Incentive and sorting effects of performance-related pay: empirical evidence from a new panel data set of a food & beverage company.

Master of Science Thesis of:
Massimo Anelli
ID:1266444

Advisor:
Prof. Michele Pellizzari

Discussant:
Prof. Tommaso Nannicini

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Abstract

The provision of incentives is widely considered an essential practice to align worker and manager interests to those of the employer. A large set of firms all over the world keep designing compensation schemes aimed at anchoring part of worker pay to firm performance. Despite the large amount of theoretical literature on performance-related pay schemes, there is little empirical work on their effects on firm performance and workforce. In this work I present a new panel data set from an Italian firm operating in the food & beverage sector. I exploit an exogenous variation of its incentive scheme for middle managers to test the predictions that average performance will rise and more able managers will be selected. Results show a significant selection effect on the managers, but leave some doubts on the profitability of introducing the new incentive scheme. Moreover, I point out some concerns on the spill-over effects that incentive schemes have on the bottom-tier personnel of the firm when the provision of incentives is granted only for managers.

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1 Introduction

The provision of incentives is widely considered an essential practice to align worker and manager interests to those of the employer. A large set of firms all over the world keep designing compensation schemes aimed at anchoring part of the worker pay to firm performance: this is done by the use of many different compensation strategies, ranging from piece rates and performance-related bonus to stock-options for top managers. Despite the frequent use of these compensation schemes and the large amount of theoretical literature on them, up to now there has been little empirical work on their effects on firm performance and workforce.

In this work I present a new set of panel data collected from an Italian firm operating in the “food & beverage” sector that provides a performance-related pay scheme for middle managers subjected to an agent-principle relation with the firm \(^1\). Moreover, I provide a qualitative and an empirical assessment of the implications of its incentive scheme on different aspects of the firm. In particular, I exploit the structural change of its incentive scheme, occurred in 2003, as an exogenous variation to estimate the impact of the new incentive scheme on different performance measures and on pay structure.

In section 2.1, I review the main empirical and theoretical literature published on the provision of incentives in firms and I take the theoretical framework set up by Lazear\(^4\) as a benchmark to provide later on some theory about the incentive scheme under consideration. Section 3 offers a precise description of the firm under study, of the manager positions whose pay is related

\(^1\)These managers are employees responsible for managing sales points on behalf of the firm.
to performance and of the main characteristics of the incentive scheme both before and after the change of 2003. In Section 4.1, I give a brief description of the data set I built and I present the descriptive statistics of some crucial variables that will be used in the following econometrics and I exploit the 2003 change of the incentive scheme to make a first static before/after comparison of performance and pay. Section 5 provides first a theoretical model helping to predict the effects of the new pay scheme and then covers the core empirical analysis aimed at testing those predictions with the help of different panel regression specifications. In 5.1, I estimate the overall impact on stores’ performance controlling for different trend assumptions in the data and I decompose the Selection Effect of the new incentive scheme on managers. Then, in 5.3, I focus on the effects on pay structure and I discuss the profitability of the change in the compensation structure under study. In 5.4 I rise some concerns on the possible spill-over effects on the basic personnel of the firm when the provision of incentives is granted only for managers. I conclude outlying possible future researches on the data set offering some hints to solve the main empirical obstacles encountered in this work.
2 Literature Review

The literature published on the provision of incentives in firms analyzes with particular emphasis the theoretical design of compensation contracts aimed at aligning employee behaviors to firm interest assuming that individual responses to incentives are always profitable for the firm. In this section I will carry on an overview of this literature, focusing on those researches assessing the empirical effects of incentive schemes. To do so, I will address the literature from two main perspectives as suggested in Prendergast (1999) [7]: those papers considering the research question “Do Incentives Matter?” and those analyzing dysfunctional behavioral responses to incentives.

Among the first category, the milestone paper was published by Edward Lazear in 2000 [4]: he tests the prediction that a move from a hourly-wage to piece-rate pay for workers in very mechanical works (such as installing car glasses) makes the average productivity rise and lets the firm attract a more able workforce. The results of his empirical analysis can be summarized as follows:

- The average level of output per worker raised by 44%.
- The gain in output results both from the fact that, on average, the workers produce more (incentive effect) and also from the ability to hire more productive workers (selection effect).
- Once he controls for worker-specific fixed effects, the pure incentive effect is to rise average productivity of 22% (only half of the entire increase). The rest is thus due to selection.
There is an increase of variance in output among workers: more ambitious workers react more to incentive and therefore produce relatively more.

Productivity gains are shared between workers and the firm: on average a given worker receives about a 10% increase in pay.

The intuition of the importance of selection as driver of increase in average productivity when providing monetary incentives to workers or managers was better formalized by Lazear himself in 2005 [5], in which he focuses on the role of incentive schemes on managers’ decisions when they have to accept a job offer whose wage is performance-related. The idea is that a manager accepting compensation lower than the market level, coupled with an extra pay linked to the profitability of the firm, is betting that firm performance will be sufficiently high to make up for any deviation in the fixed pay from the market wage. This mechanism gives scope for solving two important sources of information asymmetry when studying firm profitability: managers will chose to work for a given firm offering the kind of compensation described above either if they rationally expect the firm to achieve a level of profits sufficient to compensate the lower fixed-pay or knowing that their own ability level is high enough to make firm’s profits rise. In the former case managers have better info on the firm’s business (since they have relatively higher technical knowledge) and reveal to firm owners the real potential profitability of their firm, while in the second case there is a selection of managers accepting to work for the firm resulting in higher ability levels. As Lazear commented in his paper, this type of compensation schemes “put the money where the manager’s mouth is”.
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On the second literature perspective (the one analyzing dysfunctional behavioral responses to incentives), the more interesting studies have been published by Oriana Bandiera and alii (2005) [1], (2007)[2]. In the paper by Bandiera, Barankay, Rasul (2005)[1], they study whether workers have social preferences, by comparing workers productivity under relative incentives (where individual effort imposes a negative externality on others), with their productivity under piece rates. The results showed that the productivity of the average worker is about 50 percent higher under piece rates than under relative incentives. According to their studies, this differential is due to the fact that workers internalize the negative externality generated by the fact that an increase in their own effort affects other workers negatively under relative incentives. Moreover, the closer is the friendship among colleagues, the more they internalize the relative effect. This evidence suggests that piece rate pay guarantees that potential social relationships among workers do not affect productivity. A further aspect outlined in this paper is that workers internalize the externality describe above only when allowing for peer monitoring. This last evidence thus partially excludes altruism as the underlying cause of workers internalizing the negative externality on friends.

In a second paper by the same authors (Bandiera, Barankay, Rasul (2007)[2]), they perform an experiment in a UK firm producing soft fruit. This company has two classes of managerial staff (a single general manager and ten field managers) plus the bottom tier of the hierarchy composed of workers picking fruit. Field managers are responsible for field logistics, assign workers to rows of fruit within the field and monitor workers who have heterogenous ability in picking fruit (given the physically strenuous task). Within this set-
ting, they engineered an exogenous change in managerial compensation from fixed wages to performance-related pay based on the average productivity of bottom-tier workers and test its effects on firm productivity. Their theoretical predictions are that managerial incentives affect mean and dispersion of workers productivity through two channels: managers respond to incentives by targeting their efforts towards more able workers and select out the least able workers. In the empirical results they found that the introduction of managerial performance-related pay actually raises both the mean and dispersion of worker productivity. As predicted by theory, individual level productivity data show that managers target their effort towards high ability workers, and the least able workers are less likely to be selected into employment. According to the authors, these results suggest a possible causal link between the rising use of managerial performance-related pay and the growing earnings inequality among lower-tier workers.

On the same research branch of Bandiera we can position the work carried on by Thomas Lemieux and alii: in a recently published paper \(^2\), they try to go more in depth into the hypothesis of a causal link between incentive schemes and wage inequality. Their basic assumption is that performance-related pay jobs have a more competitive pay structure that rewards productivity differences more than other jobs in which workers are paid accordingly to a fixed wage. The empirical results of the paper show that compensation in performance-related pay jobs is closely tied to productive characteristics of workers (both observable and unobservable characteristics). Moreover, they perform a variance decomposition to the growth in wage inequality, looking at the impact of performance pay on several measures of wage inequality.

