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**Working Paper**

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DISCUSSION

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# DISCUSSION PAPER

// LAURA POHLAN AND SUSANNE STEFFES

## Performance Feedback and Job Search Behavior: Empirical Evidence From Linked Employer-Employee Data

# Performance Feedback and Job Search Behavior: Empirical Evidence from Linked Employer-Employee Data

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## Abstract

In this paper, we study whether performance feedback can serve as an instrument for firms to increase employee retention. Feedback on the relative performance may affect individual job search behavior differently depending on workers' relative rank among their peers. In line with these considerations, empirical evidence based on panel employer-employee data shows that employees performing below the median decrease their turnover intentions after the implementation of a performance feedback system at the establishment level. We find no effect for employees performing above the median.

**Keywords:** quit behavior, performance feedback, internal labor markets, linked employer-employee data

**JEL-classification:** M51, M54, J63, C23

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# 1 Introduction

Preventing employees from quitting their jobs is of utmost importance for firms. The resources firms spend to recruit and develop employees constitute a considerable component of total labor costs. For example, Dube et al. (2010) find that replacement costs in California amount to about 9 percent of annual wages, with a correspondingly large standard deviation. Muehleemann & Leiser (2018) state that hiring costs in Switzerland are on average one-third of annual wages. Therefore, ways to reduce hiring costs have been widely discussed, with technological progress as an important tool for improving the efficiency of recruitment systems.<sup>1</sup>

The second pillar, employee retention, has received less attention, arguably because the appropriate tools – good working conditions, decent salaries, promising career options – seem clear. But existing career options need to be recognized by employees, and there is a growing perception that people make systematic mistakes when assessing their future prospects within or outside their current employer.<sup>2</sup> Therefore, we suggest that it is very likely that employees also have incomplete perceptions about their career options. In this paper, we argue that firms can use performance evaluations<sup>3</sup> to reduce information asymmetries and provide pathways for future prospects within the firm, thereby increasing employee retention. Our empirical analysis is based on four waves of a linked employer-employee panel data set of German firms, the Linked Personnel Panel (LPP), which can be combined with records of social security data of the Federal Employment Agency for all workers in surveyed establishments. By using the administrative data to calculate relative residual wage positions within firms, we analyze how the introduction of a performance feedback system influences the job search behavior of employees depending on their relative performance.

In general, firms use performance evaluations for multiple purposes (Kampkötter & Sliwka 2016).<sup>4</sup> First, in most incentive schemes, they serve as the basis of performance pay. Second, they provide direct “feedback” not only on employees’ actual performance but also on their relative performance within narrowly defined peer groups. This might help the employees to learn about potential strengths and weaknesses and improve their prediction of internal, as well as external, career prospects. Third, feedback talks are used to derive a perspective for future development within the firm, e.g. through the discussion and planning of goal-setting procedures, promotions or training measures (Bakker & Demerouti 2007, Beenen et al. 2017). Hence,

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<sup>1</sup>For example, ZipRecruiter, one of the largest online employment marketplaces in the US, use Artificial Intelligence and machine learning to help companies find more and better matches: <https://venturebeat.com/2018/06/14/ziprecruiter-announces-ai-tool-that-matches-businesses-with-ideal-job-candidates/>

<sup>2</sup>An abundance of evidence from the lab has identified over- and underconfidence of individuals regarding their ability. In the field, Hoffman & Burks (2020) or Huffman et al. (forthcoming) detect significant and persistent overconfidence. Jäger et al. (2021) find that employees systematically have wrong beliefs about their outside options, i.e., the wages they could earn elsewhere.

<sup>3</sup>In the following, we use performance feedback, performance evaluations and performance appraisals interchangeably.

<sup>4</sup>Performance evaluations may (partly) be based on objective measures such as sales or financial figures but in most companies they rely on subjective assessments by supervisors. Evaluation processes typically take place on a regular and structured basis. Firms commonly use yearly cycles and base their evaluation on a performance scale ranging, for instance, from 1 "low rating" to 5 "high rating" (Frederiksen et al. 2017).

performance feedback can serve as a tool to inform and guide employees by revealing internal paths for progression, for instance, through a reallocation of tasks or investment in new skills. This, in turn, can have a direct impact on employee satisfaction and the decision to stay with the employer (Kampkötter & Sliwka 2016).

The reasoning above shows that the impact of performance feedback on job search behavior is likely to depend on the relative rank of the worker. On the one hand, providing information and guidance to relatively low-performing individuals might decrease their quit probability as they have underestimated their future career prospects or overestimated their outside options thus far. In line with this, Pfeifer & Schneck (2012) argue that higher wages of co-workers might signal better career prospects within the firm. In contrast, if a worker is already situated at the top of the pay distribution, further career advancements in the current firm are unlikely and the worker may decide to quit their job and to join another firm. On the other hand, feedback on relative performance could be perceived as unfair and discourage workers from staying with the firm if they initially believed themselves to be better positioned among their peers. Besides analyzing the effects of feedback talks on employee retention dependent of relative performance, the rich employer-employee survey and administrative data allows us to shed light on these counteracting mechanisms. In particular, we study how individual perceptions of fairness and promotion criteria change when performance feedback is implemented.

In this paper, we focus on the overall management strategy to implement performance evaluations and do not consider the specific design of a performance feedback system.<sup>5</sup> In order to identify the effect of performance feedback on individual job search behavior, we analyze the within-establishment changes in the use of performance feedback with help of fixed effects regressions. Thereby, we assume the implementation of performance feedback at the establishment level to be exogenous at the individual level. In particular, we document that establishments that introduce performance feedback systems are comparable to other firms with respect to most dimensions, such as firm size, sector composition, wage premia, performance pay systems, support in decision making or promotion criteria. We further show that the introduction of performance feedback often comes along with a bundle of HR practices that likely influence career prospects such as performance pay systems, personnel development plans or special measures for low/high performers. In order to separate the impact of the change in the provision of performance feedback from other adjustments, we control for changes in other HR instruments and employment conditions at the individual or establishment level. The measured effect can therefore be interpreted as an intention-to-treat effect as it does not capture whether an employee is actually treated by the implementation of the feedback system.<sup>6</sup> Finally, we exploit information on the reasons for

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<sup>5</sup>The design of the performance feedback system is matter of interest in many studies. In lab and field experiments, scholars establish individual versus relative performance feedback, vary the information which is revealed to the employee, or vary the timing and the frequency of the feedback talks. As in Azmat & Iriberry (2016), feedback talks are often combined with other measures like the compensation system.

<sup>6</sup>In principle, information on actual treatment of individuals are available in our data. However, employees who get performance feedback might be a selective group while the introduction of a performance feedback system for all employees at the establishment level is less likely to be driven by the productivity of single employees.

introducing performance feedback and look at those cases in which performance feedback was introduced due to reasons that are not directly linked to the actual firm performance.

In order to approximate the relative performance of individuals, we assign employees according to their observed rank position in the residual wage distribution of their peer group within the same establishment. In particular, we predict the wage of each individual conditional on observable characteristics such as gender, age, professional degree and the employment history. Then we calculate the residual wage within an establishment-occupation-job-level cell. In this way, we are able to determine the relative rank (below or above the median of the residual wage distribution) of an individual employee among a very similar group of co-workers.

Based on this empirical approach, we study the impact of performance feedback on turnover intentions, measured by the frequency with which one has thought about changing the employer in the last year, separately for below-median and above-median performers. Our results suggest that below median-performers decrease their turnover intentions after the implementation of a performance feedback system. For above median-performers, we do not find a change in turnover intentions. These results are confirmed by looking at actual job search or employer switches. Moreover, we find that below-median performers are more satisfied with their job and perceive promotion criteria as more objective after the introduction of performance evaluations. Performance feedback might therefore be a good tool that not only provides performance incentives to employees, but also provides credible information about individually tailored career paths – consequently keeping employees from pursuing their chances elsewhere.

This paper contributes to two different stands of literature. First, it contributes to the literature on relative wage positions and quit behavior which documents mixed results. Using linked employer-employee data from Germany, Pfeifer & Schneck (2012) find that workers with higher relative wage positions within their firms are, on average, more likely to quit their jobs than those with lower relative wage positions. The authors argue that this can be explained by the signal of few internal career advancement opportunities.<sup>7</sup> In contrast, Mohrenweiser & Pfeifer (2022) document a positive correlation between quit intentions and wages of co-workers in the same firm using the first two waves of the LPP and Godechot & Senik (2015) find no significant correlations based on a French employer-employee database.

In addition, our study contributes to the literature on performance appraisals as the impact on the job search behavior is a side-effect which has not been explicitly considered thus far.<sup>8</sup> The recent economic literature mainly focuses on the impact of performance feedback on performance and motivational outcomes in lab experiments (see e.g. Kuhnen & Tymula 2012, Azmat & Iriberry 2016, Gill et al. 2019).<sup>9</sup> Azmat & Iriberry (2016), for instance, find in a lab experiment that

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<sup>7</sup>See also e.g. Clark et al. (2009) who find the same pattern for the relationship between relative wages and individual job satisfaction.

<sup>8</sup>However, Lee & Ding (2020) also highlight that supervisor coaching can result in reduced turnover intentions by enhancing the extrinsic motivation of the employee.

