

An empirical analysis of the effect of a  
performance-based compensation plan:  
Evidence from an automobile distribution  
company in Korea\*  
성과급제도제도의 도입효과:  
한국기업 사례\*

(제 1 저자) Tae-Sik Ahn 안 태 식\*\*

(제 2 저자) Hye-Jeong Nam 남 혜 정\*\*\*

**ABSTRACT:** This study examines whether performance-based compensation plans act as effective devices for alleviating the agency problems by motivating employees and controlling moral hazard. Using large samples from an automobile sales and service firm in both pre-plan (2000-2001) and post-plan periods (2002-2004), we document that the productivity of employees increases following the implementation of a pay-for-performance plan. Both retention and effort

---

논문접수: 2005. 8      게재확정: 2005. 11

\* This research was partly supported by the financial support from the Management Research Center at Seoul National University.

\*\* Professor of Accounting, College of Business Administration, Seoul National University (서울대학교 경영대학 교수)(E-mail:ahnts@snu.ac.kr).

\*\*\* Ph. D.Candidate in Accounting, College of Business Administration, Seoul National University (서울대학교 경영대학 박사과정)(E-mail:nhj7547@snu.ac.kr).

\*\*\*\* We are grateful to Byung-Ki Park and Kyung-Young Kim for providing their time and access to data that made this study possible. Helpful comments and suggestions from Lee-Seok Hwang at Seoul National University, Sung-Kwon Chi at Busan National University, an anonymous referee, seminar participants at the 2005 summer conference of Korean Accounting Association, and discussants at the 2005 Asian Academic Accounting Association conference in Kuala Lumpur are gratefully acknowledged. All errors and omissions are our responsibility.

effects contribute to performance improvements while the attraction effect does not. We conduct an additional analysis by performance in the pre-plan periods and by position. Our empirical results suggest that a performance-based compensation plan has positive effects on performance for employees who were less productive before the plan while it has no significant effects on employees who were already productive in the pre-plan period. An analysis of sub-samples sorted by positions indicates that the effect of a performance-based compensation plan for managers and assistant managers is significantly positive.

**Key words:** Performance-based compensation plan, Salesperson compensation, Screening effect, Effort effect, Seniority rule.

**개요:** 본 연구는 성과급제도가 종업원의 동기부여를 유도하고 나아가 도덕적 해이를 최소화 함으로써 종업원의 성과를 향상시키는지 조사하고자 한다. 자동차판매회사에 근무하는 영업사원들의 판매실적자료를 이용하여, 성과급제도의 도입전과 후의 영업사원의 성과를 분석함으로써, 어떠한 요인이 기업의 성과에 큰 영향을 미치는지 분석하였다. 분석결과, 성과급제도가 영업사원의 성과향상을 가져오며, 생산성 있는 영업사원의 이탈을 방지하는 효과는 있으나, 능력 있는 영업사원을 유인하는 효과는 크지 않은 것으로 나타났다. 또한 성과급제도가 기존 영업사원의 도덕적 해이를 최소화하고 효율적인 노력배분을 유도하는 효과가 있는 것으로 나타났다. Banker et al.(2001)에 의하면, 성과급제도의 도입효과는 기존 사원의 노력효과보다는 생산적인 사원의 보유와 유인효과가 더 큰 영향을 미친다는 결과를 제시하고 있다. 그러나 본 연구의 결과는 기존 영업사원의 노력효과가 존재함에도 불구하고, 생산적인 영업사원의 유인효과가 미미하여 성과급제도의 효과가 크게 나타나지 않고 있다.

**한글색인어:** 성과급제도, 종업원, 선별효과, 노력효과, 연공서열.

## I. Introduction

This paper examines the effects of a performance-based compensation plan for employees in Korea. Specifically, our analysis focuses on whether a performance-based compensation plan retains and attracts more productive employees and/or

whether it encourages the effort of employees into a more productive direction. Conventional wisdom in western countries suggests that performance incentive contracts increase an organization's overall productivity (Wagner et al., 1988; Banker et al., 1996; Lazear, 1999; Rayton, 2003) and both screening and effort effects contribute to performance improvements (Banker et al., 2001). Does this conventional wisdom make sense in Asian countries like Korea? The results in this study suggest that both retention and effort effects of existing employees contribute to performance improvements. However, we cannot find significant attraction effects on performance. We attribute this finding to the inflexible labor market in Korea. That is, an experienced employee cannot move easily, even when he or she has other opportunities to work in better conditions.

Prior research primarily examines the effect of compensation plans for top executives (Antle and Smith, 1986; Lambert and Larcker, 1987; Jensen and Murphy, 1990; Hwang, 1995; Chi, 2001; Bebchuk et al., 2002; Hanlon et al., 2003). Whereas limited empirical evidence exists on the performance impact of such programs designed for lower level employees (Banker et al., 1996; Ahn and Lee, 1998). Moreover, there is no empirical evidence about the effect of performance-based compensation plans in straight-pay regime countries. International studies suggest that performance incentives in straight-pay regime countries may be controversial because the implementation of performance-based compensation plans in these countries may have adverse effects, such as psychological resistance from employees, extremely short-term performance oriented operations, and disagreements and conflicts between colleagues (Ashton, 1990; Rusbult et al., 1995; Churchill et al., 1997; Money and Graham, 1999). Money and Graham (1999) show that satisfaction with co-workers is an important factor in forming employees' overall satisfaction and their subsequent performance in Japanese firms, but not in United States firms. They also suggest that individual financial incentives are not recommended practices in Japan, while financial compensation is a key sales force management variable in the United States.

The compensation structure of Korea, a seniority-based wage system, is recently moving from a fixed hourly wage to a modified performance-based compensation plan<sup>1)</sup> However, although the proportion of firms adopting performance incentive

---

1) Korean firms also include bonuses as part of compensation packages. However, they are based upon company performance, while western countries bonuses are usually based upon individual performance (Money and Graham, 1999).

plans has increased from 20.0% in January 2000 to 28.8% in June 2004, Korean society has traditionally accepted the seniority rule. In addition, some countries using a seniority-based wage system have experienced failure because the employee's psychological resistance was greater than expected and adverse effects often overwhelmed the incentive effects.<sup>2)</sup> Effective compensation systems motivate employees both to exert themselves mentally and physically and to allocate their efforts in the ways that serve the organization's interest (Milgrom and Roberts, 1992). Therefore, it is purely an empirical question in Korea whether a performance-based compensation plan is an effective incentive scheme or not.

Using individual level productivity data in both pre-plan (2000-2001) and post-plan (2002-2004) periods from an automobile distribution company in Korea, we confirm that the productivity of employees following the implementation of a performance-based incentive plan increases after controlling for GDP, employment history, average sales, and prior year's advertising expenses. We also find that the implementation of the plan leads to the retention of more productive employees and induces employees to increase their efforts. To provide further insight into the effect of performance-based incentive plans, we re-estimate the plan effect using sub-samples by performance in the pre-plan and by position. We find that the plan effect on employees who were less productive before the plan implementation is significantly positive. Analysis of sub-samples by position indicates that the effect of a performance-based compensation plan for both managers and assistant managers is significantly positive. In sum, additional tests suggest that the low performers in the pre-plan as well as the high position employees show increased performance under a performance-based incentive plan.

We find evidence that performance-based compensation plans in Korea motivate employees to improve their productivity. It implies that performance-based incentive plans are still valid even in countries where a seniority-based wage system is prevalent.

The remainder of this paper is structured as follows. Section 2 describes the nature of performance-based compensation, prior studies, and the research site. Section 3 develops the research hypotheses, and Section 4 introduces the research design. Section 5 presents the empirical results, and Section 6 offers additional tests. Section 7 offers concluding remarks.

