Making Managers Matter

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Preliminary

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Abstract

In a field experiment, top management of a retail chain (238 stores, 7,700 employees) communicated to managers in a treatment group of stores about high rates of personnel turnover. Treated store managers were asked "to do what they can" to bring turnover down, leading to quit rates decreases by around 20% compared to the control group. The effect was persistent over nine months and vanished afterwards. A reminder treatment with a similar communication led to short-lived quit rate decreases in the same order of magnitude. Through numerous surveys throughout the hierarchy, we identify the mechanisms: treated managers interact more frequently with their employees, and employees report more managerial attention and support, thus providing causal evidence for the importance of face-to-face communication.

Keywords: organizations, managers, randomized controlled trial (RCT), insider econometrics, communication, HR, hierarchy

JEL codes: L2, M1, M12, M5

1. Introduction

There is growing evidence that management practices such as performance targets, monitoring, and incentives (e.g., Bloom et al, 2014, Bloom et al, 2017) can explain substantial parts of organizational performance and persistent productivity differences across firms (as documented by Syverson, 2011). While many of these practices can be adopted as a *technology* (Bloom et al, 2016), productivity also depends on the way people's interactions in an organization are managed; the focus of a large literature in industrial psychology and management science.

Face-to-face interaction is crucial for the well-being of people (Goffman, 1967) and for the productivity of teams (Battiston et al., 2017), but is costly in terms of time (Ellingsen and Johannesson, 2007). Top management's time is limited and information about different needs of different people at different points in time is dispersed. Hence, in large organizations, "people business" is carried out by middle managers. Delegating personal interactions implies a loss of control of the top management (Williamson, 1967, Gibbons and Roberts, 2013) and cements middle managers' importance in organizations. Until recently, little was known in economics about middle managers, but recent contributions (Lazear et al., 2015, Hoffman and Tadelis, 2017) have provided evidence on middle managers' impact on workplace performance and workers' turnover, the latter reflecting the popular insight that "people join firms, but leave managers".

In this paper, we report the results of an experiment in a retail chain with 238 stores and 7,700 employees. The goal of the experiment was to induce middle (i.e. store) managers to improve their HR activities, mainly to reduce personnel turnover. A randomized half of middle managers received a letter by top management asking them "to do what they can" to reach this goal. Personnel turnover in the respective stores decreased by up to a third, an effect that was stable for nine months. Upon sending a reminder, personnel turnover dropped one more time, at a similar rate, albeit short-lived. We provide causal evidence about the substantial effect of middle management on workers' decisions, and document the channels through which managers affect personnel turnover. Our treatment induced managers to shift their time use from customer-related to HR-related tasks; performance in terms of sales and

shrinkage[1] (the key performance indicators (KPIs) used to measure operational performance) staid constant.

The middle managers in our study firm each manage one workplace, a store with about 23 employees. Store managers allocate their time between different tasks, such as dealing with customers, workers, and the flow of goods. Their activities were initially governed by a system of KPIs, incentives, and their direct supervisors' orders. The existing system incentivized sales, shrinkage, and measures of customer service; measures of store managers' HR activities such as turnover were, however, not incentivized. In 2014, the insight grew on top management that high levels of turnover among cashiers (in the realm of 80% per year) were incompatible with the company's position as a high-quality food provider and the company's reputation.

Top management decided to communicate to middle managers about the importance of the turnover problem, intending to shift middle managers' attention to their role as HR managers. Following our advice, the CEO communicated directly to a number of randomly chosen managers. In this *Manage* treatment, store managers received a letter from the CEO asking them to do what they can to reduce turnover in their stores. This communication produced a large and stable effect, reducing the cashiers' quit rate by more than a fifth as compared to the control group, and lasting for nine months. The *Career* treatment is aimed at cashiers and made career and development opportunities within the firm salient (inspired by Ashraf et al, 2014, and Englmaier et al, forthcoming).[2] It did not result in a significant effect compared to the control group. The combined *Career+Manage* treatment produced an effect comparable to that of the *Manage* treatment, however, it realized only after a few months. After nine months, the treatment effect vanished. However, after sending a reminder, we triggered a treatment effect of a similar magnitude, thus showing the robustness of the effects we document.

In order to identify the mechanisms underlying these effects, we use a number of different surveys of managers, current and past employees, at different points of

[1] Shrinkage is the monetary value of perished goods. According to our study firm, shrinkage can be managed by careful positioning of goods (so that those closer to the expiry date are seen first).

[2] Ellingsen and Johannesson (2007) cite Wiley (1997) in writing that "full appreciation for work done" is the only job reward factor that consistently ranks among the top two motivators for U.S. Workers throughout the post-WWII period. They also refer to Elsdon (2003) who reports that "lack of recognition or appreciation is a major reason why people leave organisations, second only to lack of career development opportunities."

time. First, in a time-use survey we carried out before and after the treatment, we observe an increase in the time spent by 15 to 25 minutes per day managers on HR activities in the *Manage* and *Career+Manage* groups (compared to the other groups) and a decrease in time spent on other activities. Second, in a survey carried out a few months after the treatment started, managers in the two groups reported that they paid more attention to their employees, in particular those they believed likely to quit. Third, in another survey, cashiers in these two groups report, consistently with the manager survey, that stores managers spend more time individually with them (while group meetings appear to be unaffected). Finally, the exit interviews carried out by the HR office of the firm indicate that cashiers who left three months or less after their hiring date received more attention by managers in the two groups. Taken together, we believe the evidence on changed communication behaviour of managers to be quite reliable.

The paper contributes to a growing literature on field experiments with large firms, most of which has focused on monetary incentives (e.g. Delfgaauw et al 2013; Friebel et al. 2017, Englmaier et al, Bandiera et al, 2017). We provide the first causally interpretable evidence on the role of top managers' communication as a tool to steer middle managers, and suggest a framework in which middle managers allocate their time given existing monetary incentives and direct orders from direct supervisors. They react to top-management's skip-level communication (Friebel and Raith, 2004) by shifting their attention (Dessein and Prat, 2016) to HR activities. The fact that the treatment effect vanishes after a while is in line with middle managers' rational behavior and their expectation of rewards for decreasing personnel turnover, which did not materialize. Given that sales and shrinkage were not affected, it is likely that stores were run efficiently even before the experiment. On the headquarter level, however, high personnel turnover, for various reasons (administrative costs and firm reputation), created an externality, which was dealt with by top management's communication albeit only for a period of nine months (and an additional month after the reminder treatment).

The importance of top manager's personality and what they do for productivity has been the subject of a classic theoretical literature (e.g. Barnard, 1968; Cyert and March, 1963); and a substantial more recent empirical literature has shown how important CEOs are for firm performance (e.g. Bertrand and Schoar, 2003; Bandiera et al., 2014; Bandiera et al., 2016). The role of middle managers, is yet less

well understood. We see our contribution in providing causal evidence that middle managers matter, that the effects of their work on employee turnover are large, and that top-down communication is a powerful tool to shift managers' focus. We identify the channels through which the effect is realized: by intensifying interactions with employees. Our paper looks at the low-wage service sector. Our causal evidence complements Hoffman and Tadelis's (2017) survey-based finding about the importance of middle managers for employee turnover in a high-tech firm.

We also contribute to the literature on the performance effects of personal interactions in the workplace, whose current focus is on peer effects (Herbst and Mas 2015). Lazear et al. (2015) called for extending this research agenda to include interactions between managers and workers at different hierarchical levels. Our study responds to this call by showing the importance of middle managers in influencing worker turnover and, in particular, by uncovering a channel through which they affect turnover: communications with the workers. Our study also resonates with the theoretical literature on managerial attention and strategic focus (Geanakoplos and Milgrom, 1991, Halac and Prat, 2016, Dessein and Santos, 2016), as well as with recent empirical studies by Glover et al (forthcoming) of the link between supervisor attention and minority worker performance, and by Schoar (2017) of the effects of training on employee-manager communications.[3]

2. Study background

2.1. The firm and its workers

Our study firm is located in an eastern EU country. It runs one of the leading retail chains comprising 238 grocery stores spread over the whole country (half are located in urban areas), and controls 35% of the groceries market. An average store sells ca. 200,000 Euros worth of goods per month and employs 23 workers and a store manager (see Table 1, Panel A, column 1).

TABLE 1 ABOUT HERE

Store managers (91% female, average age 41, average tenure 6.3 years as of August 2015; see Table 1, Panel B, column 1) run the day-to-day business of the stores. Managers are responsible for operations (maintaining the availability of the

[3] Grönqvist and Lindqvist (2016) provide evidence that military training is associated with stronger management skills. Our causal evidence, however, is only related to a simple communication intervention, no training, and has strong immediate effects.

goods, store appearance, hygiene and food safety standards) and customer relations. They also take care of most of the HR which includes hiring, training and replacement of employees, as well as scheduling work shifts and distributing performance-related bonuses among the workers.[4] Each store manager reports to their regional manager who oversees ten stores on average and reports to the board of directors. Thus, given their scope of responsibilities and position in the firm's hierarchy, store managers are the middle managers of the firm.

The largest employee group in the stores (82% on average) and the ones we focus on in this study, are general store employees whom we label as "cashiers" in what follows.[5] Cashiers are 89% female, their average age is 33, their average tenure is 2.3 years, 95% of them are employed full-time (see Table 1, Panel C, column 1); cashiers almost never move between stores. In addition to operating cash registers, they fill the shelves and clean the store, working in shifts throughout the day. Cashiers earn minimum wage or close to it; their average monthly earnings, including bonuses, are 345 Euros. Many cashiers are dissatisfied with their working conditions.[6] Yet, the conditions it offers are similar to the ones offered by competitors in the country, and to the ones observed on the retail market in eastern EU countries in general (Giaccone and Di Nunzio, 2012).

2.2. The problem of cashier turnover

There is high turnover rate among cashiers, averaging at 6% per month in the period between January 2014 and August 2015. (For comparison, the turnover rate of store

[4] A store's bonus pool is determined by the regional manager in charge of the store, based on his or her subjective judgement of the store's performance. Within the store, the bonus is allocated by the store manager with the respective regional manager exerting varying degrees of advice and influence on the process. In addition to the resulting individual performance-related bonus, there is a loyalty bonus of 5% of the salary paid to employees who stay between one and three years with the firm and 10% for more than three years. This loyalty bonus is administered by the central HR office.

[5] Besides cashiers, stores employ specialists such as bakers or butchers, and (in larger stores) department managers who assist the store managers. These groups of employees have more of a career job, are better paid (their average monthly earnings, including bonuses, are 566 Euros) and tend to stay with the firm longer (average tenure 5.2 years).