<sup>9</sup>There are only very few empirical studies on the effects of subjective performance measures which are based on personnel data of single firms. Engellandt & Riphahn (2011) use data of a Swiss unit of a large international company and find that effort measured by overtime hours increases if individual performance evaluations are more flexible over time, in the sense of a lower autocorrelation, and if bonus payments are more frequently used. Frederiksen et al. (2017) use

relative performance feedback increases the subsequent effort of employees who perform under a piece-rate incentive scheme. They do not find significant treatment effects under a flat-rate system. Interestingly, this result holds independently of the content of the feedback; hence whether the feedback-receiving person was performing above or below average. However, Azmat & Iriberry (2016) also find that the content of the feedback matters. Contrary to the findings on performance, the authors find very different effects on satisfaction for below- and above-average performers: receiving positive (negative) feedback increases (decreases) individuals' subjective well-being and feeling of dominance but again only under a piece-rate incentive scheme.

To sum it up, our study is the first careful analysis on the relationship between performance feedback and individual job search behavior. For this purpose, we use a unique source of field data, a longitudinal linked employer-employee survey combined with administrative records, which allows us to overcome the drawback that personnel records from single firms or data gained through lab or field experiments might be dominated by the specific setting in the firm or in the experiment. Our results are also of direct value for practice: apart from monetary incentives, performance feedback might represent an HR strategy to reach all employees and reveal that personnel decisions such as promotions are based on objective criteria. This can reduce individual turnover intentions and hence possibly also serve as an instrument for firms to increase employee retention.

The rest of the paper is structured as follows. Section 2 describes the data source, the measurement of variables that are relevant for our analysis and the estimation sample. Section 3 presents the empirical approach and the results. Section 4 concludes.

## 2 Data

### 2.1 Data source and definition of variables

Our empirical analysis is based on the four waves (2012/13, 2014/15, 2016/17 and 2018/19) of the Linked Personnel Panel (LPP) which combines survey data of employers and employees. The data covers private sector establishments in Germany which employ at least 50 employees at the date of panel entry. The LPP can be linked with administrative data of the Federal Employment Agency which are based on employers' notifications to the social security authorities (LPP-ADIAB). While the employee survey covers a random sample of the establishment's workforce, the administrative records are available for around 85 percent of the employees. This fact makes the data exceptional and very well suited to our research question.<sup>10</sup>

Overall, the LPP is designed to conduct personnel economic research in Germany. The employer survey contains information on several HR instruments - prevalence, distribution and changes

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personnel data of six large companies and examine how performance feedback correlates with objective career outcomes. The authors find evidence for a positive relation between evaluations and pay as well as promotions and a negative correlation between evaluations and separations.

<sup>10</sup>See Kampkötter et al. (2016) and Mackeben et al. (2021) for a more detailed description of the data set.

- and further information on establishment characteristics and policies. The employee survey collects information on working conditions, individual perceptions of personnel development and treatment by the employer, the supervisor and colleagues, as well as socio-demographics, personality traits and preferences. The administrative data include, alongside information on different labor market states, such as the start and end date of dependent employment, registered unemployment, registered job-search or unemployment benefit receipt, individual information on (daily) wage records, job characteristics, as well as some socio-demographic information.

The simultaneous observation of both employers and employees over time allows analyses of the relationship between (changes in) HR management, objective and individually perceived job quality, and firm performance. Moreover, it solves the problem of common method bias which is often discussed in survey studies. In particular, the high reliability of administrative wage information of almost all employees for each establishment is an important asset of the data. Further, the information on individual perceptions and behavior which is measured independently from the information on HR instruments makes the data exceptional.

To measure the job search behavior of employees, we use information on the individuals' turnover intentions based on the following question "How often have you thought of changing your current employer in the last 12 months?". The answers can be: 1 "never", 2 "several times a year", 3 "several times a month", 4 "several times a day" and 5 "every day". In some analyses, we use a dummy variable which equals one for categories 2-5 and zero for category 1. The data further include reasons why a job change was considered and we disregard cases of turnover intentions due to personal circumstances unrelated to the workplace.

Our intention-to-treat variable relies on two employer survey questions: Employers are explicitly asked whether they use certain HR instruments and whether there have been changes in the last two years with respect to the three instruments performance feedback<sup>11</sup>, target agreements and performance pay. In addition, employers are asked for the reasons this change was made. In our empirical analysis, we compare the results of three different definitions of our treatment variable. First, we define a change-variable as an indicator equal zero in the case that the establishment does not use the instrument of performance feedback and one in case performance feedback is implemented. This variable allows for a before-after comparison and the control group consists of employers without performance feedback. The second variable is a level-variable which indicates whether the establishment has performance feedback or not. For establishments which state that they introduced performance feedback between two consecutive waves this variable is equal one in the current wave and zero in all previous waves. In this case, the control group consists of both types of establishments, those which do not use and those which do use performance feedback. Employers who indicate that they have abolished performance feedback are excluded from the analysis. Finally, we use the aforementioned change variable and only look at those cases in which performance feedback was introduced due to reasons that are not directly linked

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<sup>11</sup>The exact questions are: "Is the performance of employees in your establishment evaluated by supervisors at least once a year?" and "We are now talking about changes in target agreements and performance evaluations. Have there been any changes in these areas in the last two years? These include the introduction, abolition, expansion and reduction of the respective measure."



to the actual performance of the firm which we refer to as exogenous reasons.<sup>12</sup> Figure A.1 in the Appendix shows by means of an example the definition of the different treatment variables.

## 2.2 Descriptive statistics of establishments

Our empirical analysis relies on a comparison of individuals who are employed in establishments which introduce performance feedback with individuals who are employed in establishments which do not experience a change in the performance feedback system. However, these two types of establishments might differ in observable characteristics even before the treatment takes place. To shed some light on the comparability of both types before treatment, Table B.1 in the Appendix shows descriptive statistics of establishments that do not implement performance feedback in the future (treatment group) and those that do (control group) based on the first observation in the data. Around 7 percent of establishments in our data belong to the treatment group. In the control group of establishments, 62 percent have a structured performance feedback system.

The descriptive statistics suggest that both types of establishments are comparable with respect to most dimensions, such as firm size, sector composition, wage premia as measured by AKM establishment fixed effects<sup>13</sup>, performance pay systems, collective agreements, appraisal interviews, support in decision making or promotion criteria. However, there are some differences when considering the importance of employee retention and development options for low performers. For establishments that introduce performance feedback in the future, employee retention plays a significantly larger role and these establishments offer more support for low performers than establishments in the control group.

The implementation of performance feedback might also be accompanied by the implementation of other HR instruments. Therefore, Table B.2 in the Appendix presents a before-after comparison of selected HR instruments for the treated establishments. According to the figures, the implementation of a performance feedback systems is accompanied by a introduction of appraisal interviews and employee surveys as well as the introduction of personnel development plans. In addition, treated establishments respond that low performers are less frequently dismissed after the introduction of a performance feedback system.

## 2.3 Measuring the conditional relative rank position

The definition of relative performance used in this paper does not necessarily refer to differences in productivity in the economic sense, but to the decision of employers to pay some employees within a comparable group better than others. We approximate the relative performance by assigning

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<sup>12</sup>Exogenous reasons comprise "new ideas of the management", "positive internal experience", "external experience", "external requirement", "new technology" and endogenous reasons "expectations have not been met", "internal problems" and "advice of consultant".

<sup>13</sup>The establishment wage premia are based on the method pioneered by Abowd et al. (1999) and provided by the IAB. For a detailed description about the estimation of the AKM effects see Bellmann et al. (2020).

employees according to their rank position in the residual wage distribution of their peer group within the same establishment. In our main analysis, we distinguish between employees ranked below and above the median of the residual wage distribution and refer to these as below-median and above-median performers.

To estimate the conditional relative rank position of each employee, we use the administrative data for all individuals employed for at least one day during the observation period in the observed establishments and who were covered by social security authorities. In a first step, we derive the predicted conditional daily wage of each individual  $i$  in establishment  $j$  in period  $t$ . The OLS estimations include gender, age, experience, tenure, unemployment experience, full-time indicator, number of job-changes, entry wage and year, degree, job level and occupational segment, and are estimated at the establishment level using the following equation:

$$w_{ijt} = \delta + x'_{ijt}\beta + \epsilon_{ijt} \quad (1)$$

In the next step we rank the wage residual, the difference of the actual daily wage  $w_{ijt}$  and the predicted daily wage  $\hat{w}_{ijt}$ , among a certain group of co-workers which we call the peer group. The groups are determined by the job level-occupation segment combination at each establishment. Both are included in the five-digit code of occupations, the German Classification of Occupations 2010. The 2-digit aggregate of the code contains 14 occupational segments which are summarized based on tasks characterizing a job. In addition, the level of qualification and responsibilities needed for the job is described in four job levels.<sup>14</sup> Frederiksen et al. (2017) confirm that the distinction by job levels is important as they find that job levels explain a large component of the variation in performance evaluations while experience and firm tenure fail to explain the variation.

Our analyses require a definition of the relative rank in the performance distribution that is not influenced by our treatment. Therefore, we use information on the relative rank position at the first year of the survey which is 2012 or the next earliest possible point in time when administrative data is available.

## 2.4 Sample selection and descriptive statistics of individuals

In our empirical analysis we use four subsequent biennial waves during the period 2012 to 2018. The employer data cover around 800 establishments per year and the survey of employees of these establishments amounts to 7,100 individuals per year. The empirical analysis is based on those surveyed employers and employees who agreed on the linkage with their administrative records.

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<sup>14</sup>The first job level mainly comprises jobs where no professional qualification is necessary, the second level comprises the majority of jobs which require a secondary level vocational education (e.g. apprenticeship training), and the third and fourth levels are usually staffed with individuals holding a tertiary degree and who are qualified to take management responsibilities.

