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The Perils of Altering Incentive Plans

A Case Study

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Tiivistelmä

Tässä artikkelissa tutkitaan vähittäiskaupan ketjua, joka ottaa käyttöön myyntitavoitteen ylittämisestä palkitsevan myyntipalkkiojärjestelmän. Myöhemmin palkkiojärjestelmän voimakkuutta leikataan ja myyntitavoitteita nostetaan. Myyntipalkkiojärjestelmän vaikutuksia arvioidaan käyttäen kuukausittaista paneeliaineistoa, joka kattaa kaikki ketjun 53 toimipaikkaa 54 kuukauden ajan. Tulokset osoittavat, että myyntipalkkiojärjestelmän käyttöönotto paransi myyntiä ja voittoja. Järjestelmään tehdyt muutokset puolestaan johtivat huomattavaan pudotukseen myynnissä ja voitoissa. Nämä tulokset voidaan ymmärtää vastavuoroisuuteen perustuvan työsopimusten teorian valossa.

Asiasanat: Kannustinjärjestelmät, vastavuoroisuus, paneelidata

Abstract

This paper studies a retail chain that introduced a sales incentive plan that rewarded for exceeding a sales target and subsequently cut the incentive intensity in addition to increasing the target. Utilizing monthly panel data for 54 months for all 53 units of the chain the paper shows that the introduction of the sales incentive plan increased sales and profitability, while the changes in the plan lead to a marked drop in sales and profitability. Thus, modifying the incentive plan proved costly for the firm. The results are consistent with the gift-exchange model of labor contracts.

Key words: Incentive pay, Gift exchange, panel data

JEL: M52, J33, M54, J53

1 Introduction

A central theme in the empirical personnel economics is whether incentives "work" in the sense that they increase firm performance (Lazear and Oyer 2007). The recent literature has studied employee responses to incentives using data from single firms. The evidence covers various incentive plans ranging from piece-rates to company wide performance pay. This line of work generally shows that employees do respond to incentives and that the introduction of incentive pay increases productivity, often measured by quantity of output produced. Other measures of performance, such as profitability are rarely studied.

These studies usually focus on the effects of a change from time wages to incentive pay, often to piece-rates. In practice firms frequently experiment with their incentive plans, for example by changing the rules of the plan. In Finnish industry over 50 per cent of firms change the rules of the incentive plans annually (EK The Confederation of Finnish Industries 2006). Such changes may affect incentive intensity, organizational level of performance measures, among other things. Despite the prevalent modification of the rules of incentive plans, to our knowledge there is only a single study that considers the impact of these modifications on firm performance. Bandiera et al. (2005) show that in fruit-picking piece-rates generate higher productivity than relative incentives. Given that the literature has shown that even the adoption of low-powered incentive plans may lead to large increases in productivity, it is conceivable that changes in incentive plans may affect performance. Moreover, due to the broad diffusion of incentive pay, shifts from time wages to incentive pay are becoming rarer, but changes in incentive plans are frequent.

We analyze a retail chain of 53 establishments where the compensation plan of the sales clerks goes through significant changes. In the beginning of our period of observation the clerks were paid fixed hourly wages. Subsequently, an incentive pay plan based on exceeding a sales target was adopted. Such plans are typical in sales force compensation (Joseph and Kalwani 1998), but have received little attention with Banker et al. (1996) being an exception. This incentive plan was in place for two years, after which the company made significant changes to it: the intensity of incentives was significantly reduced and the sales targets were increased. The effect of such weakening of incentives has received little attention. We compare how the same units perform in three pay regimes: time wages, sales incentive plan, and modified sales incentive plan with reduced incentives. We study how these changes in the compensation plan affect performance in terms of sales and profitability.

2 Prior literature

Recent literature has studied the impact of various incentive plans on performance. Many of the papers have studied the impact of switch from time wages to piece rates. Lazear (2000) finds that a switch to piece-rates increased the output of auto glass installers by 44 per cent, while Shearer (2004) finds that in tree planting productivity gains from piece-rates are 20 per cent compared to time rates. Freeman and Kleiner (2005) also show that productivity in shoemaking is higher when the workers are paid by piece rates. Fewer studies examine the impact on profitability, with Freeman and Kleiner (2005) being a notable exception[1]. They show that

[1] Lazear (2000) presents some calculations and arguments that support the claim that profits increased following the introduction of the piece-rate plan. However, he did not analyze this issue in a regression framework. There are also a few older papers studying the impact of profit sharing plans of profitability (FitzRoy and Kraft 1986, Bhargava 1994).

although the switch from piece rates to time rates decreased productivity, it decreased labor and materials costs even more, thus leading to increased profitability. Apparently, the workers wasted more materials during the piece-rate regime.

There is also evidence that switching from time rates to other forms of incentive pay increases productivity. Knez and Simester (2001) find that a company wide bonus plan rewarding improvements in on-time performance in Continental Airlines helped the company to increase performance. Banker et al. (1996) study the effect of the introduction of an employee-level bonus plan in a retailing firm, and find that sales increase by about 10 per cent. Lavy (2002) shows that low-powered group incentives for teachers lead to improvements in pupil performance. Bandiera et al. (2007) show that changing managers' pay from time wages to incentive pay increases productivity of their subordinates in a fruit-picking firm.

These studies show that incentive pay in its various forms may have large effects on productivity in different settings. Notably, even low-powered group incentive plans may have substantial effects on performance. Thus, even small changes in incentives may lead to big changes in behavior. Next we describe our case and the incentive plan in more detail.

3 The case firm and the incentive plan

Our case is a Finnish firm in the non-food retailing sector. It has 53 retail outlets around Finland, making it one of the largest retail firms in Finland. Each outlet sells similar items, although there is variation in the number of items sold, since the outlets are of different size ranging from floor space of 1757 sq m to 7265 sq m. Each store contains three departments: home, leisure and clothing. Smaller establishments carry a product assortment that is a subset of the product mix offered by larger stores. Each store has a store manager, and three departmental supervisors. The retailer is neither a discount retailer nor can it be considered as a specialized or upscale retailer. Its strategy is to sell rather standard products to a wide range of customers with all items in stock on display, and self-service is the main form of service in many departments. For most employees the main tasks are to receive goods, shelve items, and maintain the appearance of their department.