[6] In a companion research project of ours, we introduced an employee referral system in randomly selected stores. The employees received a bonus of up to 135 Euros if they referred a friend. Employees rarely used the referral system. In our *Store Manager Survey Sept 2016* and *Cashier Survey Sept 2016* (see Section 6 for more details on our surveys) around 50-67% of the store managers and cashiers explicitly stated that the "unpleasant working conditions" are the reason why employees do not refer their friends.

managers (other store employees) is 0.9% (2.7%) per month over the same period.) This average disguises significant variations in the cashier turnover rate by season of the year, going from its lowest rate of 3% in January to its highest of 10% in August. Newly hired cashiers are particularly likely to quit: in fact, 50% of the cashiers who left did so within five months from being hired, similar to the numbers Burks et al. (2015) reports in a U.S. call centre.[7]

Top management has expressed the long-term ambition to halve the existing turnover rate. This, so far unofficial and un-incentivized, target reflects management conviction that there is a natural rate of turnover, and that some turnover is helpful in adjusting labor input to changes in demand (Siebert and Zubanov, 2009). However, the existing high level of turnover among cashiers was considered too high and costly to the firm.

To quantify the employee turnover problem that beset our study firm and to inform the deliberations with top management, we attempted to estimate the costs of turnover. These costs consist of four components. First, there are accounting costs at the store level: the costs of time spent on turnover administration, interviewing, selecting and training the new workers. Second, there are accounting costs at the firm level: the cost of employing HR personnel who update personnel records, run exit interviews, place job adds, collect applications and forward them to store managers. Third, there are economic costs in terms of profits stores lose because of turnover. In particular, newly hired workers are less productive than experienced workers,[8] existing workers have to put up with changes in shift schedules as many cashiers quit from one day to the other,[9] and store managers lose time dealing with personnel turnover instead of operations and customer relations.[10] Fourth, there are economic costs accrued to the firm as a whole. In particular, high turnover damages firm's reputation, diminishes the incentives to train workers, and drains the talent pool from which more senior employees can be selected. We provide calculations about the

[7] In general, high turnover is a substantial problem in sectors with low-wage workers; Manning's (2011) survey provides estimates on the elasticity of personnel turnover with respect to wages in the realm of 0.5-1.5.

[8] Blatter et al. (2012) estimate that newly hired skilled workers are about 30% less productive compared to an averaged skilled workers within a firm for about 80 days. Manning (2011) also concludes in his literature survey that the bulk of the hiring costs are the costs associated with training newly hired workers.

[9] Labor regulations allow workers to leave on three days' notice.

[10] In our pre-experimental phone survey in July 2015 we find that managers spend on average 10% of their time in dealing with turnover.

costs in Appendix I, and find a magnitude of roughly three months of wage per quit which is consistent with the estimate of Blatter et al. (2012) and the summary of case studies on turnover costs in Boushey and Glynn (2012). It should be noted, though, that these estimates are fraught with problems of endogeneity, and hence we prefer to rely on the treatment effects to provide a causal estimate of the effects of reducing personnel turnover.

2.3 Why the turnover problem became focal

Historically, our study firm, one of the first modern retail structures in the former Soviet Union, had paid wages well above the market level in retail. However, with the advent of the financial crisis in 2008 and the resulting drastic fall in purchasing power, the company had got under pressure and began to cut costs. As a consequence, wages were adjusted to competitors' level, and employee turnover increased to the level we witnessed at the beginning of our intervention.

Initially, the high cashier turnover did not receive much attention within the group of top managers. However, prior to our intervention, the problem gained in importance for a number of reasons. First, there was a change in top management in 2014, when the foreign owner of the firm took action against declining profitability. With this change the firm focused on a broader set of performance, among others quality and cashier turnover. Second, it became public in 2014 that *Lidl*, a large discounter from Germany, planned to enter the market (it did actually enter in June 2016). Top management of the firm expected an 8% drop in sales as a result of *Lidl* entry, and decided to increase its claim to quality leadership in the market. Reducing cashier turnover was viewed as a necessity in the quest to improve quality and operational efficiency.[11] Third, between 2010 and 2014 the unemployment rate in the country decreased by more than seven percentage points, which increased the hiring

[11] Bloom et al. (2012) show that firms in Central European transition countries operate with management practices that are moderately worse than those of Western European countries. They also find that stronger product market competition and higher levels of multinational ownership in those countries is strongly correlated with better management, a finding confirmed by Friebel and Schweiger (2013) who report similar results for different regions in Russia. In line with this we find that the intensified product-market competition encouraged our firm to rethink its management practices and that the foreign owner installed a new top management aiming to increase the firm's performance by improving management practices.

costs.[12] The problem gained additional importance as it became evident that because of high cashier turnover, the internal labor market of the firm was jeopardized. In 2014 and 2015 around half of the regional managers and 60% of the store managers were hired from within the firm (the share of managers hired from within the firm was higher in the years before). At a quit rate of 80%, the talent pool became thin, with the risk of declining quality of managers.

Reflecting top management's initial lack of awareness about the turnover problem (and, more general, HR matters), store managers also tended to disregard the problem. Their KPIs did not include personnel turnover, and the instructions they received about HR were mainly related to the involved paper work. In line with this lack of focus on HR, most of the training store managers received was in dealing with goods, customers, and administration, but not employees. The surveys we carried indicate that a substantial proportion of store managers did not consider HR a focal activity, and many managers did not believe that they would even be able to reduce turnover. We discuss what we find in the surveys in detail in Section 6.

3. Experimental procedures

Our experiment was registered on the *AEA* homepage (registration ID: *AEARCTR-0000826*). The description we posted is in Appendix II. We designed three experimental treatments all of which began on September 1st 2015 with a letter addressed to store managers in the respective treatment groups. Shortly thereafter, the COO office made follow-up calls to the managers in all treatment groups, to reinforce the importance of the letters they received. Lastly, in October 1st 2016, we sent a reminder letter to randomly selected store managers.

In our first treatment, labelled *Manage*, the managers received a letter, signed by the firm's CEO and chief HR officer (see Appendix III, Figure A), directing their attention to the costly personnel turnover problem and asking to take action:

We currently have a personnel turnover of about 90% per year.[13] We also know that 50% of those who leave are leaving in the first few months of their employment at FIRM NAME. Each employee's leaving costs us on average 400

[12] Blatter et al. (2012) estimate that a one percentage point reduction in the unemployment rate increases hiring costs on average by five percentage points.

[13] In the letter we communicated 90% because the respective figure was computed using the quit rates in 2015, which were particularly high. In the entire pre-treatment period, the monthly quit rates were around 6%.

Euros[14] *– at least. (...) We would like to bring your attention to the problem and ask you to do what you can, in order to bring down turnover. In particular, please talk to your employees and make them feel fully integrated into your team, among others by putting emphasis on the buddy program.*[15] *Please also note that it is important to train the new hires in the essential processes and have an open ear for problems they may have in the beginning.*

Note that this letter is vague, it influences perception about the problems store managers should deal with and provides a nudge that communication with the employees may be important. It provides no explicit incentives, but, since communications from top management are rare, it could be understood as a signal that the importance of employee turnover relative to other performance indicators had increased. The message entails no precise instruction how to implement. We stressed communication with employees because we were told by management that store managers rarely engaged in face-to-face interaction with employees.[16] Indeed, in our cashier manager survey in October 2015 among control group stores we found that 30% of the store managers had one or no meeting with employees per quarter, and another 30% held only one meeting per month (for more details on the *Cashier Survey Oct 2015*, see Section 6)

In our second treatment, *Career*, we sought to reduce turnover by informing employees in the selected stores about career and development opportunities available within our study firm. Such opportunities are numerous and diverse, ranging from operations to food manufacturing and IT. Furthermore, there is a significant internal labor market with half of the store managers beginning as cashiers. The posters, employee and store manager letters (see Appendix III, Figure B – D) we sent to the *Career* treatment stores highlight these opportunities; we also provided contact details of an HR official whom we trained in explaining the existing opportunities. The figures communicated about the internal labor market were taken from the personnel

[14] Note that at the time our regressions of quit rates on profits did only use one lag, explaining the lower cost estimate.

[15] Each new hire is assigned to an experienced colleague who helps him or her in the first few weeks of employment.

[16] It is inspiring to see the treatment in the light of Gibbons and Henderson (2012) who relate to Rivkin's concepts of *perception* (knowing that one is behind); *inspiration* (not knowing what to do about it); *motivation* (not having incentives to change); and *implementation* (not being able to get the organization to get it done). Our treatment changed perception and gave some, but little, inspiration; and no explicit motivation (see, for instance, Bandiera et al, 2007, and Manthei et al, 2017) or implementation help.

statistics of the company. Unlike in the *Manage* treatment, store managers played a rather passive role in the *Career* treatment; all we asked of them was to put the career opportunities poster in the place visible to all employees.

The third treatment, *Career+Manage*, combined the two treatments described above. Our goal was twofold. First, the treatment allows to check for complementarities between different types of communications. Second, the amount of information communicated was larger (see Appendix III, Figure E) but we effectively left it to the initiative of the store manager whether they would like to stress one or the other of the interventions, or both equally.

Materials were prepared together with the HR and Marketing department. In the last week of August, we informed the management team about the assignment of stores into the different treatment and control groups. A day later, documents were sent to stores. Regional managers had been trained in how to respond to store managers's question, but treatment status was only revealed to them at the same time as to store managers, and they were explicitly instructed by the COO not to take any actions beyond responding to questions.

FIGURE 1 ABOUT HERE

The time line of the experiments is depicted in Figure 1, which also provides an overview of the available data which will be discussed in the next sections. We implemented the treatments beginning of September 2015, informed management about first results late December 2015, and once per quarter hereafter. Our data span a time until December 2016 such that we have 16 months of observation, which provides the unique opportunity to provide insights about the long-term effects of the interventions. In October 2016, we sent a reminder to 30 stores each, in the *Manage*, and *Career+Manage treatment*. We use the same letter in both groups (see Appendix III, Figure F):

We are pleased to report a substantial reduction in firm-wide turnover that we believe has been due to the efforts of our store managers such as yourself. (...) However, turnover is still high. (...) We would like, once again, to draw your attention to the problem, and ask you to do what you can to bring it down. Please talk to your employees and try to make them feel fully integrated in your team, making use of the buddy program among our other HR initiatives. Please also note that it is important to train the new hires in the essential processes and have an open ear for problems they may have in the beginning as well as throughout their employment.

