The Role of Information in Performance Schemes: Evidence from a Field Experiment*

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Abstract

Incentive schemes affect performance and priorities of agents but, in reality, they can be complicated even for simple tasks. We analyze the effects of the salience of incentives in a multi-tasking team production setting. We use data from a controlled field experiment that changed the communication of the incentive system without changing the actual incentives. The results indicate that the salience of a given incentive scheme is qualitatively and quantitatively important for performance. We find that higher salience of incentives for quantity increases quantity, (slightly) reduces quality, and substantially increases in-pocket income of team managers.

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1 Introduction

Incentive schemes, designed to enhance performance, are key elements in a firm's personnel policy and have been in the focus of empirical research in economics in recent years. At a general level, the main empirical findings could be summarized as "*Incentives work; stronger incentives work better.*"[1] However, most of the evidence on causal effects comes from fairly simple incentive schemes and drastic interventions, as for example in Lazear's (2000) seminal *Safelite* study. In reality, however, many incentive schemes, and the organizational structures in which they are implemented, are complicated, even for simple tasks.

From a (standard) theoretical point of view, what matters for eliciting effort is to correctly design the material aspects of an incentive scheme. Whether agents in fact optimize against this scheme (in particular in situations where the scheme is complex) has, however, not received much attention. In this study, we are interested in the role of information and salience in complex incentive schemes. To address this question, we exploit data from a controlled field experiment in a large firm. The experiment varied the information about the actual performance scheme communicated to team managers and team members, while keeping the explicit incentive structure unchanged. This randomized intervention allows us to identify the causal effects of changes in the information environment, i.e., the salience of incentives, on performance.

The experiment was conducted by a large European agricultural producer. We have access to the complete personnel records for all field workers and teams for the entire 2008 harvest season (May-November). The workers' task is to harvest lettuce. They are allocated into 8 to 12 harvest teams, depending on the day. Each team consists of roughly 30 harvest workers working on a harvesting machine performing different tasks (cutters, packers, crate-staplers, stretchers, drivers).[2] The team managers are the crucial link between management and field workers. Each team manager takes the relevant operative decisions (speed of harvesting machine, matching of team members to tasks, training of incoming team members) for the entire team and communicates the details of the incentive structure to the team members.

The firm cares about the harvested quantity and quality as it faces severe contractual penalties for inferior quality delivered to large supermarket chains. Accordingly, incentives are set twofold. Quantity incentives are provided via a basic piece rate, the *gross piece rate*. This rate is determined ex-ante by the firm's management for each team and shift in order to set incentives and adjust for varying conditions with respect to weather, field, crop and demand. Quality incentives are provided via deductions from team pay for deficient quality

[1] For a survey see for example Prendergast (1999).

[2] The team composition is determined by the firm management and largely dependent on arrival and departure of seasonal workers at the firm site. From the perspective of the analysis in this paper, team composition can therefore be seen as exogenous to the decisions of team members or team managers.

as well as a tournament scheme across teams where the teams delivering the highest quality win monetary prizes. Quality is measured by regular (post-picking and pre-delivery) quality checks. The incentive structure is explained in more detail below.

We exploit a controlled experimental intervention, in which the salience of incentives was varied for a randomly selected subgroup of the harvest teams, while the actual monetary incentives remained unchanged. In the experimental treatment, the firm changed the salience of ex-ante determined gross piece rates. The treatment period was the month of August 2008, and the treatment group consisted of five teams, which are identified by their managers. The remaining harvest teams (team managers) serve as control group. All team managers are experienced and have worked for the firm in this position already for several years prior to the experiment. In the pre-intervention situation the team managers could in principle obtain information on the gross piece rate for the respective day and the relevant field, but there was neither monitoring whether the team managers informed themselves about this crucial variable, nor whether they communicated it to their team members. The intervention ensured that team managers and team members received this information as the firm's mobile quality control team briefed team managers explicitly and posted a note visible to the entire team about the current gross piece rate on the harvest machine at the beginning of a shift.

The findings suggest that increased salience of incentives (causally) increases output (quantity) by about 2.5-3.7%, has a negative (but weak and only marginally significant) effect on quality of about -5%, and increases team managers' incomes by about 5%. This effect is solely due to the fact that the details of the incentive scheme have been communicated more saliently to the team managers and their teams. Improved salience seems to lead team managers to adjust their behavior more finely to material incentives (which may change day by day), and hence work more profitably. The finding that variation in salience appears to have a stronger effect on the quantity-incentives than on quality incentives might be explained by the fact that quality incentives are more complicated and have more indirect effects, as is explained in more detail below.

Our study documents that a change in salience of an incentive system that has been in place for some time and that remains unchanged throughout has considerable effects on behavior in a realistic production environment with real incentives. With this result, our study contributes to an emerging literature in economics on the importance of salience for the effectiveness of incentives.[3] In this recent empirical literature, a series of papers by Bandiera, Barankay, and Rasul (2007, 2009, 2010a, 2010b) studies the effects of incentives by conducting field experiments in an agricultural firm. In Bandiera et al. (2010b) they show that introducing performance feedback, without changing incentives themselves, has measurable effects on output. In their study, feedback information gives incentives to change

[3]See Kluger and Denisi (1996) for a survey of the psychological literature on the effects of information interventions on performance.

the (endogenous) team composition by raising the benefits of assortative matching into teams by ability. In contrast, our findings are based on teams with exogenously determined composition. Blanes-i-Vidal and Nossol (2009) use a quasi-experiment. They document the effect of giving workers feedback on their relative performance in a setting where workers are paid piece rates and where management begins to reveal the relative position of workers in the pay and productivity distribution. This additional information about relative performance leads to substantial and lasting increases in productivity, though the material incentives have not changed. As opposed to our study, the results in Blanes-i-Vidal and Nossol (2009) may be explained by the importance of relative comparison processes among workers. Hossain and List (2009) report on a field experiment in a Chinese high-tech manufacturing facility where conditional incentives framed as either "losses" or "gains" were introduced. Both are shown to increase productivity, however, performance persistently responds stronger to incentives that are framed as losses than to identical incentives that are framed as gains. As opposed to our study, where the salience of the incentive scheme was strengthened, while leaving incentives unchanged, in Hossain and List (2009) a given underlying incentive structure is framed differently.

Our results also contribute to a recent literature on "inattentiveness" that documents the consequences of the fact that attention is a limited resource. Hossain and Morgan (2006) and Lee and Malmendier (2009) show that bidders on *ebay.com* are inattentive to relevant information. Hossain and Morgan (2006) show in a field experiment that shipping costs, that are stated separate from the "price" (but that have an effect on the final amount due) are not fully incorporated in buyers bidding decisions. As a consequence, buyers overspend on shipping costs. Lee and Malmendier (2009) show that bidders fail to take advantage of available "buy-it-now" options. Instead, bidders continue to bid in auctions on the very same item and end up paying more than they would have using the "buy-it-now" options.[4] In the context of savings, Karlan, McConnel, Mullainathan and Zinman (2010) show in field experiments that reminders that are sent to saving account holders change their savings behavior. Moreover, reminders are more effective when they increase the salience of a specific expenditure. These findings parallel to some degree our findings, where the intervention can be interpreted as a reminder making the quantity dimension of the incentive scheme more salient.

Our paper also relates to a theoretical literature that has recognized that economic decision makers may have problems in solving complex decision problems instantaneously, and that cognitive capacity and attention are rather limited resources. Simon (1955) was probably the first to propose a behavioral model of rational decision making, formally acknowledg-

[4]For evidence that different degrees of transparency of taxes affect consumption behavior, see Chetty, Looney and Kroft (2009), and Finkelstein (2009). For a more detailed discussion of inattentiveness and its consequences, see DellaVigna (2009).

ing these cognitive limitations. Recently, other theoretical treatments of this problem and its implications have been offered. Gabaix and Laibson (2006) model consumers as using (simple) heuristics for solving complex problems. They show that this consumer myopia leads to information suppression even in competitive markets as firms deliberately shroud the features of their products to make the consumers' choice problem harder and weaken competition.

The remainder of the paper is structured as follows. Section 2 describes the data and the experimental intervention in more detail. Section 3 presents our results and Section 4 concludes. All tables can be found at the end of the paper.