We observed the firm under three pay regimes. Initially the sales clerks were paid fixed hourly wages based on the national collective agreement in the retail industry. In April 2006 the chain adopted a sales incentive plan. The executive group, consisting of the executive director and sales managers, felt that performance could be enhanced by incentive pay. No store managers belonged to this decision-making group. While the adoption of the plan was decided by the executive group of the chain, the shop steward of the chain was informed of the plan prior to its implementation. The personnel were informed in March 2006. The introduction of incentive pay was a notable change in the human resource policy of the firm. The plan was directed only at the sales clerks, and neither the store manager nor department supervisors participated in it. Other incentive mechanisms such as promotion were not very important for the sales clerks; promotions were very rare.

The sales incentive plan was based on exceeding *store* level sales target and the plan quarterly, that is performance was compared to the target for a quarter. Both of these features of the plan are very common in sales force incentive plans (Joseph and Kalwani 1998). In this respect the

plan differed from the one considered in Banker et al. (1996), which was based on individual performance. Performance was measured at the store level, although in principle it could be measured at the department level. It was decided that store level measurement would be preferable since department level measures might lead to maximizing the performance of one's own department at the expense of the others.

The rules of the plan were decided annually by the executive group, and cannot be altered during the course of the year. The rules of the plan were changed by the executive group in April 2008. The personnel were informed of the changes in March. In effect, the incentives were weakened. The rationale for weakening the incentives was that the management felt that they were paying the employees too much and hoped that they could maintain the same level of performance while cutting the intensity of incentives. Thus in effect the idea was to increase profits by giving the employees less while expecting them to give the same level of effort as before.

To sum up, in the first regime the sales clerks were paid an hourly wage, in the second regime the sales incentive plan was introduced, and in the third regime the incentive plan was modified. The plan is described in Table 1.

Table 1 The structure of the incentive plan

Category	*Sales as % of sales target*	*4/2006–3/2008 Pay as % of base wage*	*4/2008– Pay as % of base wage*
0	<101%	100%	100%
1	101%–102%	102%	100%
2	102%–104%	104%	102%
3	104%–106%	106%	103%
4	106%–108%	108%	104%
5	108%–110%	110%	105%
6	>110%	112%	105%

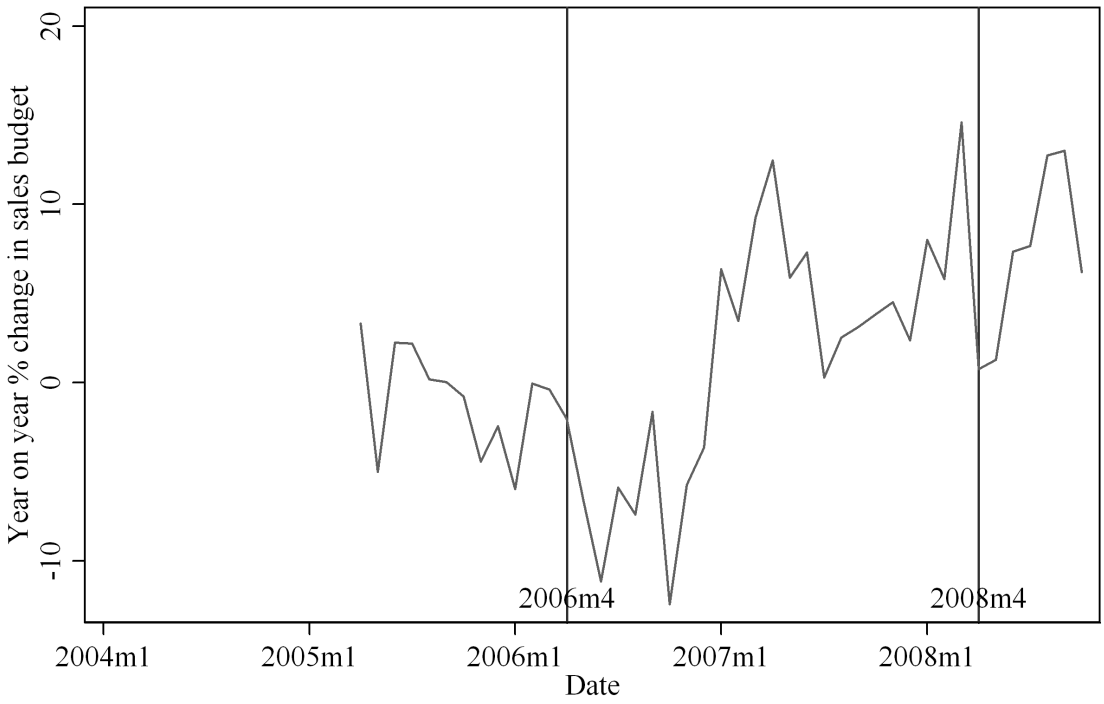
The plan was stepwise and initially had the following features: 1) the sales target had to be exceeded by at least 1% before any bonuses were paid, 2) the bonus rate increased with performance 3) the bonus payments were capped at 12% (associated with exceeding the sales target by at least 10%). After the change in the plan 1) the sales target had to be exceeded by at least 2% before any bonuses were paid, 2) the bonus rate increased less rapidly, 3) the system was capped at 5% (associated with exceeding the sales target by at least 8%). The plan appears to be quite typical in Finnish retail trade. On average, actual incentive payments are 6 % of earnings in trade, while in the whole service sector the maximum payments are 10 % of earnings (EK The Confederation of Finnish Industries 2006).

3.1 Target setting

Sales targets are set in the budgeting process, and thus these targets were used as a management tool even before the adoption of the sales incentive plan. The targets were set for each month, and they differed between stores and between months for each store, since the stores faced different circumstances and business was seasonal. The process of setting the targets is as follows: First the executive group set a sales target for the chain as a whole. Then regional sales managers (six of them) derived sales targets for each store under their supervision. They may consult the store managers, for example to get information on important local developments concerning competition and demand, but ultimately they set the target for each store. The store managers' incentive plan was unchanged during our period of observation, and thus should not influence the target setting process. The store manager then set the targets for each department in his/her store. The targets were set annually for 12 months ahead, and not revised after that. The quarterly targets were simply the quarterly sum of the monthly targets.

The evolution of the sales targets over time is shown in Figure 1. It depicts the average nominal year on year change in the sales targets over time[2]. It can be seen from the figure that the targets were falling on average until January 2007, that is 6 months after the introduction of the incentive plan. Subsequently, the sales budgets have been steadily increasing.

Figure 1 Changes in sales budget over time



Note: The initial incentive plan was introduced in 4/2006 and it was modified in 4/2008.

[2] Using weighted means (by sales) or median produces almost identical graph.

