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Abstract

This paper examines incentives and gaming behavior in a sales workforce using personnel records from one of Japan's largest auto sales chains. The company replaced a simple, linear compensation system in 2000 with nonlinear pay scheme kinked around a draw line. Econometric analysis indicates the following. First, the new pay scheme yields productivity increases, although a month-end deadline induces gaming behavior. Second, the incentive effect is weaker for used car sales staff than for new car sales staff. The difference can be attributed to disincentives such as smaller gross profits and larger servicing burdens that discouraged workers near the threshold from putting forth additional effort.

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1. Introduction

"Incentives are the essence of economics. Despite many wide-ranging claims about their supposed importance, there has been little empirical assessment of incentive provision for workers." (Prendergast 1999:7) Since the publication of a survey opening with this famous first phrase, however, several important empirical analyses have been conducted by labor economists and econometricians.

The past decade has witnessed rapid growth of empirical research on pay schemes and productivity. Paarsch and Shearer (1999, 2000) compare worker behavior under piece rate and fixed wages, using the personnel records of a Canadian tree-planting firm. Lazear (2000) examines the effect of a switch from an hourly wage regime to a piece rate regime on worker productivity at a U.S. windshield installation company. Bandiera, Barankay, and Rasul (2005, 2007) conduct field experiments which compare relative incentives with piece rate for workers and also compare fixed wages with performance pay for managers at a U.K. producer of soft fruit. Those studies have generally presented evidence that piece rates yield higher productivity than fixed or hourly wages.

The above literature has marked significant progress in investigating the linkage between pay schemes and productivity. However, the literature has been "an excess focus on the contracts of workers for whom output measures are easily observed" (Prendergast 1999:57). In other words, the previous studies focus on simple jobs to obtain aggregate measures of performance. However, those types of job do not represent most of the occupations in the contemporary labor market.

Performance-based pay systems have attracted greater interest from practitioners as well as economists. In Japan, the substitution of *seika-shugi* (pay-for-performance) pay systems for traditional seniority-based pay systems became the most common means of restructuring business and human resource structures during the prolonged recession of the 1990s. In the U.S. as well, many human resource (HR) managers became vexed by the inflexibility of traditional

job grade systems in rapidly changing competitive environments. Consequently, American corporations have attempted to increase the flexibility of job wage systems by introducing various types of performance pay plans. Unfortunately, HR managers in both Japan and the U.S. did not have access to evidence on whether the performance-based pay has truly enhanced the productivity of employees working in more complex environments than those analyzed by the previous literature.

This paper examines the impact of a performance-based pay scheme introduced in 2000 by Auto Japan, a large Japanese auto sales firm. The company replaced a simple, linear pay system with a nonlinear compensation system kinked around a draw line. The company studied is advantageous as a research site on several counts. The relevant employees are salespersons, about 800 in number, providing an opportunity to examine a large dataset. Since the staff sells used as well as new cars, results for employees performing different yet closely related job activities can be directly compared. Moreover, the pay scheme was only recently introduced and incorporates significantly stronger incentives than earlier scheme, making reasonably a precise comparison of the performance consequences of low-incentive and high-incentive systems. Finally, because of the long-term employment (high security) job practices still prevalent in large Japanese firms, employment at the dealership was stable during the period to be analyzed. Thus Auto Japan provides an excellent opportunity to examine the impact over a long period of a new incentive pay system on different types of workers in a stable employment environment.

In line with previous research, an econometric analysis indicates that higher incentives brought about , a definite departure from the earlier scheme, higher worker productivity. More interesting, however, are the empirical results indicating that: (1) the strongest incentive effect was on middle-performing employees, and (2) that new car sales staff, but not used car staff, engaged in efforts to "game" the system. A final important finding is a decline in response to compensation system change in the morale of the low performing salespeople, an outcome

likely to be of particular concern in employing organizations, still common in Japan, that feature well-developed internal labor markets and high job security.

The rest of the article proceeds as follows. Section 2 discusses the existing literature. Section 3 outlines the workings of Auto Japan's new pay system. Section 4 provides a detailed econometric analysis of the impact of the new pay scheme, including a breakdown of the impact on employees of different ability levels. Finally, Section 5 and the conclusion interpret the findings and relate those to the previous literature.

2. Sales Force Incentives: Review of Previous Studies

2.1 Agency Theory

Agency theory is the bench-mark theory for the study of efficiency- and performance-based personnel systems (Milgrom and Roberts 1992; Gibbons 1997; Baron and Kreps 1999; Prendergast 1999). Agency theory examines the problems – due to the incompleteness of contract and asymmetric information – that occur when an employer as a principal hires employees as agents.

Based on Gibbons (1997:3-4), the core logic of agency theory as it relates to wage contracts can be summarized as follows. The individual wage w is composed of fixed portion α and a fluctuating portion (that changes according to performance indicator Z). The reward can be depicted as a linear function of Z,

$$w = \alpha + \beta Z,$$

where β measures incentive intensity. In this case, the optimal incentive intensity can be expressed, under appropriate assumptions, as the decreasing function of the employee's risk aversion and marginal cost of effort, as well as the error variance of performance.[1] If the

[1] The assumptions include: (a) the employee has constant and absolute risk aversion, and (b) her/his observable performance depends linearly on her/his tasks completed, although the observations typically include a normal

employee's risk aversion level is zero, then β is equal to 1, and the optimal effort level is reached. However, since the employee's risk aversion will in reality not be zero, β is expected to be less than one; i.e., there is a trade-off between risk and incentive.

Considerable evidence now demonstrates that linking performance to wages can substantially raise employee performance. Three important studies, by Lazear (2000), Paarsch and Shearer (1999, 2000), and Bandiera, Barankay, and Rasul (2005, 2007), used company personnel data to show that the introduction of a performance pay system can stimulate employee effort and raise employee productivity. However, Lazear (2000) shows that the sorting effect of performance-based pay can nearly equal the incentive-enhancing effect. A firm that adopts a piece rate system retains and attracts high performers while low performers quit. Thus the higher levels of observed productivity result in part directly from raising productivity and in part indirectly from better from retention of good workers combined with more quits by low-performing workers. Thus, it is difficult to pin down with precision the causal role of incentive pay.

However, the sorting effect can be expected to be fairly weak in Japan's large enterprises because they rarely dismiss full-time employees. They hire primarily graduating university seniors for white-collar or service sector jobs, and guide their skill and career development for years in highly developed internal labor markets. Although low-performing workers can be dismissed, the norms surrounding the Japanese employment system make it difficult to do so. Intensive screening generally keeps the numbers of low-performing or low-ability workers fairly low, but the few such workers that do enter companies often stay on corporate payrolls until retirement, doing little productive work. The traditional tenure/seniority-based pay systems of the past increased the costs of carrying low-productivity workers. The series of economic slowdowns beginning in the early 1990s, however, put pressure on managers, particularly in Japan's service sector industries and professional occupations to raise worker productivity, and led most large firms to introduce performance pay systems by the early 2000's.

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error.

2.2 Sales Incentive Schemes

A series of studies by marketing scholars have utilized the framework of agency theory to examine incentive systems for sales forces. The most important include Basu, Srinivasan, and Staelin (1985), Coughlan and Narasimhan (1992), and Mishra, Coughlan, and Narasimhan (2003). This body of research utilizes models of a firm deciding on a reward system (composed of a fixed wage and a performance wage) that maximizes firm profits while taking into consideration changes in the effort level of salespersons under conditions of uncertainty. It uses firm-level data to examine predictions from the theory. They find that, as the number of phone calls necessary to complete a sale (variance of sales effort) increases, the share of total compensation that is performance pay increases as well.

Sales would seem to be a natural area to push the investigation of performance pay since sales figures are objective measures of individual performance, and because sales jobs are so numerous. Yet empirical studies of the compensation and performance of sales workers are rare. Important exceptions include Oyer (1998) and Asch (1990) of the timing of sales under nonlinear compensation schemes.

Oyer (1998) demonstrates that when a salesperson's sales target is set, and an incrementally increasing, nonlinear system of commission is used, the salesperson responds to the timing of the evaluation (especially when it is toward the end of the evaluation period). More concretely, both the timing of customer purchases and the level of effort can be altered. As a result, depending on her/his performance in the first half of the evaluation period, a salesperson may postpone sales to the next period (push-out) or bring sales forward to the present period (pull-in). In addition, by using industry data, Oyer confirms that there are seasonal fluctuations corresponding to the close of the fiscal year, a pattern consistent with the push-out and pull-in scenario.

