

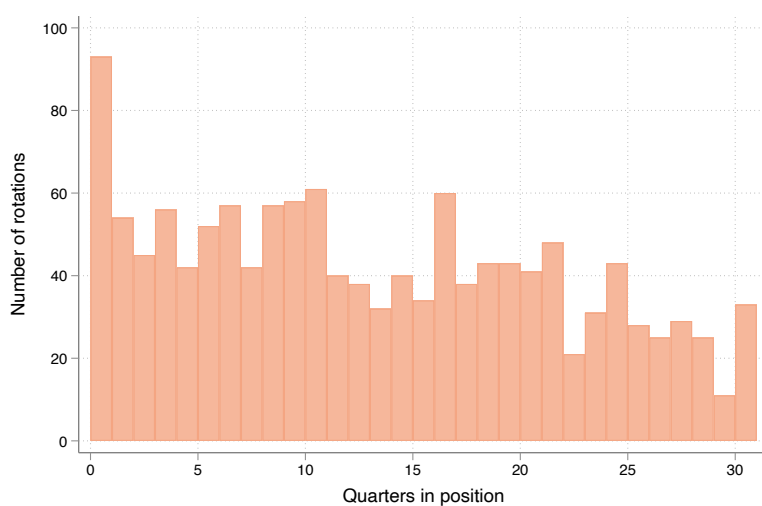
Supplemental Appendix to "Talent Hoarding in Organizations"

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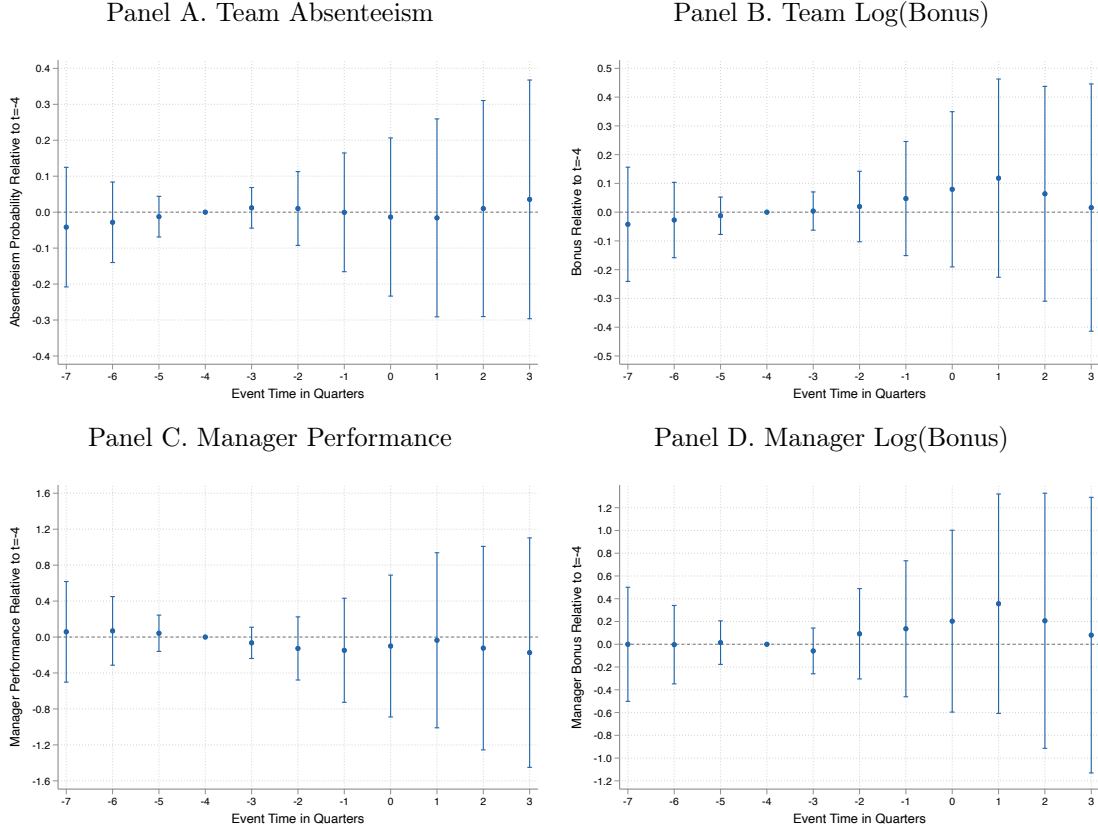
A Appendix Figures

Figure A1: Number of Manager Rotations by Managers' Length in Position



Notes: This figure illustrates variation in the timing of manager rotations, as measured by the number of quarters a manager has been in their position at the time of rotation. The number of observations is 1,359, representing the total number of all manager rotations I use for my analysis.

Figure A2: Effect of Manager Rotation on Team-Level and Manager-Level Outcomes



Notes: This figure documents the absence of pre-trends in key team-level and manager-level outcomes before a manager rotation. Panel A shows team-level absenteeism rates. Panel B shows team-level log bonus payments. Panel C shows the manager's performance rating. Panel D shows the manager's log bonus payment. Event time is defined relative to the occurrence of a manager rotation. The specification includes team and quarter fixed effects, but no other controls. I bin event time dummy variables at $t = -8$ and $t = 4$ and cluster standard errors at the team level. Robust standard errors are used and 95%-level confidence intervals are displayed. The mean outcome in Panels A (C) as of $t = -4$ is 0.09 (2.95). Outcome means for Panel B and D are unreported for confidentiality. $N=1,xxx$.