Our sample of employees is restricted to individuals who are observed at least twice and whose predicted wage (according to the wage regressions described above) is below the ceiling of the social security contributions. Moreover, we exclude employees from job level 1 for two reasons. First, we are interested in job search behavior which is driven by the comparison of internal versus external career prospects and we expect the job search of non-professional employees to be mainly driven by other factors. Second, the LPP covers too few employees from this segment of the labor market. For similar reasons, we disregard employees in agricultural, food & hospitality, security and cleaning occupations as well as employees who carry out auxiliary activities.

One caveat of the administrative data is the fact that wages above the social security contribution threshold are right-censored. This makes it impossible to calculate the relative rank position of employees who earn above this threshold. Therefore, we only consider observations with predicted wages below the social security contribution threshold (minus 2 Euros). In order to determine the relative rank of each employee for a given occupation and job level within an establishment, we only look at job level-occupation cells with at least 4 employees.

With these reductions and by excluding observations with missings in key variables, we end up with a final estimation sample of 5,448 observations which contain information on 2,261 individuals working in 506 establishments. Table 1 provides descriptive statistics of the main variables used in the baseline specification measured at the first point in time an individual is observed in the data. On average, about one third of the employees have thought about changing employer at least several times a year. Around two thirds of the employees are exposed to an establishment-level performance feedback system. 45 percent are classified as below-median performers and 55 percent as above-median performers.

In our sample, about one quarter of the employees are female. Due to the fact that the population of the LPP are private establishments with at least 50 employees (at the time of survey entrance) and additional restrictions, our sample is older and comprises an above-average level of qualification in comparison to all employees in Germany. Table 1 shows that 1.5 percent of the individuals have no professional qualification, while 81.5 percent completed an apprenticeship and 17 percent hold an academic degree. About 72 percent of the employees are 40 years or older.

On average, surveyed employees in our sample work 38 hours a week including overtime and 28 percent hold a leadership position. 65 percent receive any kind of variable pay (including extraordinary one-time compensation). Table B.3 in the Appendix presents summary statistics of additional covariates that are used in the empirical analysis. The table shows that, due to the restrictions of the sample, the wage distribution of the observed employees is somewhat compressed. Compared with the establishment-level distribution of wages, we observe more individuals earning wages around the median than at the tails.

We further observe that 9 percent of the employees who were not exposed to a performance feedback system at the establishment level in one period are treated by an implementation in the following period. Tables B.4 and B.5 in the Appendix show descriptive statistics measured in the first wave separately for employees who experience an implementation of performance feedback in subsequent waves and those who do not. Both groups are quite similar with respect to turnover intentions, qualificational level, family background, age structure, firm size and

Table 1: Descriptive statistics of individuals

	Mean	SD	Min	Max
<i>Outcomes</i>				
Turnover intentions	1.452	0.765	1	5
Turnover intentions (dummy)	0.322	0.467	0	1
<i>Treatment variables</i>				
Performance feedback (level)	0.665	0.472	0	1
Performance feedback (change)	0.066	0.248	0	1
<i>Performance</i>				
Below-median performers	0.449	0.497	0	1
Above-median performers	0.551	0.497	0	1
<i>Baseline control variables</i>				
Female	0.269	0.444	0	1
Qualificational level: none	0.015	0.121	0	1
Qualificational level: apprenticeship	0.579	0.494	0	1
Qualificational level: advanced apprenticeship	0.236	0.425	0	1
Qualificational level: university/UAS	0.170	0.376	0	1
Partner	0.865	0.341	0	1
Number of children	0.474	0.819	0	6
Age < 30	0.107	0.310	0	1
Age 30-39	0.172	0.377	0	1
Age 40-49	0.371	0.483	0	1
Age $\geq$ 50	0.350	0.477	0	1
Leadership position	0.277	0.447	0	1
Job strain	3.535	1.226	1	5
Working hours	38.308	11.608	-4	70
Job autonomy	4.099	0.923	1	5
Multitasking	4.281	0.907	1	5
Establishment size	2380.011	5430.940	13	25944
<i>Individual performance pay</i>				
Variable pay	0.649	0.477	0	1

*Notes:* UAS = university of applied sciences. Descriptive statistics are weighted by person weights and based on the first observation of individuals in the sample.  
N=2,261.

*Source:* LPP-ADIAB 7519, own computations.

some job characteristics such as working hours, receiving variable pay and the wage structure. However, there are also some differences with respect to some characteristics: individuals who work in establishments where performance feedback is introduced in future are less likely to have a leadership position. Moreover, Table B.5 indicates that these individuals work more often in establishments which make use of other HR instruments such as appraisal interviews, personnel development plans - also especially for low performers - and investments in higher qualifications. In contrast, they work less often in establishments which make use of performance pay.

## 3 Empirical analysis

### 3.1 Methodological approach

To analyze the effects of within-firm changes in the use of performance feedback on employee’s job search behavior, we estimate the following fixed effects regressions:

$$y_{ijt} = PF_{jt}\delta + x_{ijt}\beta + \epsilon_{ijt} + \psi_t + \alpha_i \quad (2)$$

$y_{ijt}$  measures turnover intentions of individual  $i$  in establishment  $j$  in period  $t$ .  $PF_{jt}$  indicates whether performance feedback is used as an HR instrument in establishment  $j$  in  $t$ .  $x'_{ijt}$  is a vector of time-varying covariates including socio-demographic characteristics (partner, number of children and age), information on working conditions and job characteristics (leadership position, variable pay, job strain, actual working hours, job autonomy, multitasking) as well as establishment size.  $\psi_t$  represents year fixed effects and  $\alpha_i$  time-invariant individual fixed effects. In our sensitivity analyses, we also include information on other HR instruments as well as information on the actual wage level and the dispersion of wages within establishments.  $\epsilon_{ijt}$  is an idiosyncratic error term.

The time-invariant individual fixed effect is eliminated by taking the difference of an individual’s variable value at each point in time and the individual mean over time. However, our estimates of the treatment effect would be biased if the implementation of performance feedback at the establishment takes place in response to employees’ behavior. Therefore, we provide some evidence on the plausibility of viewing the introduction of performance feedback as exogenous at the individual level by studying the effects of those establishments which introduced performance feedback for exogenous reasons.

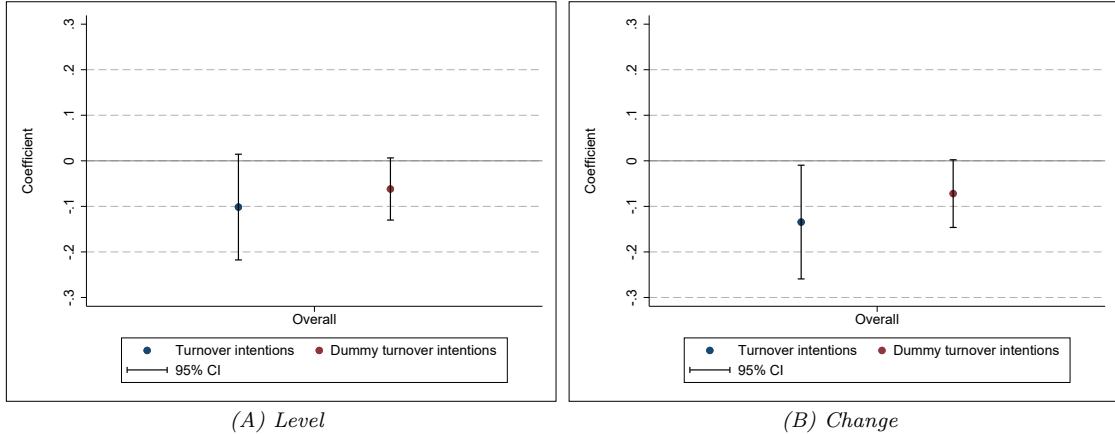
### 3.2 Estimation results

Figure 1 shows that the implementation of performance feedback in establishments is, on average, related to a decrease in the turnover intentions of professional employees. Panel (A) of Figure 1 shows the coefficient of performance feedback which is measured as a level variable, i.e. we observe firms in multiple periods and calculate the average effect. Panel (B) shows the coefficient by using the ‘change’ variable which could alternatively be interpreted as a short-run effect. Here, we take only two observations (before and after) into account for those firms that had no performance feedback system in the first period (see Section 2.1 for a more precise definition). We show the coefficients for the turnover intentions measured on a 5-point Likert-scale and measured as a dummy variable, respectively.

The estimated coefficients in panel (A) and panel (B) are quite similar in size, although there are differences in significance. The relationship is negative but not significant at a 5 percent level in the left panel but we observe a significant impact on the ordinal variable of turnover intentions and a weakly significant impact for the dummy variable in the right panel. The results in panel

(B) suggest that an employee exhibits a 7 percentage points lower probability to think about a job change and a 0.13 points lower turnover intentions on a 1 to 5 scale after the employer established a performance feedback system.

Figure 1: Overall effect of performance feedback on turnover intentions



*Notes:* Fixed effect estimations; outcomes: turnover intentions and indicator for turnover intentions; plotted coefficients: level (panel A)/change (panel B) in performance feedback on the establishment-level; baseline covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; individual perfpay: variable pay; year-FE.

N=5,538 (panel A) and 1,874 (panel B).

*Source:* LPP-ADIAB 7519, own computations.

### 3.2.1 Assignment of performance groups

So far, we have seen that the revelation of performance affects turnover intentions in the short-run but our theoretical considerations suggest that there might be effect heterogeneity. Now, we take the conditional relative rank position described in Section 2.3 as a measure of relative performance and assign the employees in our sample to four groups based on the quartiles of the rank distribution. Figure 2 shows the results for the treatment variable measured in levels and the change-variable and the pattern is quite similar: we observe a strong kink between the second and the third quartile. While the effect of performance feedback on turnover intentions is negative for the quartiles below the median, it becomes zero for employees performing above the median.