3.2 Employee influence on sales

In our store visits, we asked managers and employees how company salespersons could influence sales. One of two broad categories of reasons frequently mentioned by both groups was shelf-management, item display, and the overall appearance of the store. These issues have been also studied in the retail marketing literature. For example, Bitner (1992) discusses the impact of the surroundings, such as overall appearance of the store, on customers (and employees), while item display is considered by Simonson (1999). Bell and Menquc (2002) and Keaveney (1995) examine the effect of interaction with customers on business performance. Sales are affected by having prices in view for all items, a clean and orderly store, attractive item display, and new goods displayed quickly. To give a concrete example, if items are not shelved in their proper places in the clothing department, customers may be unable to find what they are looking for. The motivation and skills of the employees in organizing and managing products efficiently affects the store's sales.

The other set of reasons concerns interaction with customers. In this chain, employees do not usually initiate such contacts. However, when employees are in the store and engaged in other activities (e.g. shelving), they are often approached by customers who are looking for specific products or who want more product information. In such situations, employee reactions have an important bearing on customer satisfaction. Sales can be increased by helping customers find what they want even if it means crossing department lines and finding a sales clerk who knows the product in question if one does not know it oneself. Moreover, service attitude is important for sales. If an employee behaves in an unfriendly manner customer interest may be easily lost.

The sales clerks cannot set prices or give discounts to customers. The only way they can affect pricing is reducing the price of items that have not sold as well as expected, but even then the departmental supervisor has final authority. For most part, the prices are set centrally for all stores.

4 Conceptual framework

This section discusses nonlinear sales incentive plans. More specifically, we consider a plan that pays a bonus if a given quota is reached by the end of the evaluation period. The employees are paid a base wage W, and if cumulative sales at the end of the period exceed Q, they receive a bonus B[3]. Such plans are a simplified version of the plan actually used in the case firm, which had more "steps". The ideas presented here would not be modified by considering a plan with more steps, but it would introduce additional complications. Theoretical research concerning such plans is presented in Oettinger (2002). We start by discussing how such plans affect the choice of effort when compared to time wages.

To start the analysis of the choice of effort, we consider the case of fixed hourly wages. The employees compare the marginal value of effort with the marginal cost of effort. The marginal value of effort need not be zero even though the hourly wage is independent of effort. The employee may experience other tangible benefits from effort even though the wage is fixed, for

[3] (Oyer 2000) shows that such plans may be optimal in sales settings under particular conditions.

example, in terms of the esteem of co-workers or other benefits from employment (Baron and Kreps 1999 pp. 249). In particular work group effort norms may affect the marginal benefit of effort. In Akerlof's (1982) gift-exchange model, favorable group attitudes towards work lead to higher effort than the minimum required by the management, while the attitudes in turn may depend on perceived fairness of treatment by the firm. The treatment by the firm may refer to either wages or work rules. The idea is that the workers may reciprocate high wages or lenient work rules by higher effort (norm).

Now consider the change to a nonlinear incentive plan that rewards the employees for reaching a given target during a fixed period. Now there is an additional component to the marginal value of effort, namely the change in the probability of reaching the target times the bonus attached to it. When compared to time wages, the level of effort does not decrease (other benefits of effort are likely to remain the same) and probably increases if the expected additional marginal value of effort is "high" enough. If the quota is set so high that reaching with feasible levels of effort is very unlikely, incentives are reduced since the marginal value of effort is close to zero. Symmetrically, if the targets are too low, it is almost sure that the target is reached with the prevailing level of effort, and thus marginal value of effort is low. In other words "reasonable" quotas generate higher effort than those that are too high or too low (Oyer 1995, Oyer 1998). Thus, whether the incentive plan leads to any higher effort than time wages depends heavily on the level of the quota. Naturally if the firm wishes to implement an incentive plan based on a quota, it will try to set the quota at a level that would bring increases in effort. We will argue below that it would be important to get the quota right from the beginning. However, estimating the correct quota may be difficult or costly, which means that the quota has to be adjusted over time.

Suppose the firm reduces the intensity of incentives, which in this case amounts to cutting B, while holding Q fixed. There will be two effects. First, as the bonus is cut, the expected marginal benefit is reduced, and accordingly we would expect the level of effort to be lowered. The effort should still be higher than in the time wage regime, unless the marginal cost increases so steeply that a corner solution is optimal. Second, if the employees perceive reductions in incentive intensity as a negative action, or unfair treatment, they may decrease the work norm. As a result, the level of effort is reduced possibly even below what prevailed during time wages[4].

In our case, the firm also increased Q. The effect of this change is ambiguous. As seen earlier, the effect of Q on marginal value of effort is non-monotonic. The results in Oyer (2000) however suggest that it is likely the case that in equilibrium the marginal value of effort is decreasing in Q, which would mean a decreasing level of effort following the increase in Q. Akerlof's (1982) model brings an additional effect. Again, increases in the sales target may lead to reductions in effort norm, if such change is perceived as unfair treatment[5]. Changes in Q may also signal to the employees that the firm will increase Q as a function of past performance. Such behavior on the part of the firm will mute incentives, since good performance today will make good performance in the future less likely. Thus setting the quota correctly from the beginning would be important.

[4] There is a large related literature on nominal wage rigidity, which suggests that fairness and employee morale considerations are an important cause of the rigidity (e.g. Campbell and Kamlani 1997, Bewley 1999)

[5] A substantial experimental literature has established that a notable fraction of subjects in experiments have preferences for fairness and act reciprocally (e.g. Fehr and Falk 1999, Fehr and Gachter 2000)

So far we have discussed the implications of changes in the compensation plan on effort. However, incentive plans affect not only the level of effort but also the allocation of effort to different tasks. Sales incentive plans induce employees to focus their effort on sales, possibly at the expense of other goals. Thus it may direct attention to wrong tasks or lead to "gaming" the system (Holmstrom and Milgrom 1991, Baker 1992). For example, if rewarded for sales, employees may take actions that increase sales at the expense of profits. Cutting prices boosts sales while possibly hurting profitability. Quota-based plans also create incentives that affect the timing of performance (e.g. Healy 1985, Oyer 1998, Courty and Marschke 2004). Thus, to maximize their own income, employees may try to influence the timing of customer purchases, or the reporting of sales. Some of these "gaming" responses can be controlled by job design. Restricting the autonomy of employees, or the number of tasks they perform, can make it possible to provide stronger incentives on the remaining tasks. If for example, the sales agents cannot affect the pricing of their products, providing incentives on sales may not hurt profitability.

