Is Levy-Grant Scheme for Employer-Provided Training Effective? The Experience of Korean Employment Insurance System

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This paper examines the effects of levy-grant scheme for employer-provided training in Korea. Constructing three-year panel data, I investigate whether the training grant intended to encourage corporate training affects firm behavior and performance. The major findings are that training grant stimulates corporate investment in training and ultimately leads to the improvement in corporate performance. These findings suggest that training levy-grant scheme might be one of institutional arrangements to cope with the under-investment problem in training.

Keywords: Employer-provided training, Levy-grant scheme, Productivity effect

JEL Classification: J24, M53

I. Introduction

The rapid advances in technological development and global competition have led to far-reaching changes in the corporate business environment. Skill development of workers becomes the underlying force of company's sustainable competitive advantage. In particular, becoming ever more important is employer-provided training aimed to enhance adaptability to change. This in-house effort is critical, because human resources in the external labor

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market are readily available by any other company, and thus cannot serve as a unique source of competitive advantage.

In order to promote corporate investment in training, Korea runs the Job Skill Development Program (JSDP) under the framework of the Employment Insurance System. Since 1995 when the JSDP was launched, the number of employer-provided training assisted by the JSDP has been increasing on the considerable scale. In 2002, 13.4% of the insured employees took part in the company training funded by the JSDP (Lee and Kim 2004).

The JSDP is considered a type of the levy-grant scheme, in that government levies insurance payments on the businesses and uses this fund to subsidize part of the corporate training cost. The rationale behind the JSDP assumes the market failure that under-investment in job training is highly likely if left up to the corporate discretion. The externalities of job training, which bring more social benefits than private ones, would prevent businesses from investing at the level that is deemed adequate for societal needs.

This paper examines the effects of levy-grant scheme for company training in Korea. But nobody knows what amount of investment in training is optimal for society. So this study will assess how government intervention in training affects firm behavior and performance indirectly. The key question is that whether the JSDP actually stimulated corporate training investment and ultimately led to the improvements in corporate performance.

II. Previous Literature

According to human capital theory, no externalities would occur and thus under-investment in training would not happen, if employer and its employees can reap the benefits at the level proportionate to the training expenses each incurred. To better understand this argument, let us take a closer look at the two distinct types of job training: specific and general training.

The specific training is defined as training for skills that are of use exclusively at the firm providing it. Since the job skills acquired through such training cannot be put to use at other companies, the employees would be reluctant to bear the costs of training. Instead, covering for all training expenses, employer can

reap all the benefits of enhanced productivity brought about as a result of the training. Thus, specific training does not generate an externality problem either. But employer would not be able to enjoy the returns of investment in training if the trained employee quits. One of the ways of addressing this problem is to divide the costs and benefits of training between the employer and employees.

In contrast, general training cultivates job skills that would boost productivity of not only the company providing it but any other competitor as well. As an employee's productivity is raised in other firms, alternative wage offer will increase. Therefore, in a fully competitive labor market, the employee could exclusively reap the benefit of general training, regardless of whether he/she changes job. In this case, the company would not bear the cost of training and no externalities would occur.

However, in the real world, most training is likely to be neither purely firm-specific nor purely general in nature.[1] Stevens (1994, 1996) proposes the term "transferable training" for skills that are useful to not all but more than one firm. The potential returns of investment in such training may go to not only the company providing it but also the poaching company that hires the trained worker. Under these circumstances, the incentive for businesses to invest in employee training decreases, leading to under-investment.

There are other causes of under-investment in training: imperfections in the labor market due to information asymmetry and poor functioning of mechanisms for evaluating or recognizing competencies acquired by worker; imperfections in the capital market due to the inability to bear the costs of training because of credit constraints of worker; imperfections in the training market where information on the quality or outcomes of training is poor or where training might not be fully contractible; and the coordination failure between management and labor on reasonable allocation of costs and benefits (Booth and Snower 1996; and OECD 2003).