4. Research design

In general, retail firms offer good opportunities to study what we have called people business, because human interactions are frequent, the technology is simple and standardized, data are of high quality, and the work environment is representative for many jobs in the global economy (Cardiff-Hicks et al, 2015; Hortaçsu and Syverson, 2015; Friebel et al, 2017).

Our administrative data (personnel records, financial and accounting data) span a long period of time, from January 2014 until December 2016. In particular, we used 19 months of pre-treatment data for our randomization. As suggested by Athey and Imbens (2017), we use a stratified procedure in which assignment into the four different groups is carried out along quit rate (our main outcome variable of interest), the location (town or countryside), sales and number of employees (as proxies for store size). Our experiment is sufficiently powered. Based on the pre-treatment distribution of the quit rate, and the number of measurement periods before and after the treatment, having 60 stores in each treatment group would detect a treatment effect on the quit rate of 2 percentage points with probability 0.9. To see whether the treatment and control groups are balanced, we run the mean equality test on a number of store, manager and cashier characteristics. The results (Table 1) show that the four groups are balanced with respect to the quit rate – the main outcome variable – and most of the other characteristics.[17]

To estimate the treatment effects, we use the CHANGE and ANCOVA estimators (McKenzie, 2012). CHANGE is the following difference-in-difference estimator:

$$Quit_{it} = \beta \cdot treatment_i * after_t + month\ fixed\ effect_t + store\ fixed\ effect_i + optional\ controls_{it} + error_{it} \quad (1)$$

where $Quit_{it}$ is the cashier quit rate in store i and month t, $after_t$ is a dummy variable equal 1 for all pre-treatment and 0 for all post-treatment months, $error_{it}$ is the idiosyncratic error term clustered at the store level. ANCOVA estimates (for the post-treatment observations):

[17] Exceptions are store average age and share of female cashiers. These differences are unlikely to drive our results because the treatment effects do not depend on either of these variables.

$$Quit_{it} = \beta \cdot treatment_i + month\ fixed\ effect_t + \delta \cdot \overline{Quit_{\iota,PRE}} + optional\ controls_{it} + error_{it} \quad (2)$$

where $\overline{Quit_{\iota,PRE}}$ is the average of the cashier quit rate in the pre-treatment period (January 2014 to August 2015). For the reminder intervention (in October 2016), we use the same specification, i.e. $\overline{Quit_{\iota,PRE}}$ is still the average of the cashier quit rate in the pre-treatment period (January 2014 to August 2015). The coefficient β estimates the effect of our treatment in the both specifications. The ANCOVA estimator is a generalization of the basic difference-in-difference estimator that controls for baseline outcome, which reduces the variance in the estimated treatment effect, and regression to the mean. As we find (and McKenzie (2012) shows) that ANCOVA is more efficient than CHANGE, we use ANCOVA in all regressions (but will also report CHANGE in our main regression table, to show that both produce similar estimates). An alternative would be to estimate the treatment effect on the individual decisions to stay or leave with a duration or logit regression; however, clustering the observations at the store level produces similar estimates and significance statistics.

5. Treatment effects on quit rate: baseline results, treatment effect heterogeneity, and the effect of the reminder treatment

Table 2 summarizes the treatment effect over the main treatment period starting in September 2015, when the letters were sent, and ending in September 2016, before the reminder letters were sent in October 2016. Compared to the control group, the *Manage* and *Career+Manage* treatments reduce the monthly quit rate by about 1.5 and 1.1 percentage points (ppts), respectively. Compared to the mean monthly quit rate of 8.3% in the control group during the treatment period, the point estimates of the treatment effects mean 19% (*Manager*) and 14% (*Career+Manage*) reductions in cashier turnover. The *Career* treatment average effect is about -1 ppt, and is statistically insignificant. We can, however, not reject that the three treatments have statistically identical effects when comparing them with each other.

TABLE 2 ABOUT HERE

The average effects reported in Table 2 mask important variations in the magnitudes of the treatment effects over time, which are shown in Table 3. The *Manage* treatment shows large effects – in the realm of 25% to 35% of the contemporary quit rate in the control group – in all periods except June to September

2016. The *Career+Manage* treatment shows no significant effect in the first treatment quarter (September 2015 to November 2015), and then has effects in the same realm as the *Manage* treatment, petering out in June to September 2016, just like the *Manage* treatment. On the contrary, the *Career* treatment effect is stably low and mostly insignificant.

TABLE 3 ABOUT HERE

While the *Manage* treatment effect is stable in the first nine months, the effect of the *Career+Manage* treatment needs time to pick up. Our explanation for these different dynamics is that the *Career+Manage* treatment may have led an information overload. Managers may have needed some time to realize that making careers salient to cashiers fails to reduce quits (recall that, in isolation, *Career* has weak or no effects). After a while, managers may have begun to engage actively with their cashiers, leading to similar effects as in the *Manage* treatment.

To probe into treatment effect heterogeneity, we first interact the treatment dummies with a number of objective characteristics, including: (i) pre-treatment store-average cashier age, gender and quit rate; (ii) store size in headcount, location (big town vs. countryside), local unemployment rate, and whether the store had a new manager during the treatment period; and (iii) store manager age and tenure.

We find that the treatment effects are significant only in the stores in which there was either no manager change during the treatment period or the new manager moved from a store in a similar treatment (218 out of 238 stores satisfy this condition), and are zero otherwise, suggesting that our treatment indeed works through store managers. Another notable heterogeneity is in the effects of the *Manage* and *Career+Manage* treatments by store size: the effect is significantly larger in smaller stores. We explain this result in Section 8, where we also consider treatment effect heterogeneities variations with employee survey responses and store manager fixed effects. All other heterogeneities are insignificant, with the exception of the *Career* treatment whose effect weakly decreases with store manager tenure (the *p*-value of the interaction term of the *Career* treatment dummy and manager tenure is 0.07).

All treatment effects disappear in the summer of 2016. To try to revive them, we sent a reminder letter with a plea to continue efforts to reduce turnover in the end of September 2016 to 30 stores in the *Manage* and 30 stores in the *Career+Manage* groups (Figure F). By doing so, we were able to differentiate between the treatment

effects and (potentially group-specific) time trends, while still having enough power to identify the effects. The results are in Table 4. Comparing the first with the second row, *Manage* and *Career+Manage* group stores that received a reminder show a strong, albeit short-lived, treatment effect. The remaining *Manage* and *Career+Manage* and the *Career* group stores (in which no reminder was sent) do not show any effect. The reminder treatment confirms that the effect identified in the initial treatment is replicable. As before, it dies out without being reinforced by corresponding incentives – a point we discuss in more detail in Section 9.

TABLE 4 ABOUT HERE

Looking at the other important KPIs – sales, operational profits and shrinkage – we find positive treatment effects on sales and profits, and negative on shrinkage (see the regression tables in Appendix IV). None of the estimates are statistically significant, though, although there could be good reasons for an increase in productivity when personnel turnover is reduced, as discussed in Section 2. Section 9 will provide an explanation for this fact, which rests on the way managers reacted to the communication treatment.

6. What managers do to matter

We use nine different surveys carried out at different points in time, and among different target groups: regional managers, store managers, and cashiers. Moreover, we also use the survey the company generates through exit interviews among cashiers. We use such a large number of different instruments (different sources, different groups, different questions) in order to increase the reliability of the qualitative evidence (Bloom and Van Reenen, 2010) and hence to respond to the challenges highlighted by Bertrand and Mullainathan (2001). Each method and instrument (explained in detail below) may have different drawbacks and advantages, but by combining them, we believe to get a rather complete picture of store managers' reaction in response to the intervention.

Figure 1 provides a time line of all surveys, the group of employees surveyed, the main goal of the survey and the response rates. For simplicity, we will use the following labels for the different surveys in the paper:

- Surveys among cashiers: *Cashier Survey Oct 2015, Cashier Survey Sept 2016, Cashier Exit Interviews*

- Survey among store manager: *Store Manager Survey July 2015*, *Store Manager Survey Oct 2015*, *Store Manager Survey Jan 2016*, *Store Manager Survey Sept 2016*
- Survey among regional managers: *Regional Manager Survey Oct 2015*, *Regional Manager March 2016*, *Regional Manager Nov 2016*

The *Cashier Exit Interviews* were conducted by the HR office of our firm, by phone. All other surveys were framed as "international surveys by the Goethe-University Frankfurt" and a local business school, that are the "basis for the research of the professors involved".[18] Employees were assured that any response they would provide would only be accessible to the researchers who did the survey and not to the study firm. The *Cashier Survey Oct 2015*, *Store Manager Survey Oct 2015* and the *Regional Manager Survey Oct 2015* were paper and pencil surveys. The questionnaires were put by the employees in sealed envelopes and were collected by one employee working in the stores and send to a professor at a local business school. All other surveys were phone surveys conducted by a native-speaking student assistant employed by us who was not aware of the treatment status of the stores. The HR office informed the respective group of employees that a team of researchers would contact them over the next few weeks.

Although we did not incentivize the participation in the surveys (except of the *Store Manager Survey Jan 2016*, where we gave one out of ten managers a 25 Euro voucher), the response rates in all surveys were relatively high. The response rates were around 80-100% in the store and regional manager, and around 50-65% in the cashier surveys.[19]

In the next sections, we will frequently refer to items of these surveys. Here, we use the *Store Manager Survey Jan 2016*, which provides information about

[18] Regional managers were informed about our field experiment and all our surveys with the study firm. A few weeks before we implemented our treatments, COO together with us informed the regional managers in a training event about our joint research program, and told them that the HR office would centrally organize all communications. A few days before we implemented the treatments the HR office called all regional managers, provided them more details about our treatments, and asked them once again to leave all communications to the HR office. Store managers and cashiers were not aware of our involvement in the letters we send to them in our treatment period. Thus, our field experiment combines randomization and realism (Harrison and List 2004; List and Rasul 2011).

[19] In the *Cashier Survey Sept 2016* and *Cashier Exit Interviews* around 20% of the participants refused to answer the surveys. The other reasons of non-responses were that the phone numbers were incorrect, the HR office had no longer any contact information, or that the cashiers did not pick up the phone after we rang them at least three times.

managers' self-reported activities to reduce turnover. We also use *Cashier Exit Interviews*, and the *Cashier Survey Sept 2016*, both of which help us identify cashiers' perceptions about managers' interactions with cashiers.

In the *Store Manager Survey Jan 2016*, all store managers in the *Manage*, *Career+Manage*, and *Control* treatment were phoned.[20] In the interview our assistant asked the store managers the following question: *Since last Summer/Autumn, have you done anything in particular that you think could reduce turnover in your store?* The assistant made detailed notes about the responses of each store manager.