To this point the discussion has concerned a single individual. However, the plan considered in this paper is based on group performance. In this context individuals have incentives to free ride on the effort of others. However, horizontal monitoring or peer pressure may mitigate free riding (Kandel and Lazear 1992). They argue that peer pressure is likely to be more effective in small groups and when the employees in the group are similar. Furthermore, the group rewarded by the incentive plan should be a group than can engage in mutual monitoring. For example, the employees should be in the same plant. If the employees are engaged in repeated interactions, rewarding for group performance provides both means and incentives for mutual monitoring (Che and Yoo 2001).

To sum up the discussion so far, we predict that the introduction of the sales incentive plan will lead to higher effort and thus higher sales. The cut in intensity of incentives will likely lead to lower effort and sales. The impact may be large if the effort norm is affected. The impact of the sales incentive plan on profitability depends on job design. The plan may lead the employees to take actions that increase sales at the expense of profitability if they have sufficient authority to do so. Restricting their autonomy for example with respect to pricing reduces these distortions. Next we describe the data and present a descriptive analysis.

5 Data and descriptive analysis

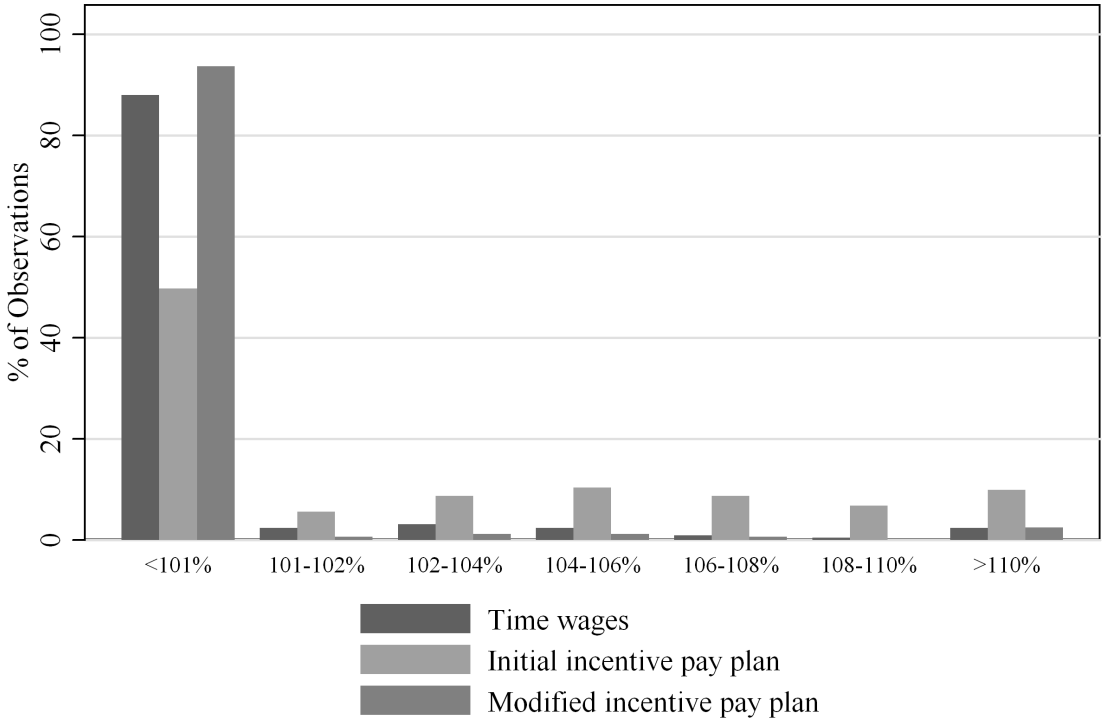
The data cover all 53 establishments in the case firm that were operating during 2004–2007[6]. Of these 53 establishments, 49 were observed for the whole period, while the remaining four started operations during the observation period. No establishments closed during 2004–2007. Our data consists of 54 monthly observations (2004:4to 2008:9). Thus we have two years of data before the sales incentive plan, and 7 quarters after the initial plan was introduced and two quarters after the change in the plan.

We begin by presenting a figure where we have classified the performance for each establishment in each quarter according to the sales incentive system presented in Table 1. We are able to do this since we have information on the targets for the whole period.

[6] There are actually 54 stores, but the last one enters the data after the introduction of the sales incentive plan, and is thus dropped from the data.

It is seen from Figure 2 that before the sales incentive plan took place almost 90 per cent of the observation fell in the first category, that is, the sales target was exceeded at most by 1 per cent. This suggests that the employees were targeting the sales target, or aimed a little below it. The picture is quite different after the introduction of the incentive plan. A little over 40 per cent of the observations fall to the first category and the rest are quite evenly distributed to the other categories. Again, a dramatic shift occurs after the change in the incentive plan. There is a substantial drop in performance, and roughly speaking it seems that performance reverts back to the same level where it was before the introduction of the incentive plan in the first place.