In contrast, Asch (1990) provides more direct evidence of a related phenomenon with individual-level data on recruiters for the Navy. The number of new recruits grows as the end of the evaluation periods nears, then falls off sharply when the new period starts. This pattern is robust even when the recruiters' length of tenure is controlled. In short, Asch shows that the productivity of recruiters changes discretely, and that degree of effort is changed at particular points in time according to the evaluation period.

Hence, Oyer and Asch showed that incentive pay systems produce undesirable side-effects. Recently, Larkin (2007) attempted to replicate Oyer and Asch's findings by examining the performance of 175 salespersons employed by a leading enterprise software vendor. The dataset includes 2,938 deals closed over the course of 22 financial quarters from 1997 to 2002. Two important findings emerged. First, the use of a sales period-based commission system using nonlinear compensation produced a gaming effect such as push-out and pull-in. Second, incentives to maximize sales volume caused a loss of revenue because salespersons discount prices in order to entice customers to purchase software. More concretely, not only do companies pay on average roughly 8 percent of sales revenues in commissions, but they also lose from the price discounts by salespersons trying to game the incentive system by manipulating the timing of sales.

2.3 Research Questions

Extending insights garnered from the above literature, this paper examines three key issues. First, do performance-oriented pay systems actually encourage individual employees to raise productivity? Second, how do incentives change in nonlinear compensation systems as individual performance approaches the threshold? Finally, when evaluation periods are established, do salespeople engage in gaming behavior as the end of the period nears? In short, this paper analyzes how incentives and gaming are produced in nonlinear systems with

performance evaluations and deadlines for performance targets.

3. New Nonlinear Compensation Scheme: Draw Based Performance Pay

Auto Japan is a regional (prefecture-wide) chain, employing about 2,300 employees in 2004. Unlike typical North American auto dealers, it is therefore a large firm. About one third of Auto Japan's employees are salespersons, so the data covers roughly 800 persons over a six-year period, from 1998 to 2004. Turnover is low, as discussed below, so this workforce is quite stable.

Each outlet includes a new car sales section, a used car sales section, and a service section. The number of employees ranges from 13 employees at the smallest outlets to 39 at the largest. The head office determines both yearly and monthly sales targets and assigns specific objectives to outlets. Auto Japan's largest outlet is given a target of 80 to 90 new cars a month.

In 2000, the greatly changed business environment prompted Auto Japan to comprehensively reform its personnel system. Auto sales rose steadily from the 1950s until the mid 1990s, but in the late 1990, as the market reached the saturation point and economic growth slowed, sales became more cyclical. To cope with the new conditions, the company sought to make personnel costs more flexible and variable, and to shift the basic standards for determining pay from primarily age- and tenure-based to primarily performance-based. Auto Japan therefore scrapped the skill grade system (*shokuno shikaku seido*) that it and most/ nearly all large Japanese firms had used since the 1970s and introduced a "job-based" wage system.

The most drastic change was introduction of the performance-based pay scheme. Figure 1 depicts the nature of change. Until 2000, the main component of the pay system was the monthly base pay supplemented with performance pay allowances that rose steadily and linearly. In contrast, the new system uses a draw line and kink, so that performance pay is not realized up to the threshold (the draw line).

The pay scheme change is expressed as follows.

Before the 2000 pay scheme revision: $w = \alpha_0 + \beta_0 Z$

After the 2000 pay scheme revision: $w = \alpha_1 + \beta_1 (Z - Z^*)$ $if\ Z \geqq Z^*$

$w = \alpha_1$ $if\ Z < Z^*$

Prior to the 2000 reform, Auto Japan used a performance-based pay scheme that paid a small commission based on the gross profit of each vehicle sold. The amount of profit on the vehicle was multiplied by the commission rate. The profit was determined by subtracting the invoice price of the vehicle from its sale price, then multiplying the resulting amount by the rate of commission, which varied by model but ranged from 2 to 5 percent. An employee could therefore realize a performance payment by selling even a single vehicle – however, the payment per vehicle was small so the incentive effect was minor (see the left panel in Figure 1).

Under the new system, however, no performance payment is paid unless an employee's performance (sales) exceeds the draw line, which serves as a threshold. Once the threshold is crossed, an employee can enjoy larger commissions. Instead of a 2 to 5 percent ratio, regardless of number of cars sold, an employee who exceeds the threshold now earns a minimum of 7 percent to a maximum of 30 percent, as depicted in Figure 1's right side panel.

The draw line represents an employee's basic pay (the predetermined monthly wage). The draw line is set differently for each employee, depending on his age/tenure and rank. As shown in Figure 1, the draw line rises steadily as an employee gains tenure and experience. As shown in the figure, the difference between the draw line (Z^*) and the individual employee's earned "amount of gross profit" (Z) represents his performance pay portion.

Managers were pursuing two goals in transforming the performance-based pay. The first was obvious: To strengthen incentives by creating the opportunity to earn much higher performance rewards by selling more cars. The second, meshing a strong incentive system with long-term employment practices (strong job security), was much trickier. Managers believed that they

basically attained their goal by making the draw line coterminous with the base wage for each employee. The new system clarifies each employee's responsibility to generate sales and support the company by making clear what his/her responsibilities are, i.e., how many cars s/he should sell each month.

In reality, of course, the second goal is not so smoothly attained since the company's and employees' viewpoints differ. From the company's point of view, the draw line indicates the employee *responsibility* to make sales. From the point of view of the employees, however, it represents the level of *effort* (or performance) needed to sell cars, and to possibly make more money. Thus, the draw line represents the possibility of changing employee behavior, but also entails the classic incentive problems identified by previous research findings.

4. Changes in Employee Behavior under the New Pay Scheme

How did employee behavior change when the draw line-linked performance-based pay system was introduced? By applying the insights of previous research to the case of Auto Japan, four issues are specified.

1. How did productivity (the number of vehicles sold) change as a result of the introduction of the performance-based pay system.
2. How did the performance of employees of varying ability change following reform of the personnel system?
3. How does the positioning of the draw line – the setting of the threshold to begin receiving performance payment – affect employee behavior?
4. Does push-out behavior (gaming) result from calculating performance within a set time period (one month in this case)?

4.1 Data

This research uses personnel and output record data compiled by Auto Japan every month from January 1998 through December 2004. The summary statistics are shown in Table 1. These indicate the employees' performance-based pay, monthly wage, length of tenure, age, education level, sales record, and the draw line. The data includes 60,727 observations of monthly data.

The data covers personnel information in considerable detail. Its major limitation, however, is that it does not include detailed information on the actual sales transactions. The only performance outcome information is the number of vehicles sold. Critical related information, such as the brands, models, and prices of the cars are not included. Therefore, there is no way to calculate the "marginal commission" on each car sold.

4.2 The Overall Effect of the Pay Scheme Change on Productivity

To determine the overall effect of the pay scheme reform, we begin by examining the distribution of vehicles sold around 2000. Figure 2 depicts the Kernel density of new and used car sales before and after the 2000 reform. Before 2000, each new car salesperson sold around 55 new cars per year, a figure about midway between 0 and 100. Following the reform, the average number rose to 68 cars, and the distribution curve shifted clearly to the right. In short, the graph indicates that an increase in the number of high performers, namely those persons able to sell an above-average number of automobiles.

The situation regarding used cars is much different, as Figure 2 shows. Prior to 2000, there was a gentle slope, indicating a low peak. As with new cars, there was a significant jump in performance followed the pay system reform, from an average of 92 vehicles sold per salesperson per year to 103 afterward. Graphically, the left side of the ridge dropped lower while the peak rose substantially almost to the 100 level. This indicates that the new wage scheme was successful in reducing the number of employees with low and increasing the number with high

productivity. Simply stated, it improved overall employee efficiency.

The improved sales are not simply a result of the steady economic growth that Japan experienced from 2002 until at least 2007. On the contrary, aggregate domestic auto sales *declined* in spite of the recovery. As Figure 3 reveals, new car sales nationwide decreased by 3 percent from 2000 through 2004, while used car sales declined even more sharply, by 9 percent, during the same period. Therefore, the improved sales at Auto Japan since 2000 very likely resulted, not from a favorable macroeconomic environment, but partly from the pay scheme change.

To analyze these developments rigorously, we need a model of the determinants of car sales. The productivity equation is written as follows. The dependent variable is the log of the number of cars sold by each individual salesperson. Explanatory variables include an After Reform Dummy (set at 1 for the period from November 2000, one month after enactment of the reform), Log of Length of Service, Log of National Sales Volume, and dummies for education level (Vocational School / Junior College Dummy and University Dummy). In addition, I have added an Outlet Location Dummy to control for the zone location where employees work, and Year-Month dummies to control seasonality. Thus, this is a simple production function to control for demand conditions, namely national sales volume and location of outlets. The results are shown in Table 2.