---

2) For example, Fujitsu in Japan implemented performance-based compensation plan in 1993. However, they could not help giving it up due to impairing harmonization and decreasing productivity.

## II. Theoretical Framework and Research Site

### 2.1 Performance-Based Compensation Plan

From an agency theory perspective, a principal designs a contract that motivates a risk-averse agent and that aligns the agent's interests with the organizational goals. A performance-based compensation plan can affect organizational performance by classifying employees by performance and by motivating employees to exert a greater effort (Milgrom and Roberts, 1992). The wage structure in Korea mainly consists of fixed base salaries regardless of number of hours worked or performance. However, fixed wages discourage productive employees and result in an overall morale decline (Lazear, 1981; Ashton, 1990). A performance-based compensation plan, one of incentive plans, has been introduced to solve these problems by linking compensation with performance.

The plan can be applied either to the individual level or to the group level. One of the simplest compensation forms for individuals is piece-rate system which pays employees a specified amount per unit produced. Piece rates are generally applied to production workers and commission-based to salespeople. Commissions are more commonly used for field salespeople who operate on their own, away from the direct monitoring of their managers, than for retail salespeople selling in stores (Milgrom and Roberts, 1992).

According to a survey taken by the Ministry of Labor in Korea, the number of firms that have introduced performance incentive plan is increasing and 27.4% of the respondents had already implemented performance-based compensation plans. Major reasons to implement performance incentive plans are both productivity enhancement and personnel expense savings. The fields of telecommunications, wholesale, and retail industry are the typical areas to which the plan is applied.

### 2.2 Prior Research

Analytical studies related to incentive plans provide evidence that incentive schemes, such as performance-based compensation plans, motivate employees to further improve their productivity (Salop and Salop, 1976; Demski and Feltham,

1978; Baiman, 1982). Some experimental studies also identify that a performance-based compensation plan is an effective incentive scheme (Chow, 1983; Waller and Chow, 1985).

However, there is little empirical evidence on such plans' multi-period effects due to the restrictions of the empirical data. A notable exception is Banker et al.(1996) who provides empirical evidence that the implementation of a performance-based incentive plan is associated with increases in sales. These findings support the agency-theoretic assumption that output increases when agents are properly rewarded for their performance. Banker et al.(2001) extend their prior study by evaluating possible causes of continuous performance improvement with employee productivity data of retail firms. They provide evidence that the plan implementation helps firms attract and retain more productive employees, supporting the hypothesis that a pay-for-performance plan acts as an effective screening device by sorting employees by ability.

Although the results reported in Banker et al.(1996, 2001) provide useful insights into the effect of performance-based compensation plans in the United States, it would be interesting to whether similar effects will occur in countries where fixed salary systems are dominant. While Banker et al.(2001) used post-plan productivity data and could not remove the possibility of survivorship bias, we use both pre-plan and post-plan data and compare the performance of both. Our results may offer some insight for salespeople who cannot be directly monitored like retail salespeople.

### 2.3 The Research Site

The research site selected for this study is one of the 100 largest Korean companies and focuses exclusively on automobile sales and service. The firm operates 123 direct offices and has 594 sales agents all over Korea. They sell various cars including passenger cars and commercial vehicles manufactured by the parent firm, as well as imported cars. The firm was the first one to specialize in automobile sales and services in Korea. The firm introduced a performance-based compensation plan to only employees<sup>3)</sup> who worked in direct sales offices in

---

3) Automobile manufacturing companies in Korea usually sell their cars through two channels: direct sales offices and sales agents. While direct sales offices are controlled by the company itself, agents operate independently from their company.

2002.<sup>4)</sup> The main objectives of the plan were to provide superior customer service and to attract, retain, and motivate employees through increased earnings opportunity. Before the plan was introduced, the compensation for salespeople was based primarily on seniority, not on performance, and salespeople were given a fixed wage even when they did not sell any cars. Therefore, no strong motivation for selling existed among the employees. Actually, the sales productivity before the plan implementation was so poor that average sales per month for many employees were zero.

Specifically, the wage structure before the plan implementation consisted of a basic salary, miscellaneous allowances reflecting position, family status, overtime, and long-service, and additional bimonthly bonuses that were up to 700 % of the monthly basic salary in a year. Therefore, the proportion of basic salary under the pre-plan was over 80% of total wages. The new plan implemented at the research site was designed to reduce the proportion of fixed wages by eliminating miscellaneous allowances, except the position allowance, and to pay on the basis of performance. Consequently, the proportion of the basic salary under the new incentive plan became less than 30% of total wages.

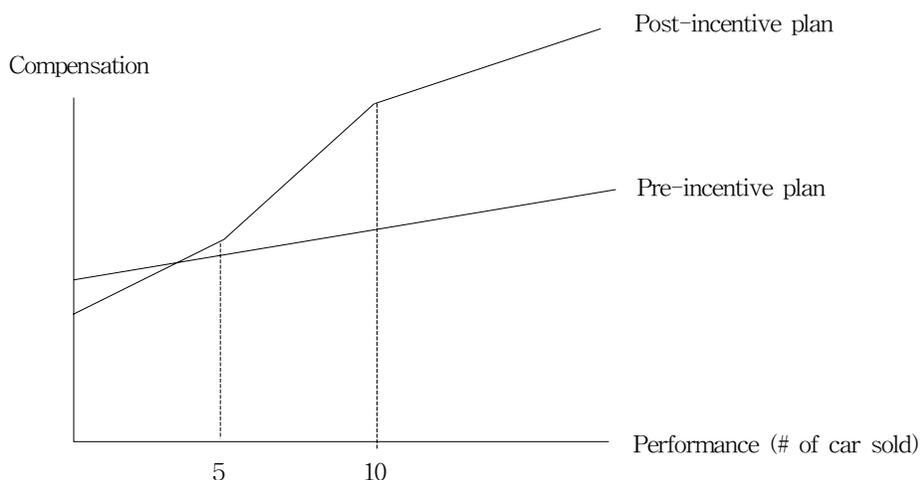
In addition, salespeople can earn an extra bonus in proportion to the number of cars sold if their monthly sales are continuously more than 5 cars during a quarter. This tends to encourage productive employees to sell consistently throughout the quarter. Under the plan, less productive employees are given lower payments than before the plan, while more productive employees are given higher payments. The structure of the two compensation systems is illustrated in <Figure 1>.

<Table 1> The wage composition before and after a performance-based compensation plan

Before		After	
Fixed	Miscellaneous allowances (position, family, overtime, long-service)	Fixed	Position allowance
Variable	Allowance by car model Efficiency allowance	Variable	Sales commission =Net sales*commission rate related to car model

4) From the interview with managers at the research site, we confirm that there was no other business restructuring during sample periods except the performance-based plan. One consideration which affects performance is layoffs implemented in the beginning of 2001. So, we exclude the employees who left the firm before the plan implementation to control this impact.

&lt;Figure 1&gt; Compensation Scheme: before and after



### III. Development of Hypotheses

Pay policies should signal what the organization values and what behavior and attitudes it wants to discourage. It should also help employees decide how to allocate their time and efforts among competing ends (Milgrom and Roberts, 1992). A performance-based compensation plan, linking pay to measures of individual productivity or performance, primarily focuses on motivating employees to exert more effort resulting in the organization's value creation. Moreover, performance-based incentive plans may work as a signal to attract and retain more productive employees. Therefore, this new compensation scheme is expected to show a positive effort effect by inducing employees to increase or better allocate their efforts and screening effect by attracting and retaining productive employees.