Figure 2 Meeting of sales targets by pay regime



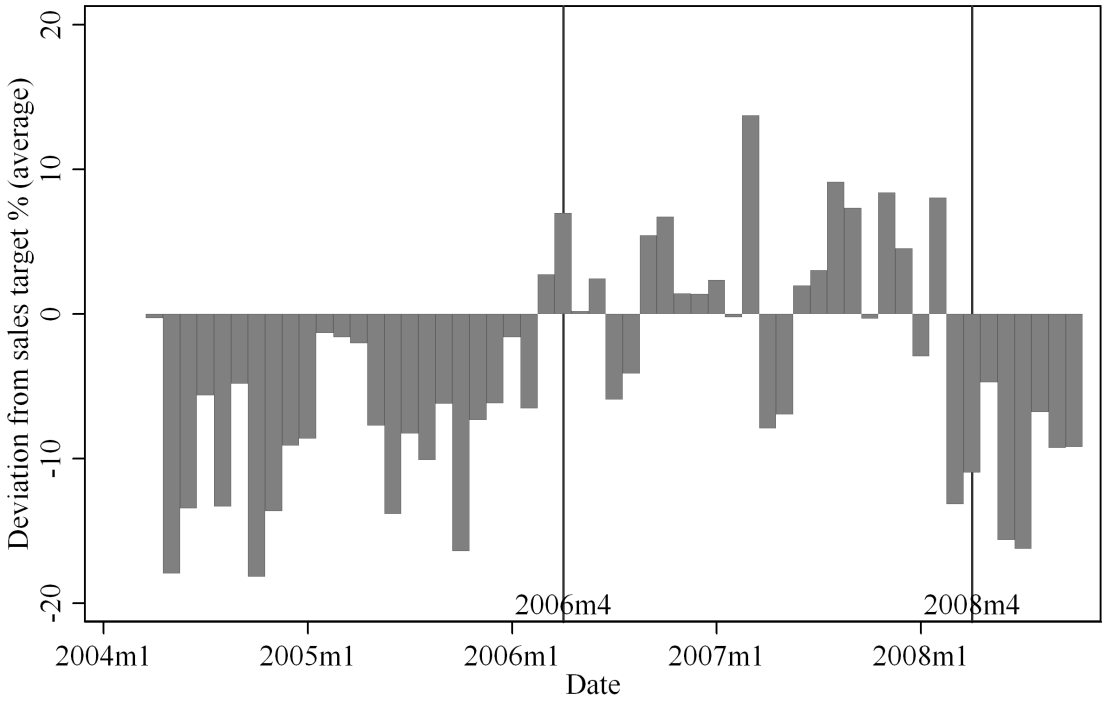
To look at the timing of changes in performance we plot the average deviation of sales from sales targets over time in Figure 3[7]. The first vertical line in the figure indicates the start of the incentive pay regime and the second vertical line indicates the date when the rules of the incentive plan were changed. It is seen from the figure that on average the establishments missed the targets in the time wage regime. However, when the incentive plan was introduced, the picture changes: Now months where the average is negative are less common and in fact the sales target is exceeded on average. The worst month during the initial incentive pay regime is the last one, i.e. March 2008, which might reflect the large increase in targets evident from Figure 1[8]. There is again a change in the figure when the incentive plan was modified. After this point

[7] Using weighted means (by sales) or median produces almost identical graph.

[8] This point will become evident in the econometric analysis.

the sales target is again missed on average in each month. Overall, the main message from Figure 3 is similar to that of Figure 2: the time wage regime and the incentive pay regime after the change in the rules are quite similar in terms of performance, while the initial incentive pay plan stands out with a notably better performance.

Figure 3 Sales in relation to sales target over time



Note: The initial incentive plan was introduced in 4/2006 and it was modified in 4/2008.

6 Estimation

Next we move beyond these descriptive figures and discuss the regression results. The regression we estimate is

$$y_{it} = \beta' x_{it} + \tau_t + \gamma_1 si_{1it} + \gamma_2 si_{2it} + \nu_i + \varepsilon_{it} \quad (1)$$

The dependent variable y_{it} for store i at date t is either 1) log (real) sales (S_{it}), 2) log $\left(\frac{S_{it}}{T_{it}}\right)$ where T_{it} is the store's sales target, or 3) and indicator variable that equals unity if a profit target is exceeded and zero otherwise[9]. The vector x_{it} includes log hours worked and log retail space[10], τ_t accounts for time effects (differs in different specifications), si_{1it} equals unity during the initial sales incentive plan and zero otherwise, si_{2it} equals unity during the modified sales incentive plan and zero otherwise, ν_i is the store effect, and ε_{it} is an error term. We allow

[9] The rationale for using this formulation in the analysis of profitability is explained below.

[10] The core input measures we use are quite traditional see e.g. (Reardon et al. 1996)

the store effect to be correlated with the other explanatory variables, that is, we use fixed effects methods.

The key parameters of interest are γ_1 and γ_2, which shows the impact of the sales incentive plan on performance. Identification of the parameters is based on a before and after comparison as all units adopt and change the plan simultaneously.

The key threat to internal validity is that any unobserved changes between the periods are attributed to the sales incentive scheme. In other words, how can we make sure we are not attributing the impact of some other changes to the changes in the compensation system? There are many potential changes that could take place concurrently with the changes in compensation system. First, there could be common performance shocks, for example due to a business cycle, changes in competitive pressure in the industry, or other changes taking place at the chain level. We control for industry-level business cycle effects by including an industry-level (retail department stores) sales value index as a control variable. Changes concerning the group are controlled for by the inclusion of year dummies.

Second, the measurement of dependent or independent variables could change over time. This is not a concern in this case, for most of the variables, since their measurement is unchanged during the period of observation. Profits however, are an exception. In late 2005 following the introduction of new information systems in 2004–2005 there are large swings in sales margin that also result in large swings in profits as we measured here. In some months in 2005, the target for sales margin is missed on average by over 40 per cent. This same phenomenon is seen also later. The sales margin can be low if either there were large discounts or if due, for example, to changes in accounting lead to changes in the valuation of the stock. We have no reliable information on what is driving these swings in the sales margin. For this reason we focus on estimating the probability of exceeding the profit target[11]. This weighs down the extreme observations and thus helps with the measurement error. Third, the observed units could change. However, in our case the units are the same for the period of observation, so this is not a concern.

Since accounting for time effects can affect the estimates, we proceed in the following way. The baseline regression includes no controls for time effects. First we add month dummies to capture seasonality. After this we add year dummies and last we include an industry level sales value index as an additional covariate. The year dummies should pick up annual shocks that are common to the establishments of this chain while the industry level index captures wider business cycle effects. This way one can transparently see how accounting for different time effects affects the estimates.

7 Results

Table 2 looks at the impact of the sales incentive plan on sales. The first column gives the baseline results that do not control for any time effects. The estimates show a 9 per cent increase in sales following the introduction of the sales incentive plan. However, after the rules are changed, sales fall back to the same level they were in the time wage regime. The second column adds month dummies, which changes the results somewhat. The impact of the introduc-

[11] The profit target is set similarly to the sales target.