As seen in Columns 1 and 2, the After Reform Dummy coefficient is positive and significant for new car sales. According to the result of the simple OLS estimate, post-reform car sales rose 29.7 percent. Further, the After Reform Dummy for the fixed effect model is also positive and significant. However, the productivity rise is 9.3 percent, only one third that of post-reform car sales derived from the OLS estimate.

For used-car sales as well, as shown in Columns 3 and 4, the OLS estimate for the After Reform Dummy variable is positive and significant. Used car sales increased 29.5 percent, very nearly the same as for new cars. However, if we eliminate the individual fixed effects, the

variable becomes insignificant.

Thus, if pooling the data by ignoring individual attributes such as ability, the compensation reform yields a large positive OLS coefficient. In the fixed effects model which controls for unobservable individual ability, the reform effect is much smaller (but still significant) in the new car sales division and disappears altogether in the used car sales division.

4.3 Pay System Effects by Ability Group

It is evident that the pay scheme brought about overall gains in productivity. By no means, however, were these gains equal across employee classes. To explore this issue, it is necessary to examine differences in ability among individual employees in the period prior to the pay policy change. There is reason to expect the differences by ability group observed here to be greater than those in similar employee settings in other advanced economies. The reason is the relatively weak sorting effect: for well-documented reasons having to do with Japan's well-developed firm internal labor markets, "losers" under the new incentive pay systems tend to stay with the firm.

For the purpose of this analysis, I divide employees into ability-based groups, with ability measured by sales performance. For the years 1998-99, the period immediately preceding the wage scheme reform, employees are divided into high-, middle-, and low-ability groups, divided at the 33.3 and the 66.6 percentiles of the distribution of sales volume. Then I investigate how the reform changed the sales performance of each group by examining productivity trends in the post-reform period.

Figure 4 shows results for new car sales staff, and Figure 5 shows those of used car sales staff. The figures suggest that the performance of the high-ability new car sales employee group improved slightly (Figure 4), while that of the high-ability used car sales group did not change significantly (Figure 5). In contrast, the sales performance of the middle- and low-ability groups increased substantially. Bear in mind, however, that these are raw data patterns with no controls

imposed for employee age and tenure. As both the middle-ability and low-ability groups include many young persons with relatively short job experience, this is a serious limitation. Their sales performance would be expected to rise as they master their jobs.

In order to investigate the net productivity changes induced by the new compensation system, I estimate the productivity equation with dummies included for the ability groups along with the measures of age and tenure appearing in Table 2. The dependent variable is the log of post-reform vehicle sales volume. The control variables are the same as in Table 2, along with the First Tertile Group Dummy and the Third Tertile Group Dummy (the baseline is the Second Tertile Group).[2]

The results are shown in Table 3. For the new car sales staff, the net productivity increase of the high-ability is shown to be 28.4 percent above that of the middle-ability group (Second Tertile Group). The productivity increase of the low-ability group was 17.1 percent below the middle group. Similar results are evident for the used car sales staff. The productivity increase of the high-ability group exceeded that of the middle-ability group by 26.6 percent, and that of the low-ability group was 22.8 percent below the base.

From these results, the following conclusions may be derived. First, for both the new and used car salespersons, the productivity increases induced by the compensation reform are ordered by employee ability group' highest in the high ability group, followed by the middle ability group, and lowest in the low ability group. Second, the productivity gain differential between the high-ability group and the middle-ability group is about the same for new and used car sales. However, the gain achieved by the two low-ability groups differs by sales division. The level of productivity increase of the new car sales staff relative to the base of middle-ability performers is much greater than that of the used car sales staff.

These differentials by staff ability group may testify to a sorting effect. To partially address this possibility, I examine the separation rate. Table 4 shows separations for Auto Japan since

[2] Annual data were used, making it easy to define dummies for the high-, middle-, and low-ability groups.

1985 broken down by occupation and reason. As far as can be determined from the data, the voluntary quit rate did note rise around 2000, when the pay scheme change was implemented.[3]

4.4 The Effects of Nonlinearity and Kinks

The previous section examined changes in sales performance by ability group following the pay system reform at Auto Japan. This section investigates the existence of nonlinearity in the post-revision movements in vehicle sales. The question addressed is whether the incentive effect changes as sales staff performance approaches the kind in the draw line.

The best way to study this question would be to compare a control group of employees to whom the draw line-based performance pay system was not applied with those to whom the new system was applied (Lazear 2000). Since the draw-based system was applied to all employees, however, such a control group does not exist in Auto Japan.

I utilized a second- best method. I divided the observation period following the reform into two sub-periods, corresponding to the first (from November 2000 to January 2002) and second (February 2002 to May 2003) halves of the post-wage reform period. Then, based on their performance of in the first sub-period, I cross-classified salespeople by: (a) performance above and below the draw line; and (b) near and far from the draw line. This yielded four groups—(1) "above-far," (2) "above-near," (3) "below-near," and (4) "below-far." The criterion for determining near and far is the same tertile standard used above (33.3 percentile). Then, as I illustrated in Figure 6, having identified persons distant from the draw line in the early period, I investigated the resulting influence on employees during the second sub-period.

The results are presented in Table 5. The productivity equation used is that of Table 2 with the following adjustments. First, using the early post-reform period (November 2000-January 2002) as the performance base, the sales staff is divided into the four cells of a cross-classification of

[3] More detailed analysis designed to separate sorting effects from the incentive-enhancing effects on present employees will be addressed in a future investigation.

above/ below the draw line and near to/far from the draw line. In addition, as before, employees are differentiated by sales division: new or used. Second, the dependent variable is Log of Auto Sales: the log of the (November 2000-January 2002) average auto sales of each of the four groups.[4]

Table 5 presents the results. First consider the results for the new car sales staff, contained in the upper panel of the Table. The performance of the entire high-performer ("above-far" and "above-near") group increased during the later post-reform period (from 1.047 to 1.046), with distance from the draw line having no effect. Second, there is a slight drop-off in the performance (91.6% of previous period) of the new car sales staff in the "below-near" category, and a substantial decline in the "below-far" group (76.8 % of previous period). Third, the "above-far" group of used car sales staff (shown in the lower panel of Table 5), like the "above far" group of new car sales staff, achieved a 4.7% sales increase (1.047). Fourth, however, both the "above-near" used-car sales staff and the "below near" used-car sales staff experienced a decline in productivity of approximately 19-23 % from the early period (0.811 and 0.766). Finally, the performance of the "below-far" sales staff held steady at about 90 percent (0.906) of their early period performance. These results suggest that the draw line stimulates effort of the new car sales employees near the kink. However, the results also indicate that the effort enhancing effect is relatively weak for the used car sales staff.

In the new Auto Japan compensation system, the draw line is the critical performance threshold determining an employee's entitlement to a performance payout. Whether or not the draw line motivates additional salesperson effort, particularly for those people whose performance lies in the vicinity of the threshold, is critical to an evaluation of the reformed system's success. Based on the results shown in Table 5, it seems reasonable to conclude that the draw line system has indeed succeeded in strengthening the incentives of the new car sales staff, particularly as their performance approached the threshold indicated by the line. However, the

[4] As noted in the following section 4.5, the reason why the later period ends May 2003 is that the method for evaluating car sales performance was changed from using a single month to averaging for two months.

Table offers little evidence that the new nonlinear pay system has been successful in motivating extra effort on the part of the used car salespersons whose performance likewise neared the payout-triggering threshold.

4.5 The Gaming Effect

The distinctive feature of the draw-based performance-pay system is that it combines a nonlinear pay scale with a performance evaluation deadline. Evaluation deadlines are necessary in any performance-based compensation system, but are especially important in a system using a draw line as a threshold.

Such deadlines, however, can pervert incentives and induce undesirable "gaming" behavior. Prior research has identified three such behaviors in the context of performance pay. One is an increase in transactions following a period of poor performance (push-out); the second is pulling transactions forward into a favorable period just before a deadline (pull-in); and the third is manipulating prices in order to increase the number of transactions and raise performance evaluations (Oyer 1998; Larkin 2007). Given these possibilities, Auto Japan stands to be vulnerable to employees gaming the performance evaluation system.

Gaming behavior could re relatively easily detected with data on the daily sales productivity of sales staff, but they are not available. I therefore estimate regressions with individual monthly sales as dependent variable, explanatory variables being the previous month's sales volume (Lagged Auto Sales) along with employee length of service, the draw line, and the year and month dummies.