#### 3.1 Plan effect

Our objective is to examine whether the performance of the employees changed with the implementation of the new incentive plan, not to test for the performance-based compensation plan's optimality. A performance-based compensation plan provides an incentive for employees to make more effort by linking performance

and compensation (Salop and Salop, 1976; Demski and Feltham, 1978; Baiman, 1982; Banker et al., 1996). Since the performance-based compensation plan at our research site is designed so that more productive employees can receive higher compensation, and employees are more likely to exert their efforts to get the same or higher levels of wages than their prior ones. This is expected in this organization because the proportion of base salary under the new plan is considerably lower than that of the pre-plan. However, enhanced competition among the employees could result in increasing the pressure on the employees and impairing harmonization among colleagues. This may have a detrimental effect on performance. Ashton (1990) also finds that performance incentives plans increase pressure on performance, and the increased pressures may harm overall performance. Korean workers accustomed to seniority-based salary, however, may show systematic resistance to the new scheme, possibly weakening the expected screening and effort effects.

Economic theory of incentive predicts that the implementation of a performance-based compensation plan induces organization performance improvement by attracting and retaining more productive employees and by motivating employees to exert more effort. Following economic theory, we predict that the sales productivity will increase after the implementation of a performance-based compensation plan.

H1: The sales productivity increases following the implementation of the performance-based compensation plan.

### 3.2 Screening effect

Economic theory suggests that the introduction of the performance-based incentive plan is expected to have two sorting effects. First, performance incentive plans help retain more productive employees. We call this the retention effect. More productive employees before the plan do not have incentives to leave the firm because their expected future wages under the plan will be higher than their prior wages. Less productive employees before the plan have incentives to leave the firm because they expect to earn lower wages through incentive pay. Performance-based compensation plans result in more productive employees being retained by

the firm and less productive employees leaving the firm (Milgrom and Roberts, 1992; Banker et al., 2001). Thus, we predict that the implementation of a performance-based compensation plan at our research site will have the effect that productive employees remain the firm and unproductive employees leave the firm.

H2: The retention rate of employees who were productive before the plan is higher than that of unproductive employees.

Second, performance incentive plans can attract more productive employees. We call this the attraction effect. Several experimental studies suggest that highly skilled individuals select performance-based incentive schemes when given a choice between fixed pay and performance-based pay (Chow, 1983; Dillard and Fisher, 1990). This may lead to the prediction that productivity of new employees who enter the firm after the plan is higher than that of new employees who join before the plan.

H3: The sales productivity of new employees who enter the firm after the plan is greater than that of new employees who enter the firm before the plan.

### 3.3 Effort effect

Performance-based compensation plans help alleviate potential moral hazard by providing incentives to exert more effort or to better allocate efforts (Basu et al., 1985; Rao, 1990). If the new plan at our research site acts as an effective mechanism to induce employees' efforts in an optimal fashion, employees will ultimately adopt productive procedures and eliminate unproductive procedures. We analyze effort effect using employees who continued their services during the full sample periods (OLDSTAY, hereafter). If the productivity of OLDSTAY increases after the plan implementation, we can infer that employees try to make more efforts to increase their compensations. This would be an effort effect without screening effects involved.

H4: The sale productivity of existing (pre-plan) employees who remain with the firm after the plan (OLDSTAY) increases after the plan.

## IV. Research Design

### 4.1 Data

The data consists of 26,432 observations from an automobile distribution firm between the years 2000 and 2004. We deleted data points for employees whose working day is less than one month in a year and for employees who left the firm before June 1, 2001.<sup>5)</sup> Because we examine the effect of a performance-based compensation plan, employees who left the firm before the leak of information that the firm would introduce the plan are considered irrelevant observations. In addition, to control for the potential layoff impact of the organizational restructuring made in the beginning of 2001 on performance, we exclude employees who left the firm before the plan implementation.

Of the remaining 15,655 observations, we truncate the top and bottom 1% outlier of samples on the basis of productivity and employment years of employees. As a result, the sample is reduced to 15,080 employee-year observations. We classify each employee into one of the following four groups, and define each group as follows<sup>6)</sup>:

- ① OLDSTAY: employees who are with the firm before the plan and remain until the end of our sample period.
- ② OLDQUIT: employees who are with the firm before the plan but leave after the plan implementation but before the end of our sample period.
- ③ NEWSTAY: employees who join the firm after the plan and remain until the end of our sample period.

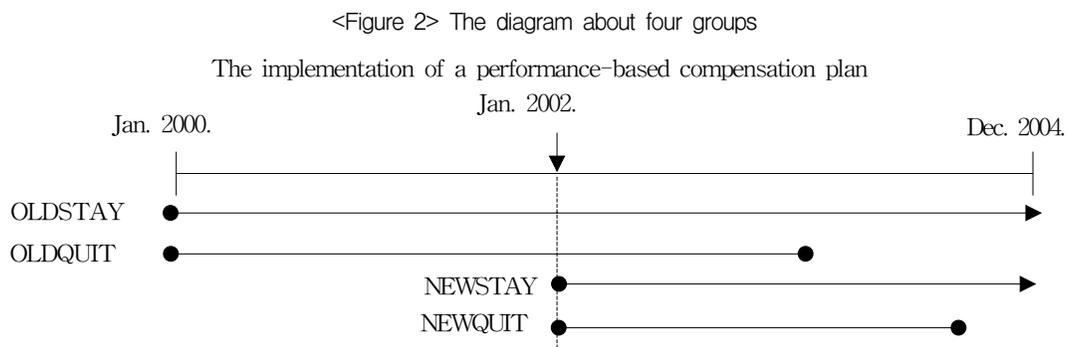
---

5) Interviews with managers at our research site indicate that they released the information about the new plan in 2~3 months before the plan implementation. However, the information could have been obtained via project team members who designed the new incentive plan. We, therefore, consider the leak period of the information as six months before the plan implementation.

6) We name and define each group following Banker et al.(2001). However, they do not provide the productivity change subsequent to plan implementation for each group because the research site they examined do not track individual data prior to plan implementation. We address this limitation by examining the individual productivity change using productivity data in both pre-plan and post-plan periods.

④ NEWQUIT: employees who join the firm after the plan but leave prior to the end of our sample period.

Each group is depicted in <Figure 2>.



Group definitions:

OLDSTAY = employees who are with the firm before the plan and remain until the end of our sample period.

OLDQUIT = employees who are with the firm before the plan but leave after the plan implementation but before the end of our sample period.

NEWSTAY = employees who join the firm after the plan and remain until the end of our sample period.

NEWQUIT = employees who join the firm after the plan but leave prior to the end of our sample period.

Panel A in <Table 2> shows that the numbers of employees are evenly allocated to each year. However, panel B shows a great deal of variation among groups. Specifically, OLDSTAY represents almost 55% of the observations while NEWSTAY represents only about 8% of the employees. We can infer that our research site has a substantially low turnover rate as with most other Korean companies.

<Table 2> Size of sample by year and group

Panel A : By year						
	2000	2001	2002	2003	2004	Total
Number of observation	3,004	3,534	2,943	3,045	2,554	15,080

Panel B : By group					
	OLDSTAY	OLDQUIT	NEWSTAY	NEWQUIT	Total
Number of observations (%)	8,276(54.9)	5,327(35.3)	1,136(7.5)	341(2.3)	15,080

Group definitions:

OLDSTAY = employees who are with the firm before the plan and remain until the end of our sample period.

OLDQUIT = employees who are with the firm before the plan but leave after the plan implementation but before the end of our sample period.

NEWSTAY = employees who join the firm after the plan and remain until the end of our sample period.

NEWQUIT = employees who join the firm after the plan but leave prior to the end of our sample period.

## 4.2 Estimation of variables and models

Since longer working days may be linearly related to higher performance, we operationalize an individual productivity (SPRO) as employee's sales scaled by employee's working days per year.<sup>7)</sup> We also use a dummy variable (PERDUM) indicating whether the sample year is after the plan or not. The PERDUM is set to 1 if sample year is in 2002~2004, 0 otherwise.