Anecdotally, managers' responses differ substantially between different groups. For example, in the *Manage* treatment one store manager said "I became worried about an employee's alcohol problem, visited him at home, suggested a medical treatment"; another store manager described that she implemented "more team-building, meetings over coffee/sweets". In the control group, many store managers said they did not believe they could affect turnover ("I can't do anything. Turnover is the workers' fault, not mine!"). We also counted words that relate to the face-to-face interaction between store managers and employees: "attention", "care", "talk", "paying respect", and find that 56.3% of the store managers in *Manage* use at least one of the words in their response, compared to 32.5% in *Career+Manage*, and 27.5% in the control group. "Paying respect" is one of the most often used expressions that managers themselves use to describe their activities undertaken as a consequence of our treatment(s).

To analyse the responses in more depth and to externally validate them, we conducted an evaluation study in the University of Cologne's experimental laboratory. We showed our assistant's interview notes to the subjects each of whom earned 8 Euros and asked them to rate those notes based on the following questions:

- "According to the store manager, how possible was it to reduce employee turnover? Rate on a scale from 1 (impossible) to 10 (quite possible)."
- "Has the manager intensified effort to reduce turnover in the last months? (no/yes)"
- "Has the manager talked to employees more over the last few months? (no/yes)"

[20] Due to resource constraints, we decided not to interview the store managers in the *Career* group in which the treatment effect was low.

- "Has the manager talked to specific groups of employees more over the last few months? (no/yes)"

Each subject in the lab rated notes from twenty different store manager interviews, and around ten different subjects rated each interview note. The subjects were not aware of the treatment status of the store managers.

From the comparison of the ratings of store manager responses between the *Manage* and control groups, we find that store managers in the *Manage* group had higher beliefs that they can affect turnover (4.6 vs. 3.2), increased their effort to reduce turnover (0.47 vs. 0.29) and, in general, talked more to their employees (0.51 vs. 0.27), in particular to some employees (0.28 vs. 0.16). When we regress these responses in an ordered logit regression on the treatment dummy, we find the dummy to be statistically significant. (Table 5, Panel A). Ratings in the *Career+Manage* group are somewhat lower than in the *Manage* group but on average still higher than in the control group, and statistically not always significant. This is in line with the fact that the *Career+Manage* treatment just began to pick up at the time of the survey.

TABLE 5 ABOUT HERE

We now turn to the results of the exit interviews, which are available for cashiers who left the company between 1st July 2015 (i.e., before the treatment) and 15th February 2016. The survey has a response rate of 57%, mainly because one third of the cashiers could not be reached; most cashiers who were reached agreed to participate. In order to deal with the truncation problem imposed by the end of the exit surveys in February 2015, we only look at those cashiers leaving during the first three months of their tenure (i.e. who enter before 15th November 2015). This is also in line with the communication to the managers that explicitly pointed to the importance of engaging with new workers in the first three months of their employment. From our analysis, we exclude cashiers who entered before but left after the treatment began (for evident reasons), which leaves us with 535 exit interviews.

The survey contains two questions of particular interest to our paper: (i) how much attention and support did you receive from your supervisor in the first weeks or months when you arrived in the store?; (ii) how much attention and support did you receive from your colleagues in the first weeks or months when you arrived in the store?

In Panel B of Table 5, we report the results from a diff-in-diff ordered logit regression in which the dependent variables are the responses to the above questions

coded on a scale from 1 to 5. We find a statistically significant effect in the *Manage* treatment in terms of managerial attention, but no effect in terms of colleagues' attention.

Results of the *Cashier Survey Sept 2016* in which two randomly selected cashiers per store were interviewed about the time per week supervisors spend on talking to them personally, are in Panel C. We do not find significant effects for the entire sample. However the effect is significant for stores in which managers did not change since the beginning of the treatment. This seems to indicate that upon a change of manager, the treatment effect disappears (arguably because the manager was not sufficiently aware of the initial communication).[21]

The survey evidence provides a consistent picture that managers increased the intensity of interaction with cahiers in those treatments in which they were asked to bring down turnover. There is also some evidence that they focused on those employees they had to believe had the highest risk of quitting, for instance in early stages of employment or the ones with private problems. The treatment also affected the way they allocated their time across different managerial tasks, a point we will discuss in Section 9, where we provide an explanation for the treatment effects.

7. Alternative explanations and robustness

If it were not for reasons of intensified communication with the employees, what other mechanisms could explain our results? The first thing coming to one's mind is the risk that managers may not fire incompetent cashiers in order to bring turnover down. However, in the personnel records of the firm there is no significant difference-in-difference in the number of workers fired in the four groups of stores. Second, managers may change their hiring practices. Out of 89 managers interviewed in the *Store Manager Survey Jan 2016* who belonged to the *Manage* or *Career+Manage* group, only three mentioned that they had changed their hiring processes. The observable characteristics (age, female) of new hires do not differ between treatment groups. Most importantly, while changes in hiring would only be possible with a certain lag, we observe immediate changes both in the initial and the reminder treatment. Third, managers may change bonus payments, however in the statistics we find neither differences in the averages nor in the distribution of bonuses.

[21] We are unable to further explore the behavior of old versus new store managers because we only carried out one cashier survey each year.

A robustness concern applies to many field experiments and also to ours: there could be spillovers between different groups of stores. In particular, store managers in the treatment group may feel discouraged about the fact that they were not included in the treatment groups. We believe this to be of no concern for our firm, for a simple reason: when we started our treatment, there were twelve other pilot projects run by the firm in subsamples of stores on issues such as prices, logistics, marketing and products. Store managers are used to such experiments and never complain about inclusion or non-exclusion to the regional managers or top management in our treatment period. Another form of spillover, about which we are also not concerned is the one in which stores in the control group may imitate what stores in the treatment groups are doing. While we cannot entirely reject that this may happen, it would only lead to an *underestimation* of the treatment effects.

8. Different types of managers

We have shown before that most important treatment effect heterogeneity is in terms of store size, with smaller shops showing larger treatment effects. To illustrate, we estimate our main specification with the treatment dummies interacted with store average size in employee headcount. Our estimates for the period of September 2015 to September 2016 imply a reduction in the *Manage* (*Manage+Career*) treatment effect of 1.7 (1.3) ppts corresponding to a one-standard-deviation increase in store size. To explain this result, we first check whether it is driven by span of control measured as the number of non-managerial employees per store / department manager in each store. It is not: the interactions between the treatment dummies and store size do not disappear when we control for the span of control as well as for its interactions with the treatment dummies.

Our explanation to the treatment effect heterogeneity by store size rests on the practice of career management in the firm, according to which, as we were informed by the COO, managers who successfully manage small stores get promoted to larger ones in order to leverage their human capital at larger scales.[22] Store managers average monthly earnings in the pre-treatment period were 935 Euros (sd: 273). A

[22] This is an argument reminiscent of the theories of Lucas (1978), Rosen (1982), Garicano (2000) and many others; for empirical evidence see, for instance, Garicano and Hubbard (2007), Smeets et al (2016).

ten-percent increase in store size is associated with a 2.6% increase in managers' wages.

Digging deeper into this argument, in the *Regional Manager Survey Nov 2016*, we showed all regional managers the names of all store managers (n = 79) who moved between stores in the pre-treatment period, and asked them about the reasons for those movements. In 85% of the cases, regional managers could provide the reason (in 15%, the regional manager responsible for the movement had quit the firm). The two most important reasons for movements were store managers' promotions (51% of the cases) and demotions (15%).[23] According to the personnel records, before promoted managers moved, they had on average 17 employees in their store, and in their new stores on average 37 employees; for demoted managers the numbers are 46 before, and 21 employees after the movement. successful managers are promoted to larger stores to increase absolute profits. This provides a first indication that the treatment effect may interact in interesting ways with the quality of the manager, and that it is mainly the weaker managers who respond to the treatment.

To substantiate this conjecture, we follow Bertrand and Schoar (2003), Lazear et al. (2015), Hoffmann and Tadelis (2017), Janke et al (2016), who all use manager movements to identify manager "fixed effects" in performance. We use the method proposed in Abowd et al. (1999) and implemented in Cornelissen (2008) to estimate the manager and store fixed effects in the quit rate. Figure 2 shows the distributions of store manager (the box plot on the left) and store fixed effects (the box plot on the right) in the quit rate. In line with the previous literature, the considerable variation in the manager fixed effects indicates that store managers matter for employee turnover.

FIGURE 2 ABOUT HERE

Interacting the *Manage* and *Career+Manage* treatment dummies with the estimated store manager fixed effects we find that a one-standard-deviation change in the manager fixed effect (i.e., one-standard-deviation decrease in manager quality as measured by ability to deal with turnover) is associated with a 3.2 ppt larger effect of the *Manage* treatment and a 1.7 ppt larger effect of the *Career+Manage* treatment. Although the latter results need to be taken with some care given the endogeneity of manager movements between stores from which manager fixed effects are estimated

[23] In the remaining cases, store managers were interim managers (9%; e.g. because the of parental leave or sickness of store managers), the manager moved privately (9%), the store was closed (5%) or other reasons were given (6%).

(a problem applying to of all the related literature), the mass of the evidence reported in this section strongly suggests the importance of differences in manager quality for the efficacy of our treatments.

9. Explaining the observations

The preceding sections have established a clear pattern: (i) in stores in which managers received a direct communication from top management about the importance of bringing down personnel turnover, personnel turnover decreased substantially (by about one third); (ii) managers and cashiers report changed behavior of store managers, in particular, more intensive communication and interaction practices; (iii) stores sales show a small but statistically not significant effect in the treatment stores; (iv) the effect on turnover is persistent over nine months, vanished, but appeared again (for a shorter period) after a repetition of the communication.

We think about these observations as being consistent with a theory in which store managers' behavior is mainly influenced by incentives, orders of their direct hierarchy (here, regional managers), and communication from the top management. While explicit incentives and orders in the hierarchy were kept constant, our treatment uses the rare instrument of direct top-down skip-level communication. It is likely that such communication (see Dessein and Prat, 2016) affects store managers beliefs about what is important for the firm, and their belief about the firm's performance evaluation, and rewards beyond explicit incentives, here, to be promoted to a larger store, or to regional manager, or receiving a discretionary bonus.

Consistent with this view, managers should shift attention and effort to activities that are likely to bring personnel turnover down, and we saw in the survey that they did indeed so. However, they would rationally do so without jeopardizing the bonuses that are made contingent on other KPIs than personnel turnover. This would imply that there should be a shift in the time use; however only a relatively moderate one. This would also imply that upon realizing that no rewards were given for the decrease in turnover rates, managers would, after a while, put less emphasis on HR activities. In order to explore these ideas, we first look at the time use of managers, and than at the promotions the firms carried out in the treatment period.