\(^2\)Lemieux, Macleod and Parent (2009)[6]
The result is that the effect of performance-related pay jobs is concentrated at the top end of the wage distribution and the effect becomes larger in early 1990s with respect to late 1970s. The conclusion of the authors is that the growing incidence of performance-related pay accounts for 25 percent of the growth in male wage inequality between the late 1970s and the early 1990s, and for most of the growth in top-end wage inequality (above the 80th percentile) during the same period.

To have instead a broad overview of what are the most common incentive practices, it is interesting to look at the survey used by Bloom and Van Reenen in their paper (2007)[3] to collect management practice data (among which incentive practices) from 732 medium-sized firms in the United States, France, Germany, and the United Kingdom. The aim of this research is to study if these measures of managerial practice are associated with firm-level productivity, which are the cross-country differences and which the within-country ones. The results obtained suggest that these measures of better management practice are strongly associated with superior firm performance in terms of productivity and profitability. Moreover they assess significant differences across countries (with U.S. firms on average much better managed than European firms) and between firms within the same country (with a long tail of extremely badly managed firms).
2.1 Theoretical Framework

As anticipated in the introduction, I use here the theoretical framework set up by Lazear in the paper cited above[4] to model some theory underlying the use of performance-related pay schemes. I will refer to this framework later in section 5, when I predict the effects of the change in the incentive scheme under analysis.

The main motivation that justifies a move to a performance-related scheme is to increase workers’ effort. Suppose \( Y \) is the performance level chosen by a worker and assume it is a function of underlying ability \( A \) and of effort \( e \):

\[
Y = f(A, e)
\]  

(1)

The firm can only observe \( Y \) and pays a wage related to some level of output. The basic option is to set a minimum level of performance per hour \( Y_0 \) and pay a fixed hourly wage \( W \) for any performance level equal to or higher than the \( Y_0 \) level. If a worker provides an output substantially below \( Y_0 \), she is fired. Moreover, for any given ability level \( A \), there is a unique possible effort level \( e \) allowing to reach a given level of output \( Y \), so that we can rewrite equation 1 as follows:

\[
Y = f(A, e(A))
\]  

(2)

with \( e(\cdot) \) decreasing in \( A \), \( e'(\cdot) < 0 \) and \( e''(\cdot) > 0 \).

For any given pair of minimum output level and fixed wage \( (Y_0, W) \), the firm will attract workers having a utility function such that:

\[
U(W, e_0(A)) \geq U(0, 0)
\]  

(3)

with \( U(\cdot) \) being a positive function of wage \( W \) and a negative function of the effort spent \( e \), \( U'(\cdot) > 0 \), \( U''(\cdot) < 0 \), \( e_0(\cdot) \) being the effort function of the
ability $A$ associated to the minimum level of output $Y_0$ and $U(0,0)$ is the utility given by leisure if the individual decides not to work.  

We can further define $A$ as the minimum ability level a firm will attract with the output/wage combination $(Y_0,W)$ such that $U(W,e_0(A)) = U(0,0)$. Hence, while a worker with ability $A$ will be indifferent between working or not, those with $A > A$ will earn rents from being employed, since they need to exert less effort to produce the same level $Y_0$.

If we observe this setting alone, we would deduce it is better for a firm to choose a combination with a low $W$ and a high $Y_0$, because it would attract only high ability type of workers at a low cost. However the combination $(Y_0,W)$ is not the only offer a worker will evaluate on the labor market: she will indeed compare the rent granted by this job offer to that of the best alternative combination $(\hat{Y}_0,\hat{W})$ offered by a competing firm.

Suppose now that not all firms on the labor market offer the same fixed hourly wage, but rather some firms offers output-related wages$(\hat{Y},\hat{W}(Y))$: in this case high-ability workers might prefer to work more if paid more. We can thus identify an upper bound $\bar{A}$ in the ability type a firm offering a fixed wage can attract such that:

$$U(W,e_0(\bar{A})) = U(\hat{W}(\bar{A}),\hat{e}(\bar{A}))$$

Then the firm offering the fixed hourly wage will end up to attract workers with ability $\underline{A} \leq A < \bar{A}$.  

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3We may further assume $U(UB,0)$ if an income is granted for unemployed people. In that case, the firm should change the combination of $(Y_0,W)$ increasing the wage offered or decreasing the minimum output level to get the same ability type of workers.

4If competition among firms is weak or the alternative job offers are sufficiently bad, then $\bar{A} \to \infty$ and all workers will choose firm 1.
Suppose further the firm offering the fixed hourly wage \((Y_0, W)\) switches to a performance-related pay scheme that grants at least the original wage \(W\) according to the rule:

\[
W = \max\{W; bY - K\}
\]

Recall from equation (2) that \(Y = f(A, e(A))\) and substitute (5) in the worker utility function to obtain utility under performance-related pay:

\[
U(bf(A, e^*(A)) - K, e^*(A))
\]

where \(e^*(A)\) is the optimal effort level chosen by a worker with ability \(A\) when paid according to the proportional rate \(b\). The switch from the hourly wage setting to the performance-related scheme is sketched in figure 1.

Figure 1: Compensation under Hourly Wage Versus Performance-related Pay
The performance-related pay scheme is easily identified in figure 1 with the thick solid step-wise curve starting from 0, stepping to \( W \) in \( e_0 \) and then switching to the \( bY - K \) line after \( e^* \), while the hourly wage pay stays constant at \( W \) level also after \( e^* \). As from the graph, workers willing or able to produce an output lower than \( e_0 \) are not hired (either are fired) by the firm under both pay schemes. Workers that produce an output ranging from \( e_0 \) to \( e^* \) are paid \( W \) under both schemes while, for output levels higher than \( e^* \), workers’ compensation is determined following the proportional rule \( bY - K \).

The compensation \( W \) under the incentive scheme can then be summed up as follows:

\[
W = \begin{cases} 
0 & \text{if } 0 \leq Y < Y_0 \\
W & \text{if } Y_0 \leq Y < Y^* \\
bY - K & \text{if } Y \geq Y^*
\end{cases}
\]

Recall now the definition of workers’ utility under performance-related pay schemes \( U(W(A), e(A)) \) and that low-ability workers need to exert more effort to produce a given level of output with respect to high-ability individuals. This implies that low-ability workers have an higher marginal cost for any marginal increase in output. Hence, to maintain a given utility level, they will require a relatively higher increase in compensation for marginal increases in output. In other words, low-ability workers have steeper indifference curves (\( \frac{\partial U_l}{\partial e} > \frac{\partial U_h}{\partial e} \)) with respect to relatively high-ability individuals.

From the point of view of the firm, it needs to offer less compensation to induce high-ability workers to provide a given amount of effort.

Let us now analyze the effects of the switch to a performance-related pay scheme by looking at the equilibria of figure 1. In the case of the fixed hourly wage pay, all workers, even the most able, choose to stay in point \( A \), since for
any output level $Y > Y_0$, all workers would have an increase in effort with no corresponding increase in compensation. As anticipated before those workers with ability $A > A$ earn a rent from exerting a relatively lower effort to produce the same output $Y_0$. Consider instead the same workers are offered a performance-related pay scheme that grants at least the same level of compensation previously earned, but allow high-ability workers to work more and to be paid more ($W = \max(W; bY - K)$): in this case, as we can see from figure 1, low-ability workers with steep indifference curves prefer to stay in A since the marginal benefit of being paid $bY - K > W$, with $Y > Y^*$, is far from offsetting the marginal increase in effort they must exert to reach such a level of output. On the other hand, more able individuals with flatter preferences will chose the equilibrium point $B$, since the cost (in terms of effort) they have to spend to achieve $Y_B$ output level is offset by their compensation increasing from $W$ to $bY_B - K$.