Table 2 The impact of the incentive plan on sales

	Baseline	*w/month dummies*	*w/month & year dummies*	*w/month & year dummies & sales index*
Log hours	1.614 ***	0.506 ***	0.499 ***	0.459 ***
	[26.1]	[9.43]	[9.16]	[8.15]
Log space	0.223	0.114	0.142	0.14
	[1.56]	[0.91]	[1.06]	[1.05]
Initial incentive pay plan	0.092 ***	0.055 ***	0.064 ***	0.049 ***
	[8.53]	[7.27]	[10.0]	[7.95]
Modified incentive pay plan	-0.007	-0.035 ***	-0.022 *	-0.030 **
	[-0.51]	[-2.91]	[-1.85]	[-2.52]
Feb		-0.084 ***	-0.085 ***	-0.059 ***
		[-12.2]	[-12.2]	[-9.23]
Mar		0.105 ***	0.105 ***	0.014 *
		[16.6]	[16.6]	[1.98]
Apr		0.111 ***	0.109 ***	-0.030 ***
		[12.9]	[12.0]	[-3.48]
May		0.118 ***	0.116 ***	-0.047 ***
		[12.6]	[12.1]	[-4.97]
Jun		0.157 ***	0.155 ***	-0.058 ***
		[15.2]	[14.8]	[-4.95]
Jul		0.152 ***	0.150 ***	-0.043 ***
		[11.7]	[11.1]	[-3.05]
Aug		0.169 ***	0.167 ***	-0.004
		[19.3]	[18.6]	[-0.41]
Sept		0.158 ***	0.156 ***	0.015
		[21.4]	[19.2]	[1.51]
Oct		0.102 ***	0.100 ***	-0.112 ***
		[14.3]	[12.5]	[-11.3]
Nov		0.157 ***	0.155 ***	-0.082 ***
		[15.2]	[14.6]	[-8.17]
Dec		0.666 ***	0.666 ***	0.111 ***
		[33.4]	[32.7]	[5.29]
2005			0.012 **	-0.034 ***
			[2.54]	[-5.99]
2006			-0.020 **	-0.103 ***
			[-2.38]	[-10.1]
2007			0.005	-0.136 ***
			[0.43]	[-8.97]
2008			-0.009	-0.202 ***
			[-0.50]	[-9.78]
Sales value index				0.809 ***
				[18.2]
Observations	2865	2865	2865	2865
R-squared	0.855	0.959	0.96	0.963

Notes: a) Coefficients are reported in the table and t-statistics in brackets. b) Significance of the variables is indicated as follows: * significant at 10%; ** significant at 5%; *** significant at 1%.
c)The t-statistics are robust to heteroscedasticity and autocorrelation within each establishment.
d) R-squared is the unadjusted within R-squared.

tion of the plan is reduced to 5.5 per cent and the impact of the change in the rules falls to -3.5 per cent. In other words, performance in terms of sales drops even below the level in the time wage regime. Adding year dummies and industry-wide sales value index changes the picture only a little. The conclusion from this analysis is that the introduction of the plan increased sales by around 5 per cent while changing the rules lead sales to drop below the level they were during the time wage regime. These results are consistent with changes in the rules of the incentive plan affecting the effort norm. Otherwise it is hard to see how sales would fall so dramatically after the introduction of the modified incentive plan.

In Table 3, the same set of regressions are presented using log(sales/target) as the dependent variable. Here the baseline figures show a 9.5 percentage points increase in the dependent variable following the introduction of the sales incentive plan and a 2.4 per cent decrease compared to the time wage regime after change in the rules of the plan. Adding month dummies in column two renders the negative effect following the rule change statistically insignificant.

The year dummies in column three changes the picture notably. Now it seems that the drop in performance following the rule change is not that large and that performance would exceed that of the time wage regime. Why does the inclusion of year dummies change the results, especially when we do not see this happening in Table 2? The difference between Table 2 and Table 3 is that the latter considers sales in relation to the target. Thus the difference has to depend on the evolution of the targets. Looking at the coefficients of the year dummies reveals that 2008 has a large negative coefficient, which is due to the notable increases in sales targets. The sales incentive plan was in fact made weaker by this change, since meeting the targets became much more difficult. Thus it can be argued that first increasing the targets and following this with cutting the incentive intensity lead to deterioration in performance.

In fact, as shown in the robustness checks in the Appendix, the large increase in targets in March 2008 is driving the coefficients on the Modified incentive plan and the dummy for 2008. Adding a dummy for this month decreases the coefficient on Modified incentive plan notably and makes it insignificant. The fact that we observe only six months after the modification of the incentive plan makes it difficult to differentiate year effects from month effects. The last column adds the industry-wide sales value index with little impact on the results. The results in Table 2 and Table 3 are robust to replacing the year dummies with a linear time trend (shown in the Appendix).

Table 4 looks at the probability of exceeding a profit target using a linear probability model and the same strategy as the previous tables. The baseline results show a 9 per cent increase in probability of exceeding the profit target following the introduction of the sales incentive plan, while this boost to profits is lost after changing the rules of the plan. Adding month dummies increases the change in profits somewhat but does not change the conclusion. In column 3 we see that introducing the year dummies increases the initial change even further. However, the qualitative conclusion is the same: profit targets were more likely exceeded during the initial incentive plan compared to the other pay regimes[12]. The results concerning profitability de-

[12] The large coefficients on log hours and log space are due to the inclusion of establishment effects. Without the establishment effects the coefficients would not be significantly different from zero, while other coefficients would remain unchanged. The large coefficients then mean that if for example an establishment would suddenly grow larger (after the targets were set) it would exceed the profit target more easily. This might happen if, for example, after setting the target it would be decided that an establishment would

Table 3 The impact of the incentive plan on sales in relation to sales target

	Baseline	*w/month dummies*	*w/month & year dummies*	*w/month & year dummies & sales index*
Log hours	-0.003	0.136***	0.184***	0.124***
	[-0.11]	[3.56]	[4.59]	[2.94]
Log space	0.117	0.132	0.103	0.101
	[1.27]	[1.40]	[1.10]	[1.10]
Initial incentive pay plan	0.095***	0.100***	0.075***	0.052***
	[14.6]	[15.1]	[9.18]	[6.13]
Modified incentive pay plan	-0.024**	-0.007	0.044***	0.032**
	[-2.29]	[-0.66]	[2.82]	[2.07]
Feb		0.036***	0.040***	0.078***
		[8.47]	[8.92]	[16.5]
Mar		0.031***	0.031***	-0.105***
		[6.11]	[6.12]	[-13.8]
Apr		0.008	0.000	-0.206***
		[1.39]	[0.010]	[-23.7]
May		-0.043***	-0.053***	-0.296***
		[-7.57]	[-7.12]	[-27.2]
Jun		-0.048***	-0.059***	-0.376***
		[-8.37]	[-7.77]	[-27.5]
Jul		-0.037***	-0.048***	-0.335***
		[-6.96]	[-6.37]	[-26.4]
Aug		-0.015**	-0.023***	-0.277***
		[-2.37]	[-3.06]	[-23.2]
Sept		0.021***	0.013*	-0.196***
		[3.80]	[1.92]	[-18.3]
Oct		-0.042***	-0.052***	-0.369***
		[-7.31]	[-7.04]	[-26.8]
Nov		-0.013	-0.024**	-0.378***
		[-1.66]	-2.68]	[-26.3]
Dec		-0.029**	-0.047***	-0.873***
		[-2.39]	[-3.52]	[-27.2]
2005			0.029**	-0.039***
			[2.55]	[-3.36]
2006			0.058***	-0.066***
			[4.77]	[-5.29]
2007			0.060***	-0.151***
			[3.86]	[-9.24]
2008			-0.026	-0.313***
			[-1.40]	[-15.8]
Sales value index				1.204***
				[25.3]
Observations	2852	2852	2852	2852
R-squared	0.281	0.334	0.375	0.452