[1]According to the OECD (2003) which analyzed the *International Adult Literacy Survey*, firms fully pay for more than 70% of continuous training courses. Loewenstein and Spletzer (1998) show that employers bear nearly all of the costs of formal training, even general training. Also training costs are not transferred to the employees because their wages do not fall during the training period. Even more strikingly, training paid for by previous employers has a larger wage effect than training paid for by the current employer.

There are various approaches by the government or labor and management organizations to address the problem of market failure in the field of job training. In France and Quebec province of Canada, the levy-exemption scheme is enforced. Under this scheme, a legal minimum on training expense is established based on total payroll, and in the event this minimum is not met, the difference between the legal minimum amount and the actual training expense is charged on the employer as an obligation. Countries such as Spain and Belgium implement levy-grant schemes, under which a portion of the total wages is levied on the employer to create a fund to be used to support employee training of the businesses.[2] The JSDP in Korea can be considered a levy-grant scheme.

The government intervention in job training of the private companies drew an array of criticisms. Some of the potential problems or drawbacks cited were that training regulations would lead to high administrative costs, that the government would not adequately account for the quality of training, that the government could risk inefficient use of resources to support training, that regulations intended to prevent abuse of the subsidy program could on the flip side pose as obstacles in meeting the changes in company's training needs, and that the large corporations would be main beneficiaries of the training grant program (OECD 2003; and Gasskov 2000).

But there are little empirical studies to assess whether institutional arrangements intended to encourage corporate training run counter the under-investment problem effectively. Holzer *et al.* (1993) is probably the only exceptional research to date on the question of government subsidy initiatives for employer-provided training. The Michigan state ran the Michigan Job Opportunity Bank-Upgrade (MJOB) program during the years 1986-90 to foster training in the manufacturing sector. The program provided one-time training grants for new technology-adopting manufacturers with 500 or fewer employees on a first-come first-serve basis. They surveyed the companies that applied for the MJOB subsidies during

[2]According to Gasskov (2000), countries that obligate employers to conduct job training are France, Denmark, India, Ireland, Malaysia, Nigeria, Singapore, and many countries in South America. And countries that have labor and management create a training fund upon agreement are Belgium, Denmark, and the Netherlands.

1988-9, comparing those that received the subsidy with those that did not. With three-year panel data, they found that training subsidies had a significantly large effect on increasing a company's training.

Meanwhile, there are growing bodies of empirical study on the productivity effects of training. This paper will review the major empirical studies that have estimated the impact of training on organizational performance by using micro-data.

Bishop (1991) used data on 2,594 employer survey under the Employment Opportunity Pilot Projects conducted by the National Center for Research in Vocational Education in 1982. The survey asked employers how much time was spent in the first three months on formal training for the new hired. The employer also reported on the productivity of the typical individual hired at the end of two years with the firm. The productivity rating was the subjective measure made on a scale of 0 to 100. He estimated the effect of initial training during the first three months of employment on productivity increase two years later. The estimated marginal rate of return of 100 hours of training ranged from 11% to 38%, depending on the estimation model applied. The analysis was confined to the effect of initial training for the new hired. And there is the problem using subjective measure of productivity.

The Holzer *et al.* (1993) study, introduced earlier, analyzed the effect of training on corporate performance using firm level panel data. Using a model that controlled for the effects of unobservable firm characteristics, they found that a doubling of worker training reduced the scrap rate by 7%. They tried to correct for the endogeneity problem of the training decision. But the limitation of this paper is that the data are retrospective.

Bartel (1994) measured the impact of the formal training programs on labor productivity. She merged data conducted by Columbia Business School on 155 businesses in 1986 with each business's 1983 information. The major finding is that business that were operating below their expected labor productivity levels in 1983 implemented new employee training programs after 1983 that resulted in significantly larger increases in labor productivity growth between 1983 and 1986. The limitation in this article is that two years' worth of data could not address the heterogeneity in productivity growth enough.