Three sub-periods are compared: (1) the pre-pay scheme reform period (January 1998-October 2000); (2) the post-reform period when a single-month-based performance evaluation system was in use (November 2000-May 2003); and (3) the later post-reform period when a two-month evaluation period was introduced (June 2003-December 2004). As both

periods use this system, it is possible to compare directly the single-month-based evaluation system in the pre-reform period (January 1998-October 2000) and the early post-reform period (November 2000-May 2003).

Table 6 shows the results. As shown in the upper panel, there is no correlation between current month results and following month results for the new-car sales staff during the pre-reform period. However, a negative and significant correlation (-0.088) appears for the post-reform period. In sum, for months in which sales volumes are large (or small) the volumes invariably become smaller (or larger) in the following month (the Year-Month Dummy controls for seasonal fluctuations). This result indicates that push-out behavior was generated: During months when it was difficult to exceed the draw line employees tried to delay closing contracts until the following month. In other words, employees "game" the draw line system to elicit the greater performance payout by manipulating and postponing the timing of deal closure.

However, this phenomenon is not observed with regard to the used-car sales staff. Results in the bottom panel indicate that there was no change in the relationship between current and following months after the reform. That relationship remained both positive and significant.

Managers slowly became aware of the gaming behavior. In June 2003, Auto Japan changed the method for accounting sales volume performance from single month to a two-month moving averaging system. As a result, as shown in Column 3 of Table 6, no negative correlation can be seen between the current month and previous month average movement value (see the notes to Table 6). In short, the new performance evaluation scheme put an end to gaming.

5. Discussion

5.1 The Effects and Side-effects of Performance-based Pay

The results of the analysis have three implications. First, in showing that performance-based pay actually did raise individual employees' productivity, the findings correspond closely to previous studies. During an economic downturn which brought about a decline in national auto sales, Auto Japan's sales actually rose steadily (Figure 2 and Table 2). Moreover, as indicated by Table 4, the separation rate did not rise following the pay scheme reform. This suggests that the productivity increase resulted from a strengthening of incentives of the existing work force and not from the sorting effect described by Lazear (2000), in which low-achieving employees generally leave the firm. On the contrary, the low-performing employees remained with the firm, even though their productivity was much lower than that of the middle-performing employees, indicating a strong possibility of declining morale among the "losers". This is a potentially serious problem for Japanese corporations since they cannot freely dismiss employees.

Second, the nonlinear pay system using a draw line as threshold does not have much effect on high performers. It is primarily middle-level performers (near the draw line) whose sales output was enhanced (Table 5). However, the effects differed significantly between new car and used car sales staffs. For the former, incentives were strengthened, but no effect can be seen for the used car salespersons.

Third, the deadline for performance evaluations motivated gaming behavior on the part of the new car sales staff (Table 6). The gaming observed takes the form of push-out-- salespeople postponing the deal closure until the following month.[5] The pattern is not observed in the data on used-car sales staff. This is because new car salespersons sell products that be ordered and can therefore include options, creating opportunities to manipulate the timing of sales. Used car salespersons, on the other hand, are limited to the available inventory and thus have no basis for holding off the sale.

Thus, the incentive effects as well as distortions observed in previous studies conducted in

[5] According to two mid-level managers in the sales department of the head office, push-out behavior (inducing customers to delay actual purchase of cars) is possible but pull-in behavior (speeding up purchases) is virtually impossible at Auto Japan (interview, December 22, 2007).

North America and Europe can also be found in a large Japanese retail enterprise that, in line with Japanese norms, adheres to long-term employment practices.

5.2 Differences between the New-car Staff and Used-car Staff

The preceding analysis has indicated significant differences between the new car and used car sales staffs. The discrepancies are attributable to several factors. To begin with, the two groups' work environments and practices are much different. The new car salespersons can approach customers outside as well as inside the store. They can therefore control to a considerable extent the degree of effort put into their tasks. In contrast, the used car salespersons are often stuck waiting for prospective customers to appear, and cannot easily put extra effort into their jobs. As a result, a performance-based pay system combined with a threshold and a deadline puts the used car sales staff at a disadvantage relative to the new car sales staff.

In addition, the difference in profit margin between new and used cars is important. Some used cars sell for around 100,000 yen but the cheapest new cars cost about ten times that. Obviously, the gross profit on a 100,000 yen used car is far less than that of any new car. The low profit margin makes it difficult to get far past the draw line threshold even by selling large numbers of used cars. In general, the sales volume per salesperson is greater for used car than for new car staff, so high performing new car staff overcome the low-profit handicap by selling more cars. But the low margin seems to shackle the middle- and low-performing staff. Moreover, used cars require more follow-up services – mainly fixing the problems that occur in used products – further reducing incentives to exert extra effort.

Finally, the environmental conditions for used car sales changed greatly from around 2000, when the new pay scheme was introduced at Auto Japan. Until that time, dealers like Auto Japan had obtained used cars by taking them as trade-ins for new cars. From the late 1990s, however, independent used car dealers appeared and auctions increased, driving down profit margins on

used cars as competition heated up. In addition, competition between used car dealers and auction houses meant that dealers like Auto Japan could not keep the most popular models on hand and missed many sales opportunities. Already facing more difficult market conditions than their new car counterparts, used car salespersons found that the new pay scheme posed another disadvantage.

6. Conclusion

This paper has examined the economic effects of a new performance pay scheme introduced in 2000 at Auto Japan, one of Japan's largest auto sales chains. The core of the change was the substitution of a nonlinear performance-based pay scheme kinked around a draw line for the dealership's simple linear compensation system. Four main issues, derived from the existing literature on performance-based pay systems, were explored: (1) What is the overall effect of a performance-based pay system on auto sales volume (productivity)? (2) What is the effect on employees of differing ability levels? (2) Does a draw line in a nonlinear system have an incentive distorting effect? Finally, (4) does the use of a month-end deadline on the performance assessment period motivate efforts by employees to "game" the compensation system?

To investigate the above issues, I examined the data supplied by the dealership personnel for the periods before and after the pay scheme change. The econometric analysis revealed the following. First, the reform appears to have stimulated productivity increases after 2000 among the new car sales staff but not the used car sales staff. This result was robust in the presence of controls for all demand factors.

Second, when dividing employees into three groups based on pre-reform sales performance (high-, middle-, and low-performing employees) the top performance group in both new and used cars divisions) displayed nearly the productivity gains. For the low-performing group,

however, the productivity improvements of the used car sales staff were inferior to those of the new car sales staff.

Third, the firm's use of the draw line set a sharp binary threshold for whether or not salespersons would earn performance pay. The analysis indicates clearly that the draw line scheme succeeded in eliciting greater effort from new car sales staff in the performance region approaching the line, but did not succeeded in stimulating similar effort on the part of the used car sales staff.

Finally, there is the question of incentive distortions drove employees to “game” the new compensation system in ways harmful to the profitability of the firm. The research verifies that use of a nonlinear pay scheme with a month-end deadline motivated employees to “push-out” car sales into the next assessment period. This was indicated by the negative correlation between the new car sales volumes in any two successive months. No such correlation was found in the case of used car sales. To put an end to this push-out gaming problem, in 2003 Auto Japan replaced the single-month performance assessment system with a two-month moving averaging system.

This research offers clear evidence of positive productivity effects of the nonlinear performance-based pay system on the new car sales force of a large auto dealership in Japan, a country with significantly different employment system norms. It thus contrasts with previous studies in this area, which have focused mostly on simple manual occupations in Western economies with much more open labor markets. Despite the different research setting and subjects, however, the results closely match the findings of the existing literature on the productivity-enhancing effects of performance pay systems. That is especially noteworthy, because the precise mechanism accounting for the productivity gains associated with the introduction of performance pay will vary with the employment practices of companies studied. In the Western economies, a major factor in those productivity gains is employee sorting. Because of the Japanese auto dealership’s highly stable employment both before and after the

compensation system reform, the sorting scenario is less credible in the present study.

Also similar to the findings of studies done in Western economies, this research finds clear evidence of employee gaming behavior in response to the performance pay system. The gaming effect is attributable to the nonlinear pay scheme with a month-end deadline. Such gaming behavior might seem at odds with conventional portrait of high employee loyalty and, consequently, diminished opportunistic behavior in the Japanese firm. Such loyalty and reduced opportunism, however, were to some degree the product of the traditional Japanese incentive system which emphasized seniority and pay stability over rewards to individual productivity. Auto Japan, however, has opted for a distinctive departure from the traditional system. Under the new pay scheme, therefore, it is unsurprising that employees have responded to the system of individualistic competition by attempting to "game" it in order to earn higher income for themselves. In any case, the company has recognized and taken steps to solve the problem by making a relatively simple adjustment in the evaluation system. Instead of measuring sales volume performance with a single month's results, it now uses a two-month moving average, making it impossible for employees to push deals out to the following month.