Notes: a) Coefficients are reported in the table and t-statistics in brackets. b) Significance of the variables is indicated as follows: * significant at 10%; ** significant at 5%; *** significant at 1%.
c)The t-statistics are robust to heteroscedasticity and autocorrelation within each establishment.
d) R-squared is the unadjusted within R-squared.

Table 4 The impact of the incentive plan on exceeding profit target

	Baseline	*w/month dummies*	*w/month & year dummies*	*w/month & year dummies & sales index*
Log hours	0.02	0.387***	0.359***	0.324**
	[0.236]	[3.403]	[3.064]	[2.673]
Log space	0.899***	0.929***	0.840***	0.838***
	[2.903]	[2.922]	[2.834]	[2.828]
Initial incentive pay plan	0.092***	0.105***	0.225***	0.212***
	[4.235]	[4.870]	[4.012]	[3.654]
Modified incentive pay plan	-0.05	-0.007	0.036	0.03
	[-1.474]	[-0.189]	[0.427]	[0.350]
Feb		0.216***	0.214***	0.236***
		[4.237]	[4.252]	[4.917]
Mar		0.107**	0.107**	0.028
		[2.406]	[2.404]	[0.448]
Apr		-0.011	-0.029	-0.150**
		[-0.238]	[-0.590]	[-2.071]
May		-0.034	-0.051	-0.194**
		[-0.837]	[-1.067]	[-2.401]
Jun		-0.006	-0.023	-0.208**
		[-0.133]	[-0.461]	[-2.102]
Jul		-0.053	-0.07	-0.238**
		[-1.276]	[-1.500]	[-2.551]
Aug		-0.060*	-0.078*	-0.227***
		[-1.679]	[-1.776]	[-2.757]
Sept		0.02	0.002	-0.121
		[0.503]	[0.031]	[-1.651]
Oct		-0.141***	-0.159***	-0.344***
		[-3.441]	[-3.307]	[-3.521]
Nov		-0.170***	-0.186***	-0.393***
		[-3.872]	[-3.489]	[-3.654]
Dec		-0.012	-0.024	-0.507**
		[-0.253]	[-0.468]	[-2.148]
2005			-0.049	-0.089*
			[-1.229]	[-1.959]
2006			-0.092*	-0.165***
			[-1.733]	[-2.976]
2007			-0.228***	-0.352***
			[-3.117]	[-4.279]
2008			-0.078	-0.245**
			[-0.934]	[-2.374]
Sales value index				0.703*
				[2.001]
Observations	2865	2865	2865	2865
R-squared	0.063	0.093	0.104	0.105

Notes: a) Coefficients from a linear probability model are reported in the table and t-statistics in brackets. b) Significance of the variables is indicated as follows: * significant at 10%; ** significant at 5%; *** significant at 1%. c)The t-statistics are robust to heteroscedasticity and autocorrelation within each establishment. d) R-squared is the unadjusted within R-squared.

pend on the specification of time effects, as shown in the Appendix, replacing year dummies with a linear time trend changes the results: while it still is the case that the introduction of the sales incentive plan increased profitability, the change in the plan did not lead to a marked decrease in profitability. However, we prefer the specification with year dummies, since they are likely to capture unobserved changes over time better than a simple linear trend.

The impact on profitability can also be assessed similarly to Lazear (2000). Sales increased by roughly 5 per cent, and from Figure 2 it is seen that the average incentive payment is in the range of 5 per cent of base wage and that this is received approximately 50 per cent of the time. Given that labor costs are on average about 10 per cent of sales, it is clear that the initial incentive plan was profitable if there was not behavior such as in Freeman and Kleiner (2005), where the employees were wasting materials in the piece-rate regime. It is hard to imagine what such behavior would be in this case firm, since the employees cannot affect pricing, a natural candidate to manipulate if rewarded for sales. Thus this kind of calculation suggests that the system initially increased profits. Furthermore, similar logic suggests that the drop in the sales following the modification of the incentive plan lead to decrease in profits. After all, sales fell while labor costs did not change compared to the time wage regime.

The impact of the plan on sales in this firm is smaller than the productivity effects found in studies focusing on piece-rates. Notably in Lazear (2000) and Shearer (2004) the effects are very large, several tens of per cents. This is natural given that the plan considered here is a group plan, not an individual plan. Another feature of the plan considered here is that the incentive plan is quite low-powered. For example in Banker et al. (1996), a similar setting to ours, the incentive pay is around 20 per cent of base pay, whereas here it is notably lower. Concerning the effect of the incentive plan, Banker et al. (1996) find that the incentive plan for individuals increased sales by around 10 per cent, around twice the effect found here. There are other examples of low-powered incentives producing a large effect, for example the studies by Knez and Simester (2001) and Lavy (2002). For instance, in Knez and Simester (2001) study the bonus awarded to employees is 65$ for each month where on-time targets are met. Although their paper does not give information on the average monthly pay of the workers, surely this amount is less than 10 per cent of their monthly income. Even quite low-powered incentive plans may have notable effects at the firm level.

8 Conclusion

This paper studies a retail chain of 53 establishments that changed its compensation plan for sales clerks from fixed hourly wages to an incentive pay plan based on exceeding a sales target. The intensity of incentives was significantly reduced after two years and the sales targets were increased before the cut in incentive intensity.

The results show that the plan was initially a success, increasing sales by over 5 per cent and also increasing the probability of exceeding a profit target, but that after the management reduced incentive intensity and increased the targets the plan lost its power. Moreover, the estimates show that performance in terms of sales fell below the level that prevailed during time wages. After the end of our observation period the firm discontinued the incentive plan since

be renovated (usually the store remains open, but with reduced sales space).

the plan was practically redundant. Few establishments met the targets and consequently incentive payments were rare.