The next step is to consider the effects of the switch to a performance-related pay scheme on the positioning of a firm on the labor market. Suppose in the status quo all firms, competing among each others on the labor market, offer a fixed hourly wage: individuals choose the combination $(Y_0, W)$ more suitable to their preferences. Suppose further a generic firm $x$ switches to a performance-related scheme offering the effort/compensation combination outlined in equation (5): in the other firms some individual of the high-ability type will prefer to move to firm $x$ (working more for a higher wage) when her utility resulting from the performance-related compensation offered by firm
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\( U(W_x(A), e^*_x(A)) > U(W, e_0(A)) \) (7)

As a result firm \( x \) now attracts the most able workers on the labor market and its average productivity will rise not only for the internal incentive effect we have seen in the model above, but also by the fact that the average ability of the workers of firm \( x \) will rise by hiring individuals with relatively higher ability (Selection Effect).

To test these theoretical predictions on his data, Lazear uses the following regression specification:

\[
y_{it} = \gamma PRP_{it} + \lambda_i + \lambda_{1994} + \lambda_{1995} + \sum_{m=1}^{12} \lambda_m + \beta Tenure_{it} + \varepsilon_{it} \quad (8)
\]

with \( y_{it} \) being the workers’ individual productivity in logs, \( PRP \) a dummy equal to 1 if the worker is paid according to the Performance-Related Pay scheme in that month, \( \lambda_i \) is a manager-specific dummy; \( \lambda_{year} \) and \( \lambda_m \) are respectively year- and quarter-specific dummies. Lazear performs specification (8) both to assess the overall impact of the switch to the performance-related compensation scheme and to disentangle pure incentive from sorting effects by comparing the estimates of \( \gamma \) obtained from running the regression with worker-specific dummies to running it without. As said at the beginning of this section, results tell us that the switch from hourly-wages to a performance-related pay scheme brings about a clear increase in average productivity due to both incentive and selection effects as predicted by theory.

\footnote{See equation (4) for the formalization of this result.}
3 The Firm under Study

The firm studied for this work is one of the world’s leading provider of food & beverage and retail services for travellers (the so-called “people on the move” sector). It operates mainly in airports and motorways under concession agreements. In Italy the firm has over 900 store on roads and motorways, offering a large variety of services from snack bars and fast-food to self-service restaurants and retail with more than 11000 employees for about 300 million customers a year. The turning point of the business history of this firm was its privatization in 1995. Before it was privatized the group was indeed part of a huge state-owned company with all the consequences this brings: a huge bureaucratic structure, far from efficient management and little care about customers. After the privatization, the new private ownership \(^6\) decided to develop a radical transformation of the company trough total reorganization of both the managerial and the organizational structure.

3.1 Structural Organization and Incentive Scheme

In particular the re-organization was aimed at controlling explosive operating costs, enhancing productivity and re-orienting services towards customers. This revolution has been accompanied (from 1999 onwards) by a strong development of new managerial tools:

- a new store organizational structure.
- a new performance-related pay scheme for store managers.
- a new information system for store data management.

\(^6\)The firm was sold to an important Italian holding company
To improve service quality and efficiency, the organizational structure of stores have been revolutionized in order to give stronger responsibilities to managers and to make personnel more flexible and interchangeable among tasks. This was aimed at seeking better and faster responses to customer needs, besides at decreasing in operating costs of stores.

The new organizational store structure can be briefly described as follows: each store has a manager who is responsible for managing human, economic, financial and technical resources of the store. He takes part to programming the budget of the store along with the firm, providing crucial information on sales, profitability potentials and store specificity. Store managers’ responsibilities (and consequently their pay) vary according to store complexity: stores are indeed divided into five clusters (from A to E) according to dimension in terms of sales, number of employees. Stores belonging to A cluster are the biggest ones (They have more than 100 employees). In the relatively larger stores, managers are assisted by 1 or 2 “Service Managers” (assisting the store manager for what concerns customer service, human resources and administrative tasks) and by 1 or 2 “Supply Managers” (assisting for trading operations, outlet and goods managing) for a maximum of four manager assistants. The store organizational structure is then completed by two other job positions: the “Head of Service”, who has responsibility for specific zones of the store (i.e. Head of Bar, Head of Self-Service, Head of retail market etc.), for everyday operations and peak time management, and the “Multi-service Operators”, that are low specialized, highly flexible and perfectly interchangeable among tasks, services, zones of the store. This latter basic figure is the main driver of reaction capacity to store needs and sudden
changes. What is important for our analysis is that store managers do not work in the same store for their entire career, but they are moved from the firm human resource division among different stores across the entire Italian network with relatively high frequency.

Another peculiarity of the firm organizational structure is that it has a closed career path: in fact, given the peculiarity of services provided by the firm under study and its dominant position in the sector, it is difficult to detect the right competencies in the job market and, consequently, a strong internal training system has been developed through the years. The main consequence is that people selected for career promotions are mainly chosen among the lower hierarchic levels. In particular store managers are selected exclusively among service/supply managers and the last possible entry in the firm from the market is through the training program to become service/supply managers. Hence the average educational level of store managers tend to be relatively low since the highest entry position is not highly valuable on the job market.

For what instead concerns the selection of the multi-service operators only part of the store managers (in particular those of the biggest stores) are trained and enabled for selection and training of new recruits, while for the other stores, selection is carried on by the human resource division of the firm.

Even within the single positions, we can outline an internal career path: once an employee is selected for an higher position, she will start working in relatively smaller stores (i.e. of cluster E/D) and then, after cumulating experience they will be moved to stores with higher complexity (i.e. clusters
B and A). This system implies that the more an employee is willing to accept to move to different stores (and hence going to live somewhere else), the more possibility to advance in the hierarchy she has.

The structural re-organization of stores outlined above needed the right incentives to develop its effects at its best. Then a performance-related pay scheme was introduced in 2000 along with a new information system aimed at tracking continuously detailed info of Stores performance. The initial incentive program was based on 3 main performance measures:

- Main Sales
- Productivity
- Service Quality

Each of these three performance measures were weighted differently for the determination of a quarterly incentive bonus, which was the result of a 3 steps assessment procedure. Firstly Main Sales performances determined a score which weighted for the 65% on the final score. The target was set as a percentage of the previous years main sales performances (around 102%). If the manager was able to reach this target, she used to get 65 points, if she could do better she could got up to 130 points, while if she did not reach the main sales target she was immediately excluded by the incentive bonus for that quarter. The second step evaluation was productivity, computed as main sales over hours worked in that store for the entire quarter. In this case the score was weighted 35% of the final score such that if the actual

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7 All store revenues excluding those rising from lotteries, cigarettes and mobile phone credit.
productivity in the quarter was at least the 98% of the budgeted one, 35 points were assigned; if it was more, the score could reach 70 points, but in this case (productivity parameter) there was no exclusion from bonus if a manager did not reach this minimum target. The condition to have access to incentive bonus was that the sum of the first two steps score was higher than 100.

The third step consisted in the so called Mystery Client evaluation: the firm, in fact, has developed a program of customer satisfaction evaluation that guarantees a constant monitoring of the service quality in every single store with monthly frequency. This evaluation program is outsourced to a company providing services ad hoc for the firm under study. The quality check is carried on by “mystery consumers”, whose identities remain absolutely unknown to store managers. The interesting peculiarity of these Mystery Clients is that they are recruited among workers of different professional origin (e.g. former truck drivers) in order to reflect the heterogeneity of consumer tastes and preferences. They visit each store, once a month, anytime during the 24 hours, registering on a long and structured check-list all the possible details useful for the evaluation of quality as perceived by customers (i.e. average queue time, quality of prepared food, kindness of employees, etc). Every time a Mystery Client visits the store and fills in the check-list, a service quality score is assigned on a mathematical base. Then the average score of the quarter determines a coefficient to be applied to the first two steps score. If the Mystery Client score reaches a certain ceiling corresponding to a fair quality level, the sales and productivity total score will be multiplied by a coefficient equals to 1 or more, while if the store performs badly in terms
of service quality, according to Mystery Client score the coefficient will be less than 1 or even 0, the lower the service quality is. In this latter case the manager is excluded by the incentive bonus, no matter how well she had scored in terms of productivity and sales.

To quantify the bonus the manager actually receives, the final score determined after the Mystery Client evaluation is multiplied by the “point-value” assigned to each manager according to the cluster of the store she manages (i.e. each manager working in a store of cluster A in 2000 had a point-value equals to €10.33 and her quarterly bonus was determined by multiplying the final score, let us say 115, by €10.33 for a total amount of €1188).