2 Experimental Design and Identification

2.1 Background Information

Firm. The firm is a large European agricultural producer that mainly produces vegetables. For the current study, we use data on all teams that harvest iceberg lettuce, the firm's main product. The harvesting is done using a team technology, where on every day of the week 8 to 12 teams independently from each other harvest lettuce in shifts on different fields in the same geographical region. Each team consists of about 33 harvest workers. These workers are mostly seasonal workers from Eastern Europe (mainly from Poland, Romania, or Ukraine). Teams are organized according to different tasks (manager, cutters, packers, crate-staplers, stretchers, drivers).[5] The team manager represents the most important team member and identifies a team in our data. He is the link between the management and workers, communicates details on the incentive structure, and takes all relevant decisions on the field, like the speed of the harvesting machine, the matching of team members to tasks, training of incoming team members, and the like. The team manager is ultimately responsible for the entire harvest performance of his team, in terms of quantity and quality of the harvested lettuce. On average, fields contain roughly 72,000 lettuces per hectare, 2/3 of which are typically of sufficiently good quality to be harvested. The decision about how fast the harvest is conducted (and hence, indirectly, how much lettuce is worth harvesting) is taken by the team manager. The data contains the complete personnel records for all field

[5]Unlike team managers, drivers, stretchers, and administrative staff, who are typically permanent employees, harvest workers like cutters or packers only stay with the firms for less than a harvest season, typically 6-8 weeks. They usually come from Eastern European countries, from where they are bused to the firm's premises. There, they live in dorms and are allocated to teams. Workers are typically recruited in their home towns, often upon recommendation by workers from previous years. Arrival and departure are organized by the firm in batches of bus loads to make travel time and cost efficient. Although there are considerable differences in the production technology, the composition of the workforce is comparable to the one in the recent study by Bandiera et al. (2009).

workers and teams for the harvest season 2008, which lasted from May 25 to November 6, 2008.

Firm's Objectives. The firm cares about quantity and quality of the harvested lettuce. A higher quantity obviously increases revenue, but due to severe contractual penalties for inferior quality delivered to large supermarket chains, low quality is very costly to the firm. As a consequence, the management sets twofold incentives. Incentives for quantity are set through gross piece rates for the amount of lettuce harvested, and which are determined ex ante. Incentives for quality are set through deductions on piece rates in terms of "quality (malus) points". These are determined by regular quality checks, post-picking and pre-delivery, where malus points are given for deficient quality in certain dimensions. Moreover, based on the quality point scores, there is a daily tournament among the harvest teams.

Firm's Policies: Quantity Incentives. The central incentive device for quantity is the *gross piece rate* per lettuce head (or crate, respectively). The gross piece rate is set daily for each team and shift by the harvest manager (a member of the firm's central management).[6] The gross piece rate is based on a target performance in terms of quantity as well as on a target quality in terms of points. Adjustments are made for the harvesting conditions, such as the conditions of the field (soil, field size), crop (size of the lettuce heads, maturity, potential damages), as well as general harvesting conditions (weather, temperature).[7] The firm also ensures that the workers obtain an average hourly wage above the legal minimum by adjusting the gross piece rate accordingly, e.g., when harvesting conditions are difficult. According to the company's internal guide book for team managers "it is the responsibility of the team manager to inform all team members about the gross piece rate before the shift begins". The average hourly wage for each team member is computed via the formula

$$\text{average hourly wage} = \frac{(\text{gross piece rate} - (\text{quality-points}) \cdot 0.005) \cdot \text{pieces}}{\text{number of total worker hours}} . \qquad (1)$$

Firm's Policies: Quality Incentives. Quality is ensured by regular quality checks (post-picking and pre-delivery). Deficient quality reduces the wage directly through deductions from the gross piece rate, i.e., the "quality points", as in equation (1) above. These deductions are essentially fines for bad quality, which teams pay into a pool. At the end of the harvest day, this pool is distributed among all teams active on that day according

[6] In particular, the firm fixes a "gross per crate price" as well as a target crate size in terms of the number of lettuce heads per crate before the shift begins. The effective "gross piece rate" is then given by the "gross per crate price" divided by the number of pieces (6-8 depending on crop conditions) per crate.

[7] Figure 1 in the appendix documents this by plotting the gross piece rate against the rainfall (in liters per square meter) and against the daily maximum temperature (in degrees centigrade) that was forecasted for the respective harvest day in the harvesting area on the day before. The data show a positive correlation between the forecasted precipitation and the gross piece rate (pairwise correlation 0.14, p-value$<$0.01) and a negative correlation between the forecasted maximum temperature and the gross piece rate (pairwise correlation before September 1 is -0.18, p-value$<$0.01), and -0.07, p-value$<$0.02 over the entire season.

to the outcome of a "quality tournament" among all teams. The teams with the best quality performance (the lowest number of malus quality points) receive the prizes by a fixed distribution scheme, with the best performing team collecting the largest share of the pool. The prizes in this tournament are determined endogenously by the size of the pool on the respective harvest day, i.e., by the quality performance of all teams harvesting on that day.[8]

Firm's Policies: Team Manager's Incentives. The team manager's total compensation consists of several components. The manager receives a fix wage according to the pay scale for a gardener's assistant that results from collective bargaining agreements. On top, the team manager receives piece rate performance pay that is proportional to the team's quantity performance. In addition, the team manager receives (potentially substantial) performance compensation for quality in terms of a quality bonus from a quality tournament, on a daily basis, between all team managers. Generally speaking, quality incentives are relatively weak for team members, but relatively strong for team managers. Finally, the team manager participates in the profits of the firm's profit center "harvest". In particular, 6.5% of the profits generated on a harvest day are distributed among all team managers that were active on that day, in proportion to their hours worked.

2.2 Experimental Treatment: Salience of Piece Rates

The experimental treatment was conducted in the treatment period August 1 - August 31, 2008. The treated population consisted of 5 randomly selected team managers and their teams, while the control population consisted of the remaining harvest teams. The control period was May 25 - July 31 and September 1 - November 6, 2008. The experimental intervention changed the salience of quantity incentives, while keeping the actual monetary incentives fixed. Before the intervention, team managers receive information on the pertaining gross piece rate every morning when they report to the firm headquarters before the start of their shift. However, there is no monitoring as to whether the team managers actually acknowledge and understand this information, i.e., whether they are informed about this crucial variable, or whether they communicate the gross piece rate to their team members. The intervention made sure that team managers and team members receive and understand this relevant information. The intervention was conducted by the quality control team. The quality control team, responsible for checking the production process on site at the different harvest machines, visits each team at the beginning of its shift. Hence, the quality team's visit is not per se perceived as an unexpected intervention. The quality control team briefed

[8]Depending on the total numbers of teams harvesting on a given day (and thus participating in the quality tournament), the best 3 (in case 8 or fewer teams participate) or 5 (in case more than 8 teams participate) receive a prize from the tournament. These teams receive prizes according to a fixed distribution key by their relative position in the tournament.

team managers explicitly before the shift began and posted a note about the piece rate on the harvest machine that was visible to all team members.

2.3 Data

The data are available on the team-shift level, for the entire harvest season from May 25 to November 6, 2008.[9] On average, more than 34,000 heads of lettuce were harvested per shift by a team of about 33 workers (including drivers, team managers, etc.), where a shift lasted eight hours on average. Team members were about 30 years old and worked for the third season for the firm. The average, the hourly wage for the team members was 6.46 Euros. In total, a given team manager earned about 81 Euros per shift, adding all his wage components. The summary statistics of the data are presented in Table 1.

In the raw data, there is no evidence for systematic differences in characteristics between treatment and control teams. The workforce of the treated teams is slightly younger and less experienced. These differences are, however, minor and do not vary systematically across control and treatment periods.[10] Treated teams exhibit a slightly shorter harvest experience in the current season. This difference might be driven by differences in the timing of arrival and departure of seasonal workers that are randomly distributed to the different teams. However, this difference is unlikely to affect performance given the simplicity of the tasks and the short required training period.[11] There are no significant differences in inputs (in terms of number of workers per shift and total worker hours per shift) between treatment and control teams, neither during treatment nor control periods. Most importantly, incentives in terms of the gross piece rate set by the firm do not differ systematically between teams receiving the treatment and teams that are in the control group, neither before nor during the treatment.[12]

[9] Of the total 1252 shift observations in our data set, only 50 shifts are shifts of a team that has already completed a shift on a different field on the same day. The analysis below is based on a sample that drops the 50 observations of a second shift on the same day and controls for a dummy indicating whether a team worked a second shift on the respective day. This implies that we base our analysis on variation on the team-day level. Including the second shifts in the estimation sample delivers virtually identical results. Results obtained with the full sample are available on request.

[10] The difference in average age is less than half a year, with average age in control and treatment teams of slightly below 30 years and 29.5 years, respectively. Similarly, the difference in experience is minor, with 2.2 seasons for control teams and 1.95 seasons for treated teams. There is no indication that these differences varied between control and treatment period.