Black and Lynch (1996) used data from national employers

survey conducted in 1994 by the National Center on Educational Quality of the Workforce (EQW). The survey data included the characteristics of businesses in 1993 as well as information on the number of employees who have received training in 1990 and 1993. They estimated the effect of various types of investment in human capital on productivity. They found that the number of employees trained in 1990 and 1993 had no significant effect on productivity, but particular training methods and content had significant positive effects. For manufacturing industry, the greater the share of time in formal off-the-job trading, the higher the productivity. For non-manufacturing industry, computer training contributed to enhance productivity. But the data used being cross-sectional, endogeneity could be a problem. In other words, the analysis fails to account for the possibility that a company's performance level may affect its decision to invest in training.

To address this drawback, Black and Lynch (1997) merged the data from Longitudinal Research Database of the U.S. Census Bureau with the manufacturers in the EQW data. Once the endogeneity problem is addressed, the positive effect of training on productivity observed in the cross-sectional analysis disappears.

Boon (1998) estimated the rate of return to training in Dutch manufacturing sector. A notable distinction of this analysis is that it took into account that training accumulates as human capital stock and applied depreciation rates for training investment during fixed time periods in a stock approach. The major finding is that human capital stock accumulated through training has a significant and positive effect on productivity. However, depending on the assumptions on the depreciation rates, this effect changes sensitively.

Barrett and O'Connell (2001) investigated the data derived from a merge of a 1993 survey on continuous training and 1997 follow-up survey in Ireland. They applied the distinction between general and specific training to the empirical task of estimating the returns to in-company training. They found differential effects of the two types of training on productivity growth. Statistically significant positive effects on productivity are found for general training, but not for specific training.[3]

[3]They explain that employees may react differently to the provision of the more valuable form of training. Employees can consider general training as

III. Data

In order to analyze whether or not the training subsidy program fostered corporate investment in employee training and whether or not such training enhanced corporate performance, a set of firm-level panel data is required. The data used in this study was constructed from various data sets.

The information on the subsidy provided to firms where training is provided by JSDP can be obtained through the *Employment Insurance Database* run by Ministry of Labor. This database contains data on the amount of training subsidy, the number of employees subject to training under the subsidy program by each establishment. Since it was after 1999 that establishments with more than 1,000 workers were covered by the JSDP, although launched in July of 1995, the data used in this analysis was confined to the years after 1999.

The information on actual corporate investment in training other than the amount of training subsidy is required in order to examine whether training grants by JSDP boost in-company training. The measures related to corporate training investment may be the number of the trained employee, duration of training, training expenditures, and so on. The training expenditure from *Financial Statements* compiled by the National Information and Credit Evaluation, Inc. is used as a measure of training investment in this study. A company's training expenditure goes on both *Statement of Income* and *Statement of Cost of Goods Manufactured* as "training expenditure." The training expenditure on the *Statement of Income* is expenditure on administrative and clerical employees, whereas the same item on the *Statement of Cost of Goods Manufactured* is expenditure on production workers. Therefore, in order to calculate total training expenditures of a company the two must be added. There remain practical difficulties still, since *Financial Statements* are available for only the companies listed on the Korea Stock Exchange and KOSDAQ and businesses subject to external audits. Even among these companies, it is rare to find instances in which training expenditures are placed on both

a gift from the employer, so they are likely to devote greater effort to general training than to specific training. This in turn leads to higher productivity effects of general training.

the *Statement of Income* and the *Statement of Cost of Goods Manufactured*. Many companies only keep them on the *Statement of Income*. Moreover, depending on the situation of the company, training expenditures could be accounted for under a different account item name. Although such possibilities of measurement errors still exist, the *Financial Statements* are currently the sole sources of information on the actual training expenditure. Thus they are used in this study while recognizing this limitation. I constructed a data comprising just the companies listing "training expenditure" on the *Statement of Income* or the *Statement of Cost of Goods Manufactured*. In other words, the data in this study is limited to firms with non-zero training expenditures. This data contains information on a company's characteristics and performance including sales, tangible fixed assets, number of employees, industry, total wages, and training expenditures.