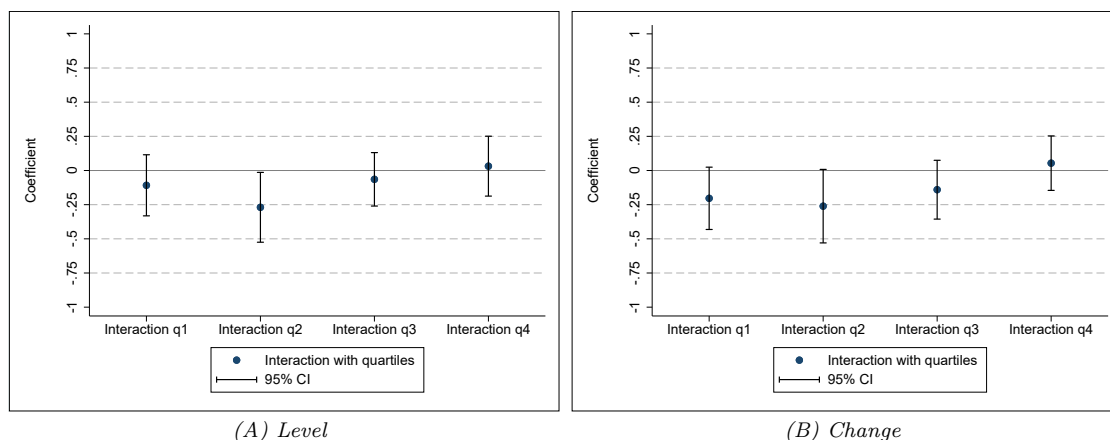
Based on this finding and due to sample size restrictions, we will concentrate in the rest of the paper on two groups only: group 1 consists of employees performing below the median and group 2 consists of employees performing above the median.

### 3.2.2 Confounding factors

In a first step, we take a look at the coefficients of five different specifications in order to identify the preferred one.<sup>15</sup> This is necessary as Table B.2 in the Appendix suggested that the implementation of performance feedback comes along with the implementation of other HR instruments

<sup>15</sup>Here we only show results for the 5-point Likert-scale measure of turnover intentions.

Figure 2: Effect of performance feedback on turnover intentions by quartiles of performance



Notes: Fixed effect estimations; outcome: turnover intentions; plotted coefficients: interactions between quartile of conditional relative rank position and level (panel A)/change (panel B) in performance feedback on the establishment-level; baseline covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; individual perfpay: variable pay; year-FE. N=5,483 (panel A) and 1,861 (panel B).  
Source: LPP-ADIAB 7519, own computations.

and a firm's broader HR strategy is likely to affect the job search behavior of employees. Since we aim to estimate the singular impact of performance feedback, we sequentially include other potentially confounding factors to avoid omitted variable bias.

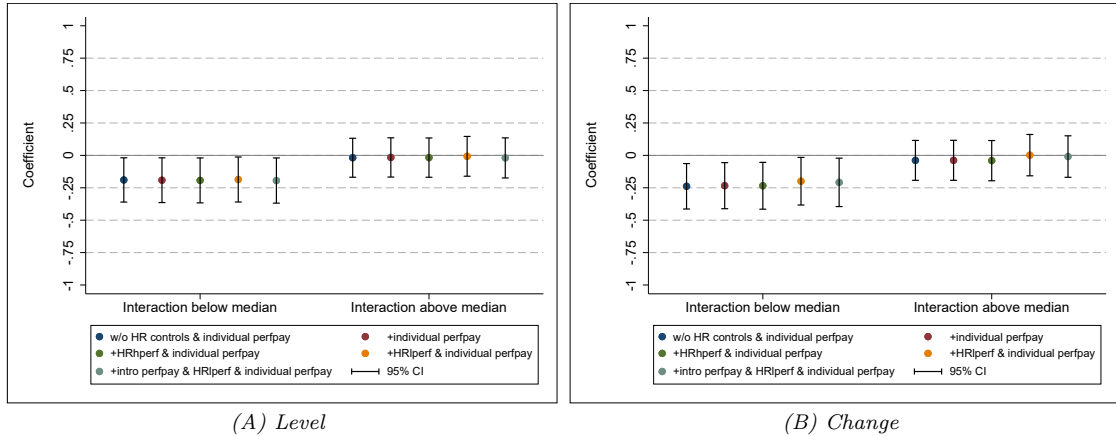
We start with a baseline specification where only employee (age, partner, number of children) and job characteristics (leadership position, actual working hours, job autonomy, perceived job strain and variety of tasks) and the establishment size are included. Next, we investigate the relevance of variable pay at the individual level by enriching the baseline covariates with a dummy variable for individual performance pay. In the third specification, we additionally include information on whether the establishment conducts appraisal interviews and personnel development plans. These instruments are often simultaneously implemented with a performance feedback system and may act in a similar direction; particularly, in the context of career opportunities. We therefore expect an up-ward bias if we do not control for these instruments.

The fourth specification includes - in addition to the former variables - information on special feedback for low performers, special training provided to low performers, and the existence of female support instruments. It also includes information on the provision of training aimed at higher qualifications and whether employee surveys are conducted. Last but not least, the information about a personnel change in the executive board of the establishment is included in this specification. All of these HR instruments aim to affect the personnel development of the employees and are likely to be interrelated to the implementation of performance feedback.

Finally, we investigate more deeply whether short-term monetary incentives unrelated to future career prospects (at least not directly) could explain our findings. In particular, we examine whether a simultaneously introduced performance pay scheme at the establishment level has a joint impact on the turnover intentions. This is likely as performance feedback is often the floor where the magnitude of performance pay is discussed and is, thus, often jointly implemented.

The respective coefficients of the change and level of performance feedback are summarized in Figure 3. Though we already interacted the variable of interest with the group dummies, we compare the coefficients of the different specifications for every respective group first, before discussing the results regarding the two groups. The first dot from the left represents the respective coefficient of the baseline specification while the other dots represent the extended specifications in the above described order. Overall, results point to the conclusion that our findings are robust to including further HR controls. The magnitude of the changes in coefficients is small and, hence, they are economically and statistically not significant. This shows that the introduction of performance feedback has a direct impact on the job search behavior of employees irrespective of whether feedback talks are implemented within a broader set of personnel development instruments or not.

Figure 3: Effect of performance feedback on turnover intentions by median of performance



Notes: Fixed effect estimations; outcome: turnover intentions; plotted coefficients: interactions between conditional relative rank position and level (panel A)/change (panel B) in performance feedback on the establishment-level; baseline covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; individual perfpay: variable pay; HRhperf controls: appraisal interviews, personnel development plans; HRlperf controls: open discussions with low performers, personnel development of low performers, change position of low performers, dismissal of low performers, higher training degrees, employee survey, female support measures, change in executive board, bhr level; intro perfpay: implementation of performance pay; year-FE. N=5,448 (panel A) and 1,827 (panel B). Source: LPP-ADIAB 7519, own computations.

### 3.2.3 Group-specific results

In this subsection, we turn to the quantitative and qualitative discussion of the differences in the estimated coefficients between below- and above-median performers. Our main focus is on the specification with all control variables included (last specification of Figure 3).<sup>16</sup> The results suggest that employees with a conditional relative rank position below the median reduce their turnover intentions significantly by around 0.2 points on a 1 to 5 scale when performance feedback is implemented in the establishment. In contrast, the effect on the turnover intentions

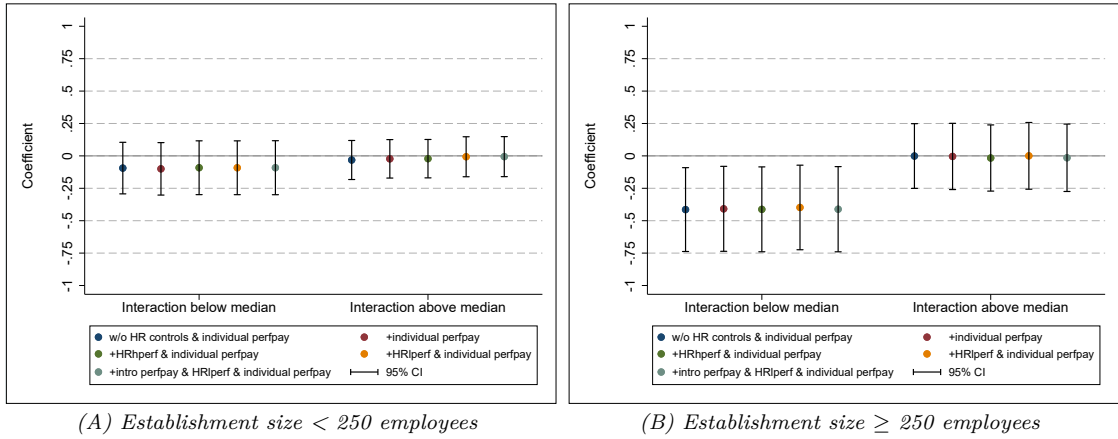
<sup>16</sup>The full set of coefficients is shown in Tables B.6 and B.7 in the Appendix.



of employees with a conditional relative rank position above the median is zero, suggesting that the implementation of performance feedback has no impact for this group of employees.

The impact of performance feedback is expected to be more pronounced if the potential gains from an internal labor market are higher. Therefore, we estimate the treatment effects for different establishment sizes as large establishments might offer more scope for career development. The results presented in Figure 4 suggest that the negative effect on turnover intentions for below-median performers is indeed driven by large establishments: individuals with a conditional relative rank position below the median reduce their turnover intentions by 0.4 points if performance feedback is implemented. For above-median performers, we document zero effects independent of establishment size.