Eq.(1) includes several control variables that may affect the level of productivity. To control for the economic trends,<sup>8)</sup> we include a macro-economic variable such as the gross national products (GDP, hereafter) provided by the Bank of Korea. Organizational behavior studies found that positive correlations between seniority and compensation have been observed (Dworkin and Park, 1986; Rusbult et al., 1995), and also that job tenure improves productivity at individual level (Blakemore and Hoffman, 1989; Lazear, 2000). Therefore, we include employees' service year (CAREER) as a proxy for job tenure. We estimate a CAREER variable as measured by the employment year at the site. The longer their tenures, the more knowledgeable they are about car sales, and the higher their performance will be. Generally, automobile firms tend to conduct a variety of advertising, promotions, price discounts, as they launch new cars. We, therefore, include an average productivity variable (AVSPRO) to control for macroeconomic, seasonal, and strategic variations among the sample periods (Banker et al., 2001). AVSPRO is estimated as the sum of yearly cars sales divided by the number of employees in the corresponding year. Finally, the amount of advertising expenses has a large impact on sales. To control for this effect, we include a natural logarithm of the advertising expenses in the previous year. In sum, we estimate daily sales of an individual employee  $i$  on the PERDUM and various control variables as follows:

---

7) We use the number of cars sold instead of the amount of cars sold due to the restriction of data.

8) According to Korea National Statistical Office, Automobile Industry, including parts manufacturing, represents 9.1% among the entire industries, and is ranked as second next to Electronic Industry, including semi-conductor, and cellular phones, which represents 14.8%. But the inter-industry effects of Automobile Industry are the biggest among the industries. It is supposed that the actual impacts on the whole industries are larger. Therefore, the correlation between economic trend and automobile industry is highly positive. To control this effect, we include a macro-economic variable as a control variable.

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 AVSPRO_t + \beta_4 GDP_t + \beta_5 \ln AD_{t-1} \quad (1)$$

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 PERDUM_t * CAREER_{it} + \beta_4 AVSPRO_t + \beta_5 GDP_t + \beta_6 \ln AD_{t-1} \quad (2)$$

Where,

$SPRO_{i,t}$  : The number of cars sold by employee  $i$  / working days of employee  $i$  in year  $t$ ,

$PERDUM_t$  : 1 if year is 2002~2004, 0 otherwise,

$CAREER_{i,t}$  : Employment years for employee  $i$ ,

$AVSPRO_t$  : Average SPRO for all employees in year  $t$ ,

$GDP_t$  : The rate of change in GDP compared with the same quarter of the previous year,

$\ln AD_{t-1}$  : Natural logarithm of the advertising expenses in the previous year.

Generally, career length (employment year) is considered one of the most influential factors that affect employees' productivity in seniority regime countries. However, the plan at our research site was designed to provide compensations for employees based on their performance, not based on their employment years. The extent of career length's effect on performance, therefore, may decrease after the plan implementation. To incorporate this effect, we include the interaction variable of  $PERDUM$  with  $CAREER$  in the Eq. (2) and measure the effect of career following the plan.

### 4.3 Tests of hypotheses

The first hypothesis states that a performance-based plan results in the improvement of productivity. To test this hypothesis, we use both Eq. (1) and Eq. (2) that include several control variables. We predict that the coefficient on  $PERDUM$  ( $\beta_1$ ) in both Eq. (1) and Eq. (2) will be significantly positive if the productivity of an individual employee increases following the plan implementation.

To investigate retention effects, we first consider prior performance of existing employees classified as  $OLDSATY$  and  $OLDQUIT$ . Based on the prior performance, we group them into quintiles where the highest productivity group is noted as  $Q_5$ . Then we estimate each group's retention rate after the plan. If high performance employees before the plan expect their future wages to increase after the plan, they will remain in the firm. Accordingly, we predict that the retention rate of

high performance groups will be higher than that of the low performance groups. Hypothesis 3 states that new employees who join the firm after the plan are expected to be more sensitive to performance because they are supposed to know the plan. To evaluate this hypothesis, first we set NDUM to 1 if an employee were hired between Jan. 2000. and Dec. 2004. and 0 otherwise. Then, we include NDUM and PERDUM\*NDUM in Eq.(3) and Eq.(4). Note here that the coefficient on PERDUM\*NDUM captures the difference in the productivities of two group of new employees who were hired before the plan and after the plan. The signs of  $\beta_4$  in Eq.(3) and  $\beta_5$  in Eq.(4) will be significantly positive if new employees who joined the firm after the plan are more productive. We specify the following model to test H3:

$$\begin{aligned} SPRO_{i,t} = & \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 NDUM_{it} + \beta_4 PERDUM_t * NDUM_{it} \\ & + \beta_5 AVSPRO_t + \beta_6 GDP_t + \beta_7 \ln AD_{t-1} \end{aligned} \quad (3)$$

$$\begin{aligned} SPRO_{i,t} = & \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 PERDUM_t * CAREER_{it} \\ & + \beta_4 NDUM_{it} + \beta_5 PERDUM_t * NDUM_{it} + \beta_6 AVSPRO_t + \beta_7 GDP_t \\ & + \beta_8 \ln AD_{t-1} \end{aligned} \quad (4)$$

Where,

- SPRO<sub>i,t</sub> : The number of cars sold by employee *i* / working days of employee *i* in year *t*,
- PERDUM<sub>t</sub> : 1 if year is 2002~2004, 0 otherwise,
- CAREER<sub>i,t</sub> : Employment years for employee *i*,
- NDUM<sub>i,t</sub> : 1 if an employee was hired between Jan. 2000. and Dec. 2004., 0 otherwise.
- AVSPRO<sub>t</sub> : Average SPRO for all employees in year *t*,
- GDP<sub>t</sub> : The rate of change in GDP compared with the same quarter of the previous year,
- ln AD<sub>t-1</sub> : Natural logarithm of the advertising expenses in the previous year.

Finally, we test whether the plan results in performance improvement of existing employees. As mentioned earlier, due to the minimal proportions of employees who joined the firm after the plan, large portions of plan effect are likely to be driven by existing employees. To separate the effort effect from the plan effect, we use only OLDSTAY employees and test whether  $\beta_1$ s in both Eq. (1) and Eq. (2) are positive. If  $\beta_1$ s in both Eq. (1) and Eq. (2) are positive, we can infer that the plan motivates existing employees to allocate their efforts more efficiently resulting in performance improvement.

## V. Empirical Results

### 5.1 Descriptive statistics

<Table 3> presents descriptive statistics for dependent variable and control variables used in the study. As shown in <Table 3>, the mean sales per working day (SPRO) is 0.118, which indicates that salespeople at our research site sell on average 0.1 car per day and 36.7 cars annually.<sup>9)</sup> There appears to be a large difference in sales per working day and employment year as the ranges for SPRO and CAREER are 0.492(=0.008-0.5), and 17(=1-18) respectively. <Table 4> reports that the sales productivity of employees decreases after the increase in 2002 when the plan was introduced. The average sales per working day also show a decreasing trend after the increase in 2002. Economic recession during that period might have played a role.

<Table 3> Descriptive statistics (n=15,080 employee-year)

Variables	Mean	Median	Std.	Min	Q1	Q3	Max
SPRO	0.118	0.096	0.079	0.008	0.068	0.147	0.500
CAREER	5.480	4.000	3.859	1.000	3.000	7.000	18.00
AVSPRO	0.117	0.116	0.014	0.102	0.104	0.120	0.144
GDP	-0.016	-0.105	0.560	-0.557	-0.553	0.483	0.842
lnAD	10.041	10.026	0.126	9.807	10.025	10.078	10.206

Variable definitions:  $SPRO_{i,t}$  is the number of cars sold per employee  $i$  divided by per working day in year  $t$ .  $CAREER_{i,t}$  is employment years for employee  $i$ .  $AVSPRO_t$  is average SPRO for all employees in year  $t$ .  $GDP_t$  is the rate of change in GDP compared with the same quarter of the previous year.  $\ln AD_{t-1}$  is natural logarithm of the advertising expenses in the previous year.