To merge the two sets of data, the amount of training subsidies by establishment from *Employment Insurance Database* was summed up by the firm unit. Following this method, I have put together panel data on 644 companies covering three years from 1999 to 2001. The final panel data holds information on the amount of training subsidy obtained through the JSDP (hereinafter referred to as the training subsidy), actual training expenditure, and corporate characteristics and performance.

Table 1 shows the characteristics of the panel data in 2001. The percentage of firms that received training subsidies stood at 88.5% in 2001, illustrating that the sample distribution is skewed toward the JSDP-subsidized firms. In the sample, the proportion of companies that were beneficiaries of the JSDP steadily increased from 80.0% in 1999, to 87.6% in 2000, and 88.5% in 2001. This skew to beneficiary firms is basically caused by the fact that my sample was limited to firms with non-zero training expenditures in *Financial Statements*. Therefore, the analysis presented hereafter does not set forth results that are representative of all Korean firms, but rather should be interpreted as a tentative analysis on the effects of the training subsidy program.

The companies receiving training grants have a noticeably higher level of labor productivity, capital intensity, wages, and investment in training than the non-beneficiaries. Furthermore, the larger the size of the company is, the more grant it received. As the results clearly indicate, the beneficiaries and non-beneficiaries of training

TABLE 1

SAMPLE CHARACTERISTICS (2001)

		Total	Beneficiaries	Non-Beneficiaries
Annual per capita sales (mil. KRW)		399.8 (530.9)	413.7 (550.8)	292.2 (323.6)
Annual per capita fixed tangible assets (mil. KRW)		183.5 (323.7)	190.4 (329.1)	130.9 (274.5)
Monthly per capita wages (thou. KRW)		2,025.8 (1094.7)	2,042.5 (1,081.3)	1,897.4 (1,192.7)
Annual per capita training expenditure (thou. KRW)		255.5 (464.0)	272.6 (484.3)	124.3 (220.9)
Annual per capita training subsidy amount (thou. won)		33.4 (39.1)	33.4 (39.1)	
Industry	Light industry (share)	0.194	0.186	0.257
	Heavy and chemical (share)	0.542	0.549	0.486
	Non-manufacturing (share)	0.264	0.265	0.257
Size	-99 (share)	0.219	0.184	0.486
	100-299 (share)	0.393	0.395	0.378
	300-499 (share)	0.138	0.147	0.068
	500-999 (share)	0.141	0.153	0.054
	1,000- (share)	0.109	0.121	0.014
	Number of firms	644	570	74

Note: The figures in ( ) are standard deviations.

subsidy show a marked difference in the characteristics and performance of the businesses. Such differences can be resolved through the fixed effect model in analyzing the effects of the training subsidy program.

IV. The Effect of Training Subsidy Program on Stimulating Investment in Training

This section aims to analyze whether the training subsidy program for employers by JSDP expedited investment in employee training. The answer to this inquiry can be sought by looking into how training subsidy brought about increase in corporate training expenditure. In particular, the main interest is placed on whether

the firms that was not subsidized one year but was subsidized in the next year increased its training expenditure, and *vice versa*.

Table 2 shows the averages of the annual per capita training subsidy amount and the annual per capita training expenditure over two consecutive years, categorized according to whether or not subsidy was provided. Noteworthy here are two interesting findings.

First, when a non-beneficiary company turned beneficiary, per capita training expenditure went up rather dramatically. For example, a firm that was not subsidized in 1999 but was subsidized in 2000 posted an increase of KRW 79 thou. in annual per capita training expenditure, from KRW 126.9 thou. in 1999 to KRW 205.9 thou. in 2000. Similarly the figure also rose during the period 2000-1 by KRW 48.6 thou. The firms that fall under the "unsubsidized⇒subsidized" category recorded the greatest increase in per capita training expenditure compared to other categories of training subsidy status.