[11] Upon arrival, new workers typically work on a fixed daily wage for 1 to 2 days while practicing their task, and switch to incentive pay thereafter. In the analysis, we only consider teams that work on performance pay, eliminating 198 team-shifts, in which teams are working on fixed wages due to bad conditions or other reasons unrelated to the intervention.

[12] The respective p-values from t-tests are 0.33 over the entire season, and 0.19 and 0.86 before and during the treatment period, respectively.

After the end of the experimental intervention, there was a policy change as the firm adjusted the way in which the quality tournament outcomes were communicated. This policy change started on September 1, 2008, and was in place until the end of the harvest season. Before September 1, the quality scores of individual teams (and their team managers) were communicated to each team separately once a week, and no ranking or information on relative outcomes was provided. After September 1, quality scores of all teams plus the ranking of all teams was communicated to all teams every workday. We control for this change in policy in our analysis either by adding a policy dummy or by ways of day fixed effects.

2.4 Identification

The purpose of our study is to test the hypothesis that a change in the salience of incentives, i.e., in the way gross piece rates were communicated to team managers and team members, had no effect on performance as the actual incentives remained unchanged. By design, treatment effects of the experimental intervention can be identified by ways of a difference-in-difference analysis, estimating the effect of the treatment on the treated. The unit of observation is a shift (team/day) observation, where teams are identified through the respective team manager. The empirical model is

$$Y_{it} = \beta \mathcal{I}_{\text{Treated Team}} \cdot \mathcal{I}_{\text{Treatment Day}} + \alpha X_{it} + \gamma_i \mathcal{I}_i + \delta_t \mathcal{I}_t + \varepsilon_{it} \,, \tag{2}$$

where i and t denote team and day, respectively, Y is the respective outcome of interest, X are controls on the team-day basis, and γ and δ are coefficients of treated team (manager) and treatment harvest day indicators. The coefficient of interest is β, which reflects the effect of the treatment period on treated teams. In other words, regression (2) represents a difference-in-difference estimation, where treated teams are compared to control groups that did not receive the informational treatment. We estimate different versions of model (2), where $\mathcal{I}_i$ and $\mathcal{I}_t$ represent binary indicator variables for treated teams and days in the treatment period, or dummies for teams and treatment days, respectively. The fact that the treatment constitutes a change in the informational environment poses a slight difficulty in defining treatment and control periods. While the time before the treatment, i.e., before August 1, serves as control, it is not entirely clear how to treat the period after the end of the treatment. Strictly speaking, the experimental treatment was only applied between August 1 and 31, implying that the period after August 31 should be treated as control period. However, it might as well be that once the importance and functioning of incentives became more salient to treated team managers, they changed their behavior even without the quality control team explicitly pointing out daily incentives as during the intervention

period. In this case, the entire period after August 1 would constitute a treatment period.[13] In the following, we present results for both identification assumptions, i.e., a treatment period from August 1-31, or from Agusut 1-November 6, 2008. In all cases, the coefficient of interest, β, measures the effect of the treatment on treated teams compared to the respective outcomes in control teams, i.e., the treatment effect on the treated.

The firm changed some details in the way quality tournaments were conducted after the treatment period ended. To account for this policy change, which affected all teams alike, we add an indicator variable for the period after the treatment (i.e., after August 31, 2008) to account for a possible level effect whenever no harvest day fixed effects are included in the estimation equation. We present different estimates using OLS and GLS estimators, and with robust standard errors that account for possible correlation of errors within a harvest day, e.g., due to weather effects or due to the daily quality tournaments. Alternatively, we allow for clustering within the team manager, or for team-specific serial correlation in the disturbances and heteroskedasticity across teams.

All specifications include controls for the material incentives in terms of the gross piece rate set by the firm in advance of the respective shift. All specifications also include controls for team composition: the mean age of team members, the mean tenure of team members (in terms of seasons they have worked for the firm), as well as the mean duration of employment in harvest in the current season in days in order to account for potential productivity differences across teams. These team characteristics change over the harvesting season within teams as there is continuous arrival and departure of seasonal workers in a particular team manager's team. In addition, the specifications include controls for team size and total work hours to account for variations in terms of the labor force at the disposal of a team manager in a given shift.

3 Results

To examine potential effects of a change in the salience of incentives, we begin by estimating the effect of the experimental treatment on the daily performance of teams in terms of the total amount of lettuce harvested per shift and team. We estimate several specifications that make different assumptions about the determinants of the team production process and that use different estimation methods. The results are displayed in Table 2. Overall, the results point towards a noticeable treatment effect of the variation in salience on quantitative performance. The total amount of lettuce harvested increases by approximately 900-1250 heads

[13]Note that communication between team managers about incentives, or the intervention itself, cannot be excluded. Increased salience of incentives for non-treated team managers through communication should bias any treatment effect toward zero, however. This implies that the results presented below should be seen as conservative estimates of the true effect.

of lettuce in response to the treatment, which corresponds to an increase in the quantity harvested of about 2.5-3.7% percent compared to an average of 34,000 heads per shift. Notably, this indicates that the null is rejected in the data that a change in the way incentives were communicated had no effect on performance, as the actual incentives remained unchanged. Apparently, performance changed only in response to making the relevant incentives (in terms of the "gross piece rate") more salient to team managers and team members.

Column (1) presents results from a standard difference-in-difference setting with indicator variables for treated teams and the treatment period, as well as the treatment effect on the treated in terms of the interaction term, which takes value 1 for treated teams during the treatment period, and zero otherwise. The findings suggest that treated groups harvest on average lower numbers of lettuce, and that performance was higher during the treatment period. Most importantly, however, there appears to be a positive treatment effect, suggesting that the explicit announcement of incentives in fact increased performance in the quantity domain. This effect is marginally significant, with a p-value of around 0.05 based on robust standard errors. As expected, the *gross piece rate* has a strong negative effect on the quantities harvested, as a higher gross piece rate reflects also more difficult harvesting conditions. The change in policy after the treatment period appears to have had no effect on quantity, as indicated by the insignificant effect of the respective dummy. While team size appears to have only a weak effect, an increase in the total labor input in terms of work hours per shift induces a significant increase in harvested quantity, with one additional man hour being associated with approximately 125 additional lettuce heads harvested. This specification explains about 85% of the total variation in harvested quantity.

Column (2) presents results for a specification that includes team manager dummies, making the indicator for treated teams obsolete.[14] This specification accounts for time invariant team manager effects, for instance due to differences in leadership style or experience. All results are qualitatively and quantitatively very similar. The treatment effect on the treated is even slightly larger and significant at the 5% level. Column (3) presents results for a specification that includes dummies for each day, but no team manager dummies, making the treatment period and the post-treatment period dummies obsolete.[15] Day effects common to all teams reflect variations in harvesting conditions, weather, temperature, but do also account for different demand conditions faced by the firm, or cyclical variation in the labor force due to the departure of workers and the arrival of new workers. Again, the main results are similar, indicating a somewhat smaller, and slightly less significant treatment effect. Columns (4) and (5) present results from a specification with team and day fixed effects, with robust standard errors that allow for clustering within team and day, respectively. The treatment effect is of similar size as in the previous specifications, particularly as in specifica-

[14] Standard errors are robust and allow for clustering within teams.

[15] Standard errors are robust and allow for clustering within day.

tion (2), and marginally significant. Due to the fact that the analysis is based on data with only 13 cross-sectional units (teams) but 165 time periods (harvest days), clustering on the team level implies larger standard errors than clustering at the day level. Nevertheless, the effect is significant at approximately the 7% level or at the 3% level, respectively. All other results are similar, as well, where this specification explains the variation in output even better than the previous ones. Finally, column (6) presents results from GLS estimates that allow for AR(1) disturbances that might differ across teams, as well as for heteroskedasticity across teams. Again, the results are similar, with a treatment effect on quantity that is even slightly larger and significant at the 2% level.

The results are qualitatively similar, but quantitatively and statistically slightly larger once the alternative definition of the treatment period as the time after August 1 (instead of August 1-31 only) is adopted. The results, presented in Table 3, point towards a positive and statistically significant treatment effect on the treated across all specifications. These results suggest that the treatment effect was likely to be long-lived, in the sense that team managers changed their behavior once the incentives had become more salient, even after the quality teams had stopped ensuring that the team managers were informed about the gross piece rate.