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Figure 1. Changes in the Performance-based Pay Scheme

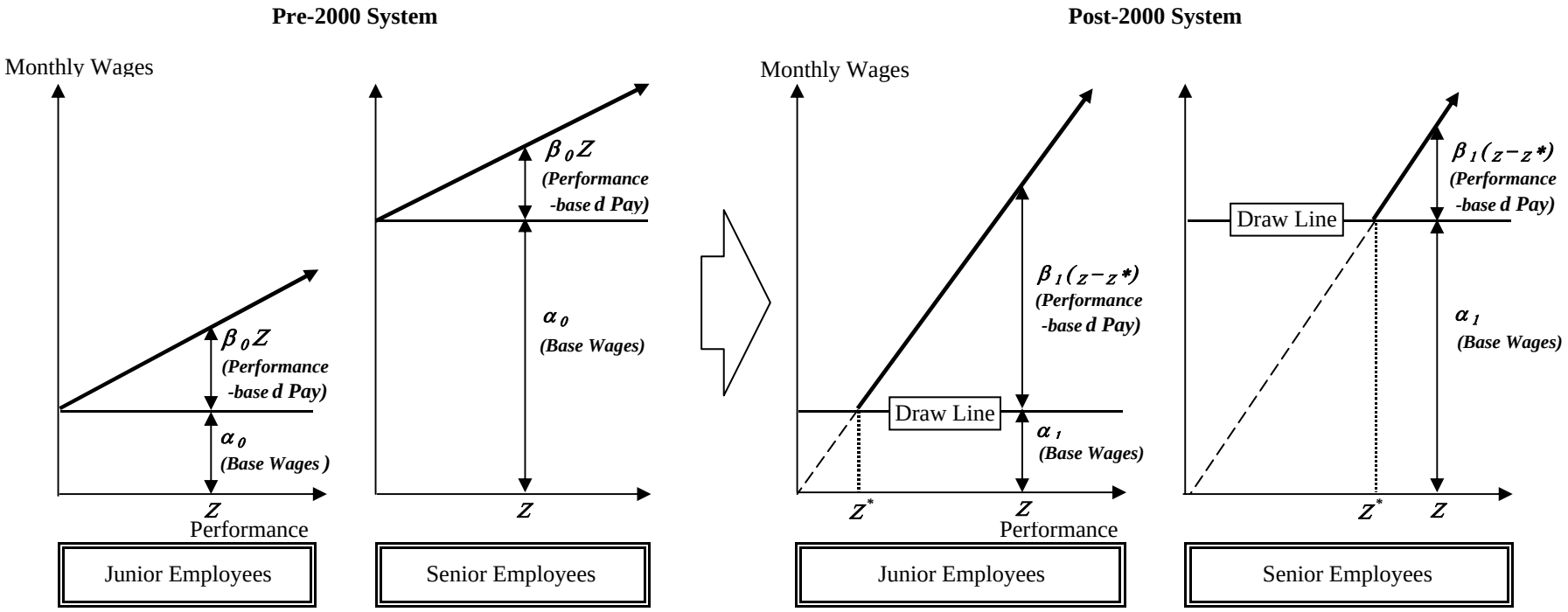
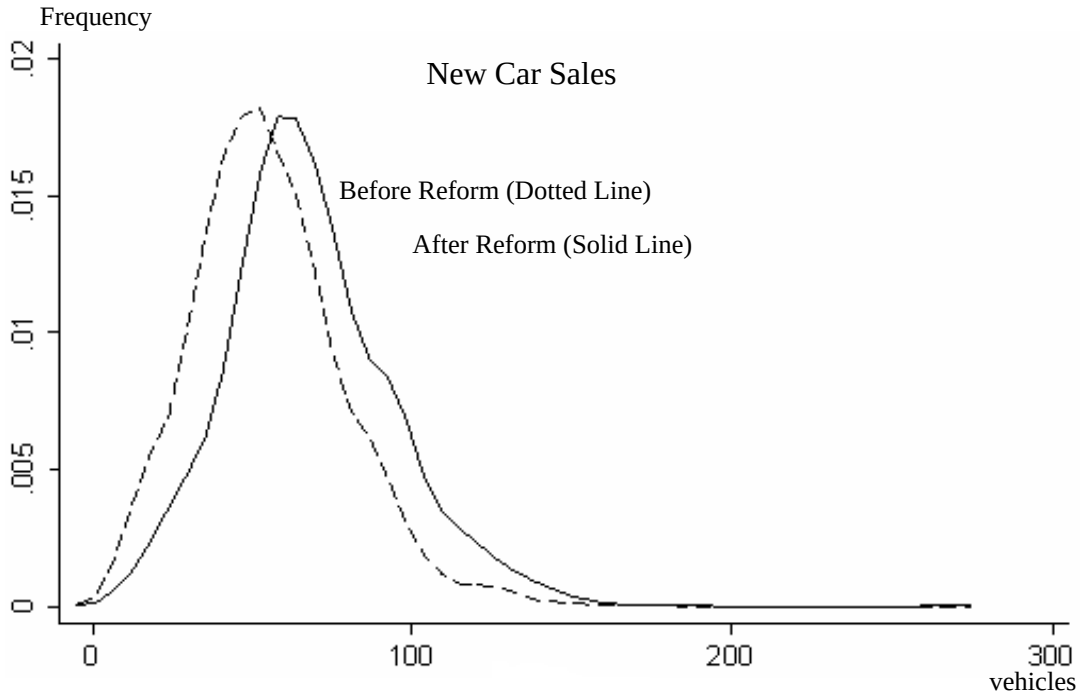


Table 1. Summary Statistics

	Full Sample			New Car Sales Staff			Used Car Sales Staff		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
New Car Sales Staff	60727	0.785	0.411						
Used Car Sales Staff	60727	0.215	0.411						
Length of Service (years)	60727	11.672	9.586	47658	10.963	9.314	13069	14.258	10.104
High School Dummy	60727	0.212	0.408	47658	0.193	0.394	13069	0.281	0.449
Vocational School / Jr. College Dummy	60727	0.167	0.373	47658	0.149	0.356	13069	0.233	0.423
University Dummy	60727	0.603	0.489	47658	0.645	0.479	13069	0.450	0.498
Monthly Sales of New Cars (vehicles)				47658	5.295	3.437			
Monthly Sales of Used Cars (vehicles)							13069	8.316	4.357
National Sales Volume of New Cars (Vehicles)	60727	338454.8	89671.12						
National Sales Volume of Used Cars (Vehicles)	60727	389006.5	77419.56						
Monthly Total Earnings (yen)	60727	432536.1	156991.7	47658	433218.3	162491.4	13069	430048.2	135028.4
Draw Line (yen)	42249	264653.7	147198.4	33176	263120.0	146034.1	9073	270262.1	151255.6