Figure 4: Effect of performance feedback on turnover intentions by median of performance and establishment size



Notes: Fixed effect estimations; outcome: turnover intentions; plotted coefficients: interactions between conditional relative rank position and level in performance feedback for establishment size < 250 employees (panel A) and establishment sizes  $\geq$  250 employees (panel B); baseline covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; individual perfpay: variable pay; HRhperf controls: appraisal interviews, personnel development plans; HRlperf controls: open discussions with low performers, personnel development of low performers, change position of low performers, dismissal of low performers, higher training degrees, employee survey, female support measures, change in executive board, bhr level; intro perfpay: implementation of performance pay; year-FE.

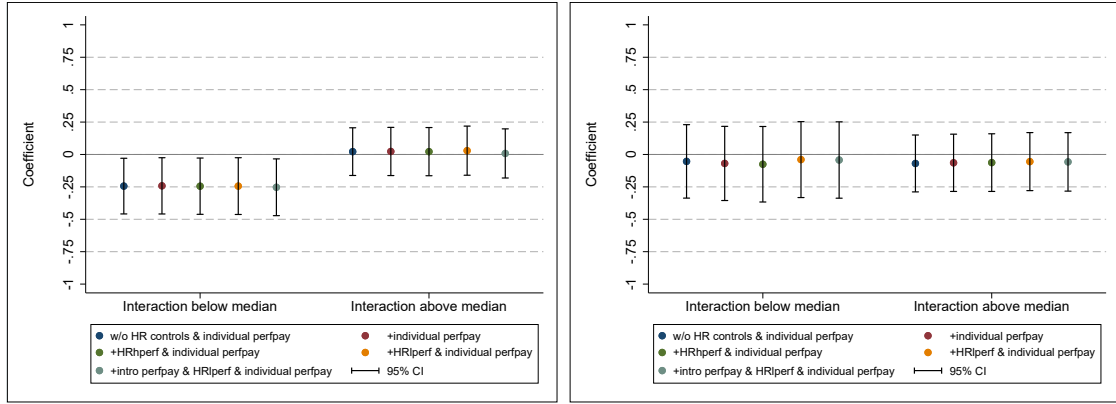
N=2,909 (panel A) and 2,539 (panel B).

Source: LPP-ADIAB 7519, own computations.

In another specification, we additionally control for percentiles of the actual wage level of the employee and the dispersion of wages within establishments as a larger variance in wages might offer more scope for potential wage increases. However, the results in Figure B.1 in the Appendix show that the estimated coefficients do not change compared to the baseline specification.

Finally, Figure 5 shows the results by job level. The second level comprises jobs which require a secondary level vocational education (e.g. apprenticeship training), and the third and fourth levels are usually staffed with persons who hold a tertiary degree and are qualified to take management responsibilities. Our prior would be that employees working in jobs at the second level face more information asymmetries in the sense that they are less well informed about their relative rank position than employees of higher job levels and the effect of performance feedback might hence be more pronounced for the former group. The results presented in Figure 5 confirm that the negative effects for below-median performers are driven by employees of job level 2.

Figure 5: Effect of performance feedback on turnover intentions by median of performance and job levels



(A) Job level 2

(B) Job level 3 or 4

Notes: Fixed effect estimations; outcome: turnover intentions; plotted coefficients: interactions between conditional relative rank position and level in performance feedback for job level 2 (panel A) and job level 3 or 4 (panel B); baseline covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; individual perfpay: variable pay; HRhperf controls: appraisal interviews, personnel development plans; HRlperf controls: open discussions with low performers, personnel development of low performers, change position of low performers, dismissal of low performers, higher training degrees, employee survey, female support measures, change in executive board, bhr level; intro perfpay: implementation of performance pay; year-FE.

N=3,761 (panel A) and 1,687 (panel B).

Source: LPP-ADIAB 7519, own computations.

In sum, we see that the introduction of performance feedback has a negative impact on the turnover intentions of below-median performers and no impact on above-median performers. Two considerations might explain the finding that employees who perform below the median reduce their turnover intentions: first, they may reduce their overall career aspirations because they see lower chances to benefit from internal or external movements. This reasoning is supported by recent findings of Jäger et al. (2021). The authors compare workers' subjective outside options against objective measures of pay premia from matched employer-employee data and document that many workers mistakenly believe their current wage is representative of the external labor market. Hence, their results suggest that objectively low-paid (high-paid) workers are overpessimistic (overoptimistic) about their outside options. Second, comparatively low performing employees could have an incentive to stay and to invest in their human capital in order to increase future career options. As the performance feedback is often accompanied by a discussion on prospects of career development, it is not unlikely that a supervisor offers such options. Table B.9 in the Appendix further suggests that the turnover intentions of treated below-median performers in the period before the treatment takes place is exceptionally high as compared to control individuals while the differences are less pronounced for above-median performers. After the implementation of performance feedback, below-median performers reach levels of turnover intentions that are comparable to the control group.

### 3.2.4 Exogenously implemented performance feedback

Establishments introduce individual performance feedback systems for different reasons which might be more or less related to actual firm performance and hence influence individual job search behavior. The employer survey also contains information on the reasons for introducing a performance feedback system. Table 2 shows the responses, classified as exogenous and endogenous reasons. The figures show that the most often mentioned reason is new ideas of the management team, which was true in 54 percent of cases. 28 percent indicate that they already gained positive experience with performance feedback, 14 percent mention external experience and less than 10 percent mention other external reasons such as external requirements or new technologies. Turning to endogenous reasons for the introduction of performance pay, 28 percent of the establishments state internal problems, 14 percent that expectations have not been met and 10 percent state it was at the advice of a consultant.

Table 2: Reasons for implementing performance feedback

<i>Exogenous reasons</i>	
New ideas of the management	0.542
Positive internal experience	0.278
External experience	0.139
External requirement	0.097
New technology	0.083
<i>Endogenous reasons</i>	
Expectations have not been met	0.139
Internal problems	0.278
Advice of consultant	0.097

*Notes:* Multiple answers possible.

N = 72.

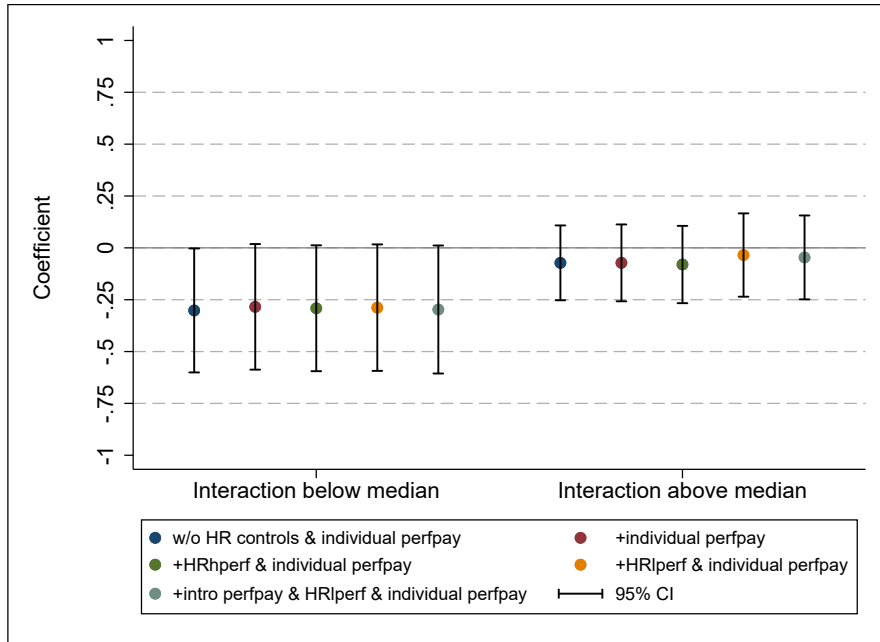
*Source:* LPP-ADIAB 7519, own computations.

In order to analyze whether reasons for the introduction might be a potential driver of the results, we study the effects only for those individuals who work in establishments where performance feedback is introduced due to exogenous reasons. Figure 6 shows that the effects are the same compared to the baseline results: below-median performers reduce their turnover intentions significantly and for above-median performers we do not find a significant effect.

### 3.2.5 The role of affective behavior

In the following, we analyze differences in the affective reaction of the two groups of employees after performance feedback is implemented. Beside the content of the feedback talk and the resulting emotions, the 1-to-1 meeting and the individualized attention of the supervisor might

Figure 6: Effect of performance feedback on turnover intentions by median of performance, exogenous reasons for implementation of performance feedback



(A) Change

Notes: Fixed effect estimations; outcome: turnover intentions; plotted coefficients: interactions between conditional relative rank position and change in performance feedback on the establishment-level; covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size, variable pay, appraisal interviews, personnel development plans, open discussions with low performers, change position of low performers, dismissal of low performers, personnel development of low performers, higher training degrees, employee survey, female support measures, change in executive board, bhr level, implementation of performance pay, year-FE.

N=1,662.

Source: LPP-ADIAB 7519, own computations.

improve the relationship and perceptions of the manager and encourage individuals to stay in the establishment.<sup>17</sup>

Therefore, we consider in the following analyses overall job satisfaction, perceptions of fairness and management quality as well as the evaluation of the promotion criteria in the establishment. The results in Table 3 suggest that individuals do not change their view of being disadvantaged in a personnel decision when performance feedback is implemented. We find weak evidence that above-median performers (weakly significant at the 10 percent level) are more likely to feel supported by the management. However, we document a substantial increase by 0.25 points of a standard deviation in the job satisfaction of below-median performers.