Second, the increase in per capita training expenditure far outpaced the increase in training subsidy amount. For instance, per capita training subsidy for the "unsubsidized in 1999⇒subsidized in 2000" category rose by KRW 11.6 thou., but their per capita training expenditure jumped much more substantially by KRW 79 thou..

The above summary statistics only shows the change in the average per capita training expenditure caused by the changes in the training subsidy without controlling other factors that may impact corporate decision of training. This study will examine whether the corporate training subsidy program promotes corporate investment in training, even when other factors that may influence corporate training investment are controlled.

The model used for the estimation is as follows:

$$\Delta T_{jt} = \alpha_0 + \alpha_1 Grant_{jt} + \alpha_2 \Delta X_{jt} + \varepsilon_{jt}$$

where j and t denote the firm and time, respectively.

Since this study attempts to find out whether the training subsidy program spurred on corporate investment in training, the amount of change in per capita training expenditure (ΔT) was set as the dependent variable. The variables related to the training subsidy program (*Grant*) were used two types. One is the variable indicating the change in the status of subsidy, namely the dummy

TABLE 2

THE EFFECT OF TRAINING SUBSIDY ON CORPORATE TRAINING INVESTMENT

(Unit: number of firms, 1,000 won)

		1999		2000		
	Number of Companies	Per Capita Training Expenditure (A)	Per Capita Training Subsidy	Per Capita Training Expenditure (B)	Per Capita Training Subsidy	(B) – (A)
Unsubsidized⇒Unsubsidized	43	81.7		119.5		37.8
Subsidized ⇒Unsubsidized	37	91.8	15.2	100.4		8.6
Unsubsidized⇒Subsidized	86	126.9		205.9	11.6	79.0
Subsidized ⇒Subsidized	478	217.7	26.7	263.8	36.4	46.1
Total	644	189.2	25.8	237.0	32.6	47.8
		2000		2001		
	Number of Companies	Per Capita Training Expenditure (A)	Per Capita Training Subsidy	Per Capita Training Expenditure (B)	Per Capita Training Subsidy	(B) – (A)
Unsubsidized⇒Unsubsidized	31	175.0		98.9		-76.1
Subsidized ⇒Unsubsidized	43	139.7	14.2	142.6		2.9
Unsubsidized⇒Subsidized	49	70.0		118.6	13.3	48.6
Subsidized ⇒Subsidized	521	264.5	34.2	287.0	35.3	22.6
Total	644	237.0	32.6	255.5	33.4	18.5

variables of "unsubsidized⇒subsidized," "subsidized⇒unsubsidized." The other is the change of amount in per capita training subsidy, because the amount of training subsidy varies even among the subsidized firms.

In addition, per capita sales, the number of workers, capital intensity, and per capita wage were used as explanatory variables (ΔX) affecting corporate training investment. Improvement in business performance as measured by per capita sales can bring about greater investment in employee training. The growth in corporate size, on one hand, can lead to more demand for training, but on the other hand a greater number of workers could bring down the per capita training expenditure. Increases in capital intensity may further necessitate the training of workers handling machinery and equipment. Per capita wage is taken as an indicator that represents the quality of workers. In general, training investment is likely to rise for high-quality workers. In the meantime, as the amount of change in corporate training investment could vary depending on the industry to which a firm belongs, the non-manufacturing industry was set up as a reference variable with both the light industry and heavy chemical industry added as dummy variables. Also the dummy variable of year was included to control business cycles and other factors that may affect all firms.

The estimated results showed in Table 3 are generally in line with expectations. Looking at the effect of the training subsidy program on corporate investment in training tells us that training subsidy do accelerate corporate training expenditure. In Model (1), with other factors controlled, it was found that newly subsidized firms increased training investment more drastically compared to the firms with no changes in subsidy status. On the other hand, when formerly subsidized firms stop receiving training subsidy, their investments in training tended to drop. In Model (2), the amount of per capita training subsidy significantly boosted per capita training expenditure.

Such estimated results imply that, although the training subsidy program could hand out windfalls to some companies providing training, the windfall effect is not big enough to offset the effect of stimulating training investment.