<Table 4> Descriptive statistics by year

Year	SPRO	CAREER	AVSPRO	GDP	lnAD
2000	0.129	4.848	0.144	-0.105	10.078
2001	0.116	5.202	0.116	-0.553	10.206
2002	0.130	5.278	0.120	0.842	10.025
2003	0.111	5.873	0.104	-0.557	10.026
2004	0.103	6.370	0.101	0.483	9.807

Variable definitions:  $SPRO_{i,t}$  is the number of cars sold per employee  $i$  divided by per working day in year  $t$ .  $CAREER_{i,t}$  is employment years for employee  $i$ .  $AVSPRO_t$  is average SPRO for all employees in year  $t$ .  $GDP_t$  is the rate of change in GDP compared with the same quarter of the previous year.  $\ln AD_{t-1}$  is natural logarithm of the advertising expenses in the previous year.

9) We assume that one year consists of 311 business days.

<Table 5> shows descriptive statistics on sales per working day (SPRO) by groups. As shown in the table, productivities of ‘stay’ groups (OLDSATY or NEWSTAY) are greater than these of ‘quit’ groups (OLDQUIT or NEWQUIT) in both pre-plan and post-plan periods. It implies that more productive employees tend to remain in the firm. These results are consistent with Banker et al. (2001).

<Table 5> Descriptive statistics on sales per working day by groups

		N	Mean	Median	Std.	Min	Q1	Q3	Max
OLDSTAY	Pre-plan	3,013	0.139	0.115	0.089	0.009	0.076	0.500	0.178
	Post-plan	5,263	0.127	0.107	0.081	0.010	0.071	0.500	0.156
OLDQUIT	Pre-plan	3,525	0.107	0.087	0.073	0.009	0.057	0.490	0.134
	Post-plan	1,802	0.109	0.087	0.074	0.011	0.060	0.500	0.134
NEWSTAY		1,136	0.085	0.074	0.059	0.009	0.046	0.109	0.473
NEWQUIT		341	0.062	0.052	0.044	0.008	0.033	0.079	0.365

Group definitions:

OLDSTAY = employees who are with the firm before the plan and remain until the end of our sample period.

OLDQUIT = employees who are with the firm before the plan but leave after the plan implementation but before the end of our sample period.

NEWSTAY = employees who join the firm after the plan and remain until the end of our sample period.

NEWQUIT = employees who join the firm after the plan but leave prior to the end of our sample period.

<Table 6> reveals that the higher the position and the longer the career, the higher the performance. For example, the productivities for managers are greater than that for staffs (0.166 vs 0.113). The number of employment years for managers is longer than that for staffs (9.412 vs 2.041).

<Table 7> shows correlations among variables used in the study<sup>10)</sup> The relation between sales productivity (SPRO) and a performance plan (PERDUM) is significantly negative and the introduction of a performance-compensation plan results in the reduction of sales productivity. To note is that this seemingly negative correlation is before the control of affecting variables. The positive correlation between sales productivity (SPRO) and employment years at the firm (CAREER) fit our expectation

10) A possible econometric problem is a multicollinearity. To address this issue, we estimate variance inflation factor (VIF) and condition index. The highest value of VIF in our results is below 6 and condition index is also below 30 except GDP and lnAD. The results from excluding each variable in the original model one after another, however, are almost identical, indicating the insignificance of multicollinearity. Moreover, R<sup>2</sup> becomes slightly lower than that of full regression. Therefore, we included two variables as control variables.

that longer employment years result in higher performance. However, without controlling other variables, these relations cannot be appreciated per se because these relations could be interpreted as spurious associations.

<Table 6> Means of SPRO and CAREER by positions and by periods

	SPRO		CAREER		N	
	Pre-plan	Post-plan	Pre-plan	Post-plan	Pre-plan	Post-plan
Manager	0.166 (0.140)	0.136 (0.117)	9.412 (9.000)	9.805 (9.000)	1,397	2,314
Assistant Manager	0.111 (0.094)	0.117 (0.098)	6.238 (5.000)	5.514 (5.000)	1,404	2,404
Senior Staff	0.105 (0.085)	0.105 (0.087)	4.131 (3.000)	4.255 (3.000)	1,634	1,719
Staff	0.113 (0.90)	0.095 (0.076)	2.041 (2.000)	3.053 (2.000)	2,103	2,105

1. Variable definitions:  $SPRO_{i,t}$  is the number of cars sold per employee  $i$  divided by per working day in year  $t$ .  $CAREER_{i,t}$  is employment years for employee  $i$ .
2. Position definitions :  
 Managers = employees who work for the firm over 5years.  
 Assistant Managers = employees who work for the firm over 3years and less than 5years.  
 Senior Staff =employees who work for the firm over 1years and less than 3years.  
 Staff = employees who work for the firm less than 1year.
3. The median-values are in parentheses.

<Table 7> Correlations among variables

Variables	SPRO	PERDUM	CAREER	NDUM	GDP	AVSPRO	lnAD
SPRO	1	-0.038***	0.163***	-0.191***	0.050***	0.122***	0.027***
PERDUM	-0.043***	1	0.137***	-0.065***	0.252***	-0.550***	-0.876***
CAREER	0.152***	0.099***	1	-0.307***	-0.003	-0.164***	-0.123***
NDUM	-0.145***	-0.065***	-0.211	1	0.057***	0.155***	0.014
GDP	0.034***	0.515***	0.020**	0.039***	1	0.279***	-0.576***
AVSPRO	0.108***	-0.659***	-0.118***	0.173***	0.037***	1	0.422***
lnAD	0.057***	-0.732***	-0.105***	0.009	-0.594***	0.422***	1

1. Variable definitions:  $SPRO_{i,t}$  is the number of cars sold by employee  $i$  divided by per working days of employee  $i$  in year  $t$ .  $PERDUM_t$  is dummy variable and is set to 1 if year is 2002~2004, and 0 otherwise.  $CAREER_{i,t}$  is employment years for employee  $i$ .  $NDUM_{i,t}$  is dummy variable and is set to 1 if an employee was hired between Jan. 2000 and Dec. 2004, and 0 otherwise.  $AVSPRO_t$  is average SPRO for all employees in year  $t$ .  $GDP_t$  is the rate of change in GDP compared with the same quarter of the previous year.  $\ln AD_{t-1}$  is natural logarithm of the advertising expenses in the previous year.
2. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).
3. Upper diagonal represents Spearman rank and lower diagonal represents Pearson correlation

## 5.2 Regression results

### 5.2.1 Plan effect

Although productivity of employees seems to have decreased after the plan, this trend is more likely to be driven by economic recessions in Korea. We, therefore, estimate the plan effect after controlling for other variables that affect the productivity.