9.1 Time use

Inspired by Bandiera et al (2016), we carried out time-use surveys of store manager by phone, a pre-treatment (*Store Manager Survey July 2015*) and a post-treatment survey (*Store Manager Survey Sept 2016*; see Section 6). The timing of the second survey is not optimal, because the treatment effect had already vanished by the time, but in first and second survey, we explicitly asked managers to "think about the last months". Managers were asked to indicate how they allocated their time across different tasks: (i) management and control of the flow of goods, and logistics; (ii) interacting with clients; (iii) administrative work, such as paper work, handling of money, communication with my boss and the central office; (iv) managing, training and communicating with the people who work in your store and dealing with personnel turnover.

We find that store managers in the *Manage* treatment spent about 25 more minutes per day on dealing with HR and turnover, which is compensated by less time spent on customers. (The same effect of the *Career+Manage* treatment is 15 minutes, and is statistically insignificant.) We also find (Table 6) that the magnitude of the *Manage* treatment effect increases with additonal time spent on HR and turnover. Specifically, the magnitude of the coefficient on the interaction between the *Manage* treatment dummy and the change in the time spent on HR (in hours), -0.034, implies that an additional hour per day spent on these activities increases the treatment effet by 3.4 ppt. Thus, the extra time the *Manage* treatment causes managers to spend on HR – 25 minutes per day (in a 40 hour week) – explains a 1.4 percentage points decrease in the quit rate, which is commensurate with the average treatment effect we reported earlier. These observations are consistent with the view that at the time of the treatment, top management's communication affected store managers' beliefs about personnel turnover being an input for their evaluation.

TABLE 6 ABOUT HERE

9.2 Were there rewards for lower personnel turnover?

One possibility of rewarding performance in terms of personnel turnover would consist in a discretionary bonus to managers who reduced turnover in their stores. Looking at the store manager bonus before and after the start of the experiment (75 Euros per month, on average), we observe only a small correlation between store manager bonus and quit rate. The estimated correlation between the bonus and quit rate implies a trivial (60 Cent) increase in the monthly bonus corresponding to the 1.5

ppts decrease in the quit rate caused by the *Manage* and *Career+Manage* treatments. There is no significant direct effect of those treatments on manager bonus, either.

Where there implicit, career incentives? We can also investigate this: Consider all manager movements in the relevant time span from the beginning of our field experiment until June 2016, the month after the treatment effect vanished. In this period of time, 52 store managers and three regional managers had to be replaced, for a variety of reasons (e.g. store manager turnover, promotions, maternity leave). This would have given the firm scope for career rewards, either by promoting to a larger shop, or to regional manager. As a background, recall that the treatment effect is larger in smaller stores, and we know from surveys that managers from smaller stores with good sales performance are usually promoted to larger stores.

Is there a discernible effect of personnel turnover on how these positions were filled? Notice first that the three regional managers and 13 of the store managers were replaced by people from the external labor market. 21 of the store managers were replaced by store employees who were promoted, and 18 store managers were replaced by other store managers who moved between stores. Out of these 18 store managers – the only moves that could have been a promotion for store managers who had reduced their personnel turnover – ten were from stores in the *Manage* or *Career+Manage* treatment, and eight from *Control* or *Career* Treatments. According to the *Regional Manager Survey Nov 2016*, only one of the managers in the *Manage* or *Career+Manage* was promoted, and four were even demoted. Hence, no career rewards were given to shops that had reduced their personnel turnover.

With neither promotion nor bonuses affected by the treatments, the lack of material reward may be a likely explanation for the treatment effect to vanish after a while. As discussed before, however, when we repeated the treatment, personnel turnover, again, decreased, however only for a short period. It hence seems that the second time, middle managers updated their beliefs about the communication even faster than before.

9.3 Were shops efficiently run before the treatment?

Recall that we did not find statistically significant effects on sales in the treatment group of stores (although point estimates are positive for sales, and negative for shrinkage). This could be owing to high standard errors, but there is also an explanation in line with the simple agency framework we have suggested. Upon

receiving the communication about bringing down personnel turnover, managers shift some of their effort to interacting with the employees. This may have a certain positive effect on the productivity of the workforce, and would increase sales in the treatment group. However, there is also the direct effect of the reallocation of effort from customers to employees which would reduce the sales. What we pick up may be the composite of the two effects.

This also implies that the stores were initially run efficiently in terms of the incentivized KPIs, and that there was little if any scope of improving the commercial performance of stores. On the level of the headquarters, however, high personnel turnover created a number of substantial costs. We can only put a price tag to one of them, the administrative costs of the HR department who would do the bulk of the paper work for the stores. The treatment effect estimates on the quit rate imply a reduction of cashier quits by 370 incidents over the treatment period. Taking the administrative costs alone (244 Euros per quit), the saving is 90,000 Euros. This does not seem much, but it should be noted that first, the costs of the experiment were negligible and second, there are many costs that would be hard to quantify, such as an increasingly thin talent pool for the internal labor market of the firm and a decreasing reputation, both because of high labor turnover.

10. Concluding remarks

By communicating to middle managers about the importance of personnel turnover, we induced a reduction by up to a third of the personnel turnover. There was no change in the incentive scheme or the underlying key performance indicators, but nonetheless the effects are quite large. In part, this may be explained by the fact that it appears to be the laggards who react most intensively. It is however also noteworthy that our firm is situated in an Eastern European country formerly part of the Soviet Union, a region with relatively low levels of managerial efficiency (see Bloom et al, 2012, and Friebel and Schweiger, 2013). While the foreign owners had introduced numerous new management practices such as price setting, logistics, product, and customer management, people business was not among the priorities of the company before we began our collaboration.

Our paper shows that enhanced communication matters for one performance measure (personnel turnover) without negatively affecting the others (sales, shrinkage). The intervention was profitable for the firm, workers report more

intensive interactions with their supervisors which is likely to increase their well-being. First, if this were not the case, one should observe an increase rather than a decrease in quits, and second, we know from exit interviews that more than 50% of the employees who quit were still unemployed three to four months after the quit decision. With most of the remaining workers reporting to work in jobs with similar pay and work conditions, it indeed seems so that many workers leave because of bad managers, an effect that was mitigated through our treatment. Moreover, as the reduction in quits led to fewer people being unemployed at any given moment of time, our treatment seems to have positive externalities in terms of lower expenses for unemployment benefits.

Communication from top managers to middle managers can have substantial effects. This conjecture is a commonplace in the management literature (at least since Barnard, 1938). The causal evidence we find for the effect of communication corroborates this conjecture, but it is also noteworthy that the effect has a certain duration, but ultimately fades away. A similar, second, communication has effects of the same magnitude but much shorter duration. To investigate the question of optimal frequency of skip-level communication from the top is a fascinating topic that we leave for future research.

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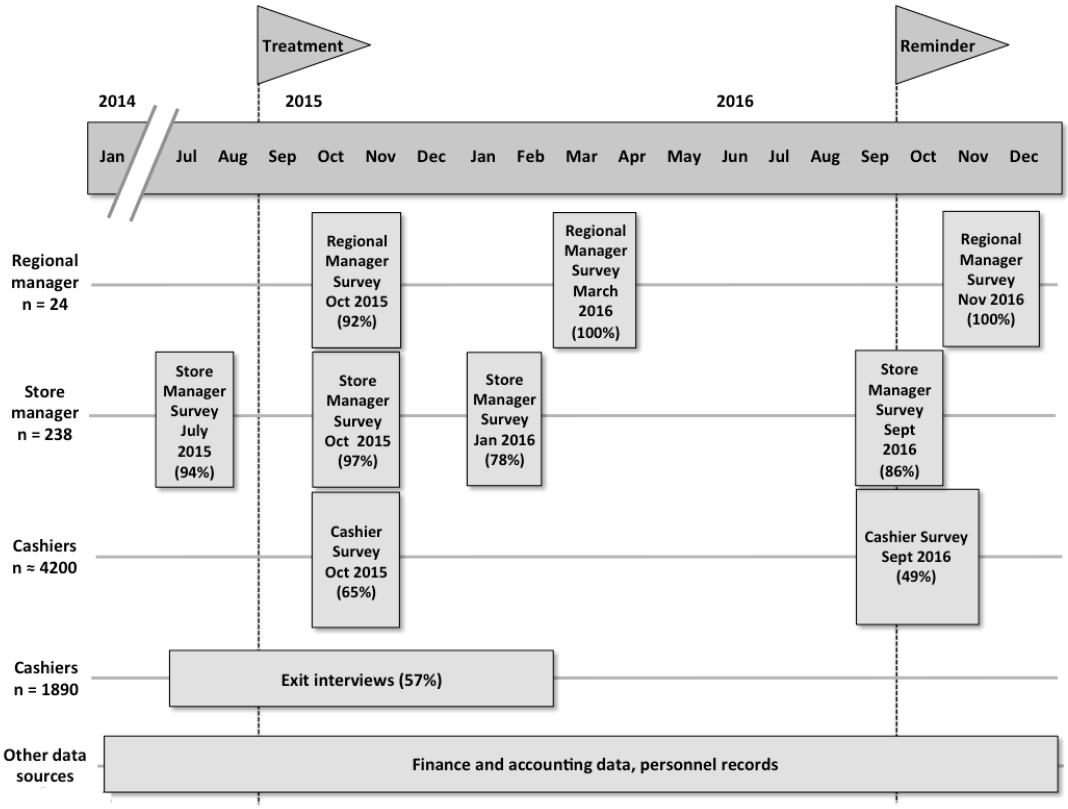
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Figures and Tables

Figure 1: Data sets used in the paper



Notes: Response rates in the surveys are in parenthesis. Store manager and cashier surveys were framed as "international surveys in the retail industry". Exit interviews: We only use data for cashiers who quit in the first three months in the paper (n=945, response rate: 57%). Store Manager Survey January 2016: Eleven store managers were not interviewed as they only recently moved to the store.