Table 4 repeats the same analysis, using the same specifications, for performance in terms of quality instead of quantity. The dependent variable is quality (malus) points, where a higher value corresponds to lower quality. The results indicate a positive treatment effect over the period August 1-31. This effect, however, is only on the verge of significance, with p-values mostly between .1 and .2. Once two-way fixed effects are included, none of the controls exhibits an effect, which might indicate a substantial randomness in the determination of quality points through random sampling on part of the quality control teams. Nonetheless, interpreting the treatment effect qualitatively, we find indications that more salient quantity incentives lead to higher priority for quantity at the cost of quality. In terms of economic significance of the treatment effect, treatment makes quality points go up for the treated group by more than 5 percent (an increase of approximately 1 point compared to a mean of around 18 points). As indicated by columns (1) and (3), the policy change after the treatment period, which implied a change in the way daily quality tournaments were communicated, appears to have had some effect on quality. It appears to have lowered quality, in terms of increasing the average malus points per team. However, alternatively this might be driven by seasonal effects, provided that conditions for harvesting get already more difficult in September, and the prime growing season for vegetable is over. Since the change in firm policy affected all teams alike, a more detailed analysis of this effect would require data from previous seasons as control.

The effects are similar when applying the alternative treatment period definition, using the entire period after August 1, as treatment period. The results are shown in Table 5 and

point toward a positive effect of the treatment on quality (malus) points, i.e., a negative effect on quality. Except for the specifications without team manager controls these results are not statistically significant, however.

Since the team faces a multi-tasking problem – harvesting a large quantity at a high quality – estimating quantity and quality jointly might be more efficient. Tables 6 and 7 present the results from SUR estimations of quantity and quality outcomes for the different specifications without and with team manager and day dummies (columns (1) and (2), and (3) and (4), respectively), as well as when controlling for quality (quantity) in the quantity (quality) regression (columns (5) and (6)). The estimates deliver identical coefficients, but the results are statistically more significant.[16]

Another possible effect of the change in the salience of incentives might be on effort. Table 8 shows the results for an investigation of whether the salience of incentives had any impact on effort, measured by the duration of shifts in hours, or by the length of breaks, respectively. The specifications are again the same ones as for quantity and quality performance. With the exception of team size, which has a positive effect both on the length of a shift and on break time, none of the controls displays a systematic effect. In particular, we find no evidence for any effect of the experimental intervention on the amount of hours worked during a shift, as indicated by columns (1)-(6) of the table, or on break time, in columns (7)-(12). In fact, the coefficient estimate is close to zero, and the standard errors indicate that effects are nowhere near significance.[17]

The ultimate question concerning the treatment effect is whether the salience of incentives changed the payoffs of team members and team managers. To investigate this issue, we first present Table 9, which shows results for the average hourly wage as dependent variable. The average hourly wage is determined endogenously by a formula that takes into account quantity and quality performance of the team in relation to the time worked, as discussed in section 2. The results show that the experimental intervention had no effect on the average hourly wage for team members, regardless of the specification. This indicates that incentive salience plays no role for the wages of team members, but it still might be that the variation in the priority given to quantity and quality by the team manager might affect the team manager's compensation. The results also show that more experienced teams, in terms of workers that have been with the firm in previous years, and that have been working for the firm for quite a while in the current season, are able to work more efficiently, in the sense of achieving a higher hourly wage. In contrast, larger teams, and longer work days imply lower

[16]One has to keep in mind, however, that the standard errors do not account for clustering, and hence should be seen as a lower bound.

[17]The results are similar when based on the longer treatment period definition, treating all days after August 1 as treatment. Detailed results are available upon request.

hourly wages for the workers.[18]

In light of the fact that the main decisions about the relevant harvest parameters, such as speed of the harvesting machine, or the attention devoted to quantity and quality, are made by the team manager, the question remains whether increased salience has any impact on the manager's decisions and, hence, on his earnings. The results for the team manager's total daily performance pay for quantity harvested are presented in Table 10. Columns (1)-(6) contain results for estimates obtained with the same specifications for the piece rate component of the manager's daily earnings, which is closely linked to the piece-rates of the harvest teams, and hence their hourly wage. The results show that the intervention of increased salience of quantitative incentives had no significant effect on this earnings component, consistent with the findings for the team members. This is not surprising, given that the team manager's compensation for quantity is just a transformation of the team members' compensation for quantity. The only difference with respect to the results for the team members is that working longer hours, in terms of total man hours per shift, tends to increase the earnings of the manager, whereas it has a small but negative effect for workers.

However, team managers were not unaffected by the variation in incentive salience. The results presented in Columns (7)-(12) of Table 10 document this by using the manager's total daily compensation, which includes a fix wage component as well as components for quality and earnings from participation in the profits of the profit center "harvest" at the firm, as dependent variable.[19] The treatment effects are very similar when identified over the longer treatment period, see Table 11. The findings suggest that the experimentally increased salience of quantity incentives had a positive and significant treatment effect on the team managers' earnings. During the treatment period, treated team managers made about 3-5 Euros more in response to the treatment. This corresponds to a pay rise of 3.5-5 percent compared to the average compensation of 81 Euros per day. Again, more experienced teams and more total work hours per shift also increase the managers' earnings, while team size has a negative effect.

The results are confirmed by several robustness checks. We obtain qualitatively similar results when using logged outcome variables, as reported in Table 12. While statistical significance is slightly weaker with these specifications, the results are qualitatively identical and even quantitatively very close to the results obtained for linear outcomes. For instance, the treatment effect of about 5% for a linear measure of quantity as dependent variable in Table 2 before compares closely to the effect of 5.2% obtained with a logged quantity performance measure as dependent variable in Table 12. Similar comments apply to the results for quality and team managers' earnings. Unreported results show that the results are also

[18] Again, the results are similar for the alternative definition of the treatment period.

[19] All team managers that work on a given day receive 6.5 percent of the daily profits of the profit center, which are distributed proportionally by the team managers' working time on that day.

qualitatively similar when restricting attention to shorter control periods, e.g., restricting attention to July and August 2008 as control and treatment period. In addition, in unreported estimations we find no evidence that the treatment had a significant effect on variability of performance, neither within team across time, nor across teams within day. There is some evidence for a successive increase in the effect during the treatment period. Unreported results show that when the treatment period is split up in three sub-periods, we find typically the weakest effect during the first subperiod, i.e., during the first 10 days of the treatment in August 2008, for quantity and wages. There does not appear to be a significant interaction between material incentives (gross piece rate) and the treatment effect, as one might expect if team managers focus more on quantity if quantity incentives are high. However, this is not too surprising in light of the fact that our measure of incentives, the gross piece rate, is chosen systematically by the firm to account for difficult harvesting conditions. Hence, there might be two opposing effects on this interaction that cancel each other out. In summary, we find that a change in the salience of incentives had effects on performance and earnings, even though material incentives remained unchanged.

4 Conclusion

Incentive schemes and hierarchies are complicated in reality, even for simple tasks. As many studies have shown, incentive schemes affect performance and priorities of agents. Our study indicates that information about (and salience of) incentive systems is important to make them work effectively. We use data from a controlled field experiment to document that a change in communication of incentives, while holding the actual incentive structure fixed, has quantitatively and qualitatively relevant effects on performance. We find that ensuring more transparency of the whole performance pay system increases output (quantity), tends to reduce quality slightly, and increases the team managers' incomes.

A possible interpretation of the results is that team managers and team members work below their possibilities as long as the incentives are not fully salient to them. This holds in particular for the team manager, who apparently is able to increase his earnings despite no change in the material incentives. Interestingly, even though there is no significant effect on the average hourly wage for the team members, performance in terms of quantity seems to have increased in response to the greater salience of the incentives. One explanation for this finding could be the fact that the firm uses the gross piece rate not only as incentive device, but also as a means to adjust workers' earnings for difficult harvest conditions. In this sense, the gross piece rate fulfils both an incentive and an insurance function that might cancel each other out in terms of effects on actual wages. Nevertheless, from a more behavioral perspective, it is conceivable that the improvement in salience could reinforce reciprocal behavior by part of the workers: they might perceive the firm's incentive scheme as fair

in this context, and greater salience might lead to harder work, reciprocating the firm's incentive policy.

More work is needed to obtain a better understanding of the effects of complex organizations, such as team production structures with intricate multi-level performance schemes, on performance, however. Open questions concern the effects of team composition and turnover, as well as the working of incentives in multitasking settings.