In a next step, we assess the impact of performance feedback on the employee's evaluation of promotion criteria. Interestingly, employees performing above median do not change their view. Instead, we observe a significant decrease in the assessment that promotion decisions are based on non-objective criteria among the below-median performers. This finding is in line with the evidence that for establishments that introduce performance feedback employee retention and

<sup>17</sup>See the organizational psychology literature on the importance of 1-to-1 meetings (e.g. Kim 2020, Castro et al. 2022).

Table 3: Channels

<b>Panel A: Effect of Performance feedback (level) on</b>		
	Below median	Above median
Job satisfaction	0.252**	0.095
<b>Perception of</b>		
being disadvantaged in personnel decision	-0.090	-0.025
being supported by management	0.031	0.190*
<b>Promotion criteria being based on</b>		
expected skill-fit for new position	-0.163	0.096
expected skill-fit of old position	-0.056	0.122
non-objective criteria	-0.354***	-0.007
<b>Panel B: Effect of Performance feedback (change) on</b>		
	Below median	Above median
Job satisfaction	0.254*	0.027
<b>Perception of</b>		
being disadvantaged in personnel decision	-0.095	-0.022
being supported by management	0.009	0.154
<b>Promotion criteria being based on</b>		
expected skill-fit for new position	-0.256*	0.100
expected skill-fit of old position	0.013	0.140
non-objective criteria	-0.460***	-0.046

*Notes:* Fixed effects estimations with full specification; Each row represents the regression output of the respective outcome variable. Outcome variables are standardized. \*\*\* Significant at the 1 percent level. \*\* Significant at the 5 percent level. \* Significant at the 10 percent level.

N = 5,332-5,500 (panel A) and N = 1,783 - 1,844 (panel B).

*Source:* LPP-ADIAB 7519, own computations.

support for low performers plays a significantly larger role. In particular, the introduction of personnel development plans could be more relevant for comparatively low performing employees and coincide with a structured and objective way of defining promotion criteria.

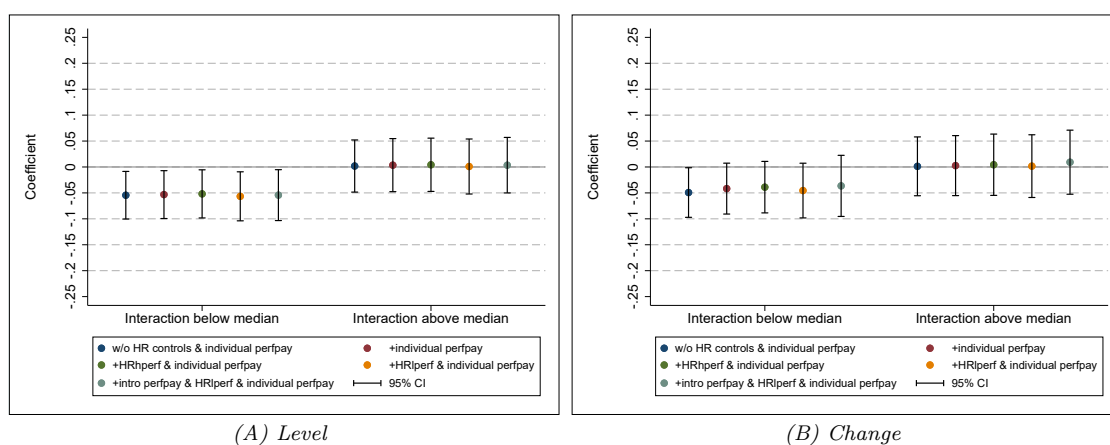
Table B.8 in the Appendix shows further analyses of affective behavior. Additional outcome variables include perceptions of fairness and treatments shown by the supervisors of the establishment but also on clarity and goal communication by the management. Although some coefficients are large and positive for both below- and above-median performers (e.g. on the perception of supervisors showing trust towards employees, good guidance of supervisors), we do not find any significant relationship.

This result leads us to the conclusion that the introduction of performance feedback matters for the turnover intentions of employees and part of the impact is explained by fairness perceptions regarding career opportunities. We do not find strong evidence on a positive impact on the perception of supervisor and management quality which goes beyond the career planning of the individual employee.

### 3.2.6 Actual job search and employer switches

Besides information on turnover intentions, the LPP also includes information on actual job search. Figure 7 shows the effects of performance feedback on the incidence of searching for a new job in dependence of the relative performance of the employees.<sup>18</sup> In line with the results for turnover intentions, employees performing below median decrease their job search activities significantly by around 5 percentage points when performance feedback is introduced while higher performing employees do not change their job search behavior.

Figure 7: Effect of performance feedback on actual job search by median of performance



Notes: Fixed effect estimations; outcome: actual job search; plotted coefficients: interactions between conditional relative rank position and level (panel A)/change (panel B) in performance feedback on the establishment-level; baseline covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; individual perfpay: variable pay; HRhperf controls: appraisal interviews, personnel development plans; HRlperf controls: open discussions with low performers, personnel development of low performers, change position of low performers, dismissal of low performers, higher training degrees, employee survey, female support measures, change in executive board, bhr level; intro perfpay: implementation of performance pay; year-FE.

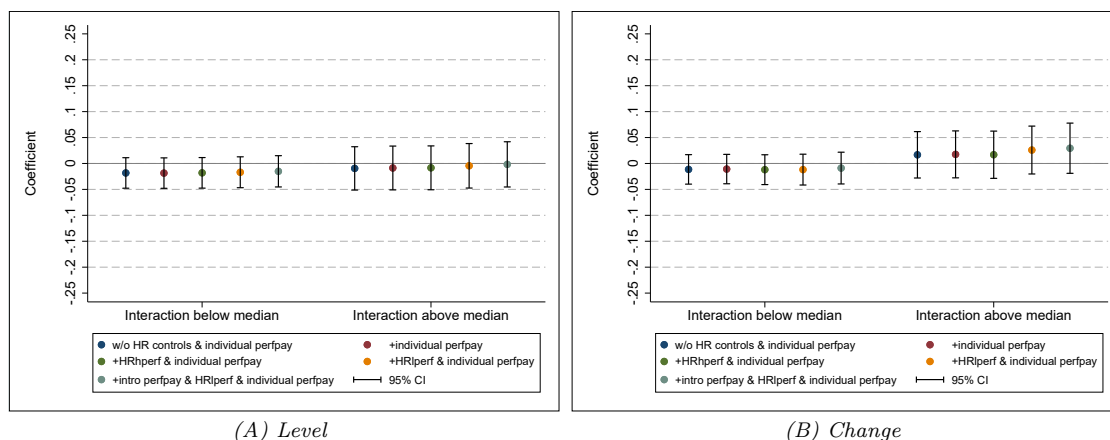
N=4,915 (panel A) and 1,620 (panel B).

Source: LPP-ADIAB 7519, own computations.

In a last step, we look at the effects of the introduction of performance feedback on actually observed employer switches in the social security data. We are able to follow individuals up to the end of the actual observation period which is 31/12/2019 and study whether individuals change their employer in the same and subsequent year of the survey wave or not. Figure 8 shows the results for below- and above-median performers. Panel (A) suggests that for below-median performers the probability to switch the employer is slightly reduced but the effects are not significant and for above-median performers the effect is close to zero. The effects are more

<sup>18</sup>We use a measure of actual job search based on the question "Have you been actively looking for another job during the last 12 months or have you been approached by another employer?" and the answers: 1 "yes, I have been actively searching", 2 "yes, I have been approached by another employer", 3 "both is true" and 4 "no, neither". We generate a dummy variable which equals one for categories 1 to 3 and zero for category 4.

Figure 8: Effect of performance feedback on employer switches by median of performance



*(A) Level* *(B) Change*

*Notes:* Fixed effect estimations; outcome: job-to-job transitions; plotted coefficients: interactions between conditional relative rank position and level (panel A)/change (panel B) in performance feedback on the establishment-level; baseline covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; individual perfpay: variable pay; HRlperf controls: appraisal interviews, personnel development plans; HRlperf controls: open discussions with low performers, personnel development of low performers, change position of low performers, dismissal of low performers, higher training degrees, employee survey, female support measures, change in executive board, bhr level; intro perfpay: implementation of performance pay; year-FE.  
N=5,501 (panel A) and 1,844 (panel B).  
*Source:* LPP-ADIAB 7519, own computations.

positive but still insignificant when looking at the change variable of performance feedback (panel (B)).<sup>19</sup>

<sup>19</sup>We observe a similar pattern when we look at employer switches conditional on surviving, i.e. we only study the effects for individuals in waves where no employer switching has occurred in previous waves. The results are shown in Figure B.2 in the Appendix.

## 4 Conclusion

In this paper, we study the effects of the implementation of performance feedback at the establishment level on employees' job search behavior. We find that establishments that have a problem with relatively high turnover among those performing below the median introduce performance feedback and other forms of employee involvement and development.

In our empirical analysis, we study the effects of the overall management strategy to implement a performance feedback system while controlling for many other changes in employment conditions at the establishment and employee level. Our findings suggest that the implementation of feedback talks has heterogeneous effects on workers' job search behavior depending on their relative performance. Employees performing below the median significantly decrease their turnover intentions and are more satisfied with their job, while employees performing above the median do change their turnover intentions. The same pattern in heterogeneities is confirmed when looking at other outcomes of job search behavior such as actual job search and employer switches.

Our study delivers useful insights about the impact of performance feedback which might be helpful for the design of management strategies to retain workers. Our findings suggest that firms that introduce feedback talks are successful in retaining a specific group of individuals who do not belong to the top-performers and might be unsure about their future development options within the firm. This could be an efficient strategy against the background of skilled-worker shortages and large hiring costs. Nevertheless, retaining relatively low performers could also change the composition of the work force and have a negative impact on the productivity of the firm in the long-run. The consequences for firm-level outcomes would be an interesting direction for future research.