As shown in <Table 8>, the coefficient on PERDUM in Eq. (1) is 0.013(t value:

<Table 8> The results for plan effect

Model 1:

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 AVSPRO_t + \beta_4 GDP_t + \beta_5 \ln AD_{t-1}$$

Model 2:

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 PERDUM_t * CAREER_{it} + \beta_4 AVSPRO_t + \beta_5 GDP_t + \beta_6 \ln AD_{t-1}$$

	Prediction	Full Sample	
		Model 1	Model 2
Intercept	(?)	-0.67*** (-8.29)	-0.681*** (-8.41)
PERDUM	(+)	0.013*** (5.21)	0.01*** (3.22)
CAREER	(+)	0.003*** (21.14)	0.003*** (12.01)
PERDUM*CAREER	(?)	- -	0.001* (2.04)
AVSPRO	(+)	0.745*** (10.43)	0.744*** (10.41)
GDP	(+)	0.006*** (3.66)	0.006*** (3.73)
lnAD	(+)	0.067*** (8.34)	0.068*** (8.48)
Adj R <sup>2</sup>		0.04	0.04
N		15,080	15,080

1. Variable definitions:  $SPRO_{i,t}$  is the number of cars sold by employee  $i$  divided by per working days of employee  $i$  in year  $t$ .  $PERDUM_t$  is dummy variable and is set to 1 if year is 2002~2004, and 0 otherwise.  $CAREER_{i,t}$  is employment years for employee  $i$ .  $AVSPRO_t$  is average SPRO for all employees in year  $t$ .  $GDP_t$  is the rate of change in GDP compared with the same quarter of the previous year.  $\ln AD_{t-1}$  is natural logarithm of the advertising expenses in the previous year.

2. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

3. The t-values are in parentheses.

5.21) and significantly positive. This result strongly supports our first prediction<sup>11)</sup> The coefficient on PERDUM\*CAREER in Eq. (2) is also significantly positive indicating that employment year is still an important factor affecting the performance even after the plan.<sup>12)</sup>

### 5.2.2 Screening effect

We present the descriptive statistics of performance quintiles prior to the plan in panel A of <Table 9>, which is needed to test H2. The productivity of Q5 exceeds that of Q1 and the employment year of Q5 is longer than that of Q1. In these comparisons, we find that there are a positive association between the mean productivity and the mean service year in the pre-plan. Panel B of <Table 9> reveals that the retention rate of Q5 exceeds that of Q1 ( $0.71 > 0.35$ ). Consistent with our prediction, we find evidence that a performance-based compensation plan can act as a screening device which keeps more productive employees and encourages less productive employees to leave<sup>13)</sup> Panel C shows the results of the attraction effect. The coefficient on NDUM is significantly positive and consistent with our conjecture which the shorter career, the lower performance. However, the coefficient on PERDUM\*NDUM in panel C, which represents the attracting effect of new employees after the plan is positive but insignificant. In summary, we conclude that a performance-based compensation plan at our research site induces more productive employees to remain in the firm. However, it does not seem to attract productive new employees. While Banker et al. (2001) indicates that a large portion of the

11) There is a possibility that the result can be induced from other effects. One possibility is external effects such as domestic economic, industry trends. However, we already include a macro-economic control variable. The second thing is internal effects such as promotion, firm specific policies. But, we controlled layoff impact during the sampling process. Moreover, we also were informed from a manager at the research site that other restructuring plans were not implemented during the sample period. Finally, unobserved effects such as employee characteristics, mental satisfaction can affect employees' performance. However, we have restricted data. So, we leave this for future research. Based on our findings, we can infer the results are induced mostly from plan implementation. We appreciate the helpful comments from an anonymous referee.

12) The lagged career can also affect the productivity since service year in the beginning of the year affects the productivity of the year. We re-estimate the first hypothesis using lagged career instead of career. The results are still valid (not tabulated).

13) The descriptive statistics of OLDQUIT group also show similar results. Assistant managers were less likely to leave the firm after the plan and their performance in the post-plan actually increased. However, other positions' performances did not increase after the plan (not tabulated).

continuing productivity gains is related to both retention and attraction effects, our study did not find the attraction effect for the productive new employees.

<Table 9> The results for screening effect

Model 3:  

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 NDUM_{it} + \beta_4 PERDUM_t * NDUM_{it} + \beta_5 AVSPRO_t + \beta_6 GDP_t + \beta_7 \ln AD_{t-1}$$

Model 4:  

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 PERDUM_t * CAREER_{it} + \beta_4 NDUM_{it} + \beta_5 PERDUM_t * NDUM_{it} + \beta_6 AVSPRO_t + \beta_7 GDP_t + \beta_8 \ln AD_{t-1}$$

Panel A : Descriptive statistics on performance before to the plan by each groups

	Q1 (Low sales)	Q2	Q3	Q4	Q5 (High sales)	All	Q5-Q1
Avg. Productivity	0.044	0.069	0.095	0.133	0.242	0.122	0.198
Avg. employment year	4.48	4.88	4.89	5.43	6.04	5.14	1.56*** <sup>a</sup>
N	729	730	732	730	730	3,651	

Panel B : The retention rate of each group after the plan (Retention effect)

	Q1	Q2	Q3	Q4	Q5	All	Q5-Q1
The retention rate	0.35	0.46	0.58	0.66	0.71	0.55	0.36*** <sup>b</sup>

Panel C : New employee dummy (Attraction effect)

	Prediction	Model 3	Model 4
Intercept	(?)	-0.601*** (-7.46)	-0.612*** (-7.59)
PERDUM	(+)	0.015*** (5.91)	0.09** (3.02)
CAREER	(+)	0.003*** (17.44)	0.002*** (8.61)
PERDUM*CAREER	(?)	- -	0.001*** (3.27)
NDUM	(?)	-0.064*** (-13.47)	-0.067*** (-13.85)
PERDUM*NDUM	(?)	0.001 (0.17)	0.006 (0.83)
AVSPRO	(+)	0.932*** (12.93)	0.937*** (13.01)
GDP	(+)	0.005*** (2.96)	0.005*** (3.01)
lnAD	(+)	0.058*** (7.27)	0.059*** (7.44)
Adj R <sup>2</sup>		0.06	0.06
N		15,080	15,080

1. Variable definitions:  $SPRO_{i,t}$  is the number of cars sold by employee  $i$  divided by per working days of employee  $i$  in year  $t$ .  $PERDUM_t$  is dummy variable and is set to 1 if year is 2002~2004, and 0 otherwise.  $CAREER_{it}$  is employment years for employee  $i$ .  $NDUM_{it}$  is dummy variable and is set to 1 if an employee was hired between Jan. 2000 and Dec. 2004, and 0 otherwise.  $AVSPRO_t$  is average  $SPRO$  for all employees in year  $t$ .  $GDP_t$  is the rate of change in  $GDP$  compared with the same quarter of the previous year.  $\ln AD_{t-1}$  is natural logarithm of the advertising expenses in the previous year.
  2. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).
  3. The number of  $NDUM$  observations is 295 (in the pre-plan) and 188 (in the post-plan), respectively.
  4. The mean productivity ( $SPRO$ ) of  $NDUM$  is 0.0593 (in the pre-plan) and 0.0466 (in the post-plan), respectively.
  5. The  $t$ -values are in parentheses.
- <sup>a</sup> represents that  $t$ -statistics testing mean difference between Q1 and Q5 is significant at the 1%.  
<sup>b</sup> represents that  $t$ -statistics testing mean difference between Q1 and Q5 is significant at the 1%.

## 5.2.3 Effort effect

The plan effect includes mixed evidences both screening and effort effects. We re-estimate Eq. (1) and Eq. (2) using only OLDSTAY productivity data to pick up an effort effect of existing employees. As seen in <Table 10>, the coefficients on PERDUM in both Eq. (1) and Eq. (2) are a significantly positive. These findings also support our predictions that existing employees make more efforts subsequent to the plan implementation.