While 2000 was the year of Incentive Scheme Introduction (we can consider the first three years of operation as a scheme pilot, given the limited amount of resources invested on it), in 2003 there was a discrete change of the entire compensation scheme for managers, in terms of both incentive parameters and generosity. The point-value assigned to each manager have been almost doubled (i.e. a manager of a cluster A store who obtained 100 final points used to take a quarterly bonus of €1033 with the old scheme, while after 2003 the same performances would have rewarded him with €1800). On the other side, the performance targets to be reached by the managers to access the incentive bonus, after 2003 started being far more challenging and relatively more under control of store managers. For what instead concerns the base pay nothing changed: in this sense we must remark that the outcome of the incentive scheme change was in fact a wage expansion.

The main changes in incentive parameters in 2003 can be summarized as follows:
• *Productivity* is abandoned and replaced by the *operative margin*\(^8\).

• The target is no more a percentage of previous years performances, but the budget value computed at the beginning of each year by the programming & control division of the firm with the collaboration of the manager on the basis of past and expected performance of the store.

• Failure in reaching the Sales target no more excludes managers from bonus.

• There is no more maximum target and the incentive bonus increases proportionally to performance with no upper bounds.

• The Mystery Client target level required to get a coefficient of 1 (in order to maintain unaltered the performance score) is increased and also for this parameter there is now an unlimited progression of the coefficient proportional to service quality evaluations.

The first implication that must be outlined is that the new incentive scheme allows managers to control better the outcome of their pay since there is now a closer linkage between the effort spent by managers and the incentive bonus outcome. Indeed, tying managers’ compensation to the *operative margin*, provides them more effective incentives to control all operating costs of the stores: *productivity* was computed as the sales over the hours worked and hence labor cost was the only cost accounted for. Moreover, sales have strong exogenous variation in this firm and hence sales performance is often out of managers’ managerial power: suppose the oil price goes up and people reduce

\(^8\)Computed as total store sales minus total costs ascribable to the operation of the single store.
travelling, then the manager will have no responsibility in controlling it, but she will easily lose her bonus in such a case. The same is not true for operative margin: in the same case described above a manager would be able to reduce operating costs according to the decrease in sales.

Hence the new incentive scheme results are far more generous for the most capable managers as a result of increasing the bonus value and making the incentive parameters more challenging. The theory would suggest us that such an exogenous change in the incentive scheme will deploy its effects on performance through two different channels:

- an Incentive Effect (managers will spend more effort in improving their store performances)
- a Selection Effect (more able managers will be selected)

The type of data set I built is particularly suitable for disentangling these two effects since we can exploit the exogenous variation in the compensation scheme and the fast moving career path to identify the net impact of managers on the stores.
4 The Data Set

4.1 Data Description

According to the incentive scheme and structural organization outlined in the previous section, I built a data set integrating different info sources on two main dimensions:

- store manager information
- store data

The *id-numbers* of managers and stores let us match them together. The data set covers quarterly a time span going from 2000 to 2005.

For what concerns store managers, we have a large set of info:

- Demographic and Social information (gender, age, place of birth, civil status, number of children)
- Educational information (type of study, educational attainment)
- Employment information (contractual level, id-number of the managed store, job position, seniority, a dummy identifying if and from when they are enabled to select and hire new personnel by themselves\(^9\))
- Retributive information (quarterly base wage, incentive bonus)

For each store manager, we can then track the stores she managed over time and use the store id-number to merge all performance info relative to it. In particular with our data set we are able to merge the following store info:

\(^9\)In the case managers are not allowed to hire new workers, the firm human resource division assists them for the recruitment of new personnel
• Characteristics of the store (Cluster, Type of Store\textsuperscript{10}, Location, Services offered)

• Composition of workforce (number of workers, number of Head of Services, number of Multi-service operators, number of contracts per type\textsuperscript{11})

• Performance measures (Main Sales, Productivity, Hours worked, Mystery Client coefficient, Margin)

### 4.2 Descriptive Statistics

The database under consideration include 186 stores located mainly on Italian toll-highways (representing almost the 95\% of stores in the sample), 364 store managers having managed at least one of the 186 stores for at least a quarter between 2000 and 2005. The switch to the new incentive scheme described in section 3.1 occurred with the first quarter of 2003 and in the data set is tracked with the dummy $N$ equal to one from that quarter onwards.

Table 1 presents some descriptive statistics (mean and standard deviation) of the main store performance variables and breaks them down by incentive scheme (by $N$ dummy). Productivity is measured by the firm as the ratio between Sales and total Worked Hours by personnel per store in each quarter, Sales refers to revenues of the store coming from the regular operation\textsuperscript{12} and Mystery Client is the customer satisfaction coefficient assigned by quality evaluators each quarter as described in section 3.1.

As a first general consideration, the standard deviation of performance

\textsuperscript{10}Restaurant, Snack Bar, Retail

\textsuperscript{11}Number of fixed-term, training, part-time contracts

\textsuperscript{12}Excluding revenues rising from lotteries, cigarettes and mobile phone credit.
Table 1: Descriptive Statistics by Incentive Scheme

<table>
<thead>
<tr>
<th>Performance Variables</th>
<th>Incentive Scheme</th>
<th>Productivity</th>
<th>Sales at constant prices</th>
<th>Hours Worked</th>
<th>Mystery Client</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old</td>
<td>68.32</td>
<td>721540</td>
<td>10968</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.57</td>
<td>637622</td>
<td>9612</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>New</td>
<td>70.03</td>
<td>736889</td>
<td>11753</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.58</td>
<td>631875</td>
<td>10069</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69.17</td>
<td>729228</td>
<td>11361</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.61</td>
<td>634725</td>
<td>9851</td>
<td>0.27</td>
</tr>
<tr>
<td>Percentage Increase</td>
<td></td>
<td>2.50%</td>
<td>2.13%</td>
<td>7.16%</td>
<td>6.19%</td>
</tr>
</tbody>
</table>

Mean in the first line, Standard Deviation in the second line.

variable is huge, implying that the stores in the sample have very different size and there is high heterogeneity in performance levels. However the average level of all performance variables is clearly higher under the new incentive scheme even if we use the consumer price index to control for inflation when analyzing variables in euros as sales. Among all variables it is remarkable the significant increase in hours worked by personnel of each store.

In table 2 pay variables are summarized: Base Pay represents the basic contractual compensation managers receive independently of their store performance; Bonus is the performance-related component of compensation that can be either zero in the case the manager does not reach the minimum level of performance or higher than zero according to the score obtained in the quarter as described in section 3.1; Bonus Coverage is the percentage of managers on their total number either reaching or overcoming the minimum performance target in each quarter and Total Pay is simply the sum by quarter of Base Pay and Bonus. All pay variables are at constant price: I
have deflated the series using the Consumer Price Index\textsuperscript{13}.

Table 2: Descriptive Statistics by Incentive Scheme

<table>
<thead>
<tr>
<th>Incentive Scheme</th>
<th>Base Pay at constant prices</th>
<th>Bonus at constant prices</th>
<th>Bonus Coverage</th>
<th>Total Pay at constant prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old</td>
<td>5911</td>
<td>533</td>
<td>61.60%</td>
<td>6442</td>
</tr>
<tr>
<td></td>
<td>810</td>
<td>542</td>
<td>48.70%</td>
<td>1034</td>
</tr>
<tr>
<td>New</td>
<td>5940</td>
<td>820</td>
<td>63.00%</td>
<td>6756</td>
</tr>
<tr>
<td></td>
<td>818</td>
<td>838</td>
<td>48.30%</td>
<td>1248</td>
</tr>
<tr>
<td>Total</td>
<td>5925</td>
<td>677</td>
<td>62.30%</td>
<td>6600</td>
</tr>
<tr>
<td></td>
<td>814</td>
<td>720</td>
<td>48.50%</td>
<td>1158</td>
</tr>
<tr>
<td>Percentage</td>
<td>0.49%</td>
<td>53.85%</td>
<td>2.27%</td>
<td>4.87%</td>
</tr>
</tbody>
</table>

Mean in the first line, Standard Deviation in the second line.