Figure 2: Box plots of manager and store fixed effects from the quit rate regression

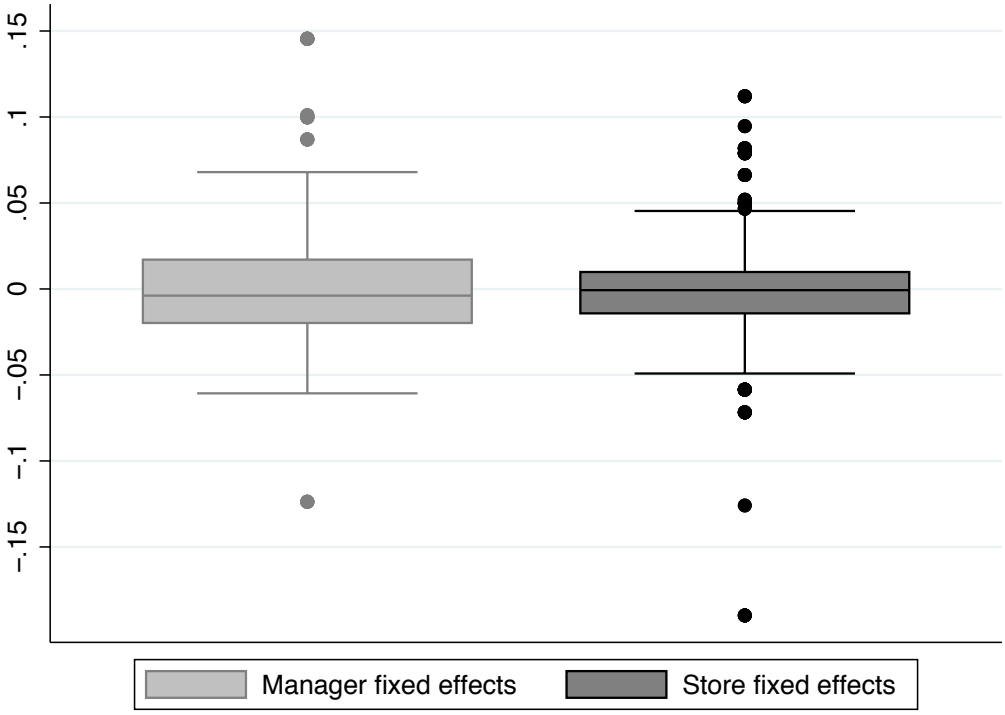


Table 1: Descriptive statistics, by treatment group (Jan. 2014 – Aug. 2015)

	Panel A: Characteristics of stores					
	All stores (n = 238)	**Control** (n = 59)	**Manage** (n = 60)	**Career + Manage** (n = 59)	**Career** (n = 60)	**Mean equality test p-value**
Mean monthly sales	205,557 (154,266)	190,366 (126,874)	208,690 (154,187)	202,306 (145,263)	220,905 (183.930)	0.738
Mean store size (in square meters)	643.36 (371.42)	584.19 (307.35)	653.11 (385.00)	645.36 (358.26)	687.40 (413.06)	0.441
Mean number of employees	24.13 (17.50)	21.97 (14.27)	23.37 (16.14)	25.86 (20.40)	25.30 (18.38)	0.613
Mean monthly shrinkage	5,752 (4,276)	5,340 (3,542)	5,431 (3,718)	6,368 (4,970)	5,860 (4,626)	0.543
Span of control (non-managerial employees per manager)	3.38 (1.56)	3.17 (1.45)	3.45 (1.54)	3.43 (1.68)	3.46 (1.56)	0.551
Location: Town	53.29%	52.73%	48.71%	56.90%	55.89%	0.812
Regional unemplyment rate	7.73% (2.33%)	7.44% (2.20%)	7.64% (1.91%)	7.96% (2.85%)	7.89% (2.29%)	0.559
	Panel B: Characteristics of store managers					
Mean monthly earnings	939.18 (260.43)	931.13 (256.44)	932.35 (248.89)	950.08 (260.76)	943.29 (274.61)	0.844
Mean age (in years)	40.64 (8.72)	42.22 (6.75)	38.81 (9.01)	41.43 (9.43)	40.51 (8.67)	0.524
Mean tenure (in years)	6.26 (4.38)	6.15 (4.43)	5.75 (4.21)	7.05 (4.69)	6.04 (4.11)	0.773
Share of females	91.10%	87.49%	96.23%	86.85%	93.70%	0.052
Percentage of work time allocated to HR (self-reported)	27.66% (11.08%)	28.16% (11.47%)	25.63% (8.74%)	26.83% (10.99%)	29.93% (12.51%)	0.172
	Panel C: Characteristics of cashiers					
Mean monthly quit rate	5.54% (7.68%)	5.73% (7.87%)	5.56% (7.81%)	5.10% (7.12%)	5.76% (7.88%)	0.493
Mean number of cashiers	17.61 (13.04)	16.26 (11.18)	18.13 (13.15)	17.21 (12.33)	18.83 (15.05)	0.712
Mean monthly earning	345.02 (104.98)	347.28 (105.74)	347.87 (104.15)	340.57 (104.48)	343.89 (105.42)	0.474
Mean age (in years)	32.85 (12.68)	31.54 (12.27)	33.14 (12.64)	32.10 (12.68)	34.45 (12.88)	0.004
Mean tenure (in years)	2.26 (2.52)	2.18 (2.56)	2.28 (2.48)	2.24 (2.42)	2.33 (2.61)	0.865
Share of females	88.99%	88.13%	88.18%	89.38%	90.28%	0.514

Notes: Panel A and C: Data are from January 2014 – August 2015; Panel B: Earnings, age, tenure and share of females are from August 2015, percentage of work time allocated to HR is from a pre-treatment store manager survey in July 2015. Number of employees: Excluding store managers

Table 2: Average treatment effects in the main treatment period (Sept. 2015 – Sept. 2016)

	CHANGE	ANCOVA
Manage treatment	-0.017**	-0.015**
	(0.028)	(0.007)
Career + Manage treatment	-0.011	-0.011*
	(0.007)	(0.006)
Career treatment	-0.011	-0.009
	(0.008)	(0.007)
Control group	0.083	0.083
average quit rate	(0.011)	(0.011)

Notes: The specification that generates the results in this table is the usual ANCOVA estimator (equation 2). * p<0.1, ** p<0.05, *** p<0.01.

Table 3: Average treatment effects by time period

	Sept. 2015-Nov. 2015	Dec. 2015-Feb. 2016	Mar. 2016-May 2016	June 2016-Sept. 2016
Manage treatment	-0.019**	-0.029**	-0.019*	0.002
	(0.009)	(0.014)	(0.010)	(0.010)
Career + Manage treatment	-0.005	-0.026**	-0.025**	0.007
	(0.009)	(0.012)	(0.010)	(0.011)
Career treatment	-0.009	-0.017	-0.017*	0.003
	(0.009)	(0.014)	(0.010)	(0.010)
Control group	0.074	0.081	0.081	0.093
average quit rate	(0.009)	(0.015)	(0.009)	(0.010)

Notes: The specification that generates the results in this table is the usual ANCOVA estimator (equation 2). * p<0.1, ** p<0.05, *** p<0.01.

Table 4: Average treatment effects after sending the reminder

	Oct. 2016	Nov. 2016	Dec. 2016
Manage/Career + Manage treatment: Reminder sent	-0.032**	-0.010	0.013
	(0.013)	(0.015)	(0.012)
Manage/Career + Manage treatment: No reminder sent	0.012	0.008	-0.016
	(0.016)	(0.016)	(0.013)
Career treatment	0.002	0.006	0.005
	(0.017)	(0.014)	(0.014)
Control group average quit rate	0.062	0.057	0.051
	(0.088)	(0.064)	(0.073)

Notes: The specification that generates the results in this table is the usual ANCOVA estimator (equation 2). * p<0.1, ** p<0.05, *** p<0.01.

Table 5: Responses in our store manager interviews (Panel A), cashier exit interviews (Panel B) and cashier survey (Panel C)

	Mean (SD) response Control	Estimated ologit coefficients; baseline: Control		
		Manage	Career + Manage	Career
Panel A: Differences in free text responses of store managers in the phone interviews, evaluated by ten external evaluators (Jan. 2016; n=129)				
A1. According to the store manager, to what extent is it possible for her/him to reduce employee turnover? (Scale: 1 (not possible) to 10 (possible); LHS variable: Mean scale)	3.191 (1.551)	1.233*** (0.383)	0.516 (0.353)	(NOT SURVEYED)
A2. Has the store manager increased effort to reduce the turnover in the last months compared to the time before? (Scale: Yes or no; LHS variable: share of "yes" responses)	0.293 (0.375)	0.948** (0.393)	0.716* (0.406)	
A3. Has the store manager talked to workers more over the last few months compared to the time before? (Scale: Yes or no; LHS variable: share of "yes" responses)	0.271 (0.340)	1.023** (0.416)	0.353 (0.365)	
A4. Has the store manager talked to particular groups of workers more over the last few months compared to the time before? (Scale: Yes or no; LHS variable: share of "yes" responses)	0.165 (0.234)	0.745* (0.396)	0.651* (0.380)	
Panel B: Difference-in-Difference in the responses of former cashiers who quit in the first three months after being hired in exit interviews (July 2015 - Feb. 2016; n=535)				
B1. How much attention and support did you receive from your supervisor in the first weeks or months? (Scale: 1 (no attention) to 5 (a lot of attention))	4.098 (1.036)	0.688* (0.406)	0.452 (0.417)	0.393 (0.412)
B2. How much attention and support did you receive from your colleagues in the first weeks or months? (Scale: 1 (no attention) to 5 (a lot of attention))	4.301 (0.913)	-0.060 (0.399)	0.042 (0.444)	0.240 (0.483)
Panel C: Difference in the responses of randomly selected cashiers in phone interviews (Sept. - Oct. 2016)				
How many minutes per week on average does your store manager talk to you personally about work or other issues? (Scale: 0 min (=1), 1-5 min (=2), 6-10 min (=3), 11-30 min (=4), 31-60 min (=5), 61-120 min (=6), >120 min (=7))				
C1. Responses: all cashiers (n=334)	4.322 (1.596)	0.331 (0.347)	0.417 (0.326)	0.085 (0.281)
C2. Responses: cashiers where the store manager is the same since the beginnig of the treatment in Sept 2015 (n=223)	4.228 (1.648)	0.772* (0.415)	0.752* (0.401)	0.041 (0.349)

Notes: Column 1: Mean response for stores in the control group. Standard deviations are in parenthesis. Column 2-4: Coefficients estimated in Ologit estimations. Standard errors (in parenthesis): Robust standard errors in Panel A, standard errors are clustered on store level in Panel B and C. Panel A: We did not interview the store managers in the *Career* treatment group because of time constraints of our student assistants. In Panel C we include a dummy as control that captures whether a store received a reminder at the beginning of October. * p<0.1, ** p<0.05, *** p<0.01.