TABLE 3

ESTIMATION ON THE EFFECTS OF TRAINING SUBSIDY ON CORPORATE INVESTMENT IN TRAINING

Dependent variable = ⊿ln (per capita training expenditure)

	(1)	(2)
Constant	0.319 (0.073)*	0.092 (0.072)
⊿ln (Sales)	0.356 (0.085)***	0.341 (0.085)***
⊿ln (Number of employees)	0.127 (0.104)	0.114 (0.102)
⊿ln (Capital intensity)	-0.014 (0.064)	-0.021 (0.063)
⊿ln (per capita wage)	0.630 (0.087)***	0.631 (0.086)***
Industry [Non-manufacturing industry]		
Light industry	-0.022 (0.093)	-0.009 (0.092)
Heavy and chemical industry	-0.023 (0.074)	-0.010 (0.073)
Training subsidy variable		
1. Changes in training subsidy status [unchanged]		
unsubsidized⇒subsidized	0.247 (0.102)**	
subsidized⇒unsubsidized	-0.401 (0.127)***	
2. ⊿ln (per capita amount of training subsidy)		0.054 (0.008)***
Year 2001	-0.152 (0.064)**	-0.129 (0.063)**
Adj *R*-Sq.	0.103	0.120
N	1,288	

Notes: The figures in ( ) are standard errors. And the variables in [ ] are reference variables. * statistically significant at the 10% level; ** at the 5% level; and *** at the 1% level.

V. The Effect of Training on Corporate Performance

In this study the Cobb-Douglas production function model was used to analyze the effect of a firm's investment in training on its performance. There are two inputs in production function, capital and effective labor. The latter means the labor service actually provided by an employed worker that the company employs.

$$Y=AK^{\beta}(eL)^{\gamma} \tag{1}$$

The effectiveness of labor (e) is supposed as indicator of increases in the human capital accumulated in trained worker. In this study the effectiveness of labor is the function of training as follows.[4]

$$e=T^{\theta},\ 0\leq\theta\leq 1 \tag{2}$$

Therefore, if training is not provided, the effective labor (eL) equals the number of employed workers (L). And if training investment is made, the effective labor (eL) is larger than the number of employed workers (L).

If equation (2) is put into equation (1), the production function is changed as indicated below.

$$Y=AK^{\beta}(LT^{\theta})^{\gamma} \tag{3}$$

If equation (3) is divided by the number of workers and takes natural logarithm, it changes into the following equation.

$$\ln(Y/L)=\ln A+\beta\ln(K/L)+(\beta+\gamma-1)\ln L+\theta\gamma\ln T \tag{4}$$

The estimation equation is converted as follows, j and t denoting firm and time.

$$\ln(Y/L)_{jt}=b_0+b_1\ln(K/L)_{jt}+b_2\ln L_{jt}+b_3\ln T_{jt}+\varepsilon_{jt} \tag{5}$$

Estimates of the coefficient on the variable T will be biased if the error term (ε_{jt}) is correlated with T. This could be happen if the error term includes heterogeneity across firms in their technologies and type of output that are not observable (η_j).

$$\varepsilon_{jt}=\eta_j+\mu_{jt} \tag{6}$$

In this study the fixed effect model is used to eliminate the unobservable firm-specific effects through the first difference

[4]If a trained worker leaves his firm, the human capital created by training is lost for the firm. But it is assumed that labor mobility can be ignored in the short term.

method.

Thus, the final estimation equation is as shown in (7) below:

$$\ln(Y/L)_{jt} - \ln(Y/L)_{jt-1} = b_1(\ln(K/L)_{jt} - \ln(K/L)_{jt-1}) + b_2(\ln L_{jt} - \ln L_{jt-1}) + b_3(\ln T_{jt} - \ln T_{jt-1}) + \mu_{jt} - \mu_{jt-1} \quad (7)$$

In the estimation equation, per capita sales is used as the dependent variable,[5] and the per capita training expenditure as the training investment variable. Added to the explanatory variables is the industry variable that may affect the productivity. And the year dummy is also used to control the effect of economic fluctuation that may have influence on all firms.