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# Appendix

## A Treatment definition

Figure A.1: Definition of performance feedback



## **B Further descriptive statistics and empirical results**

Table B.1: Descriptive statistics of establishments by treatment

	Implementation of performance feedback in future		
	No	Yes	P-value
Firm size: 50-99 employees	0.524	0.554	0.654
Firm size: 100-249 employees	0.319	0.257	0.321
Firm size: 250-499 employees	0.107	0.167	0.162
Firm size: $\geq$ 500 employees	0.050	0.022	0.346
Agriculture, mining, energy	0.020	0.009	0.538
Manufacturing	0.367	0.325	0.524
Construction	0.032	0.038	0.824
Wholesale, retail trade	0.168	0.140	0.582
Transport and storage	0.090	0.103	0.742
Accommodation and food services	0.012	0.015	0.870
Information and communication	0.007	0.068	0.000
Other high-skilled services	0.249	0.247	0.981
Education, health, social work	0.055	0.056	0.960
AKM establishment FE	0.305	0.268	0.167
Performance feedback (level)	0.616	0.000	0.000
Performance pay (level)	0.548	0.625	0.256
Collective agreement	0.594	0.562	0.637
Appraisal interviews	0.714	0.704	0.861
Employee survey	0.372	0.383	0.866
Personnel development plans	0.401	0.488	0.192
Importance of employee retention	3.534	3.882	0.009
Change in ownership	0.060	0.071	0.712
Change in executive board	0.180	0.226	0.387
Decision support: management consultant	0.367	0.389	0.759
Decision support: competition	0.369	0.479	0.124
Decision support: association information	0.560	0.630	0.338
Decision support: none	0.228	0.232	0.950
Personnel management in the board of directors	0.469	0.510	0.549
Female support measures	0.242	0.328	0.138
Open discussion with low performers	4.290	4.307	0.901
Personnel development of low performers	3.356	3.809	0.008
Change position of low performers	2.740	3.001	0.122
Dismissal of low performers	3.483	3.813	0.074
Investment in higher qualifications (medium level)	40.743	44.400	0.583
Investment in higher qualifications (high level)	12.369	24.329	0.009
Promotion criteria: professional competence	1.453	1.417	0.752
Promotion criteria: personal competence	2.036	1.880	0.255
Promotion criteria: ethic values	3.742	3.730	0.933
Promotion criteria: tenure	4.404	4.590	0.192
Number of establishments	722-898	56-67	

*Notes:* Descriptive statistics are weighted by establishment weights and based on the first observation in the sample.

*Source:* LPP-ADIAB 7519, own computations.

Table B.2: Descriptive statistics of treated establishments

	Implementation of performance feedback		
	Before	After	P-value
Performance feedback (level)	0.000	1.000	0.000
Performance pay (level)	0.653	0.760	0.161
Collective agreement	0.562	0.531	0.710
Appraisal interviews	0.740	0.953	0.000
Employee survey	0.355	0.628	0.001
Personnel development plans	0.501	0.730	0.005
Importance of employee retention	3.965	4.002	0.816
Change in ownership	0.071	0.061	0.801
Change in executive board	0.220	0.291	0.335
Decision support: management consultant	0.530	0.531	0.992
Decision support: competition	0.525	0.522	0.981
Decision support: association information	0.588	0.668	0.519
Decision support: none	0.259	0.068	0.039
Personnel management in the board of directors	0.558	0.341	0.009
Female support measures	0.325	0.291	0.662
Open discussion with low performers	4.382	4.349	0.824
Personnel development of low performers	3.860	3.750	0.541
Change position of low performers	3.018	3.015	0.989
Dismissal of low performers	3.854	3.464	0.066
Investment in higher qualifications (medium level)	43.983	49.698	0.493
Investment in higher qualifications (high level)	24.302	27.238	0.689
Promotion criteria: professional competence	1.348	1.455	0.497
Promotion criteria: personal competence	2.002	2.089	0.706
Promotion criteria: ethic values	3.798	3.426	0.169
Promotion criteria: tenure	4.567	4.752	0.281
Number of establishments	29-72		

*Notes:* Descriptive statistics are weighted by establishment weights.

*Source:* LPP-ADIAB 7519, own computations.

Table B.3: Further descriptive statistics of individuals

	Mean	SD	Min	Max
<i>HR control variables</i>				
Appraisal interviews	0.858	0.349	0	1
Personnel development plans	0.729	0.444	0	1
<i>HR control variables - extended</i>				
Open discussion with low performers	4.217	0.858	1	5
Personnel development of low performers	3.644	1.043	1	5
Change position of low performers	3.227	1.133	1	5
Dismissal of low performers	3.154	1.266	1	5
Investment in higher qualifications (medium level)	79.695	40.160	0	100
Investment in higher qualifications (high level)	46.462	49.854	0	100
Employee survey	0.570	0.495	0	1
Female support measures	0.517	0.500	0	1
Change in executive board	0.310	0.463	0	1
Personnel management in the board of directors	0.473	0.499	0	1
Performance pay (level)	0.737	0.440	0	1
<i>Wage measures</i>				
wage pct 0-5	0.473	0.499	0	1
wage pct 5-25	0.737	0.440	0	1
wage pct 25-50	0.049	0.217	0	1
wage pct 50-75	0.186	0.389	0	1
wage pct 75-95	0.312	0.463	0	1
wage pct >95	0.274	0.446	0	1
Difference establishment wage max-pct 75	0.158	0.365	0	1
Difference establishment wage pct 75-pct 50	0.022	0.146	0	1
Difference establishment wage pct 50-pct 25	38.616	30.834	0	132
Difference establishment wage pct 25-min	22.610	11.205	0	68

*Notes:* pct = percentile. Descriptive statistics are weighted by person weights and based on the first observation of individuals in the sample.

N=2,261.

*Source:* LPP-ADIAB 7519, own computations.

Table B.4: Descriptive statistics of individuals by treatment

	Implementation of performance feedback in future		
	No	Yes	P-value
<i>Outcomes</i>			
Turnover intentions	1.449	1.474	0.719
Turnover intentions (dummy)	0.322	0.323	0.950
<i>Performance</i>			
Below-median performers	0.455	0.384	0.042
Above-median performers	0.545	0.616	0.042
<i>Baseline control variables</i>			
Female	0.281	0.151	0.000
Qualificational level: none	0.016	0.003	0.149
Qualificational level: apprenticeship	0.581	0.562	0.654
Qualificational level: advanced apprenticeship	0.240	0.205	0.233
Qualificational level: university/UAS	0.164	0.229	0.017
Partner	0.862	0.898	0.138
Number of children	0.473	0.491	0.775
Age < 30	0.099	0.186	0.000
Age 30-39	0.167	0.215	0.092
Age 40-49	0.375	0.334	0.233
Age $\geq$ 50	0.358	0.265	0.011
Leadership position	0.286	0.190	0.005
Job strain	3.555	3.343	0.016
Working hours	38.221	39.150	0.257
Job autonomy	4.093	4.152	0.443
Multitasking	4.296	4.131	0.014
Establishment size	2262.494	3518.532	0.001
<i>Individual performance pay</i>			
Variable pay	0.649	0.650	0.999
Number of individuals	2,100	161	

*Notes:* UAS = university of applied science. Descriptive statistics are weighted by person weights and based on the first observation of individuals in the sample.

*Source:* LPP-ADIAB 7519, own computations.



Table B.5: Further descriptive statistics of individuals by treatment

	Implementation of performance feedback in future		
	No	Yes	P-value
<i>HR control variables</i>			
Appraisal interviews	0.849	0.940	0.000
Personnel development plans	0.720	0.817	0.003
<i>HR control variables - extended</i>			
Open discussion with low performers	4.195	4.437	0.000
Personnel development of low performers	3.661	3.485	0.013
Change position of low performers	3.205	3.431	0.006
Dismissal of low performers	3.157	3.122	0.710
Investment in higher qualifications (medium level)	78.309	93.122	0.000
Investment in higher qualifications (high level)	44.044	69.892	0.000
Employee survey	0.547	0.787	0.000
Female support measures	0.495	0.728	0.000
Change in executive board	0.303	0.383	0.016
Personnel management in the board of directors	0.454	0.653	0.000
Performance pay (level)	0.748	0.629	0.000
<i>Wage measures</i>			
wage pct 0-5	0.052	0.027	0.110
wage pct 5-25	0.184	0.203	0.447
wage pct 25-50	0.319	0.239	0.021
wage pct 50-75	0.264	0.367	0.002
wage pct 75-95	0.163	0.114	0.054
wage pct >95	0.019	0.050	0.003
Difference establishment wage max-pct 75	39.525	29.809	0.000
Difference establishment wage pct 75-pct 50	22.654	22.185	0.610
Difference establishment wage pct 50-pct 25	16.710	15.401	0.042
Difference establishment wage pct 25-min	72.318	91.254	0.000
Number of individuals	2,100	161	

*Notes:* pct = percentile. Descriptive statistics are weighted by person weights and based on the first observation of individuals in the sample.

*Source:* LPP-ADIAB 7519, own computations.