Figure 2. The Kernel Density of Sales Volume Before and After the 2000 Reform



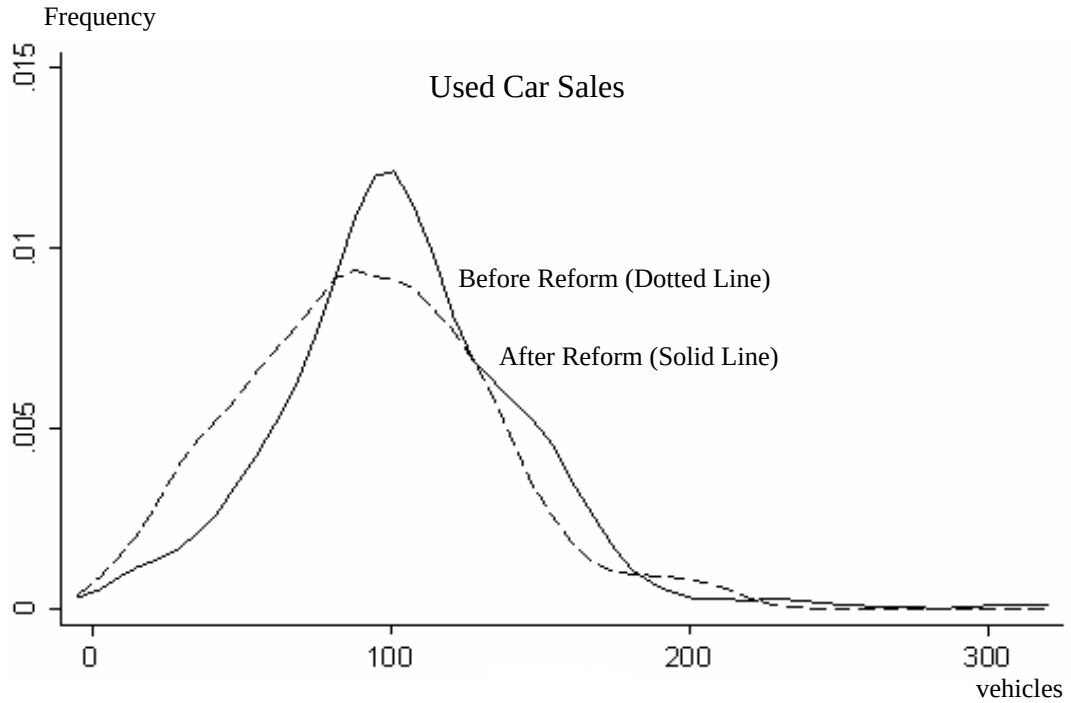
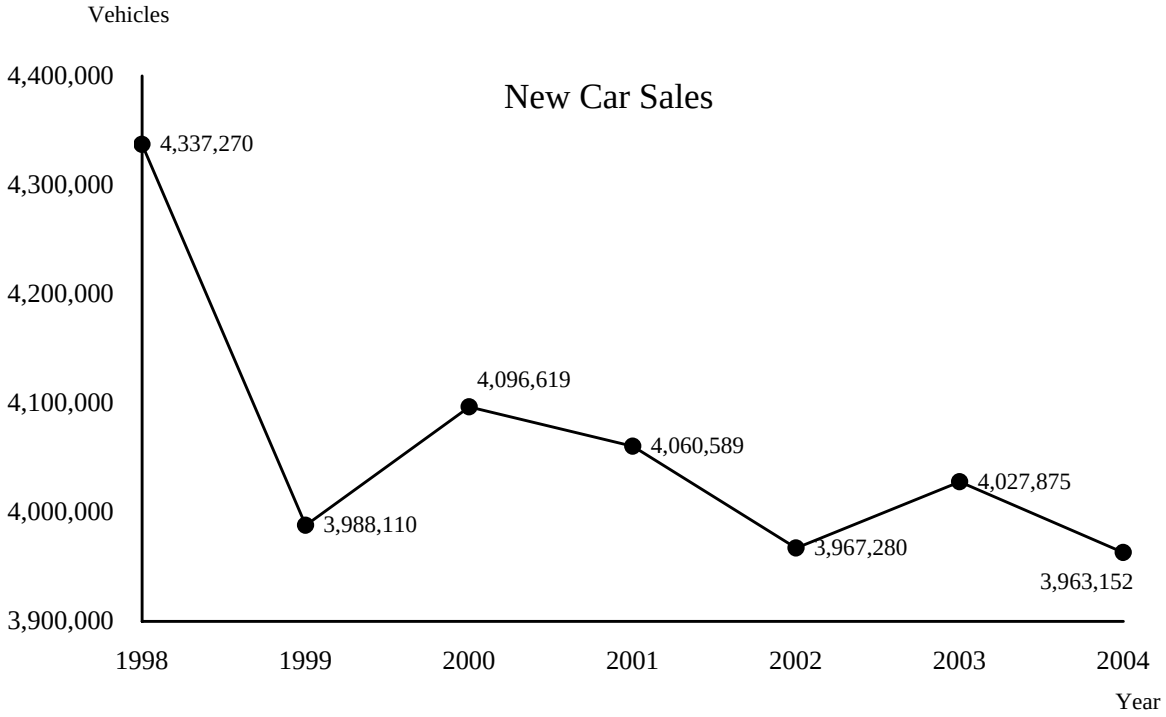
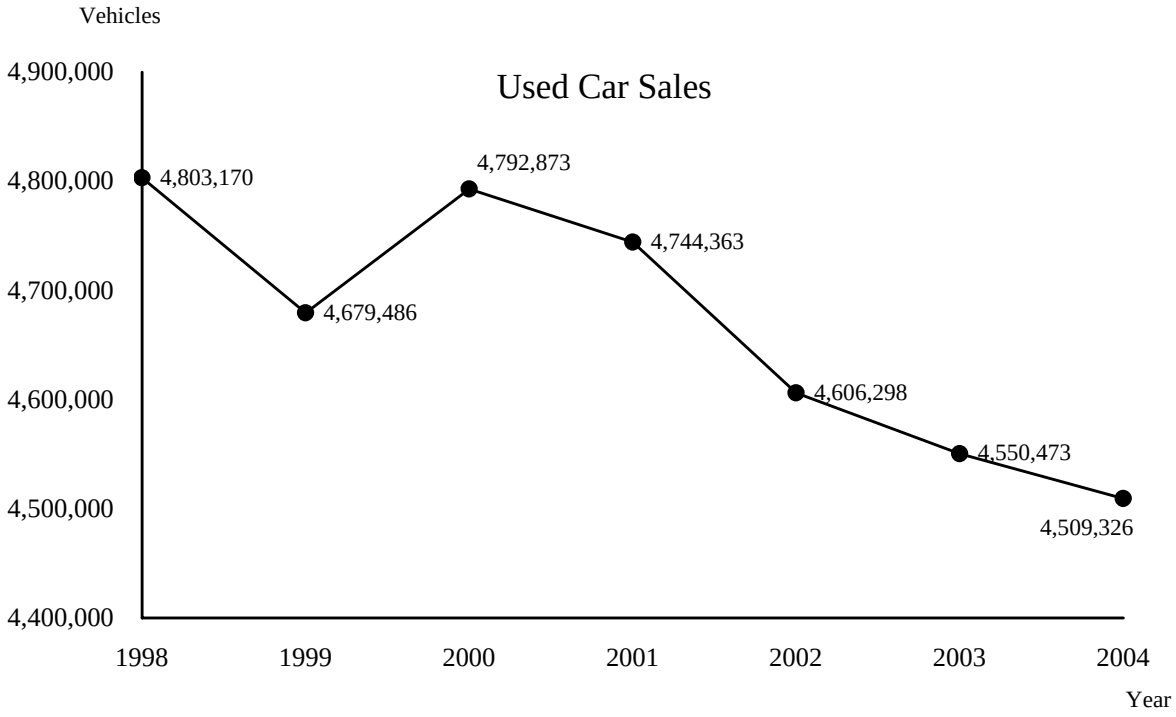


Figure 3 . Trends of National Sales Volume





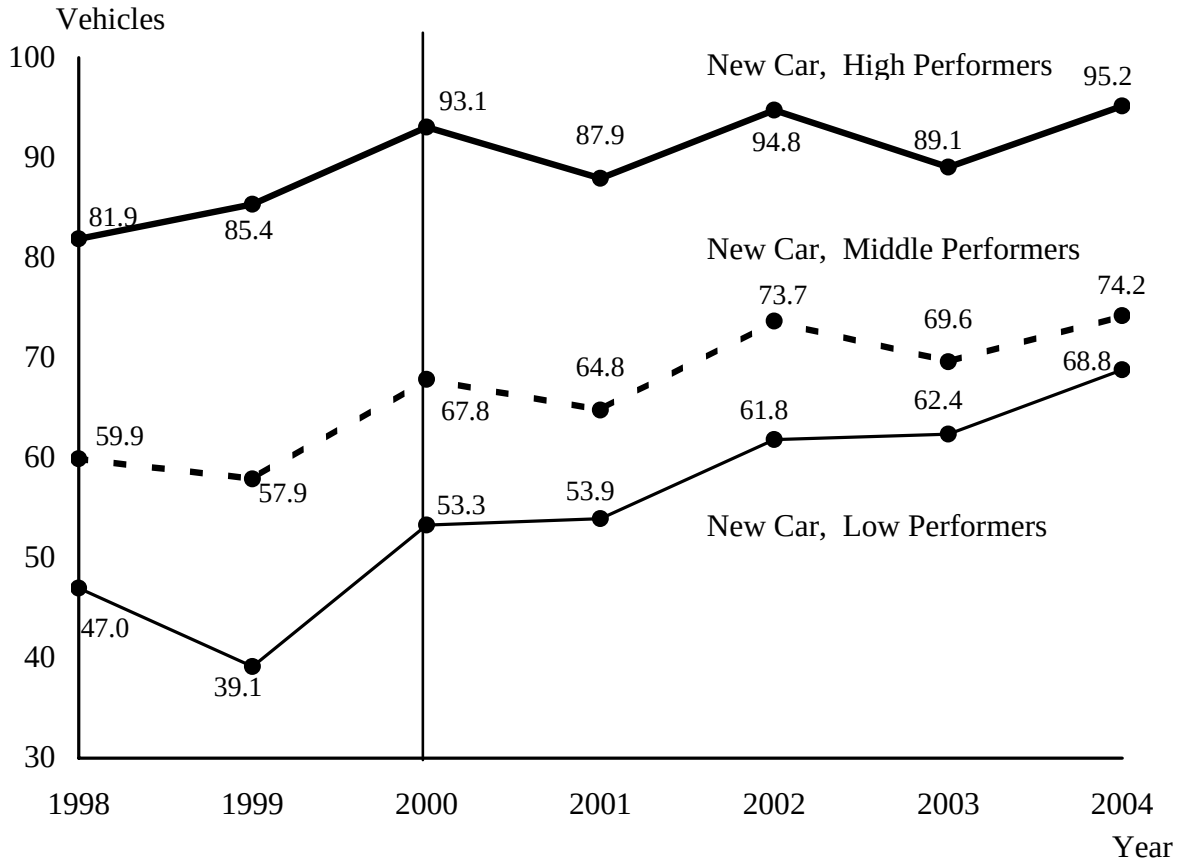
(Sources) The Japan Automobile Dealers Association.