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Figure 1: Piece Rates and Harvest Conditions: Weather Forecasts

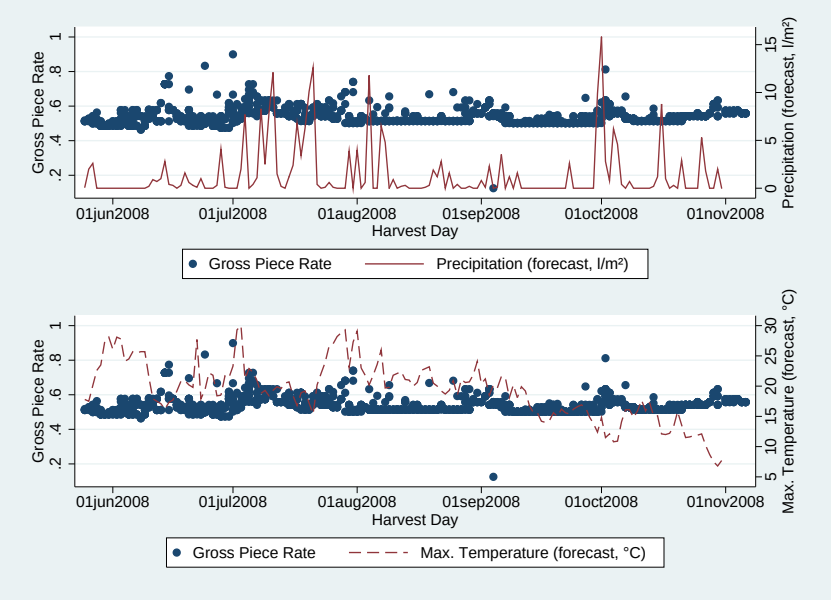

Table 1: Summary Statistics

Variable	Mean	Std.Dev.	N
Gross Piece Rate (Crate)	0.54	0.05	1,202
Pieces harvested (per shift)	34,590.1	9,592.9	1,202
Quality (Malus) Points	18.73	4.21	1,202
Average Hourly Wage (p.r.)	6.45	0.77	1,202
Work Hours (per shift)	8.00	2.06	1,202
Hours of Break Time (per shift)	0.58	0.26	1,202
Team Size	33.1	1.49	1,202
Total daily performance pay	45.19	12.83	1,202
Total daily compensation	82.23	22.63	1,202
Years of Experience	5.50	1.30	1,202
Mean Days Worked in Harvest (team)	54.28	26.84	1,202
Mean Seasons of Experience (team)	2.05	0.57	1,202
Mean Age (team)	29.74	2.62	1,202

Note: Observations are shifts. Total daily performance pay, total daily compensation and years of experience refer to the respective team manager. Mean days worked in harvest refers to current season. Gross piece rate refers to "gross per crate" price.

Table 2: Results: Quantity

	Pieces Harvested					
Treatment Period: August 1-31	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Effect on Treated	1,148.5*	1,322.2**	1,159.3*	1,379.8*	1,379.8**	1,364.3**
[s.e.]	[588.9]	[571.3]	[594.7]	[672.6]	[595.5]	[569.5]
[p-value]	[0.051]	[0.041]	[0.053]	[0.065]	[0.022]	[0.017]
Treatment Group	-1,445.5***		-1,670.5***			
	[272.1]		[281.1]			
Treatment Period	1,498.3***	1,642.5				
	[523.0]	[943.2]				
Dummy After-Treatment Period	1,084.3**	809.4				
	[545.6]	[705.0]				
"Gross" Piece Rate	-59,167.4***	-58,777.9***	-43,480.9***	-42,657.3***	-42,657.3***	-42,747.6***
	[6,258.7]	[9,680.7]	[9,136.3]	[11,128.2]	[9,724.1]	[2,886.9]
Mean Age (team)	-65.9	191.2	-103.2*	14.2	14.2	17.7
	[58.3]	[168.7]	[55.0]	[157.2]	[90.8]	[95.6]
Mean Years of Experience (team)	3,318.9***	2,369.5***	3,561.2***	3,008.2***	3,008.2***	3,065.8***
	[316.8]	[516.7]	[340.5]	[676.9]	[458.9]	[433.5]
Mean Days Worked in Harvest (team)	14.8*	11.1	5.7	4.5	4.5	-2.3
	[8.6]	[11.9]	[16.2]	[27.6]	[21.9]	[19.0]
Team Size	-124	-127	-228.7**	-230.9*	-230.9**	-202.8***
	[83.9]	[72.9]	[102.0]	[109.6]	[102.4]	[77.4]
Total Work Hours per Shift	122.8***	124.6***	123.8***	126.1***	126.1***	126.8***
	[2.2]	[3.6]	[2.7]	[3.3]	[2.9]	[1.8]
First of two Shifts	-393.3	-476.9	-693.9	-679.7	-679.7	-794.8
	[532.1]	[377.8]	[554.6]	[464.0]	[563.0]	[512.1]
Team Manager Dummies	no	yes	no	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202
R-squared	0.833	0.841	0.891	0.993	0.993	

Note: Columns (1)-(5) show OLS estimates. Robust standard errors are shown in brackets. Standard errors are clustered on team level (col. (2) and (4)) or day level (col. (3), (5)), respectively. Column (6) shows GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent variable is total pieces of lettuce harvested. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 3: Results: Quantity (Alternative Definition of Treatment Period)

	Pieces Harvested					
Treatment Period: after August 1	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Effect on Treated	1,189.1**	723.7	1,492.0***	1,256.0**	1,256.0**	1,215.2***
[s.e.]	[472.6]	[410.5]	[467.1]	[454.7]	[484.0]	[467.7]
[p-value]	[0.012]	[0.106]	[0.002]	[0.019]	[0.011]	[0.010]
Treatment Group	-1,960.6***		-2,293.1***			
	[382.5]		[366.5]			
Treatment Period	1,320.0***	1,708.6*				
	[506.2]	[815.8]				
"Gross" Piece Rate	-58,751.4***	-58,298.4***	-43,200.9***	-42,368.5***	-42,368.5***	-42,553.7***
	[6,369.0]	[9,704.7]	[9,177.7]	[11,287.5]	[9,738.9]	[2,889.9]
Mean Age (team)	-94.9*	85.7	-110.3**	-11.1	-11.1	-8.1
	[56.9]	[165.1]	[55.1]	[162.6]	[92.2]	[95.4]
Mean Years of Experience (team)	3,489.9***	2,800.7***	3,520.8***	3,007.5***	3,007.5***	3,087.6***
	[301.9]	[511.8]	[333.8]	[672.7]	[458.3]	[431.6]
Mean Days Worked in Harvest (team)	4.7	-4.7	14.1	15.6	15.6	5.5
	[7.3]	[11.6]	[16.6]	[26.2]	[22.7]	[19.3]
Team Size	-105	-103.3	-210.6**	-214.6*	-214.6**	-193.2**
	[84.9]	[79.6]	[102.3]	[109.0]	[103.3]	[77.2]
Total Work Hours per Shift	122.9***	124.5***	123.9***	126.1***	126.1***	126.8***
	[2.2]	[3.6]	[2.7]	[3.3]	[2.9]	[1.8]
First of two Shifts	-436.4	-495.1	-621.8	-618.6	-618.6	-750.5
	[549.7]	[377.2]	[554.8]	[455.9]	[562.1]	[512.5]
Team Manager Dummies	no	yes	no	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202
R-squared	0.833	0.839	0.892	0.993	0.993	

Note: Columns (1)-(5) show OLS estimates. Robust standard errors are shown in brackets. Standard errors are clustered on team level (col. (2), (4)) or day level (col. (3), (5)), respectively. Column (6) shows GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent variable is total pieces of lettuce harvested. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 4: Results: Quality

	Quality (Points)					
Treatment Period: August 1-31	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Effect on Treated	1.055	1.008	1.114*	0.929	0.929	0.762
[s.e.]	[0.644]	[1.078]	[0.588]	[0.691]	[0.580]	[0.533]
[p-value]	[0.102]	[0.370]	[0.060]	[0.206]	[0.111]	[0.153]
Treatment Group	0.574**		0.929***			
	[0.271]		[0.292]			
Treatment Period	0.553	0.683				
	[0.517]	[0.566]				
Dummy After-Treatment Period	0.925	1.913**				
	[0.564]	[0.823]				
"Gross" Piece Rate	18.698***	18.214***	2.628	-0.764	-0.764	0.514
	[3.349]	[5.058]	[4.135]	[3.188]	[3.836]	[2.853]
Mean Age (team)	0.052	-0.067	0.073	-0.052	-0.052	-0.034
	[0.055]	[0.093]	[0.057]	[0.150]	[0.101]	[0.090]
Mean Years of Experience (team)	0.341	0.681	-0.768**	-0.034	-0.034	0.076
	[0.338]	[0.589]	[0.315]	[0.601]	[0.382]	[0.408]
Mean Days Worked in Harvest (team)	-0.013	-0.032**	0.047***	-0.029*	-0.029	-0.026
	[0.008]	[0.012]	[0.015]	[0.016]	[0.019]	[0.017]
Team Size	-0.165*	-0.093	-0.09	0.016	0.016	0.003
	[0.087]	[0.138]	[0.112]	[0.163]	[0.111]	[0.078]
Total Work Hours per Shift	0.002	0.003	0.002	0.003	0.003	0.004**
	[0.002]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]
First of two Shifts	0.575	1.262	0.858	1.649**	1.649***	1.670***
	[0.626]	[0.711]	[0.535]	[0.685]	[0.549]	[0.481]
Team Manager Dummies	no	yes	no	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202
R-squared	0.061	0.133	0.389	0.974	0.974	