Table B.6: Effect of performance feedback on turnover intentions divided by median of performance - Part I

	(1) Level	(2) Change
PF interacted performance below median	-0.194** (0.089)	-0.208** (0.095)
PF interacted performance above median	-0.020 (0.079)	-0.009 (0.081)
<b>Baseline covariates:</b>		
Partner	-0.053 (0.077)	-0.144 (0.135)
Number of children	0.013 (0.028)	0.012 (0.047)
Age 30-39	0.069 (0.135)	0.082 (0.199)
Age 40-49	0.201 (0.160)	0.251 (0.245)
Age $\geq$ 50	0.241 (0.168)	0.308 (0.263)
Leadership position	-0.002 (0.049)	-0.009 (0.103)
Job strain	0.021 (0.013)	0.066*** (0.022)
Working hours	-0.001 (0.003)	-0.003 (0.006)
Working hours squared	-0.000 (0.000)	0.000 (0.000)
Job autonomy	-0.070*** (0.016)	-0.056** (0.026)
Multitasking	0.001 (0.017)	0.014 (0.033)
Establishment size	-0.000 (0.000)	-0.002** (0.001)
Establishment size squared	0.000 (0.000)	0.000* (0.000)
Number of observations	5,448	1,827
Number of individuals	2,478	869
R-squared	0.020	0.058

Notes: PF = performance feedback. FE estimations.

Source: LPP-ADIAB 7519, own computations.

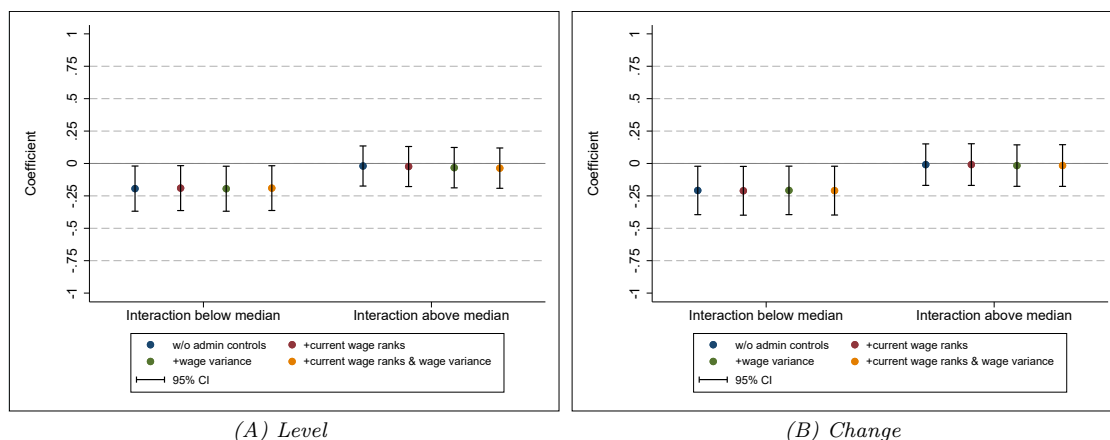
Table B.7: Effect of performance feedback on turnover intentions divided by median of performance - Part II

	(1) Level	(2) Change
<b>Additional covariates:</b>		
Variable pay	-0.088*** (0.029)	-0.162*** (0.056)
Appraisal interviews	-0.020 (0.039)	-0.106** (0.051)
Personnel development plans	0.011 (0.034)	0.037 (0.056)
Open discussion with low performers	0.007 (0.013)	0.007 (0.022)
Personnel development of low performers	0.003 (0.013)	-0.014 (0.020)
Change position of low performers	-0.004 (0.011)	0.003 (0.019)
Dismissal of low performers	-0.004 (0.010)	-0.015 (0.017)
Investment in higher qualifications (medium level)	0.000 (0.000)	0.001** (0.001)
Investment in higher qualifications (high level)	-0.001* (0.000)	-0.001 (0.000)
Employee survey	-0.028 (0.034)	0.115* (0.068)
Female support measures	0.037 (0.028)	0.102* (0.056)
Change in executive board	0.012 (0.023)	0.016 (0.039)
Personnel management in the board of directors	0.031 (0.026)	0.031 (0.049)
Performance pay (level)	0.091 (0.079)	0.086 (0.138)
Year 2014	-0.030 (0.022)	-0.044 (0.038)
Year 2016	-0.039 (0.042)	-0.006 (0.078)
Year 2018	-0.084** (0.041)	-0.190*** (0.067)
Constant	1.831*** (0.272)	2.027*** (0.469)
Number of observations	5,448	1,827
Number of individuals	2,478	869
R-squared	0.020	0.058

*Notes:* FE estimations.

*Source:* LPP-ADIAB 7519, own computations.

Figure B.1: Effect of performance feedback on turnover intentions by median of performance, controlling for administrative wage information



*(A) Level* *(B) Change*

*Notes:* Notes: Fixed effect estimations; outcome: turnover intentions; plotted coefficients: interactions between conditional relative rank position and level (panel A)/change (panel B) in performance feedback on the establishment-level; covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; variable pay; appraisal interviews, personnel development plans; open discussions with low performers, personnel development of low performers, change position of low performers, dismissal of low performers, higher training degrees, employee survey, female support measures, change in executive board, bhr level; implementation of performance pay; year-FE; wage ranks: percentiles of the actual wage level; wage variance: difference of quartiles of the wage distribution within establishments. N=5,448 (panel A) and 1,827 (panel B).  
*Source:* LPP-ADIAB 7519, own computations.

Table B.8: Channels II

<b>Panel A: Effect of Performance feedback (level) on</b>		
	Below median	Above median
<b>Perception of</b>		
being fairly treated by supervisor	0.094	0.191
supervisors showing trust towards employees	0.122	0.183
good guidance of supervisors	0.085	0.106
supervisors openly explaining dissatisfaction with employees' performance	-0.182	-0.015
clear communication of requirements and goals	0.035	0.044
<b>Panel B: Effect of Performance feedback (change) on</b>		
	Below median	Above median
<b>Perception of</b>		
being fairly treated by supervisor	0.030	0.128
supervisors showing trust towards employees	0.009	0.225*
good guidance of supervisors	0.079	0.084
supervisors openly explaining dissatisfaction with employees' performance	-0.180	0.041
clear communication of requirements and goals	0.000	0.024

*Notes:* Fixed effects estimations with full specification; Each row represents the regression output of the respective outcome variable. Outcome variables are standardized. \*\*\* Significant at the 1 percent level. \*\* Significant at the 5 percent level. \* Significant at the 10 percent level.

N = 4,771 - 5,497 (panel A) and N = 1,642 - 1,842 (panel B).

*Source:* LPP-ADIAB 7519, own computations.

Table B.9: Turnover intentions by treatment

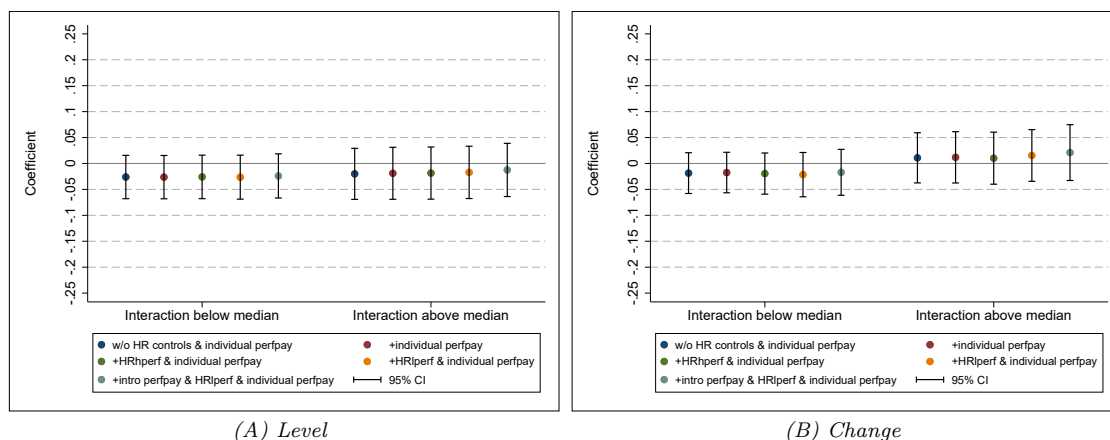
	Below median	Above median
Treated before treatment	1.701	1.405
Treated after treatment	1.481	1.452
Controls without performance feedback in t0	1.522	1.577
Controls without performance feedback in t1	1.515	1.521
Controls with performance feedback in t0	1.484	1.445
Controls with performance feedback in t1	1.538	1.454

*Notes:* The table shows mean values of turnover intentions for individuals in establishments where performance feedback is implemented (treated) and individuals where no change in the performance feedback system of the establishment takes place (controls). Controls are further distinguished by whether the establishment has a performance feedback system or not. The level of turnover intentions is shown in the wave before and after treatment for treated individuals and in the first and second observed wave for control individuals.

N = 77 - 84 (treated), 268 - 338 (controls without performance feedback) and 690 - 804 (controls with performance feedback).

*Source:* LPP-ADIAB 7519, own computations.

Figure B.2: Effect of performance feedback on employer switches by median of performance



Notes: Fixed effect estimations; outcome: job-to-job transitions conditional on no switching in prior years; plotted coefficients: interactions between conditional relative rank position and level (panel A)/change (panel B) in performance feedback on the establishment-level; baseline covariates: partner, number of children, age, leadership position, job strain, actual working hours, job autonomy, multitasking, establishment size; individual perfpay: variable pay; HRrperf controls: appraisal interviews, personnel development plans; HRlperf controls: open discussions with low performers, personnel development of low performers, change position of low performers, dismissal of low performers, higher training degrees, employee survey, female support measures, change in executive board, bhr level; intro perfpay: implementation of performance pay; year-FE.

N=4,613 (panel A) and 1,576 (panel B).

Source: LPP-ADIAB 7519, own computations.



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