These results are in line with the theory of effort determination offered by Akerlof (1982). It seems likely that the firm's decision to cut incentive intensity and increase the targets led to a large reduction in the effort norm. Large increase in the targets also may have signaled to the employees that management will increase the targets based on past performance. This ratcheting up of the targets also reduces effort incentives. Thus in this case the experimentation with the incentive plan was costly to the firm. The more general lesson is that changing a well-working incentive plan is risky.

The results are based on a before-after comparison, so other changes taking place concurrently with the changes in the compensation system are a potential threat to internal validity. The regressions control for industry wide business cycle effects, as well as year effects. Moreover, graphical analysis shows that changes in performance in terms of exceeding the sales target coincide with the changes in the compensation system. Although it can never be ruled out that the same unobserved factor could be behind the results, it would be a remarkable coincidence that its timing would match the timing of the two changes in the compensation system.

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Appendix

Table A1 Summary statistics

	Obs	*Mean*	*Sd*	*Min*	*Max*
Log sales	2865	6.510	0.373	5.359	7.994
Sales as percent of target	2852	-0.039	0.109	-0.553	0.646
Profits	2865	0.397	0.489	0	1
Log space	2865	8.699	0.283	7.953	9.641
Log hours	2865	8.298	0.271	7.471	8.891
Initial incentive pay plan	2865	0.444	0.497	0	1
Modified incentive pay plan	2865	0.129	0.336	0	1

Notes: Log sales and Profits are deflated by the consumer price index. Number of observations for Sales as percent of target is lower compared to other variables due to missing values for entering establishments.

Table A2 Robustness checks

	Dummy for 3/2008			*Linear time trend instead of year dummies*		
	Sales	*Sales in relation to sales target*	*P(Profit/ profit target)>0*	*Sales*	*Sales in relation to sales target*	*P(Profit/ profit target)>0*
Log hours	0.457 ***	0.106 **	0.336 ***	0.459 ***	0.072 *	0.320 ***
	[8.040]	[2.439]	[2.746]	[8.208]	[1.790]	[2.685]
Log space	0.14	0.098	0.840 ***	0.132	0.148	0.874 ***
	[1.044]	[1.072]	[2.835]	[0.992]	[1.518]	[2.831]
Initial incentive pay plan	0.049 ***	0.055 ***	0.210 ***	0.030 ***	0.082 ***	0.209 ***
	[8.038]	[6.478]	[3.629]	[5.240]	[8.889]	[4.034]
Modified incentive pay plan	-0.035 ***	-0.01	0.058	-0.067 ***	-0.025	0.184 **
	[-2.941]	[-0.638]	[0.620]	[-7.675]	[-1.466]	[2.172]
Feb	-0.060 ***	0.071 ***	0.241 ***	-0.054 ***	0.074 ***	0.241 ***
	[-9.123]	[14.683]	[4.925]	[-8.778]	[15.306]	[4.929]
Mar	0.021 ***	-0.053 ***	-0.006	0.018 ***	-0.078 ***	0.052
	[2.724]	[-7.153]	[-0.086]	[2.752]	[-10.771]	[0.888]
Apr	-0.024 ***	-0.167 ***	-0.176 **	-0.014 *	-0.156 ***	-0.152 **
	[-2.696]	[-20.042]	[-2.363]	[-1.836]	[-17.774]	[-2.299]
May	-0.041 ***	-0.250 ***	-0.224 **	-0.029 ***	-0.233 ***	-0.185 **
	[-4.183]	[-23.253]	[-2.596]	[-3.112]	[-22.876]	[-2.582]
Jun	-0.050 ***	-0.319 ***	-0.246 **	-0.037 ***	-0.297 ***	-0.187 **
	[-4.262]	[-24.200]	[-2.395]	[-3.219]	[-22.694]	[-2.118]
Jul	-0.036 **	-0.283 ***	-0.273 ***	-0.019	-0.255 **	-0.211 **
	[-2.488]	[-23.451]	[-2.873]	[-1.374]	[-22.310]	[-2.612]
Aug	0.002	-0.231 ***	-0.258 ***	0.024 **	-0.199 ***	-0.195 ***
	[0.186]	[-20.220]	[-2.971]	[2.567]	[-18.442]	[-2.852]
Sept	0.021 *	-0.156 ***	-0.147 *	0.049 ***	-0.119 ***	-0.083
	[2.004]	[-15.148]	[-1.916]	[5.741]	[-13.012]	[-1.428]
Oct	-0.105 ***	-0.313 ***	-0.381 ***	-0.078 ***	-0.270 ***	-0.291 ***
	[-10.079]	[-23.068]	[-3.838]	[-9.599]	[-21.615]	[-3.650]
Nov	-0.074 ***	-0.316 ***	-0.434 ***	-0.044 ***	-0.268 ***	-0.330 ***
	[-7.049]	[-22.309]	[-3.957]	[-4.729]	[-20.911]	[-3.816]
Dec	0.129 ***	-0.743 ***	-0.593 **	0.143 ***	-0.689 ***	-0.406 *
	[5.904]	[-23.301]	[-2.496]	[6.703]	[-21.454]	[-1.940]
Dummy for 3/2008	-0.018 *	-0.131 ***	0.087			
	[-1.972]	[-10.807]	[0.830]			
2005	-0.033 ***	-0.031 **	-0.095 **			
	[-5.894]	-2.666]	[-2.064]			
2006	-0.101 ***	-0.051 ***	-0.175 ***			
	[-10.099]	[-4.089]	[-3.176]			
2007	-0.133 ***	-0.123 ***	-0.370 ***			
	[-8.807]	[-7.626]	[-4.562]			
2008	-0.191 ***	-0.231 ***	-0.300 **			
	[-9.303]	[-11.389]	[-2.592]			
Sales value index	0.786 ***	1.039 ***	0.813 **	0.833 ***	1.050 ***	0.629 *
	[18.507]	[21.758]	[2.305]	[17.678]	[20.924]	[1.873]
Date				-0.004 ***	-0.005 ***	-0.008 ***
				[-8.918]	[-10.883]	[-3.398]
Observations	2865	2852	2865	2865	2852	2865
R-squared	0.963	0.463	0.105	0.963	0.394	0.097

Notes: a) Coefficients are reported in the table and t-statistics in brackets. b) Significance of the varibles is indicated as follows: * significant at 10%; ** significant at 5%; *** significant at 1%.
c) The t-statistics are robust to heteroscedasticity and autocorrelation within each establishment.
d) R-squared is the unadjusted within R-squared.

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