Table 6: Treatment effect by extra time (pre- vs. post-treatment) spend on HR

Manage treatment	-0.006
	(0008)
Career + Manage treatment	-0.006
	(0.007)
Career treatment	-0.009
	(0.008)
Manage treatment * Δ Time spend on HR (in hours)	-0.034**
	(0.016)
Career + Manage treatment * Δ Time spend on HR (in hours)	-0.001
	(0.016)
Career treatment * Δ Time spend on HR (in hours)	0.004
	(0.014)

Notes: The specification that generates the results in this table is the usual ANCOVA estimator (equation 2). * p<0.1, ** p<0.05, *** p<0.01.

Appendix I: Calculation of the costs of turnover

This section provides details of the *ex ante* calculation of the costs of turnover we carried out. The costs of turnover that we include in our calculations consist of four components: 1) the accounting costs of managing turnover at the store level (e.g., manager time); 2) the accounting costs at the firm level (e.g., the costs of employing HR personnel that deal with turnover); 3) the economic costs of turnover in terms of the effect it has on store profitability; and 4) the economic costs of turnover in terms of its effects on the firm's reputation, human capital accumulation, and the talent pool. The first two components can be easily estimated, the third requires strong assumptions to be statistically estimated, and the fourth cannot be quantified. We base our calculations on the pre-treatment (January 2014-August 2015) average number of quits of 1.2 per store per month, the average cashier salary of 345 Euros per month, the average store manager salary of 940 Euros per month, and the average operational profit (sales minus costs of sales minus wages minus overheads minus shrinkage) of 38,065 Euros per store per month.

Starting with the first component – the accounting costs of turnover accrued to individual stores – we learned from several randomly selected store managers we interviewed in the Spring 2015 that it takes one hour to interview each applicant, which given the hires per applicant rate of 0.4 means 2.5 hours per hire. It takes store manager two hours to instruct each new hire, half an hour to process the paperwork of each leaver, and another half an hour to rewrite the work schedule. Each newly hired worker undergoes a two-day on-the-job training during which he or she is paid but does not work. We assume the costs of training to be the store manager day's salary. Besides, a mentor (another cashier) spends two hours with each newly hired worker. Summing up, each quit takes 40 hours of cashier time and 18 hours of store manager time. This is in line with the results in a pre-experimental phone survey, in which store managers stated that they spend on average around 10% of their time in dealing with quits.

Turning to the second component – costs accrued at the firm level – we learned from interviews with the head of HR that there were twenty-three employees in the HR office whose job was to administer hiring and quits. In our calculations, we assume that their wages are 10% higher than the average wage of cashiers, giving the monthly wage budget of 8,730 Euros. On top of this figure comes the tax wedge of 38.8%, which is the Eurostat 2015 average tax wedge estimate for the eastern EU

countries (Eurostat, 2015). Additionally, there are rental costs of the office space required to sit them, estimated at 10 Euros per sq m per month, which is in the range of office space rates in non-premium locations in the city where our study firm is based. Assuming every employee needs 5 square meter, these costs amount to 1,150 Euros per month.

Summing up, the accounting costs of personnel and cashier and store manager time spent on dealing with the consequences of turnover amount to 292 Euros per store per month, or 244 Euros per quit.

As for the third component of turnover costs – lost profits – we observe a negative correlation between store operational profit and quits. Regressing changes in log operational profit on changes in labor input and up to three lags of changes in the quit rate gives the coefficients -0.18, -0.14, -0.17 on the current, first and second lags of changes in the quit rate are. (The coefficients on the deeper lags are small and insignificant.) For reasons of endogeneity (workers leaving at a higher rate the stores that are less productive), these results cannot be interpreted as causal evidence on the effect of quits; a naïve estimate stemming from the regression coefficients would suggest a 4.9% decrease in operational profit (=0.1*(-0.18-0.14-0.17)) in response to a permanent increase in the quit rate by 0.1. If the present quit rate went from the pre-treatment average 0.056 down to zero, the operational profits would increase by 38,065*0.49*0.056=1045 per store per month on average, suggesting that each quit costs 870 Euros in terms of lost sales.

Summing up, the total costs of turnover are 244+870=1114 Euros per quit, of which 234 Euros are the direct accounting costs. This figure corresponds to just under two-and-a-half months' worth of cashier gross salary. Note that our estimate does not include the costs of uniform and placing job adverts, and, more importantly, the costs turnover brings to the firm's reputation and talent pool (the fourth component).

Appendix II: AEA RCT Registry (August 31st, 2015)

Friebel, Guido, Matthias Heinz and Nick Zubanov (2015), "The impact of employer-employee communication on employee turnover."

We run a field experiment to investigate the impact of employer-employee communications on employee turnover. Our study firm – a network of 238 retail stores located in an Eastern European EU member state – has been troubled with store staff turnover averaging at 90% per year, a figure high even for the retail sector standards. Turnover is expensive, costing about 400 Euros per quit worth of time spent finding and training up a replacement. Low pay and limited career options have been blamed for high store staff turnover.

Yet, the fact that half of the leaving staff quit within the first three months on the job suggests that turnover could be reduced by better induction into the firm, which we believe can be accomplished through improved employer-employee communications. Hence, our first experimental treatment, labeled "job induction", is to send a letter signed by the firm CEO to the treatment group store managers motivating them to do what they can to reduce staff turnover. In particular, the letter mentions the importance of helping employees fully integrate into their teams, of training new hires, and of having an open ear for the concerns workers may have, especially in the beginning of their tenure.

Our second treatment, labeled "career communication", is about communication with the staff regarding career options at our study firm. Although career options for store staff are perceived as limited, the facts are that a considerable proportion of store and regional managers were promoted from cashiers, and that our study firm offers a variety of careers in its HR, logistics, finance and production divisions (we do not cover these in our experiment). Employees in the stores selected for our second treatment receive letters emphasizing these facts and encouraging them to contact a specially appointed HR officer for information on career possibilities.

Finally, our third treatment combines the above two so that we can learn whether job induction and career communication are substitutes, complements or neutral to each other in their effect on staff turnover.

We select employees into treatments or control group by store using stratified randomization. In addition to store average quit rate, which is our outcome variable, we balance the treatment and control group in terms of store sales, size and location, as these characteristics are correlated with staff turnover. We work with store and regional managers to ensure that we can detect and minimize information spillovers between stores in different treatment groups. The field experiments starts on September 01st, 2015.

Appendix III: Materials

Figure A: Store manager letter in the *Manage* treatment

[LOGO OF THE FIRM]

Dear NAME OF THE STORE MANAGER,

Over the last few years, FIRM NAME has invested much effort and resources in maintaining and further improving the quality of goods, customer service and refurbishments. We believe that we are on a good way to become the best retailer in COUNTRY! However, much remains to be done for FIRM NAME to achieve the leading position. We would like to ask you for your help in dealing with an important problem that many stores are facing on a daily basis.

It is about personnel turnover. We currently have a personnel turnover of around 90% per year. We also know that 50% of those who leave are leaving in the first few months of their employment at FIRM NAME. Each employee's leaving costs us on average 400 Euros – at least.

This turnover severely impedes your efforts of improving the quality of our products and services. In this case, a biggest part of your job is for searching new employees and training them. Also, all organized training, such as practice sessions and leadership clubs, are not effective as they should be.

We would like to bring your attention to the problem and ask you to do what you can, in order to bring down the turnover. In particular, please talk to your employees and make them feel fully integrated into your team, among others by putting emphasis on the buddy program. Please also note that it is important to train the new hires in the essential processes and have an open ear for problems they may have in the beginning.

Need help, consultation or advice? Contact NAME AND PHONE NUMBER OF AN EMPLOYEE IN THE HR DEPARTMENT.

Yours sincerely,

PICTURE, NAME AND SIGNATURE OF THE CEO

PICTURE, NAME AND SIGNATURE OF THE HEAD OF HR

Figure B: Poster in the *Carreer* treatment

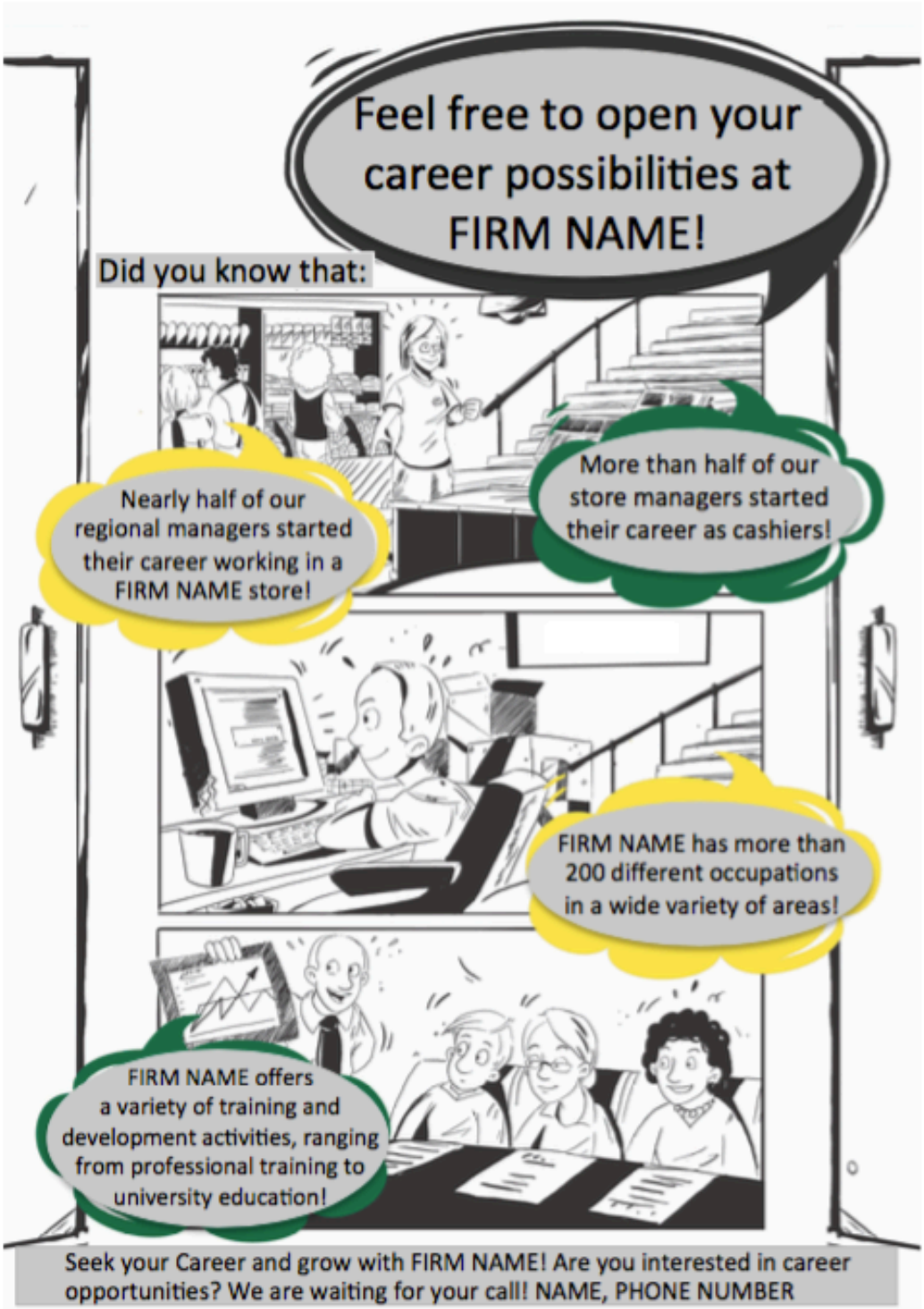


Figure C: Employee letter in the *Carreer* treatment

[LOGO OF THE FIRM]

Your Career Opportunities at FIRM NAME!