As shown by table 2, once we control for inflation *Base Pay* stays substantially constant over the entire period\textsuperscript{14}, while the increase in the average bonus received by managers is striking. The overall effect on compensation corresponds to an increase (+4.87%) of average total pay per quarter and to a significatively higher dispersion in compensation. Moreover, under the new incentive scheme, an higher share (63%) of managers reach the minimum performance target getting the bonus.

In table 3, I computed the average growth rates of the two main performance variables and of total pay.

The summary statistics of table 3 suggest that the average growth rate quarter by quarter in performance was actually higher under the old incentive scheme while the opposite is true for wages. This should make us suspect

\textsuperscript{13} Source: ISTAT - the Italian national institute of statistics

\textsuperscript{14} Some of the managers included in the data may have had, over the period, a contractual increase in base pay according to their seniority
Table 3: Average Growth Rates of main Performance Variables by Incentive Scheme

<table>
<thead>
<tr>
<th>Incentive Scheme</th>
<th>Productivity</th>
<th>Sales</th>
<th>Total Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old</td>
<td>1.31%</td>
<td>4.94%</td>
<td>1.00%</td>
</tr>
<tr>
<td></td>
<td>13.04%</td>
<td>30.36%</td>
<td>11.13%</td>
</tr>
<tr>
<td>New</td>
<td>1.08%</td>
<td>2.77%</td>
<td>1.02%</td>
</tr>
<tr>
<td></td>
<td>21.47%</td>
<td>25.12%</td>
<td>14.05%</td>
</tr>
<tr>
<td>Total</td>
<td>1.19%</td>
<td>3.81%</td>
<td>1.01%</td>
</tr>
<tr>
<td></td>
<td>17.95%</td>
<td>27.77%</td>
<td>12.74%</td>
</tr>
</tbody>
</table>

Mean in the first line, Standard Deviation in the second line.

that there exists a trend in performance both before and after the introduction of the new incentive scheme. This trend can potentially be exogenous to variations in the compensation scheme and we thus have to take it into account. To do so, in the next section, we will include different trend assumptions in the regressions specified in order to identify the effect of the new incentive scheme.
Analyzing the effects of the New Incentive Scheme

Using performance data of the sample under analysis, my intention is to carry out an empirical study of the effects of the switch to the new incentive scheme. To sketch an idea of what theoretical predictions we are going to test with the data, I have arranged a graph of both the old and the new incentive schemes adapting the theoretical framework presented in section 2.1 to the case of the firm under analysis.

Figure 2: Compensation before and after the change of incentive schemes - Incentive effect

As we can see from figure 2, the switch to the new incentive scheme can be substantially represented as an increase in the slope of the performance-related portion of pay scheme (from $b$ to $b'$). As a result, we expect the relatively low-ability managers to stay in point $A$, since not even a more...
generous incentive scheme is enough to offset the high marginal cost they face for a marginal increase in output. The more able managers that were already positioned on the upward-sloping portion of the compensation curve will prefer to work more and earn more, moving from point $B$ to point $C$. Recalling equation (6) on page 14, a manager with high ability $A_h$ will choose her new optimal level of effort $e_C^*$, given the new proportional rate $b'$, according to which is now paid, and given her own ability $A_h$.

Even if the more able managers were already preferring to work more (by positioning themselves in the portion of compensation scheme proportional to output) and those with low-ability stay in point $A$ even under the new scheme, there is still room for a selection effect on those managers lying somewhere between the two types. Let us then introduce a third type of managers with ability $A_m$ such that $A_l < A_m < A_h$. Their indifference curves have a slope somehow intermediate between that of the low and that of the high-ability type. As shown in section 2.1, there will be a boundary level of ability (let us call it $A_m$) for which the manager is indifferent between producing an output level $Y_0$ under the fixed-wage scheme and producing $Y^*$ under the performance-related pay scheme. With the switch to the new incentive scheme under analysis (from $b$ to $b'$) the level of manager ability for which it is indifferent producing $Y_0$ or $Y^*$ is lower (let us call it $A_m$). Then all managers with ability such that $A_m < A < A_h$ will switch from point $A$ in figure 3 to point $C$, preferring to work more and getting a higher compensation, since the generosity of the new compensation scheme is now enough to compensate an increase in their effort.
Figure 3: Compensation before and after the change of incentive scheme -
Selection Effect

From the graph is clear that these middle-ability managers have indifference curves with slope such that, under the old incentive scheme they would have been positioned in $B$ if paid according to simple proportional pay rule (and hence preferred to stay in $A$ producing $Y_0$, given the rule described in equation (5)), while under the new incentive scheme they are clearly bettered off positioning in the upward-sloping portion of the compensation curve. The result is that this share of managers will switch their production level from $Y_0$ to $Y_C$. Hence the increase in average productivity under the new incentive scheme will be the higher, the more managers will switch from the flat part of the compensation curve to the proportional component. Summing up what theory predicts:

- Managers of high-ability type are expected to exert an even bigger effort in increasing the performance to which their pay is related. (Incentive
• A share of managers that, under the old incentive scheme, preferred to produce the minimum level of output will now choose to produce more and be paid more. (Selection Effect)

We must notice that these theoretical predictions refer only to a partial equilibrium and not to a general equilibrium as in the theoretical framework of section 2.1. In fact, in the case under study, all the effects predicted by theory are strictly referring to the firm internal equilibrium: as explained in section 3.1, the new store managers are chosen by the firm under study exclusively among internal workers belonging to lower levels of the hierarchy and there is no direct inflow from the labor market to store manager position. As a result, the incentive scheme will have little or no impact on the labor market, since we will unlikely observe the firm attracting more able individuals for job positions not directly affected by the new incentive scheme.

5.1 Aggregate Effects on Firm Performance

We thus start detecting whether the switch to the new incentive scheme had positive effects on the overall performance of the firm. Given the data available, we can track continuous store performance on the entire period (2000-2005) only for “Main Sales” and “Productivity” computed as described in section 4.2. Recalling the qualitative description of the incentive scheme, “Sales” performance are the main parameter for the incentive scheme both before and after the switch to the new incentive scheme, while “Productivity” was replaced by the “Operative Margin” parameter when the scheme was changed. Thus, while attention on sales parameter was kept constant over
time, the other performance objects changed significantly: in fact, under the old incentive scheme, managers’ effort was directed on boosting sales and controlling the total hours worked by the personnel in his store\textsuperscript{15}, while the new scheme focused more on all type of costs\textsuperscript{16}. Hence the attention on labor costs switched from the simple number of hours worked by the personnel to the overall cost of labor: this may have an impact on the contract types chosen by the managers and on the use of the personnel, since a manager may theoretically increase the hours worked making the cost of labor increase less than proportionally (i.e. using more fixed term workers, overtime work etc.)\textsuperscript{17}.

The first regression I have modelled to estimate the overall effects of the new incentive scheme on these two performance components is the following:

\[ y_{sq} = \lambda_s + \gamma N_q + \varepsilon_{sq} \]  

(9)

where \( y_{sq} \) is the log of one of the two measures of performance shown above (either Sales or Productivity) of store \( s \) in quarter \( q \), \( N_q \) is a dummy equal to one for quarters in which the new scheme is applied and \( \lambda_s \) is a store fixed effect which captures time-invariant heterogeneity across stores, that is highly relevant as we have seen from the huge standard deviations in the descriptive statistics of section 4.2. This is a very basic specification since it does not allow us to control for potential trends in performance over time: the increase in performance might thus be the result of an underlying trend rather than the effect of the new incentive scheme. It is then necessary to

\textsuperscript{15}Recall productivity is computed as sales over total hours.
\textsuperscript{16}Operative margin is computed as sales minus all costs due to store operation
\textsuperscript{17}I will focus on this matter later in section 5.3
test different trend restrictions:

\[
y_{sq} = \lambda_s + \gamma N_q + \beta_1 t_q + \phi Q + \varepsilon_{sq}
\]  
(10)

\[
y_{sq} = \lambda_s + \gamma N_q + \beta_1 t_q + \beta_2 t_q^2 + \phi Q + \varepsilon_{sq}
\]

\[
y_{sq} = \lambda_s + \gamma N_q + \beta_1 t_q + \beta_2 t_q^2 + \beta_3 t_q^3 + \phi Q + \varepsilon_{sq}
\]

Where \( t_q \) is a progressive variable increasing by one unit quarter by quarter, so as to capture a linear trend component in the data, and \( Q \) is a quarter variable ranging from one to four that lets us control potential seasonality in performance.