Note: Columns (1)-(5) show OLS estimates. Robust standard errors are shown in brackets. Standard errors are clustered on team level (col. (2), (4)) or day level (col. (3), (5)), respectively, in brackets. Column (6) shows GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent variable is number of quality (malus) points. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 5: Results: Quality (Alternative Definition of Treatment Period)

	Quality (Points)					
Treatment Period: after August 1	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Effect on Treated	1.191**	0.771	1.338**	0.44	0.44	0.403
[s.e.]	[0.503]	[0.668]	[0.515]	[0.544]	[0.540]	[0.437]
[p-value]	[0.018]	[0.273]	[0.011]	[0.436]	[0.417]	[0.356]
Treatment Group	0.073		0.384			
	[0.413]		[0.415]			
Treatment Period	0.449	0.906				
	[0.480]	[0.562]				
"Gross" Piece Rate	18.616***	17.771***	2.858	-0.841	-0.841	0.504
	[3.286]	[5.119]	[4.220]	[3.430]	[3.927]	[2.856]
Mean Age (team)	0.043	-0.034	0.066	-0.064	-0.064	-0.042
	[0.053]	[0.082]	[0.057]	[0.150]	[0.100]	[0.090]
Mean Years of Experience (team)	0.366	0.541	-0.803**	-0.013	-0.013	0.088
	[0.326]	[0.516]	[0.311]	[0.622]	[0.383]	[0.410]
Mean Days Worked in Harvest (team)	-0.013**	-0.021	0.055***	-0.026	-0.026	-0.022
	[0.006]	[0.012]	[0.015]	[0.017]	[0.020]	[0.018]
Team Size	-0.154*	-0.091	-0.073	0.024	0.024	0.008
	[0.086]	[0.130]	[0.112]	[0.158]	[0.111]	[0.078]
Total Work Hours per Shift	0.002	0.003	0.002	0.003	0.003	0.004**
	[0.002]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]
Second of two Shifts	0.612	1.352*	0.924*	1.680**	1.680***	1.692***
	[0.620]	[0.722]	[0.534]	[0.668]	[0.549]	[0.481]
Team Manager Dummies	no	yes	no	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202
R-squared	0.063	0.131	0.393	0.974	0.974	

Note: Columns (1)-(5) show OLS estimates. Robust standard errors are shown in brackets. Standard errors are clustered on team level (col. (2), (4)) or day level (col. (3), (5)), respectively, in brackets. Column (6) shows GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent variable is number of quality (malus) points. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 6: Results: Quantity and Quality (Joint Estimation)

Dependent Variable	Quantity	Quality (Points)	Quantity	Quality (Points)	Quantity	Quality (Points)
Treatment Period: after August 1	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Effect on Treated	1,148.483*	1.055*	1,379.785***	0.929*	1,364.501***	0.907*
[s.e.]	[592.685]	[0.617]	[481.030]	[0.479]	[481.766]	[0.481]
[p-value]	[0.053]	[0.087]	[0.004]	[0.052]	[0.005]	[0.059]
Treatment Group	-1,445.519***	0.574**	-6,271.158***	19.164***	-6,118.856***	-9.159***
	[262.138]	[0.273]	[1,321.275]	[4.399]	[1,348.164]	[1.328]
Treatment Period	1,498.292***	0.553	64.535	-1.124	34,596.234***	-1.125
	[489.761]	[0.510]	[2,444.092]	[2.435]	[4,528.538]	[2.435]
Dummy After-Treatment Period	1,084.263**	0.925	-2,879.608	2.827	31,632.183***	4.547*
	[541.532]	[0.564]	[3,267.169]	[2.928]	[4,893.560]	[2.454]
"Gross" Piece Rate	-59,167.370***	18.698***	-42,657.337***	-0.764	-42,644.774***	-0.068
	[2,627.861]	[2.735]	[3,039.521]	[3.028]	[3,039.500]	[3.266]
Mean Age (team)	-65.935	0.052	14.236	-0.052	15.097	-0.053
	[55.932]	[0.058]	[85.139]	[0.085]	[85.149]	[0.085]
Mean Years of Experience (team)	3,318.889***	0.341	3,008.234***	-0.034	3,008.795***	-0.083
	[318.227]	[0.331]	[376.001]	[0.375]	[375.989]	[0.384]
Mean Days Worked in Harvest (team)	14.774*	-0.013	4.513	-0.029*	4.989	-0.029*
	[8.327]	[0.009]	[16.492]	[0.016]	[16.512]	[0.016]
Team Size	-123.967	-0.165*	-230.904***	0.016	-231.164***	0.02
	[81.637]	[0.085]	[77.161]	[0.077]	[77.160]	[0.077]
Total Work Hours per Shift	122.844***	0.002	126.088***	0.003*	126.037***	0.001
	[1.848]	[0.002]	[1.865]	[0.002]	[1.867]	[0.004]
Second of two Shifts	-393.304	0.575	-679.689	1.649***	-706.816	1.661***
	[601.132]	[0.626]	[533.926]	[0.532]	[536.040]	[0.532]
Quality (Points)					16.445	
					[28.953]	
Quantity						0.0001
						[0.0003]
Team Manager Dummies	no	no	yes	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202
R-squared	0.833	0.061	0.896	0.461	0.896	0.461

Note: Columns (1)-(2), (3)-(4) and (5)-(6) show SURE estimates. Standard errors are shown in brackets. Dependent variables are total pieces of lettuce harvested and number of quality (malus) points, respectively. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 7: Results: Quantity and Quality (Joint Estimation; Alternative Definition of Treatment Period)

Dependent Variable	Quantity	Quality (Points)	Quantity	Quality (Points)	Quantity	Quality (Points)
Treatment Period: after August 1	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Effect on Treated	1,189.084**	1.191**	1,255.993***	0.44	1,247.265***	0.415
[s.e.]	[464.851]	[0.483]	[397.854]	[0.397]	[398.038]	[0.399]
[p-value]	[0.011]	[0.014]	[0.002]	[0.268]	[0.002]	[0.298]
Treatment Group	-1,960.567***	0.073	28,437.414***	-9.190***	-6,033.386***	-7.817***
	[358.974]	[0.373]	[4,416.366]	[1.317]	[1,345.964]	[1.327]
Treatment Period	1,319.994***	0.449	-3,876.846	-0.157	30,215.452***	27.645***
	[454.501]	[0.472]	[3,289.697]	[3.283]	[4,922.880]	[4.925]
"Gross" Piece Rate	-58,751.392***	18.616***	-42,368.511***	-0.841	-42,351.823***	-0.003
	[2,615.797]	[2.717]	[3,042.910]	[3.037]	[3,042.857]	[3.272]
Mean Age (team)	-94.925*	0.043	-11.128	-0.064	-9.861	-0.064
	[54.970]	[0.057]	[85.208]	[0.085]	[85.223]	[0.085]
Mean Years of Experience (team)	3,489.870***	0.366	3,007.457***	-0.013	3,007.710***	-0.072
	[308.823]	[0.321]	[375.620]	[0.375]	[375.602]	[0.385]
Mean Days Worked in Harvest (team)	4.748	-0.013*	15.62	-0.026	16.136	-0.026
	[6.467]	[0.007]	[17.026]	[0.017]	[17.042]	[0.017]
Team Size	-104.951	-0.154*	-214.567***	0.024	-215.053***	0.029
	[81.549]	[0.085]	[77.076]	[0.077]	[77.075]	[0.077]
Total Work Hours per Shift	122.926***	0.002	126.106***	0.003*	126.044***	0.001
	[1.850]	[0.002]	[1.864]	[0.002]	[1.866]	[0.004]
Second of two Shifts	-436.4	0.612	-618.636	1.680***	-652.001	1.693***
	[599.824]	[0.623]	[533.536]	[0.532]	[535.715]	[0.533]
Quality (Points)					19.855	
					[28.901]	
Quantity						0.0001
						[0.0003]
Team Manager Dummies	no	no	yes	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202
R-squared	0.833	0.063	0.896	0.460	0.896	0.460