Model (1) of Table 4 shows that an increase in capital intensity, which means investment, enhances productivity. And an increase in employment was found to lower productivity. This may be either due to the diminishing returns to scale or because the productivity of new recruits is lower than that of the existing employees. Now, let us take a look at the effect of training on corporate performance, which is our main concern. The estimated result shows that the more training investment a firm makes, the more significantly its productivity increases.

Model (2) and (3) show how the change in training subsidy status affects their performance. Model (2) indicates that productivity rises more for the formerly unsubsidized firms that are now subsidized than those that did not experience any change in subsidy status. Conversely, the productivity of the firms that received training subsidy, but now do not get them, did not increase. In Model (3), per capita training subsidy amount had a significant positive effect on the corporate productivity. The above findings suggest that training subsidy through the JSDP enhances corporate performance to some degree by augmenting corporate investment in training.

[5]It would be better to use per capita value added as productivity variable, but unfortunately no relevant information was available in the data used for this study. Meanwhile, per capita raw material cost should have been controlled when the variable of per capita sales was used, but it also failed due to absence of relevant information.

TABLE 4

ESTIMATION ON THE EFFECT OF TRAINING ON CORPORATE PERFORMANCE

Dependent variable = Δ ln (Per capita sales)

	(1)	(2)	(3)
Δ ln (Capital intensity)	0.190 (0.021)***	0.203 (0.022)***	0.202 (0.022)***
Δ ln (Number of employees)	-0.126 (0.035)***	-0.138 (0.037)***	-0.133 (0.036)***
Δ ln (Per capita training expenditure)	0.079 (0.009)***		
Training subsidy status [unchanged]			
unsubsidized⇒subsidized		0.099 (0.036)***	
subsidized⇒unsubsidized		0.018 (0.046)	
Δ ln (Per capita training subsidy amount)			0.008 (0.003)***
Industry [Non-manufacturing industry]			
Light industry	0.025 (0.027)	0.025 (0.028)	0.032 (0.027)
Heavy and chemical industry	0.012 (0.018)	0.015 (0.019)	0.019 (0.018)
Year 2001	0.009 (0.020)	-0.003 (0.020)	0.001 (0.020)
Adj R-Sq.	0.128	0.085	0.086
N		1,288	

Notes: The figures in ( ) are standard errors. And the variables in [ ] are reference variables. *** statistically significant at the 10% level.

VI. Conclusion

This study intends to examine the effects of subsidy program for company training in Korea. I constructed panel data over three years from 1999 to 2001. The major findings from the analysis are as follows:

First, training subsidy program encourages corporate investment in training. Receiving training subsidy and the amount of per capita training subsidy through the JSDP significantly increase the corporate training investment.

Second, employer-provided training significantly contributed to enhance firm's productivity.

Third, the provision of the training subsidy to firms and per capita training subsidy were also discovered to significantly boost corporate productivity.

The above findings show that as a levy-grant scheme, the Job Skill Development Program contributes to improving corporate performance by encouraging corporate investment in training. This

means that the training subsidy does not simply provide a windfall for subsidized firms.

This study has limitations as follows. The sample firms in panel data are not representative of all firms nationwide, and biased to the subsidized firms because the data is limited to firms with non-zero training expenditures. Moreover, the study has not gone far enough to analyze the long-term effects of the training subsidy program, as the data used here are those collected over a relatively short period of only three years. In making estimation, the study could control the unobservable corporate characteristics by using the fixed effect model, but failed to fix the simultaneous bias between training decision and corporate performance.[6]

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[6]The effects of training investment on corporate performance can reflect in part the effects of the reverse causality, *i.e.*, the effects of corporate performance on training investment. But with the limited data available, it was not possible to make estimation through instrumental variable, which have effect on training investment but not on corporate performance. Therefore, the estimated effects of the training investment on corporate performance in this study may be larger than the actual effects.

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