Results of table 4 show that the trend in performance is a main component of the data at hand. The problem is to identify the correct trend specification. Unfortunately we do not have a control group and we cannot say how the trend would have been if there had been no change in the incentive scheme. The striking result of table 4 is that, once we control for any of the trend specifications, the effect of the move to the new incentive scheme on performance disappears\(^{18}\). This may be due to two possible causes: either the incentive scheme really had no effects on performance or the trend specification causes problems in identifying the effect. In particular, problems of collinearity between the dummy variable \( N \) and trend specifications arise in this regression specification since the trend component is likely to capture the entire performance increase before and after the switch to the new incentive scheme\(^{19}\).

---

\(^{18}\)We have tested also linear and cubic trend specifications, but the result is unchanged.

\(^{19}\)Recall the dummy \( N \) is just a variable equal to 1 for all observations from the first quarter of 2003 and that this unit change in \( N \) corresponds to the unit increase of the variable \( t \) for the same quarter observations.
### 5.2 Incentive versus Sorting Effects

As we have seen in the theoretical framework and in the empirical testing by Lazear in section 2.1, “Sorting Effects” of incentive schemes are, in the majority of the cases, a main component of increase in productivity when introducing incentive schemes. In the case of the company under consideration it is not straightforward to observe such a phenomenon because there are no inward flows in the workforce at the store management level of the hierarchy. The career path is pretty much inside the company and all store managers are chosen among the lower levels of the hierarchy. Moreover, there

---

**Table 4: Estimating effects of the new incentive scheme on performance**

<table>
<thead>
<tr>
<th></th>
<th>Productivity</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>N</td>
<td>2.443***</td>
<td>1.854***</td>
</tr>
<tr>
<td></td>
<td>(0.305)</td>
<td>(0.378)</td>
</tr>
<tr>
<td>t</td>
<td>0.256**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.100)</td>
<td></td>
</tr>
<tr>
<td>t²</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>0.672***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.143)</td>
<td></td>
</tr>
</tbody>
</table>

Stores Fixed Effects: Yes, Yes, Yes, Yes, Yes, Yes
Mgr Fixed Effects: No, Yes, No, No, Yes, No
Observations: 4464, 4405, 4464, 4464, 4405, 4464
Number of store: 186, 186, 186, 186, 186, 186

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses
Dependent variables in logarithms and multiplied by 100
is not much outflows (apart those towards pension). Hence we can not study
the underlying ability of new hired or separation rates (quits plus layoffs) as
made in many researches. However, since we observe managers over time we
can look at how the estimates of (9) change when we include manager fixed
effects:

\[
y_{sqi} = \lambda_s + \lambda_i + \gamma N_q + \varepsilon_{sq}
\]

(11)

Once we have introduced the 364 manager-dummies the value of \(\gamma\) should
reflect the pure incentive effect of the switch to the new incentive scheme,
while the residual effect should be imputed to selection. As we can see from
column (3) and (6) of table 4, once we control for manager-specific dummies
in the basic specification, the effect of the new incentive scheme captured by
\(\gamma\) decreases. Recalling that both the performance dependent variables in the
regression are in logarithms and multiplied by 100 \(y_{sqi} = 100 \times \log(Y_{sqi})\),
to retrieve the percentage increase of the incentive scheme we must take the
marginal effect by computing the exponential of the coefficient divided by
100 and subtracting 1\(^20\). Hence, from column (1) in table 4 we can see that
the overall increase in productivity can be approximated to +2.47\% while
the overall effect of the incentive scheme on sales is about +2.32\%. Of this
overall effect, only a portion is imputable to pure incentive effect. Once we
have added managers fixed effect (as in specification (2) of the table), in facts,
\(\gamma\) will capture the average increase of performance per given manager after
the introduction of the new incentive scheme: interpreting table 4 results, a

\(^{20}\)Recall \(N\) is a dummy assuming either value 0 or 1: to get the marginal effect of the
new incentive scheme on performance we hence have to compare the impact of \(\gamma\) on \(Y_{sqi}\)
\(e^{\gamma N}\) when \(N = 1\) (\(e^{\gamma}\)) to that when \(N = 0\) \((e^{0})\). The marginal effect is then equal
to \(e^{\gamma} - 1\).
given manager have increased the productivity of the store he manages by 1,87%. This latter can be interpreted as the pure incentive effect the new incentive scheme had on the managers, while the gap between 2,47% and 1,87% should be imputed to some sort of selection effects. To conclude the analysis of table 4, we can see that, once we control for manager fixed-effects, the impact of the coefficient $\gamma$ on sales vanishes as the new incentive scheme had no pure incentive effects on this particular performance parameter.

To overcome the empirical problem of trend specification outlined in section 5.1 and give more evidence on the results explained above we need to look for alternative empirical strategies. As we have perceived from the previous basic specifications, the sorting component of the new incentive scheme may be prevalent in the case under study. The intuition is thus to look at the mechanisms driving a possible selection among managers in the company under analysis. For instance we may study if the new incentive scheme has somehow affected the type of managers that get advancements in the hierarchy. As explained in section 3.1 describing the structural organization, the strategy of the company under analysis is to move managers frequently among stores, from those of low complexity and size to bigger and more complex ones: the idea of the company is to make managers improve their skills and experience gradually, considering dynamic displacement of managers across the entire store network as an important strategy of organizational development. Consequently advancements in the hierarchy are often conditioned to movements from one store to another, even in very different regions of the country. In practice we can frequently observe the following strategy occurring: in store $x$ (e.g. one belonging to cluster A$^{21}$) the po-

$^{21}$See section 3.1 for the classification of stores
position of the manager is vacated for some reason (retirement, promotion of the manager), then the human resource division of the company will look for a substitute among those managing a store with lower level of complexity (e.g. a store belonging to cluster B). To identify a small set of candidates (generally 3 or 4), they observe the performance of the stores managed by these managers in the previous period, focusing on how they scored for the incentive scheme. Once a candidate is chosen for the vacant position, she will leave her own position vacant as well and the same procedure will be applied again to managers of the next lower complexity level (e.g. cluster C).

The idea is thus that, with the new incentive scheme, a larger number of managers will choose to exert a bigger effort against a higher compensation as shown in figure 3 and managers will “signal” their own relative ability more intensely. As an indirect result, the human resource division of the company can have better info on the underlying ability distribution of their managers and consequently promote relative more productive managers in the hierarchy. This results in higher average performance as explained in the theoretical framework.

The mechanism outlined above, gives us the guess for exploiting the change of managers in the stores as an alternative source of variation to estimate the effects of the incentive scheme: the intuition is that if the new incentive scheme conveys its effects through selection, the managers chosen to cover new manager positions in any of the store should show relatively higher performance. In econometric terms this effect can be captured by using a new dummy-variable ($N_1$) instead of the dummy $N$ from previous regression: this new dummy assumes value 1 from the first quarter there is a change of man-
ager in the store after the introduction of the new incentive scheme onwards (and no more simply equal to 1 after 2003). The good news of this choice is that the variation we are trying to estimate is no more collinear with year and quarter dummies since the variable $N$ turns to 1 in different quarters for different stores. This allows us to overcome the identification problems of the previous specifications and to use specific-year and quarter dummies to control for eventual exogenous effects across years and quarters as in Lazear [4]. To formalize this hypothesis we can outline a regression of the following type:

$$\quad y_{sq} = \lambda_s + \gamma N_{1q} + \rho \text{Tenure} + \sum_{\text{quarter}=2}^{4} \lambda_{\text{quarter}} + \sum_{\text{year}=2001}^{2005} \lambda_{\text{year}} + \varepsilon_{sq} \quad (12)$$

Where $N_{1}$ is the new dummy capturing variation of the incentive scheme according to changes of managers in the stores, $\lambda_s$ is still a store fixed-effect, $\sum_{\text{quarter}=2}^{4} \lambda_{\text{quarter}}$ is a set of quarter-dummies (one for each of the four quarters, excluding the first of the year to avoid collinearity), $\sum_{\text{year}=2001}^{2005} \lambda_{\text{year}}$ is a set of year-dummies equal to one for each of the years in the sample excluding the first one (2000) for collinearity. The prediction is that the new incentive scheme variable $N_{1}$ will be positive and significant if the hypothesis of selection is confirmed.