Note: Columns (1)-(2), (3)-(4) and (5)-(6) show SURE estimates. Standard errors are shown in brackets. Dependent variables are total pieces of lettuce harvested and number of quality (malus) points, respectively. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 8: Results: Effort

	Working Time											
	Total Work Hours (Shift)						Break Time					
Treatment Period: August 1-31	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment Effect on Treated	0.371	0.297	0.234	0.143	0.143	0.131	0.062*	0.048	0.042	0.027	0.027	0.031
[s.e.]	[0.271]	[0.323]	[0.239]	[0.309]	[0.240]	[0.290]	[0.034]	[0.030]	[0.033]	[0.024]	[0.033]	[0.029]
[p-value]	[0.171]	[0.379]	[0.331]	[0.653]	[0.553]	[0.653]	[0.007]	[0.140]	[0.204]	[0.302]	[0.420]	[0.290]
Treatment Group	-0.14		-0.06				0.016		0.027			
	[0.130]		[0.119]				[0.017]		[0.017]			
Treatment Period	-0.509**	-0.432					-0.103***	-0.092**				
	[0.228]	[0.381]					[0.025]	[0.033]				
Dummy After-Treatment Period	-0.356	-0.215					-0.031	-0.036				
	[0.258]	[0.263]					[0.034]	[0.031]				
"Gross" Piece Rate	4.958***	4.793**	0.625	0.196	0.196	0.682	0.622***	0.543**	0.002	-0.163	-0.163	-0.04
	[1.647]	[1.874]	[2.046]	[1.836]	[2.140]	[1.561]	[0.207]	[0.216]	[0.305]	[0.238]	[0.291]	[0.186]
Mean Age (team)	-0.082***	-0.098	-0.057*	-0.019	-0.019	-0.026	-0.010***	-0.008	-0.007*	0.004	0.004	-0.003
	[0.026]	[0.061]	[0.030]	[0.074]	[0.051]	[0.049]	[0.003]	[0.006]	[0.003]	[0.008]	[0.007]	[0.005]
Mean Years of Experience (team)	0.372**	0.493*	0.186	0.262	0.262	0.113	0.045**	0.051	0.028	0.029	0.029	0.001
	[0.158]	[0.242]	[0.193]	[0.438]	[0.241]	[0.224]	[0.020]	[0.033]	[0.022]	[0.049]	[0.034]	[0.023]
Mean Days Worked in Harvest (team)	-0.011***	-0.012**	-0.004	-0.01	-0.01	-0.005	-0.001***	-0.001***	-0.001	0	0	0.001
	[0.004]	[0.004]	[0.006]	[0.010]	[0.008]	[0.009]	[0.000]	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]
Team Size	0.090**	0.084**	0.102**	0.096**	0.096**	0.073*	0.009**	0.011**	0.010*	0.012**	0.012**	0.007
	[0.040]	[0.038]	[0.046]	[0.037]	[0.045]	[0.039]	[0.005]	[0.005]	[0.006]	[0.005]	[0.005]	[0.004]
First of two Shifts	-3.018***	-2.893***	-3.009***	-2.882***	-2.882***	-3.023***	-0.264***	-0.250***	-0.263***	-0.251***	-0.251***	-0.250***
	[0.352]	[0.223]	[0.439]	[0.301]	[0.450]	[0.256]	[0.042]	[0.040]	[0.044]	[0.047]	[0.045]	[0.029]
Team Manager Dummies	no	yes	no	yes	yes	yes	no	yes	no	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202
R-squared	0.163	0.188	0.383	0.963	0.963		0.113	0.155	0.332	0.898	0.898	

Note: Columns (1)-(5) and (7)-(11) show OLS estimates. Robust standard errors are shown in brackets. Standard errors are clustered on team level (col. (2), (4), (8), (10)) or day level (col. (3), (5), (9), (11)), respectively. Columns (6) and (12) show GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent variable are total shift length net of break time, and break time, respectively. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 9: Results: Average Hourly Wage from Performance Pay

	Average Hourly Wage					
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Effect on Treated	-0.016	0.011	-0.001	0.038	0.038	0.037
[s.e.]	[0.096]	[0.088]	[0.091]	[0.090]	[0.092]	[0.099]
[p-value]	[0.870]	[0.899]	[0.994]	[0.677]	[0.677]	[0.708]
Treatment Group	-0.265***		-0.305***			
	[0.048]		[0.048]			
Treatment Period	0.235***	0.197				
	[0.081]	[0.122]				
Dummy After-Treatment Period	0.148	0.012				
	[0.093]	[0.103]				
"Gross" Piece Rate	0.602	0.547	2.446	2.695	2.695	2.024***
	[1.142]	[1.487]	[1.859]	[1.586]	[2.008]	[0.519]
Mean Age (team)	-0.033***	-0.019	-0.031***	-0.007	-0.007	-0.012
	[0.010]	[0.026]	[0.011]	[0.028]	[0.021]	[0.017]
Mean Years of Experience (team)	0.489***	0.412***	0.610***	0.519***	0.519***	0.541***
	[0.054]	[0.075]	[0.060]	[0.099]	[0.075]	[0.077]
Mean Days Worked in Harvest (team)	0.005***	0.007**	0	0.01	0.010**	0.011***
	[0.001]	[0.002]	[0.003]	[0.006]	[0.004]	[0.003]
Team Size	-0.034**	-0.035**	-0.038**	-0.042**	-0.042**	-0.035**
	[0.016]	[0.013]	[0.017]	[0.017]	[0.017]	[0.014]
Total Work Hours per Shift	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]
First of two Shifts	-0.038	-0.093	-0.135	-0.206	-0.206	-0.171*
	[0.139]	[0.157]	[0.143]	[0.188]	[0.145]	[0.094]
Team Manager Dummies	no	yes	no	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202
R-squared	0.188	0.215	0.428	0.993	0.993	

Note: Columns (1)-(5) show OLS estimates. Robust standard errors are shown in brackets. Standard errors are clustered on team level (col. (2), (4)) or day level (col. (3), (5)), respectively. Column (6) shows GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent Variable average hourly wage is given by the formula

$$\text{Average hourly wage} = \frac{(\text{gross piece rate} - \text{Quality-Points} \cdot 0.005) \cdot \text{Pieces}}{\text{Number of total work hours per shift}}$$

where "gross piece rate" is determined by the firm before the shift begins in terms of a gross per crate price and a target size of crates in terms of heads of lettuce. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 10: Results: Team Manager's Total Daily Earnings

Treatment Period: August 1-31	Earnings Team Manager											
	From Piece Rates						Total Earnings (all incl.)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment Effect on Treated	0.818	1.072	0.896	1.139	1.139	1.156	2.953*	4.107**	3.279**	4.160*	4.160***	4.625**
[s.e.]	[0.864]	[0.641]	[0.764]	[0.973]	[0.800]	[1.124]	[1.553]	[1.543]	[1.467]	[1.973]	[1.288]	[2.034]
[p-value]	[0.344]	[0.123]	[0.242]	[0.266]	[0.157]	[0.304]	[0.057]	[0.022]	[0.027]	[0.059]	[0.002]	[0.023]
Treatment Group	-2.394***		-3.001***				-6.079***		-6.259***			
	[0.521]		[0.498]				[0.960]		[0.862]			
Treatment Period	2.417***	2.168					2.293	1.631				
	[0.756]	[1.273]					[1.428]	[2.241]				
Dummy After-Treatment Period	1.37	0.479					0.212	1.535				
	[0.985]	[1.683]					[1.890]	[2.995]				
"Gross" Piece Rate	-2.023	-1.332	13.638	15.436	15.436	21.073***	-35.396**	-17.772	-42.045**	-13.634	-13.634	-10.036
	[11.180]	[16.292]	[16.340]	[17.951]	[17.451]	[5.951]	[14.953]	[19.160]	[17.731]	[13.525]	[12.619]	[9.042]
Mean Age (team)	-0.298***	-0.14	-0.243***	0.045	0.045	-0.078	0.031	0.248	0.059	0.114	0.114	0.078
	[0.100]	[0.168]	[0.090]	[0.251]	[0.192]	[0.186]	[0.178]	[0.271]	[0.177]	[0.435]	[0.294]	[0.323]
Mean Years of Experience (team)	3.660***	2.562**	5.268***	4.711**	4.711***	4.285***	3.955***	3.088	4.047**	4.037	4.037**	3.214**
	[0.639]	[1.035]	[0.662]	[1.721]	[0.958]	[0.872]	[1.316]	[1.963]	[1.838]	[3.061]	[1.606]	[1.542]
Mean Days Worked in Harvest (team)	0.037***	0.042*	-0.038	-0.02	-0.02	-0.016	0.076***	0.03	0.124**	-0.049	-0.049	-0.07
	[0.014]	[0.023]	[0.025]	[0.044]	[0.037]	[0.037]	[0.025]	[0.036]	[0.053]	[0.078]	[0.064]	[0.064]
Team Size	-1.252***	-1.312***	-1.430***	-1.512***	-1.512***	-1.469***	-1.847***	-2.010***	-2.125***	-2.323***	-2.323***	-2.206***
	[0.159]	[0.164]	[0.198]	[0.146]	[0.198]	[0.146]	[0.290]	[0.273]	[0.354]	[0.294]	[0.317]	[0.252]
Total Work Hours per Shift	0.152***	0.154***	0.158***	0.160***	0.160***	0.162***	0.257***	0.258***	0.271***	0.272***	0.272***	0.272***
	[0.004]	[0.004]	[0.006]	[0.006]	[0.006]	[0.003]	[0.008]	[0.010]	[0.010]	[0.011]	[0.009]	[0.006]
First of two Shifts	-3.125***	-3.642***	-3.956***	-4.418***	-4.418***	-4.870***	-11.856***	-9.308***	-12.576***	-9.501***	-9.501***	-10.057***
	[1.096]	[0.835]	[1.190]	[0.835]	[1.104]	[0.972]	[2.032]	[1.695]	[2.346]	[1.835]	[1.836]	[1.538]
Team Manager Dummies	no	yes	no	yes	yes	yes	no	yes	no	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202
R-squared	0.687	0.693	0.767	0.983	0.983		0.653	0.724	0.729	0.985	0.985	