&lt;Table 10&gt; The results for effort effect

Model 1:

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 AVSPRO_t + \beta_4 GDP_t + \beta_5 \ln AD_{t-1}$$

Model 2:

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 PERDUM_t * CAREER_{it} + \beta_4 AVSPRO_t + \beta_5 GDP_t + \beta_6 \ln AD_{t-1}$$

	Prediction	OLDSTAY Group	
		Model 1	Model 2
Intercept	(?)	-0.989*** (-8.87)	-0.968*** (-8.63)
PERDUM	(+)	0.018*** (4.82)	0.023*** (4.87)
CAREER	(+)	0.002*** (9.31)	0.003*** (7.13)
PERDUM*CAREER	(?)	- -	-0.001 (-1.70)
AVSPRO	(+)	0.809*** (7.53)	0.81*** (7.55)
GDP	(+)	0.004 (1.68)	0.004 (1.57)
lnAD	(+)	0.099*** (8.86)	0.097*** (8.58)
Adj R <sup>2</sup>		0.03	0.03
N		8,276	8,276

1. Variable definitions:  $SPRO_{i,t}$  is the number of cars sold by employee  $i$  divided by per working days of employee  $i$  in year  $t$ .  $PERDUM_t$  is dummy variable and is set to 1 if year is 2002~2004, and 0 otherwise.  $CAREER_{it}$  is employment years for employee  $i$ .  $AVSPRO_t$  is average SPRO for all employees in year  $t$ .  $GDP_t$  is the rate of change in GDP compared with the same quarter of the previous year.  $\ln AD_{t-1}$  is natural logarithm of the advertising expenses in the previous year.

2. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

3. The t-values are in parentheses.

## VI. Additional Tests

The plan effect may differ depending on positions and prior performances. The results in <Table 8> indicate that employment year has a strong positive impact on sales productivity. However, a performance-based plan is designed to provide higher compensation for higher productive employees regardless of employment years. If the plan is effective for low position employees, the productivities of low position employees will increase after the plan. To further investigate whether the plan effect differs by positions, we construct four sub-samples on the basis of positions (Managers, Assistant managers, Senior staffs, and Staffs) and re-examine the plan effect. Although the publicly available evidence on the efficacy of incentive plans at manager levels is very limited, we show that performance plans are effective at manager levels. The results of position analysis in <Table 11> reveal that high position groups show significant improvement in performance. Specifically, the coefficients on PERDUM for managers and assistant managers are significantly positive while the coefficients on PERDUM for senior staffs and staffs are insignificant. These findings also seem intuitive in the Korean labor market since it takes three to five years for a novice to be trained about a firm's operation. Taking into account the training period positions, assistant managers and higher ranked employees can be the main target for the plan. Thus, the efficacy of the plan may be better for the higher position groups.

To analyze the plan effect by the performance before the plan, we define two dummy variables (GDUM) as follows; First, we classify our samples into three groups based on the prior performance and set to 1 for the highest performance group and 0 for the lowest performance group. Second, we calculate the mean (median) sales per working day in pre-plan period and partition our samples into two sub-samples as follows; set 1 if prior performance is higher than the mean (median), 0 otherwise. <Table 12> shows that the coefficient on PERDUM\*GDUM is significantly negative. It implies that the performances of less productive employees in pre-plan improve after the plan while productive employees performance decline after the plan. These results do not change when we repeat the same analysis using the groups defined by the second method. Thus, we conclude that the effect of a performance-compensation plan is more significant for pre-plan low performers than

<Table 11> The results for plan effect by position

Model 1:

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 AVSPRO_t + \beta_4 GDP_t + \beta_5 \ln AD_{t-1}$$

Model 2:

$$SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 PERDUM_t * CAREER_{it} + \beta_4 AVSPRO_t + \beta_5 GDP_t + \beta_6 \ln AD_{t-1}$$

	Manager		Assistant Manager		Senior Staff		Staff	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Intercept	-0.612*** (-3.56)	-0.613*** (-3.57)	-0.334* (-2.29)	-0.323* (-2.19)	-0.407* (-2.49)	-0.624*** (-3.88)	-0.513*** (-3.28)	-0.485*** (-3.11)
PERDUM	0.014** (2.51)	0.023*** (2.47)	0.022*** (4.53)	0.025*** (3.64)	0.006 (1.26)	-0.041*** (-6.33)	-0.016*** (-3.32)	0.010 (1.29)
CAREER	0.002*** (7.95)	0.003*** (5.81)	-0.004*** (-10.57)	-0.004*** (-7.16)	-0.003*** (-6.58)	-0.012*** (-13.58)	0.007*** (12.43)	0.018*** (7.17)
PERDUM*CAREER	- -	-0.001*** (-1.17)	- -	-0.001 (-0.73)	- -	0.013*** (12.00)	- -	-0.012*** (-4.41)
AVSPRO	1.681*** (10.13)	1.696*** (10.19)	0.585*** (4.22)	0.582*** (4.19)	0.151 (1.10)	0.401*** (2.96)	0.334** (2.71)	0.452*** (3.58)
GDP	-0.001 (-0.21)	-0.001*** (-0.27)	0.000 (0.12)	0.000 (0.11)	0.011*** (2.97)	0.011*** (3.13)	0.015*** (5.01)	0.014*** (4.43)
lnAD	0.052*** (3.02)	0.052*** (2.99)	0.039** (2.69)	0.038** (2.58)	0.050*** (3.13)	0.072*** (4.54)	0.056*** (3.69)	0.050*** (3.26)
Adj R2	0.08	0.08	0.04	0.04	0.02	0.06	0.06	0.06
N	3,711	3,711	3,808	3,808	3,353	3,353	4,208	4,208

1. Variable definitions:  $SPRO_{i,t}$  is the number of cars sold by employee  $i$  divided by per working days of employee  $i$  in year  $t$ .  $PERDUM_t$  is dummy variable and is set to 1 if year is 2002~2004, and 0 otherwise.  $CAREER_{i,t}$  is employment years for employee  $i$ .  $AVSPRO_t$  is average  $SPRO$  for all employees in year  $t$ .  $GDP_t$  is the rate of change in  $GDP$  compared with the same quarter of the previous year.  $\ln AD_{t-1}$  is natural logarithm of the advertising expenses in the previous year.

2. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

3. The t-values are in parentheses.

<Table 12> The results for plan effect by prior performance

Model 5:  $SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_{it} + \beta_3 GDUM_t + \beta_4 PERDUM_t * GDUM_t$

Model 6:  $SPRO_{i,t} = \alpha + \beta_1 PERDUM_t + \beta_2 CAREER_t + \beta_3 PERDUM_t * CAREER_t + \beta_4 GDUM_t + \beta_5 PERDUM_t * GDUM_t + \beta_6 AVSPRO_t + \beta_7 GDP_t + \beta_8 \ln AD_{t-1}$

	Prediction	High_Low group dummy		Mean-based group dummy	
		Model 5	Model 6	Model 5	Model 6
Intercept	(?)	-0.649*** (-8.33)	-0.625*** (-7.90)	-0.584*** (-7.79)	-0.579*** (-7.60)
PERDUM	(+)	0.045*** (16.64)	0.048*** (15.59)	0.039*** (15.36)	0.039*** (13.68)
CAREER	(+)	0.001*** (8.40)	0.002*** (7.18)	0.001*** (5.91)	0.001*** (4.42)
PERDUM*CAREER	(?)	-	-0.001 (-1.81)	-	-0.000 (-0.41)
GDUM	(+)	0.109*** (65.26)	0.109*** (64.96)	0.120*** (72.58)	0.120*** (72.18)
PERDUM*GDUM	(?)	-0.052*** (-22.48)	-0.051*** (-21.87)	-0.053*** (-23.51)	-0.053*** (-23.05)
AVSPRO	(+)	0.711*** (11.01)	0.707*** (10.95)	0.698*** (11.22)	0.697*** (11.20)
GDP	(+)	0.003 (2.25)	0.003 (2.10)	0.003 (2.23)	0.003 (2.19)
lnAD	(+)	0.061*** (8.00)	0.058*** (7.55)	0.055*** (7.59)	0.055*** (7.40)
Adj R <sup>2</sup>		0.31	0.31	0.35	0.35
N		13,603	13,603	13,603	13,603