The results shown in table 5 tell us that stores in which there was a manager change after the introduction of the new incentive scheme have clearly better sales performance, while the same stores seem to have no significantly higher productivity level. This suggest us that if we consider the moment of manager substitution in the store as the moment in which the firm selects managers, the selection effect of the new incentive scheme is remarkable in the data at hand. Moreover, these results appear consistent with those of
### Table 5: Estimating Selection effect of the new incentive scheme using the first manager change as variation

<table>
<thead>
<tr>
<th>Productivity</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td><strong>N1</strong></td>
<td>-0.663</td>
</tr>
<tr>
<td>(0.503)</td>
<td>(0.536)</td>
</tr>
<tr>
<td><strong>Tenure</strong></td>
<td>0.013**</td>
</tr>
<tr>
<td>(0.007)</td>
<td>(0.011)</td>
</tr>
<tr>
<td><strong>Year Fixed Effects</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Quarter Fixed Effects</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Store Fixed Effects</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>4464</td>
</tr>
<tr>
<td><strong>Number of store</strong></td>
<td>186</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Dependent variables in logarithms and multiplied by 100

Table 4 after the introduction of manager-specific dummies: indeed, the new incentive scheme effects on productivity decreased only by a small fraction controlling for managers fixed effects, while the N impact disappeared for what concerns sales. To sum up, it seems the new incentive scheme had a prevalent pure incentive effect on productivity performance, while a strong selection effect is evident for sales. This maybe due to the fact that the new compensation scheme does not provide anymore incentives for productivity whereas gives more weight to sales performance. As a result, those managers willing to get promoted under the new incentive scheme have to boost sales more than any other performance result, since the firm will choose them according to how they score in the new incentive scheme, as described above. A
robustness check of this evidence might come from running the same regressions on the third performance measure that substituted productivity (the operative margin), but unfortunately this variable was not tracked under the old incentive scheme.

Regression (12) takes into account only changes of managers in the stores assuming, as explained, that all manager changes correspond to advancements or to some kind of step-forward in the hierarchy, but this is not a written rule, it is just a very regular practice. However, there maybe specific case and exceptions to this practice and some of the manager changes could correspond to no implicit advancement. For this reason we want to focus on managers to have extra evidence for our theory. The idea, in this case, is to exploit the fact that even within the job position of store manager there are two contractual levels. In particular, when managers are promoted to big stores their contractual level increases as well. In our data set we are able to track who are those managers having received such a contractual promotion during the time period covered by it. The intuition is to track their performance relative to those of their colleagues with a dummy equal to one for those receiving such a promotion after the introduction of the new scheme. We thus enrich specification (10) as follows:

\[ y_{sqi} = \lambda_s + \gamma N_q + \beta_1 t_q + \beta_2 t_q^2 + \phi Q + \alpha Pro_{qi} + \varepsilon_{sq} \]  

where \( Pro_{qi} = 1 \) if managers has got a promotion after the introduction of the new Incentive Scheme. We expect \( \alpha \) to be positive and significant if those promoted under the new incentive scheme have actually relative higher performance (and implicitly relative higher ability).
Table 6: Estimating relative performance of those managers getting contractual promotions after the introduction of the new incentive scheme

<table>
<thead>
<tr>
<th></th>
<th>Productivity</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>$N$</td>
<td>-0.910</td>
<td>-0.745</td>
</tr>
<tr>
<td></td>
<td>(0.636)</td>
<td>(1.247)</td>
</tr>
<tr>
<td>$t$</td>
<td>0.256**</td>
<td>1.008***</td>
</tr>
<tr>
<td></td>
<td>(0.100)</td>
<td>(0.196)</td>
</tr>
<tr>
<td>$t^2$</td>
<td>0.001</td>
<td>-0.031***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>$Q$</td>
<td>0.673***</td>
<td>4.311***</td>
</tr>
<tr>
<td></td>
<td>(0.143)</td>
<td>(0.281)</td>
</tr>
<tr>
<td>$Pro$</td>
<td>0.208</td>
<td>3.470**</td>
</tr>
<tr>
<td></td>
<td>(0.823)</td>
<td>(1.614)</td>
</tr>
</tbody>
</table>

Store Fixed effects: Yes, Yes
Observations: 4323, 4323
Number of store: 186, 186

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Dependent variables in logarithms and multiplied by 100

As shown in table 6, the results obtained in the previous regressions are confirmed: managers getting promotions after the switch to the new incentive scheme do have better sales performance. Also the different behavior of sales and productivity in the results already observed in previous specifications is confirmed in this setting: managers selected for promotions after the introduction of the new incentive scheme perform better for what concerns sales, but not for productivity. According to coefficient $\alpha$ managers getting the promotion under the new incentive scheme make their store sales on av-
average 4.02% better than their colleagues’ stores.

The effects of the new incentive scheme can be summarized by having a look at the distributions of average store performance before and after: as shown in figure 4, the two distributions have very similar shape, but the one of the new incentive scheme is clearly shifted to the right. This suggests that the increase in performance observed after the switch to the new incentive scheme have been pretty much homogenous across stores. Moreover it is remarkable to look at the main peak of the distribution: the fact that the peak value is lower under the new scheme implies that there is less concentration of performance around the modal value. This result is consistent with the theoretical predictions presented in figure 3 at page 33 according to which...
the increase in average performance should be mainly caused by the switch to higher performance levels of middle-ability managers.

5.3 Pay and Profitability

After having studied the effects of the new incentive scheme on firm performance, it is interesting to analyze how the pay structure reacted to the new compensation scheme and thus if the costs faced by the firm to implement it have been worthy.

As we have seen in the descriptive statistics shown in section 4.2, the percentage increase of average pay has been larger then that of performance$^{22}$. To obtain more precise estimates of the effects on pay, we can apply the same econometric specification we used in regression (11), substituting the logarithm of the performance variable $y_{sqi}$ with the logarithm of total pay (base pay plus bonus) received by managers in the specific quarter $p_{sqi}$:

$$p_{sqi} = \lambda_s + \lambda_t + \gamma N_q + \varepsilon_{sq} \quad (14)$$

In this case coefficient $\gamma$ should capture the impact of the new incentive scheme on compensation.

As we can see from table 7 the log of total pay has increased by 4.5%, implying a 4.6% rise in compensation $^{23}$ at page 38. This increase is by far larger than that of performance computed in the previous section. Specification (2) of table 7 controls for manager-specific fixed effects. On the contrary

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$^{22}$Total pay under the new incentive scheme is on average +4.87% versus an increase of +2.13% of sales and +2.50% of productivity.

$^{23}$Recall the percentage increase can be retrieve by computing $(e^\gamma - 1)$ as shown in section 5.2.
Table 7: Estimating Pay increase of the new incentive scheme

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>N</em></td>
<td>4.496***</td>
<td>5.639***</td>
</tr>
<tr>
<td></td>
<td>(0.371)</td>
<td>(0.389)</td>
</tr>
<tr>
<td>Store fixed effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Manager fixed effects</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>4294</td>
<td>4291</td>
</tr>
<tr>
<td>Number of store</td>
<td>186</td>
<td>186</td>
</tr>
</tbody>
</table>

Dependent variables in logarithms and multiplied by 100

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

of what happened with performance, in this case \( \gamma \) increases. This implies that, for a given manager, compensation rose actually by 5.8%. The reason why the effect is higher with manager dummies is that individuals getting promotions to manager positions after the introduction of the new incentive scheme have structurally lower pay levels, since base pay is strictly correlated to seniority in the firm.

It is also interesting to take a look at average pay distribution under the two schemes as we did for sales performance. The two distributions in figure 5 have pretty similar shapes with the one of the new incentive scheme lying clearly to the right of the old scheme distribution. Moreover peak values are lower under the new scheme as for sales. This suggests both an homogenous increase of the average pay and a higher dispersion of compensation.

