strive to achieve the reform, thereby giving a sense of unity in the company? ()

4-2. Scope of the effects of organizational reform

2 Were the effects of the reform shown in the divisions or sections? If they were, please give an example of the effects. ()

(Write the example here)

3 Were the effects of the reform shown between divisions, and not just within one division? If they were shown between divisions, please give an example of the effects. ()

4 Were the effects of the reform shown between the company and the business partners, and not just within the company? If they were, please give an example of the effects. ()

4-3. Details of the organizational reform (delegation of authority)

When a company undergoes organizational reform, sometimes the employees' decision-making authority is also revised. In the case of your company, ()

2 Was decision-making authority given to those in a lower position as a result of the organizational reform? ()

- 3 Were posts simplified in conjunction with decision-making authority being given to those in a lower position?
 - 4 As a result, was there a change in the details of the job or the way of doing the job? Please give an example. ()
- 4-4. Details of the organizational reform (IT activities)
- 2 Did the IT system make your company more streamlined, for example by reducing the amount of paper-based documentation ?
 - 3 In the last decade, did your company launch organizational reform, rather than raise business efficiency, by utilizing the IT system ?
 - 4 Did an opportunity to earn new profits arise as a result of the organizational reform by the organizational reform baseo on the IT system? Please give an example. ()
- 5. Promotion system**
- 2 Does your company mainly have a performance-based promotion system?
 - 3 If the promotion system is mainly a performance-based one, does your company have a management-by-objectives system? If it does, when did that system begin?
 - 4 Did the performance of the employees improve as a result of using the management-by-objectives system and introducing a performance-based promotion system?

6. Schemes to improve motivation

- 2 Are there any schemes other than promotion-related or pay-related systems to increase the motivation of the employees? Please give an example. ()
- 3 Is that scheme used on an institutional basis throughout the company?
- 4 Do you monitor when the employees' motivation, retention rate or job performance increases as a result of such scheme?

7. Handling employees that perform poorly

- 2 Are they handled in some specific way other than by giving them oral warnings?
- 3 Does that handling include measures that are implemented faster than the average term of office?
- 4 Are the measures implemented as soon as a problem is confirmed (before a routine rotation) ?

8. Handling employees that perform well

- 2 Is it made clear within the division that the employee's performance is good, for example by management praising employees at meetings?
- 3 Is there a system to connect good performance to things such as financial reward or promotion?
- 4 Was the motivation of the employees raised through introducing such system?

9. Securing good manpower

- 2 Can you identify the high performance and core employees, mentioned in the question 9, in your company? Please give an example. ()
- 3 Such excellent employees are treated well compared with ordinary employees? If so, how they are treated? ()
- 4 Could you prevent the loss of such excellent employees?

10. Evaluating the interpersonal skills of the managers

- 2 Do the managers give clear criteria such as the degree to which persons of a lower position should be nurtured?
- 3 Is there an incentive system, such as a pay-related or promotion-related system, to reward managers that have nurtured excellent staff of a lower position?
- 4 Did the motivation of the managers increase as a result of introducing such system?

11. Nurturing human resources through training

- 2 Is there training on an occupational ability basis or an assignment basis, aiming to improve the work skills of the employees? Over the course of one year, on average how long is spent on training?
(Training on an occupational ability basis means training in specialist capabilities that are required in each field, such as management, business, research and development, and manufacturing. Assignment-based training means training in areas such as languages, OA, computing, and acquisition of official certifications.)
- 3 Do those training activities help to improve business results? Please give an example.
- 4 Are the effects of those training activities adaptable to other companies?

12. Nurturing human resources through OJT

- 2 Is OJT performed on a daily basis?
What percentage of the supervisor's working time is spent on giving instructions to those in a lower position?
()
()
()
- 3 Does OJT contribute to business results? Please give an example.
- 4 Are the effects of OJT monitored? Please give an example of the methods used.

13. Employees' expertise

- 2 Are employees rotated in a fixed schedule, such as once every two or three years?
- 3 To improve the expertise of the employees, are they assigned to a set position for a long time?
- 4 Is there a systematic program in place to ensure the employees acquire some expertise?

Appendix 2 The results of principal component analysis

Questions	Japan		Korea	
	1st component	2nd component	1st component	2nd component
q1	0.17	0.13	-0.02	0.31
q2	0.25	0.04	0.07	0.28
q2_1	0.22	-0.06	-0.06	0.29
q2_2	0.22	0.20	0.04	0.40
q2_3	0.22	-0.04	-0.03	0.41
q2_3_1	0.18	0.07	-0.11	0.44
q2_3_2	0.23	0.23	0.06	0.37
q2_3_3	0.20	0.04	0.15	0.19
q3	0.16	0.03	0.19	0.11
q4	0.24	-0.38	-0.06	-0.02
q4_1	0.29	-0.37	-0.05	0.01
q4_2	0.30	-0.34	0.07	0.01
q4_3	0.21	-0.14	0.03	0.08
q4_4	0.24	-0.25	0.10	-0.03
q5	0.15	0.29	0.40	-0.01
q6	0.22	0.12	0.38	-0.08
q7	0.17	0.15	0.29	0.02
q8	0.20	0.35	0.28	0.01
q9	0.10	0.20	0.34	-0.07
q10	0.17	0.25	0.38	-0.03
q11	0.24	0.10	0.24	0.04
q12	0.15	-0.15	0.24	0.05
q13	0.14	0.17	0.23	0.07