Table 2. Determinants of Monthly Auto Sales per Person, 1998-2004

	New Car Sales Staff		Used Car Sales Staff	
	OLS	Fixed Effect	OLS	Fixed Effect
After Reform Dummy	0.297***	0.093***	0.295***	0.027
	(0.034)	(0.033)	(0.052)	(0.044)
Log of Length of Service	0.102***	0.372***	0.098***	0.502***
	(0.005)	(0.025)	(0.008)	(0.041)
Log of National Sales Volume	0.841***	0.836***	0.957***	0.674***
	(0.041)	(0.035)	(0.077)	(0.061)
Vocational School / Jr. College Dummy	-0.005	-	0.071***	-
	(0.009)	-	(0.012)	-
University Dummy	-0.008	-	-0.023**	-
	(0.008)	-	(0.012)	-
Constant	-9.507***	-9.863***	-10.527***	-7.762***
	(0.527)	(0.460)	(1.001)	(0.778)
Outlet Location Dummies	Yes	Yes	Yes	Yes
Year-Month Dummies	Yes	Yes	Yes	Yes
R^2	0.2301	0.1676	0.1475	0.0629
F-Value	120.82	159.88	21.56	27.92
Number of Observations(Groups)	36891	36891(726)	10932	10932(235)

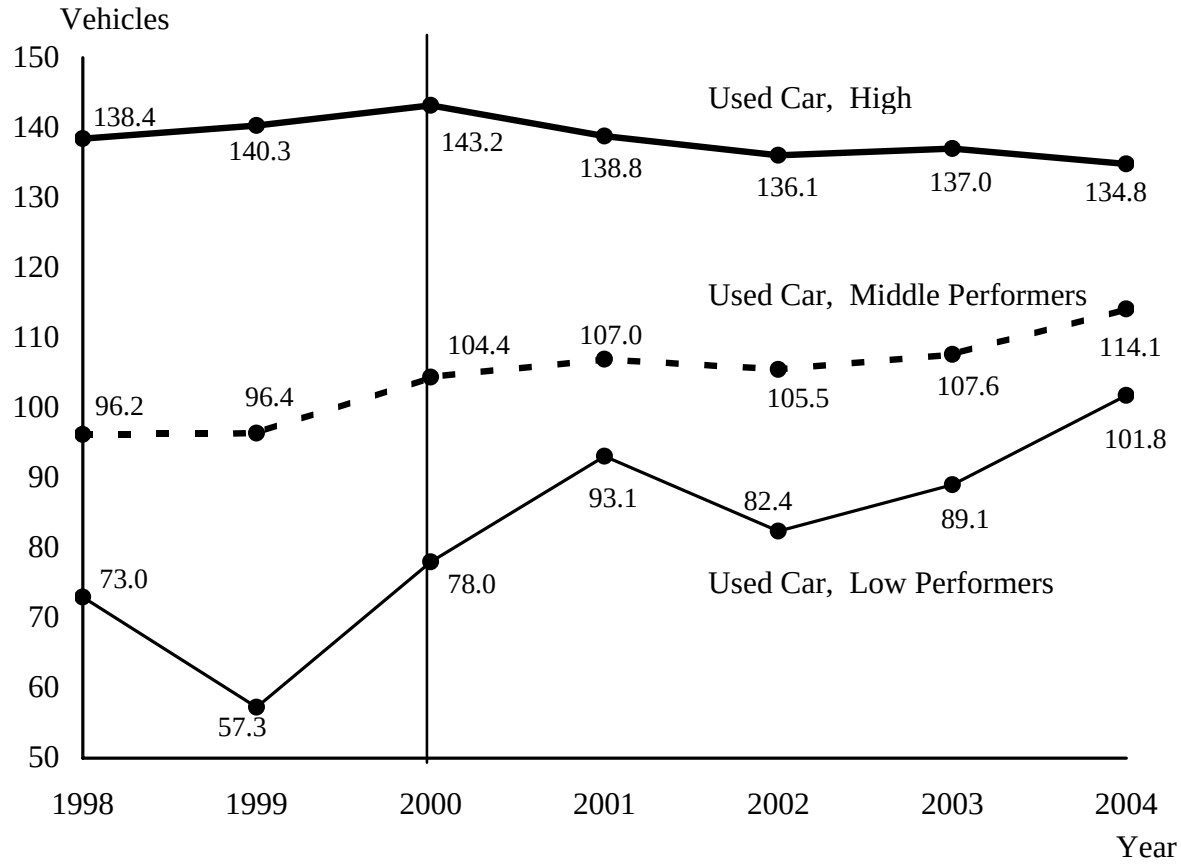
(Notes) *** and ** indicate significance at the 1 percent and 5 percent levels.
The numbers in parentheses indicate standard error.

Figure 4. Trends of Annual Auto Sales by Ability of New Car Sales Staff



(Notes) High, middle or low performers are separated by the standard of their annual auto sales in 1998-99. If an employee's sales is above the first tertile (below the third tertile), he/she is defined as a "high (low)" performer. If an employee's sales is in between, he/she is defined as "middle" performers.
This sample excludes employees who had been employed less than 3 years in 1998, in order to control for the effect of initial rapid skill accumulation.

Figure 5. Trends of Annual Auto Sales by Ability of Used Car Sales Staff



(Notes) High, middle or low performers are separated by the standard of their annual auto sales in 1998-99. If an employee's sales is above the first tertile (below the third tertile), he/she is defined as a "high (low)" performer. If an employee's sales is in between, he/she is defined as "middle" performers.
This sample excludes employees who had been employed less than 3 years in 1998, in order to control for the effect of initial rapid skill accumulation.

Table 3. Determinants of Annual Auto Sales per Person, OLS, 2000-2004

	New Car Sales Staff	Used Car Sales Staff
Log of Length of Service	-0.052***	-0.059*
	(0.014)	(0.031)
Log of National Sales Volume	-3.691***	-0.707
	(0.491)	(0.593)
Vocational School / Jr. College Dummy	-0.014	0.024*
	(0.020)	(0.036)
University Dummy	-0.045***	-0.076**
	(0.017)	(0.034)
First Tertile Group (1998-99) Dummy	0.284***	0.266***
	(0.015)	(0.031)
Third Tertile Group (1998-99) Dummy	-0.171***	-0.228***
	(0.016)	(0.036)
Constant	60.509***	15.674*
	(7.474)	(9.119)
R^2	0.3304	0.2910
F-Value	140.59	35.07
Number of Observations	1698	499

(Notes) ***, **, and * indicate significance at the 1 percent, 5 percent, and 10 percent levels.
The numbers in parentheses indicate standard error.