Was the change in incentive scheme profitable for the firm? This is hard to say with the information at hand: too many different variables play a role in determining the effects of the new incentive scheme on profits. Anyways it
is meaningful to outline here a bunch of tenets to make some considerations on the profitability of the case under study:

- For what concerns firm compensation policy, the switch to the new incentive scheme turned out to be a generous wage expansion for store managers. Previous wage level is granted and for any given performance above the minimum target, managers are paid sensibly more, even controlling for inflation.

- A larger share of manager reaches the minimum performance target under the new incentive scheme as shown in the descriptive statistics of section 4.2.
• The percentage rise in firm performance is clearly lower than the percentage increase of manager compensation.

• The incidence of manager pay on total costs per store is relatively low (above all in big stores). As a consequence, a given percentage increase in manager pay does not imply a significant increase in store operating costs, while the same percentage increase in performance can have an impact by far larger in absolute terms on store revenues.

• The only variable we can look at to get an idea of variation in costs is the number of hours worked in each store. From table 8, it is evident that there has been a substantial increase in the total hours worked (+7.2% without controlling for manager fixed effect) in each store after the introduction of the new incentive scheme. This increase certainly had an impact on the cost side of store operation.

Table 8: Increase in Total hours worked by personnel in each store

<table>
<thead>
<tr>
<th>Hours worked in the store</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>6.951***</td>
<td>5.317***</td>
</tr>
<tr>
<td></td>
<td>(0.479)</td>
<td>(0.573)</td>
</tr>
<tr>
<td>Store fixed effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mgr fixed effects</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Seasonal Controls</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>4462</td>
<td>4403</td>
</tr>
<tr>
<td>Number of store</td>
<td>186</td>
<td>186</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1
Standard errors in parentheses
Dependent variables in logarithms and multiplied by 100
The magnitude of the effect of this increase in hours worked on labor costs is unclear. Indeed managers have several options to increase hours worked in their stores and each of these options can impact differently on labor costs. For instance, think about the two main strategies a manager can take to increase the hours worked: either she enlarges the workforce by hiring new workers (exploiting the so called extensive margin) or she boosts overtime hours of existing labor force (intensive margin). Which is the cheapest way in terms of labor costs is theoretically undetermined, since it depends by the comparison between hiring costs and overtime premium. If we consider the Italian labor market, we have no doubts about which is the cheapest option for a manager willing to increase hours worked: the huge hiring costs and the strict employment protection legislation make new hiring very costly. Moreover, taxes on overtime hours have recently been reduced. As a matter of fact, Italy has by far the cheapest combination for overtime hours with one of the highest maximum overtime limit among the European countries (12 overtime hours a week) and the lowest wage premium (10%)\textsuperscript{24}. It is thus not surprising to observe managers preferring the intensive margin to increase labor in their store. Moreover, the increase in total worked hours might also be endogenous to the new incentive scheme, since managers are no more evaluated on the total number of hours, but on labor costs. Anyways, as we will see in the following section 5.4 this intuition is confirmed by the data. Going back to our discussion on profitability, we can thus conclude that labor costs in-

\textsuperscript{24}Source for both values: Boeri T., Van Ours J. (2008). \textit{The economics of imperfect labor markets} [9], ch. 5 Table 5.1 pg. 103
crease is likely to be relatively small though the significant increase in worked hours.

To make more precise considerations on profitability of the new incentive scheme it would thus be important to have some info on store profits (useful to have the store operative margin or labor costs), allowing us to evaluate not only the increase of store revenues, but also the effects on the cost side of store operation. Moreover, the identification problem rising when estimating the effect of the new incentive scheme together with the trend \(^{25}\) does not allow us to determine precisely how firm performance would have behaved if the new incentive scheme was not developed. This prevents us to identify the net increase in performance.

What we can instead affirm undoubtedly is that there has been a selection effect allowing the firm to sort and promote those managers with relatively higher ability or ambition. This had undoubtedly positive effects on overall performance of the firm making the average level of manager ability and performance rise.

### 5.4 Impact on Store Personnel

A store manager for sure does not increase store performance alone: she will of course exerts an higher effort in improving her own managing performance, but she will also indirectly affect workers performance. In this last section I analyze the spill-over effects that incentives for managers can have on the bottom-tier personnel not receiving incentives. The intuition is that managers have to make the workers either work more or improve their

\(^{25}\)See table 4 results
productivity to enhance store performance. As we have seen in table 8, the total number of hours worked per store in each quarter increased significantly after the introduction of the new incentive scheme and we expect this increase to be driven by the exploitation of the intensive margin (overtime hours).

Unfortunately we can not track overtime hours in the sample at hand. However we know the total number of workers per store in each quarter. The intuition is thus to look at the average percentage increase of the number of workers after the introduction of the new incentive scheme and compare it with the percentage increase of hours worked estimated in table 8.

<table>
<thead>
<tr>
<th>Table 9: Increase in total number of workers by store</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of workers in the store</td>
</tr>
<tr>
<td>(1)        (2)</td>
</tr>
<tr>
<td>N          1.192** 1.143*</td>
</tr>
<tr>
<td>(0.542) (0.598)</td>
</tr>
<tr>
<td>Store fixed effects Yes Yes</td>
</tr>
<tr>
<td>Mgr fixed effects No Yes</td>
</tr>
<tr>
<td>Seasonal Controls Yes Yes</td>
</tr>
<tr>
<td>Observations 4463 4404</td>
</tr>
<tr>
<td>Number of store 186 186</td>
</tr>
</tbody>
</table>

Dependent variables in logarithms and multiplied by 100

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

As from table 9, the total number of workers has increased significantly less (+1.94% vs. +7.2%) then the hours worked. This is consistent with our hypothesis according to which the increase in hours worked was driven mainly
by making the workforce work more (presumably through overtime work), instead of by hiring new workers.

This last consideration gives scope for some concerns about equity issues when giving incentives to managers only. The fact that we observe a rise in firm performance without a significant increase in the number of workers (always assuming the manager cannot make the store performance increase alone) suggests that the increase in pay scheme generosity for managers did have spill-over effects on all workers: indeed either an increase of workers’ productivity or an increase of hours worked by the same number of workers are implied in what we have observed. It is likely a combination of the two. Anyways the matter of fact is that workers do work more and have no direct increase in wage after the introduction of the new incentive scheme. Even if we consider the overtime premium (10% on extra hours) as the marginal increase of worker pay after the introduction of the new scheme given the increase in hours worked per individual, we are likely to obtain a very low impact on worker pay with respect to the increase of manager compensation. This inevitably rise some concerns on the equity of profits share with workforce when the provision of incentives is granted to managers only.
6 Conclusions

In this work I present a new set of panel data I collected from an Italian firm providing incentives for middle managers responsible for managing stores. Using these data, I exploit an exogenous compensation change, allowing for a more generous incentive scheme, to test the theoretical predictions that average performance will rise and more able managers will be selected. Results show an increase in performance and a significant selection effect on managers. However, given the contemporaneous variation of the incentive scheme in all stores, econometric problems rise when introducing different trend specifications and prevent a correct identification of the net increase in performance. For what concerns manager pay, the effective outcome of the new compensation scheme is, on average, a large wage expansion and doubts on the profitability of introducing the new incentive scheme are far from being cleared. Moreover, I discuss the potential spill-over effects that incentive schemes have on the bottom-tier personnel when the provision of incentives is granted only for managers: from the data, there is evidence that the increase in performance is accompanied by a significant increase in total hours worked by personnel in each store and there is almost no workforce expansion. This implies that managers prefer to rise overtime hours, making the personnel work more to increase store performance. Concerns on workers’ participation in profits are thus the issue of my final discussion.

The large amount of information in the data set leaves scope for further research in different directions: demographic and social variables associated with managers might be exploited either to study potential correlations of observable characteristics with unobservable ones such as ability or to detect
if the provision of incentives has impact on wage inequality and statistical discrimination. To solve instead the problems rising when identifying the net impact of the incentive scheme, the intuition is to look for a second exogenous source of variation reducing manager control on store performance such as traffic jams or weather conditions.

References


REFERENCES