Dear NAME OF THE EMPLOYEE,

We are grateful for your dedication and daily work in reaching our main goal - to become the best and most attractive to costumer grocery store in COUNTRY! We believe that while achieving this common goal, every employee (without exception) have ability to grow.

Our company offers many different career opportunities for each employee – that is why FIRM NAME is a great place for every employee who seeks a career.
We would like to share some facts with you.

Did you know

- More than half of our store managers started their career as cashiers!
- Nearly half of our regional managers started their career working in an FIRM NAME store!
- Almost all Shift Managers and Unit Managers started their work at the cash-desk!
- FIRM NAME is employed more than 200 different occupations in a wide variety of areas – production, logistics, marketing, IT, finance, HR, Commerce!
- FIRM NAME sponsors a variety of training and development activities for its employees, ranging from professional training to university education and also provides the opportunity to participate in various projects!

After starting to work in higher position there will be not only substantial wage increase, but also you can develop your professional activities, leadership skills and to grow as a person.

Are you interested in career opportunities? We are waiting for your call on internal: NAME AND PHONE NUMBER OF AN EMPLOYEE IN THE HR DEPARTMENT
Seek your Career and grow with FIRM NAME!

Yours sincerely,

FIRM NAME

Figure D: Store manager letter in the *Career* treatment

[LOGO OF THE FIRM]

Dear NAME OF THE STORE MANAGER,

Over the last few years, FIRM NAME has invested much effort and resources in maintaining and further improving the quality of goods and shops, for instance by refurbishments. We believe that we are on a good way to become the best retailer in COUNTRY.

However, much remains to be done in this direction. As the next step in our strategy for FIRM NAME to achieve the leading position, we are introducing a new initiative to make career opportunities at FIRM NAME more visible to its employees.

Such opportunities are ample. For instance, 52% of the current store managers started their career as cashiers. Furthermore, along with a substantial wage and status increase, a promotion brings additional opportunities to develop professionally and to exercise leadership at work.

Enclosed you will find letters in separate envelopes that are addressed to each individual employee, as well two posters. We kindly ask you to do the following:

- Place one poster (the A4 size) on the staff information board.
- Place the other poster (the A3 size) where most store employees can see it, for example, in the staff common lounge.
- Arrange the meeting with all employees, for instance, in the morning. If not everyone can attend this meeting, please arrange another meeting so that everyone is informed.
- During the meeting(s) please read the letter aloud to ensure everyone is informed.
- Hand over the addressed envelope to each employee.

You will also find a few extra copies of the employee letter, to be given to newly hired employees. Please make additional copies if needed.

You can call NAME AND PHONE NUMBER OF AN EMPLOYEE IN THE HR DEPARTMENT in case you have questions. Also let the employees know that they can call us with their questions.

Yours sincerely,

FIRM NAME

Figure E: Store manager letter in the *Career+Manage* treatment

[LOGO OF THE FIRM]

Dear NAME OF THE STORE MANAGER,

Over the last few years, FIRM NAME has invested much effort and resources in maintaining and further improving the quality of goods, customer service and refurbishments. We believe that we are on a good way to become the best retailer in COUNTRY!

However, much remains to be done for FIRM NAME to achieve the leading position. We would like to ask you for your help in dealing with an important problem that many shops are facing on a daily basis.

It is about personnel turnover. We currently have a personnel fluctuation of around 90% per year. We also know that 50% of those who leave are leaving in the first few months of their employment at FIRM NAME. Each employee's leaving costs us on average 400 Euros – at least.

This turnover severely impedes your efforts of improving the quality of our products and services. In this case, a biggest part of your job is for searching new employees and training them. Also, all organized training, such as practice sessions and leadership clubs, are not effective as they should be.

We would like to bring your attention to the problem and ask you to do what you can, in order to bring down the turnover. In particular, please talk to your employees and make them feel fully integrated into your team, among others by putting emphasis on the buddy program. Please also note that it is important to train the new hires in the essential processes and have an open ear for problems they may have in the beginning.

In order to inform every employee about career opportunities in our company we have written a personal letter to each of your employees (you will find all letters in this envelope).

We believe, that FIRM NAME is a great place for the ones who seek career options and we are glad that we can suggest broad opportunities for that. For instance, 52% of the current store managers started their career as cashiers, Unit managers or in the other positions. We want to bring your attention, that along with a substantial wage increase, a promotion brings additional opportunities to develop professional activities and to exercise leadership at work and to grow as a person.

Please do the following as soon as possible with the posters and letters in this envelope:

- Place one poster (the A4 size) on the staff information board.
- Place the other poster (the A3 size) where most store employees can see it, for example, in the staff common lounge.
- Arrange the meeting with all employees (If not everyone can attend this meeting, please arrange another one so that everyone is informed and during the meeting please read the letter aloud to ensure everyone is informed.
- Hand over the addressed envelope to each employee.

You will also find a few extra copies of the employee letter, to be given to newly hired employees. Please make additional copies if needed.

Need help, consultation or advice? Contact NAME AND PHONE NUMBER OF AN EMPLOYEE IN THE HR DEPARTMENT.

Yours sincerely,

PICTURE, NAME AND SIGNATURE OF THE CEO	PICTURE, NAME AND SIGNATURE OF THE HEAD OF HR

Figure F: Store manager letter in the *Reminder* treatments

[LOGO OF THE FIRM]

Dear NAME OF THE STORE MANAGER,

You /your store received a letter from us, in September 2015, asking you to do what they can to reduce turnover. We are pleased to report a substantial reduction in firm-wide turnover, that we believe has been due to the efforts of our store managers such as yourself. We are grateful for this!

However, turnover is still high. Dealing with quits and searching and training new employees takes time and other valuable resources away from important activities around the store. Besides, organized training, such as practice sessions and leadership clubs, are not as effective as they should be when people often come and go.

We would like, once again, to draw your attention to the problem of turnover, and ask you to do what you can to bring it down. Please talk to your employees and try to make them feel fully integrated in your team, making use of the buddy program among our other HR initiatives. Please also note that it is important to train the new hires in the essential processes and have an open ear for problems they may have in the beginning as well as throughout their employment.

Need help, consultation or advice? Contact NAME AND PHONE NUMBER OF AN EMPLOYEE IN THE HR DEPARTMENT.

Yours sincerely,

PICTURE, NAME AND SIGNATURE OF THE CEO

PICTURE, NAME AND SIGNATURE OF THE HEAD OF HR

Appendix IV: Tables

Table A: Average treatment effects on store operational profits in the main treatment period

	Sept. 2015-Sept. 2016	Sept. 2015-Sept. 2016	Sept. 2015-Nov. 2015	Dec. 2015-Feb. 2016	Mar. 2016-May 2016	June 2016-Sept. 2016
Manage treatment	-0.005	0.004	-0.028	-0.033	-0.021	0.059
	(0.022)	(0.020)	(0.031)	(0.030)	(0.025)	(0.040)
Career + Manage treatment	-0.016	-0.008	-0.026	-0.028	0.000	-0.013
	(0.024)	(0.022)	(0.032)	(0.028)	(0.029)	(0.034)
Career treatment	0.014	0.017	0.001	-0.001	0.008	0.045
	(0.023)	(0.020)	(0.032)	(0.027)	(0.025)	(0.033)
Lag quits	NO	Yes	NO	NO	NO	NO

Table B: Average treatment effects on sales in the main treatment period

	Sept. 2015-Sept. 2016	Sept. 2015-Sept. 2016	Sept. 2015-Nov. 2015	Dec. 2015-Feb. 2016	Mar. 2016-May 2016	June 2016-Sept. 2016
Manage treatment	0.009	0.009	0.005	0.002	0.000	0.038
	(0.015)	(0.015)	(0.018)	(0.019)	(0.018)	(0.020)
Career + Manage treatment	-0.003	-0.003	0.005	-0.003	0.001	-0.014
	(0.014)	(0.014)	(0.014)	(0.017)	(0.017)	(0.019)
Career treatment	0.020	0.020	0.020	0.022	0.028	0.022
	(0.015)	(0.015)	(0.016)	(0.019)	(0.017)	(0.022)
Lag quits	NO	Yes	NO	NO	NO	NO

Notes: The specification that generates the results in this table is the usual ANCOVA estimator (equation 2). Lags of quit rate are incorporated as a potential mediator of the treatment effect (column 2). The observations with annual sales growth above the top 1% (76%) and below the bottom 1% (-26%) are excluded from the sales regression. These observations come from stores that underwent renovation and were thus closed part of the time. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table C: Average treatment effects on shrinkage (relative to sales) in the main treatment period

	Sept. 2015-Sept. 2016	Sept. 2015-Sept. 2016	Sept. 2015-Nov. 2015	Dec. 2015-Feb. 2016	Mar. 2016-May 2016	June 2016-Sept. 2016
Manage treatment	0.000	0.014	0.005	0.027	-0.001	-0.037
	(0.028)	(0.028)	(0.030)	(0.035)	(0.035)	(0.036)
Career + Manage treatment	0.002	0.012	0.007	0.001	0.001	0.006
	(0.026)	(0.026)	(0.029)	(0.032)	(0.035)	(0.031)
Career treatment	0.022	0.028	0.031	0.031	0.006	0.017
	(0.028)	(0.028)	(0.030)	(0.032)	(0.040)	(0.036)
Lag quits	NO	Yes	NO	NO	NO	NO

Notes: The specification that generates the results in this table is the usual ANCOVA estimator (equation 2). Lags of quit rate are incorporated as a potential mediator of the treatment effect (column 2). * p<0.1, ** p<0.05, *** p<0.01.