Table 4. Rate of Separation by Occupational Groups, 1985-2004 (%)

Year	Quit				Mandatory Retirement				Total
	New Car Sales Staff	Used Car Sales Staff	Non Sales Employees	Subtotal	New Car Sales Staff	Used Car Sales Staff	Non Sales Employees	Subtotal	
1985-1990	6.7	4.4	5.2	6.0	NA	NA	NA	NA	NA
1991-1997	9.4	5.9	4.9	6.1	NA	NA	NA	NA	NA
1998	5.2	3.6	2.6	3.5	0.8	0.0	0.6	0.6	4.1
1999	7.8	7.2	4.2	5.4	0.9	1.7	1.6	1.4	6.8
2000	4.8	4.7	2.9	3.5	0.5	0.6	1.1	0.9	4.4
2001	5.7	4.7	4.4	4.7	1.1	1.2	1.2	1.2	5.9
2002	4.3	6.7	3.1	3.7	1.1	0.6	1.9	1.6	5.2
2003	5.1	3.6	2.3	3.1	0.5	1.2	1.4	1.2	4.3
2004	3.7	7.6	1.7	2.6	0.5	1.9	1.1	1.0	3.6

Figure 6. Illustrative Four Employee Groups Categorized by the Distance to Draw Line based on the November 2000-January 2002 Sales Record

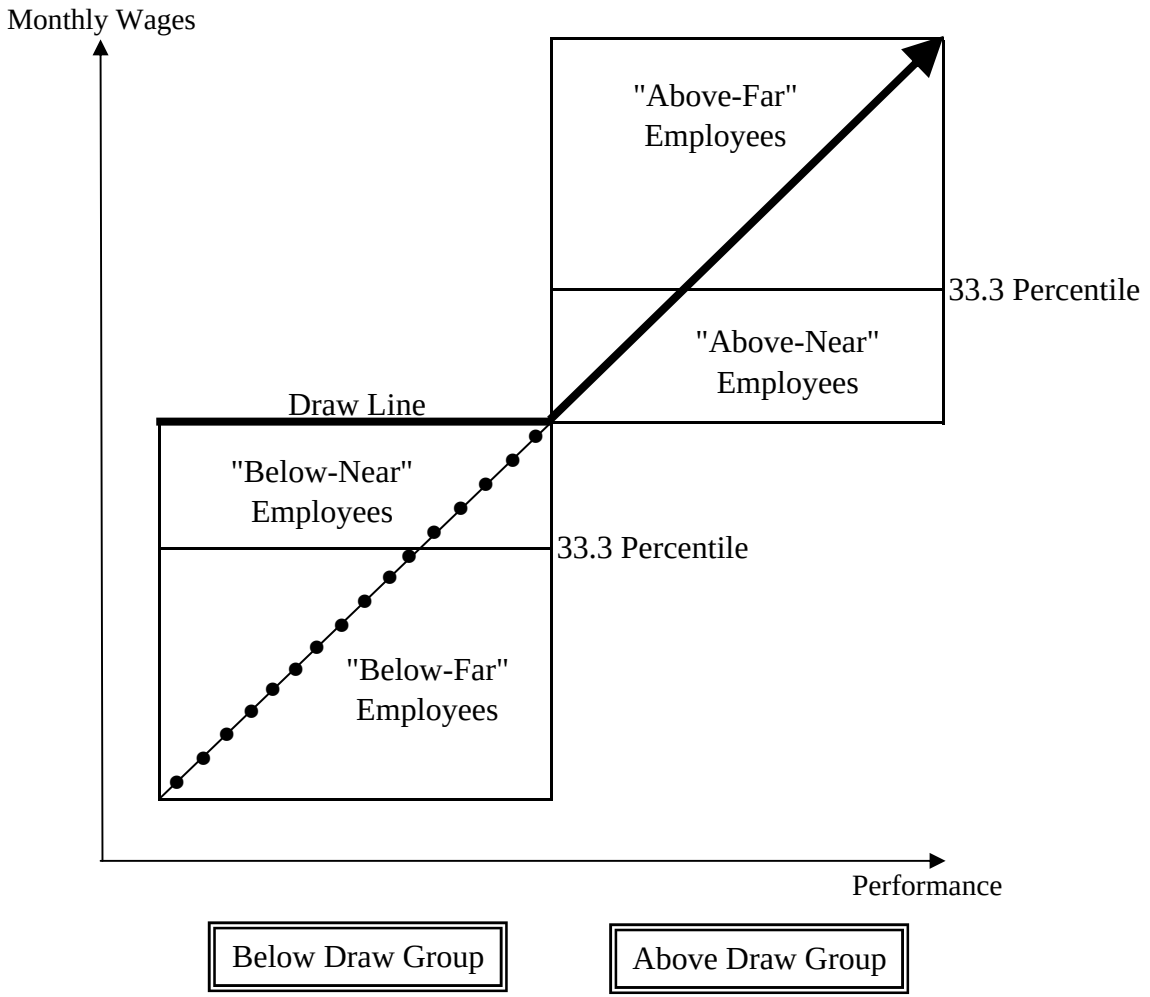


Table 5. Determinants of Monthly Auto Sales per Person, OLS, February 2002-May 2003

New Car Sales Staff	"Above-Far" Employees	"Above-Near" Employees	"Below-Near" Employees	"Below-Far" Employees
Log of Auto Sales (November 2000-January 2002)	1.047***	1.046***	0.916***	0.768***
	(0.043)	(0.066)	(0.087)	(0.077)
Log of Length of Service	-0.027	-0.013	-0.012	0.039
	(0.018)	(0.020)	(0.034)	(0.042)
Log of National Sales Volume	1.344***	1.251***	1.203***	1.065
	(0.043)	(0.046)	(0.069)	(0.104)
Vocational School / Jr. College Dummy	0.017	0.003	-0.037	0.001
	(0.028)	(0.033)	(0.049)	(0.066)
University Dummy	-0.022	0.0003	-0.033	0.049
	(0.025)	(0.026)	(0.039)	(0.050)
Constant	-17.182***	-16.037***	-15.204***	-13.439***
	(0.548)	(0.592)	(0.877)	(1.334)
R^2	0.4059	0.3142	0.3325	0.3283
F-Value	339.78	245.66	124.12	58.28
Number of Observations	2480	2687	1237	587

Used Car Sales Staff	"Above-Far" Employees	"Above-Near" Employees	"Below-Near" Employees	"Below-Far" Employees
Log of Auto Sales (November 2000-January 2002)	1.047***	0.811***	0.766***	0.906***
	(0.065)	(0.058)	(0.063)	(0.065)
Log of Length of Service	-0.008	0.059**	0.069	0.042
	(0.022)	(0.028)	(0.051)	(0.046)
Log of National Sales Volume	0.792***	0.730***	0.380***	0.449***
	(0.061)	(0.099)	(0.104)	(0.122)
Vocational School / Jr. College Dummy	-1.546.E-04	0.020	0.071	-0.002
	(0.027)	(0.045)	(0.047)	(0.090)
University Dummy	0.011	-0.002	0.023	0.011
	(0.029)	(0.045)	(0.045)	(0.049)
Constant	-10.331***	-9.166***	-4.668***	-5.774***
	(0.796)	(1.281)	(1.337)	(1.570)
R^2	0.3898	0.4462	0.4335	0.5243
F-Value	104.61	80.76	60.23	59.63
Number of Observations	812	496	388	267

(Notes) *** and ** indicate significance at the 1 percent and 5 percent levels.
The numbers in parentheses indicate standard error.

Table 6. Determinants of Monthly Auto Sales per Person, Fixed Effect Model, January 1998-December 2004

New Car Sales Staff	Before Draw Single Month Basis (January 1998-October 2000)	After Draw, Period Ⅰ Single Month Basis (November 2000-May 2003)	After Draw, Period Ⅱ 2 Month Moving Average Basis (June 2003-December 2004)
Lagged Auto Sales	-0.009	-0.088***	0.431***
	(0.009)	(0.008)	(0.010)
Log of Length of Service	1.342***	2.682***	1.304**
	(0.345)	(0.378)	(0.554)
Log of Draw Line	-	-0.559	-0.420
	-	(0.588)	(1.320)
Constant	1.977**	9.522	5.977
	(0.789)	(7.238)	(16.356)
Year-Month Dummies	Yes	Yes	Yes
R^2	0.2209	0.1345	0.4605
F-Value	186.45	197.70	224.91
Number of Observations(Groups)	14902(603)	14221(558)	8005(477)

Used Car Sales Staff	Before Draw Single Month Basis (January 1998-October 2000)	After Draw, Period Ⅰ Single Month Basis (November 2000-May 2003)	After Draw, Period Ⅱ 2 Month Moving Average Basis (June 2003-December 2004)
Lagged Auto Sales	0.330***	0.097***	0.534***
	(0.015)**	(0.016)	(0.018)
Log of Length of Service	2.561	2.594***	2.951***
	(0.915)	(0.832)	(1.117)
Log of Draw Line	-	-2.759**	1.404
	-	(1.279)	(3.284)
Constant	-2.808	37.353	-20.932
	(2.475)	(15.710)	(41.336)
Year-Month Dummies	Yes	Yes	Yes
R^2	0.3403	0.1383	0.4146
F-Value	53.84	29.78	76.82
Number of Observations(Groups)	4519(184)	4049(160)	2350(154)

(Notes) *** and ** indicate significance at the 1 percent and 5 percent levels. The numbers in parentheses indicate standard error.
For the June 2003-December 2004 period, the dependent variable is defined as (auto sales(t) + auto sales(t-1))/2, and the independent variable (Lagged Auto Sales) is defined as (auto sales(t-1) + auto sales(t-2))/2.