1. Variable definitions:  $SPRO_{i,t}$  is the number of cars sold by employee  $i$  divided by per working days of employee  $i$  in year  $t$ .  $PERDUM_t$  is dummy variable and is set to 1 if year is 2002~2004, and 0 otherwise.  $CAREER_{i,t}$  is employment years for employee  $i$ .  $GDUM$  is dummy variable and is set to 1) 1 if the highest performance group in the pre-plan, 0 if the lowest performance group in the pre-plan. 2) 1 if performance is higher than mean (median) value in the pre-plan, 0 otherwise.  $AVSPRO_t$  is average  $SPRO$  for all employees in year  $t$ .  $GDP_t$  is the rate of change in  $GDP$  compared with the same quarter of the previous year.  $\ln AD_{t-1}$  is natural logarithm of the advertising expenses in the previous year.
2. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).
3. We delete the samples (1,075) which prior performance is zero, and re-estimate this regression. The results of the reduced samples do not change (results not tabulated).
4. The  $t$ -values are in parentheses.

pre-plan high performers. These results could be alternatively interpreted. Since cooperation among colleagues in Korea society is still considered important factor than competition for serving in a company, one possibility is aid acting in collusion with colleagues to achieve their performance. However, this issue is just a conjecture and beyond this paper.

## VII. Summary and Conclusion

This paper examines the effect of a performance-based compensation plan using productivity data for an individual employee at a Korea automobile distribution company. We find evidence that a performance-based compensation plan is effective in motivating employees to work harder and the plan effect is more significant when prior performance is lower or the employee's position is higher. We also find that performance improvement is induced by a retention effect rather than an attraction effect. These findings support the agency-theoretic assumptions that outputs increase when agents are rewarded for performance. The plan acts as an effective device in sorting employees by ability and eliciting more effort from employees. One of the possible explanations that the plan does not provide an attraction effect at our research site may be due to the inflexible labor market in Korea.

A caveat that must be recognized, however, stems from the limitation that field-research imposes on our ability to control all other factors influencing the phenomenon being studied. Second, the available data do not allow us to analyze the plan effect based on the dollar amount of cars sold by employees even though the plan at our research site is constructed to compensate on the basis of the amount of cars sold.

Notwithstanding these caveats, this study contributes to the literature in terms of providing empirical evidence using actual sales data over five-years in an automobile sales and service firm. In addition, we provide evidence that the performance-based incentive plan for employees is an effective scheme in Korea where seniority-based wage systems are prevalent. Our findings also can provide useful information for firms which are planning to implement a performance-based plan or have already implemented a plan.

## REFERENCES

- Ahn, T. S. and Lee, S. Y. 1998. A field study on the impact of compensation changes on sales mix. *Korean Accounting Review* 23(4): 3-22. [printed in Korean]
- Antle, R., and A. Smith. 1986. An Empirical Investigation of the Relative Performance Evaluation of Corporate Executives. *Journal of Accounting Research* 24(1):1-39.
- Ashton, R. H. 1990. Pressure and performance in accounting decision settings: Paradoxical effects of incentives, feedback and justification, *Journal of Accounting Research* 28(Supplement):148-180.
- Baiman, S. 1982. Agency research in management accounting. *Journal of Accounting Literature* 1 : 154-213.
- Banker, R. D., Lee, S., and Potter, G. 1996. A Field Study of the Impact of a Performance-Based Incentive Plan. *Journal of Accounting and Economics* 21(2): 195-226.
- Banker, R. D., Lee, S., Potter, G., and Srinivasan, D. 2000. An Empirical Analysis of Continuing Improvements Following the Implementation of A Performance-Based Compensation Plan. *Journal of Accounting and Economics* 30(3): 315-350.
- Basu, A. K., Lai, V. Srinivasan, and R. Staelin. 1985. Salesforce Compensation Plans: An Agency Framework Perspective, *Marketing Science* 4(4): 267-291.
- Bebchuk, L. A., J. M. Fried., and D. I. Walker. 2002. Managerial Power and Rent Extraction in the Design of Executive Compensation. Working Paper. *Massachusetts Avenue Cambridge.*
- Blakemore, A. E. and Hoffman, D. I. 1989. Seniority Rules and Productivity: An Empirical Test. *Economica* 56: 359-371.
- Chi, S. K. and Kim, T. S. 2001. The empirical relationship between managers' compensation and characteristics of accounting income. *Korean Accounting Review* 26(1): 25-54. [printed in Korean]
- Chow, C. 1983. The effects of job standard tightness and compensation scheme on performance: an exploration of linkages. *The Accounting Review* 58(4): 667-685.

- Churchill G. A., Jr & A. Pecotich, and J. P. Peter. 1997. Sales force management. Homewood, IL: Richard D. Irwin, Inc.
- Dworkin, J. B., and Jay, P. 1986. Collective Bargaining in Professional Basketball: An Empirical Investigation. *Journal of Sport Behavior* 9: 131-140.
- Demski, J. and G. Feltham. 1978. Economic incentives in budgetary control systems. *The Accounting Review* 53(2): 336-359.
- Dillard, J. F. and Fisher, J. G. 1990. Compensation schemes, skill level and task performance: an experimental examination. *Decision Sciences* 21(1): 121-137.
- Feltham, G. and Xie, J. 1994. Performance Measure Congruity and Diversity in Multi-Task Principle/Agent Relation. *The Accounting Review* 69(3): 426-453.
- Hanlon, M., S. Rajgopal, and T. Shevlin. 2003. Are executive stock options associated with future earnings?. *Journal of Accounting and Economics* 36(1-3): 3-41.
- Hwang, I. T. 1995. Management Compensation and Corporate Performance. *Korean Accounting Review* 20(3): 107-125. [printed in Korean]
- Jensen, M. C. and K. L. Murphy. 1990. Performance Pay and Top Management Incentives. *Journal of Political Economy* 98(2): 225-264.
- Lambert, R. A. and D. F. Larcker. 1987. An Analysis of the Use of Accounting and Market Measures of Performance in Executive Compensation Contracts. *Journal of Accounting Research* 25(Supplement): 85-125.
- Lazear, E. P. 2000. Performance Pay and Productivity. *American Economic Review* 90: 1346-1362.
- Milgrom, P. and Roberts, J. 1992. Economics, Organization and Management., Englewood Cliffs, NJ: Prentice-Hall.
- Money and Graham. 1999. Salesperson Performance, Pay, and Job Satisfaction: Tests of a Model Using Data Collected in the United States and Japan. *Journal of International Business Studies* 30(1): 149-172.
- Rao, R. C. 1990. Compensating heterogeneous salesforces: some explicit solutions. *Marketing Science* 9: 319-341.
- Rayton, Bruce A. 2003. Firm Performance and Compensation Structure: Performance Elasticities of Average Employee Compensation. *Journal of Corporate Finance* 9(3): 333-352.
- Rusbult, C. E., Insko, C. A., and Lin, Y. W. 1995. Seniority-Based Reward

- Allocation in the United States and Taiwan. *Social Psychology Quarterly* 58(1):13-30.
- Salop, J. and Salop, S. 1976. Self-Selection and Turnover in the Labor Market. *Quarterly Journal of Economics* 90(4): 619-627.
- Wagner, J. A., Rubin, P. A., and Callahan, T. J. 1988. Incentive payment and non-managerial productivity; an interrupted time series analysis of magnitude and trend. *Organizational Behavior and Human Decision Processes* 42: 47-74.
- Waller, W. and C, Chow. 1985. The Self-Selection and Effort Effects of Standard-Based Employment Contracts: A Framework and Some Empirical Evidence. *The Accounting Review* 60(3): 458-476.