Note: Columns (1)-(5) and (7)-(11) show OLS estimates. Robust standard errors are shown in brackets. Standard errors are clustered on team level (col. (2), (4), (8), (10)) or day level (col. (3), (5), (9), (11)), respectively. Columns (6) and (12) show GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent variable is daily earnings of team manager from piece rates only (columns (1)-(6)) and total daily earnings (columns (7)-(12)), in Euros. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 11: Results: Team Manager's Total Daily Earnings (Alternative Definition of Treatment Period)

	Daily Earnings Team Manager											
	From Piece Rates						Total Earnings (all incl.)					
Treatment Period: after August 1	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment Effect on Treated	0.373	0.174	0.755	0.588	0.588	1.013	-0.425	3.277	0.83	3.664	3.664**	4.394***
[s.e.]	[0.953]	[0.979]	[0.849]	[1.470]	[0.919]	[0.945]	[1.749]	[2.379]	[1.653]	[3.041]	[1.466]	[1.698]
[p-value]	[0.695]	[0.862]	[0.375]	[0.697]	[0.523]	[0.284]	[0.808]	[0.196]	[0.616]	[0.254]	[0.014]	[0.010]
Treatment Group	-2.517***		-3.262***				-5.436***		-6.142***			
	[0.853]		[0.757]				[1.587]		[1.444]			
Treatment Period	2.421***	2.28					3.463**	1.684				
	[0.874]	[1.621]					[1.592]	[2.922]				
"Gross" Piece Rate	-1.239	-0.504	13.693	15.375	15.375	21.246***	-33.487**	-17.363	-42.629**	-12.846	-12.846	-9.604
	[11.245]	[16.277]	[16.354]	[18.236]	[17.416]	[5.961]	[14.779]	[19.307]	[17.855]	[13.291]	[12.621]	[9.051]
Mean Age (team)	-0.335***	-0.284	-0.248***	0.03	0.03	-0.106	-0.056	0.062	0.047	0.039	0.039	-0.008
	[0.098]	[0.182]	[0.090]	[0.259]	[0.195]	[0.187]	[0.175]	[0.322]	[0.175]	[0.451]	[0.300]	[0.323]
Mean Years of Experience (team)	3.918***	3.158**	5.252***	4.734**	4.734***	4.323***	4.603***	3.822*	4.064**	4.042	4.042**	3.200**
	[0.614]	[1.146]	[0.664]	[1.723]	[0.954]	[0.872]	[1.263]	[2.049]	[1.858]	[2.960]	[1.599]	[1.537]
Mean Days Worked in Harvest (team)	0.021*	0.017	-0.035	-0.015	-0.015	-0.01	0.033*	0.013	0.126**	-0.017	-0.017	-0.038
	[0.011]	[0.018]	[0.027]	[0.048]	[0.040]	[0.037]	[0.019]	[0.035]	[0.056]	[0.093]	[0.067]	[0.065]
Team Size	-1.234***	-1.285***	-1.419***	-1.501***	-1.501***	-1.467***	-1.801***	-1.955***	-2.100***	-2.274***	-2.274***	-2.186***
	[0.161]	[0.172]	[0.198]	[0.136]	[0.198]	[0.146]	[0.291]	[0.281]	[0.352]	[0.283]	[0.315]	[0.252]
Total Work Hours per Shift	-3.240***	-3.723***	-3.913***	-4.379***	-4.379***	-4.841***	0.257***	0.258***	0.271***	0.272***	0.272***	0.273***
	[1.108]	[0.871]	[1.193]	[0.876]	[1.110]	[0.972]	[0.008]	[0.010]	[0.010]	[0.012]	[0.009]	[0.006]
First of two Shifts	0.152***	0.154***	0.158***	0.160***	0.160***	0.162***	-12.135***	-9.201***	-12.475***	-9.320***	-9.320***	-9.914***
	[0.004]	[0.004]	[0.006]	[0.006]	[0.006]	[0.003]	[2.043]	[1.817]	[2.350]	[1.968]	[1.843]	[1.535]
Team Manager Dummies	no	yes	no	yes	yes	yes	no	yes	no	yes	yes	yes
Day Dummies	no	no	yes	yes	yes	yes	no	no	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202
R-squared	0.686	0.691	0.767	0.983	0.983		0.651	0.723	0.728	0.985	0.985	

Note: Columns (1)-(5) and (7)-(11) show OLS estimates. Robust standard errors are shown in brackets. Standard errors are clustered on team level (col. (2), (4), (8), (10)) or day level (col. (3), (5), (9), (11)), respectively. Columns (6) and (12) show GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent variable is daily earnings of team manager from piece rates only (columns (1)-(6)) and total daily earnings (columns (7)-(12)), in Euros. ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.

Table 12: Robustness: Results for Logged Outcome Variables

	Quantity		**Quality**		**Earnings of Team Manager**	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Effect on Treated	0.052***	0.053***	0.053	0.045	0.067***	0.066**
[s.e.]	[0.019]	[0.019]	[0.033]	[0.030]	[0.019]	[0.029]
[p-value]	[0.008]	[0.006]	[0.111]	[0.126]	[0.001]	[0.022]
"Gross" Piece Rate	-1.546***	-1.531***	-0.052	0.046	-0.339	-0.142
	[0.331]	[0.109]	[0.212]	[0.156]	[0.263]	[0.146]
Mean Age (team)	0	0	-0.004	-0.004	0.004	0.005
	[0.003]	[0.003]	[0.006]	[0.005]	[0.005]	[0.005]
Mean Years of Experience (team)	0.094***	0.097***	0.002	0.007	0.065***	0.052**
	[0.015]	[0.015]	[0.020]	[0.023]	[0.024]	[0.022]
Mean Days Worked in Harvest (team)	0	0	-0.001	-0.001	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Team Size	-0.008**	-0.005**	0.001	0.001	-0.032***	-0.029***
	[0.003]	[0.003]	[0.006]	[0.004]	[0.005]	[0.004]
Total Work Hours per Shift	0.004***	0.004***	0	0.000**	0.004***	0.004***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
First of two Shifts	-0.142***	-0.129***	0.099***	0.102***	-0.263***	-0.276***
	[0.040]	[0.019]	[0.029]	[0.027]	[0.059]	[0.025]
Team Manager Dummies	yes	yes	yes	yes	yes	yes
Day Dummies	yes	yes	yes	yes	yes	yes
Observations	1202	1202	1202	1202	1202	1202
R-squared	0.99		0.997		0.99	

Note: Columns (1), (3) and (5) show OLS estimates. Robust standard errors clustered on day level are shown in brackets. Columns (2), (4) and (6) show GLS estimates, accounting for team-specific AR(1) disturbances within teams and heteroskedasticity across teams. Dependent variables are quantity in terms of total pieces of lettuce harvested in columns (1) and (2), quality in terms of quality malus points in columns (3) and (4), and total daily earnings of the team manager in columns (5) and (6). ***, **,* indicate significance at 1-, 5-, and 10-percent level, respectively.