B Appendix Tables

Table B1: Workers' Survey Quotations

Form of talent hoarding	Quotations by workers
Informal underrating	"[My] former boss made me look bad at the potential new superiors behind my back in order to keep me on the team."
Formal underrating	"Supervisors suppress potential ratings because of fear that employees will leave their current position for a promotion." "Out of fear that workers will leave the team, supervisors tend to underrate employees." "My supervisor would certainly find out if I applied to another position at the firm and that would have a negative impact on my assessment."
Suppressed development	"[Supervisors] keep employees in their positions by preventing further development, rejecting training courses, and increasing workloads to prevent capacity for new tasks and development measures." "Career development is not supported by direct supervisors, instead it is actively blocked with the goal of keeping people in their current positions."
Soft pressure	"I decided not to apply internally ... because the message communicated to me in the employee dialogue was that I can't leave the team within three years of joining." "My boss strongly hinted that in order for my success until now to be considered I need to follow through on my project until the very end otherwise my efforts will not be fully taken into account."
Threats	"... my supervisor communicated very openly in a workshop that if one of his employees applied and was not hired, his career in his current department would also be at an end."
Retaliation	"The position should fit exactly so that negative effects of applying regarding the current manager are worthwhile." "Fear of negative reactions from the supervisor: I have seen it from many colleagues who openly stated that they were applying. These colleagues then received no further training and no more interesting projects. The supervisor had written them off. This made the months leading up to the final change of job very difficult."

Notes: This table displays worker quotations regarding talent hoarding at the firm. The quotations are based on workers' free-text responses to questions on internal career development at the firm.

Table B2: Managers' Survey Quotations

Statement	Quotations by managers
Misaligned incentives	"Regarding the development of your subordinates, there often is a conflict of interests for managers, since the employee then usually leaves the team and the position will not be approved to be refilled again." "Managers have no interest in developing talents because they have no direct benefit from it." "Managers pursue their own goals and often prevent further development of workers, because they are not rewarded for developing talent." "Selfish managers are not willing to promote or recommend subordinates to other areas of the firm, even if that would add value to the firm." "[Middle] Managers can't improve the situation themselves since they depend on the upper management. That is why they block the development of their subordinates."
Risk of losing talent	"I observe that managers are not interested in letting good workers leave their current position or develop them, otherwise they would have to fill the current position again." "Managers don't actively support workers in switching positions because the vacant position is usually not (immediately) filled again." "Positions are cut if an employee takes on a new job or even dies, so managers are afraid that their team will shrink and they don't know how to do all the work with the rest of the team. Managers would be more open to talk to employees about developing them if they would know that they can fill the vacant position again." "Many managers are not necessarily interested in developing workers or helping them to get a better job within the firm, because they would lose a good worker. Switches to other areas at the firm are not encouraged, even if it would have been the right move for the worker." "If you are good at what you are doing, it is very unlikely that you will be suggested for a higher-level position, especially if that position is in a different team." "Supervisors have the policy to do whatever it takes to keep people in their team, even if this means ignoring the development of the team members."

Notes: This table displays manager quotations regarding talent hoarding at the firm. The quotations are based on managers' free-text responses to questions on internal career development at the firm.

Table B3: Comparison of Analysis Sample to Representative Survey of German Workforce

	Analysis sample (1)	Large manufacturers (2)	German workforce (3)
Female	0.21	0.21	0.45
German citizen	0.89	0.85	0.88
Age (years)	43.3	44.1	43.9
Married	0.61	0.59	0.54
Children	0.80	0.62	0.62
Education (years)	15.8	11.7	11.8
Firm Tenure (years)	13.3	16.8	13.2
Weekly hours	41.1	40.5	38.1
Team leadership	0.18	0.25	0.29
Observations	1xx,xxx	1,472	13,791

Notes: This table compares the employees in my sample to a representative survey of German workers (BIBB). Because the most recent version of the BIBB was conducted in 2018 (Hall et al., 2020), I restrict my quarterly sample to 2018. Column 1 reports summary statistics for my analysis sample. Column 2 uses data from the BiBB survey and restricts to employees in manufacturing firms with at least 250 employees in West Germany. Column 3 uses data from the BiBB survey for all labor force participants in West Germany. Columns 2 and 3 are weighted to achieve representativeness of the German population. Team leadership is defined based on whether someone supervises direct reports.

Table B4: Heterogeneity in Manager Hoarding by Incentives Using an Alternative Measure Based on Suppression of Training Opportunities

Outcome variable:	Top tercile training measure		
	(1)	(2)	(3)
Financial incentive (share)	0.2007 (0.033)	– –	– –
Team size	– –	-0.0143 (0.001)	– –
Visibility	– –	– –	0.0298 (0.013)
Outcome Mean	0.3001	0.3001	0.3001
Predicted difference p90–p10	0.1380	-0.1403	0.0298
Observations	6,xxx	6,xxx	6,xxx

Notes: This table uses an alternative measure of managers' hoarding actions based on managers' withholding of access to high-visibility training opportunities to examine whether managerial talent hoarding is more prevalent among managers with stronger incentives to hoard talent. I use three distinct measures of hoarding incentives. Column 1 captures financial incentives using the share of total compensation that is performance-related. Column 2 uses the number of team members overseen by the manager. Column 3 includes a binary indicator for low talent visibility, defined as working in a functional area where individual achievements are less visible. Each coefficient is estimated separately based on a linear model for managers' hoarding propensity using an OLS regression of the indicator that managers are hoarding-prone, defined as being in the top tercile of the distribution of mean deviations between predicted and actual training assignments, on one incentive measure at a time. The predicted difference p90-p10 refers to the predicted difference in the outcome between the 90th and 10th percentiles of the continuous regressors (between values 1 and 0 for binary indicators), holding all other covariates at their mean values. See Appendix Section E.2.3 for details on the construction of this alternative hoarding measure. See Appendix Section E.2.1 for definitions of the incentive measures and Appendix Table E3 for their distribution in the sample. Appendix Tables E6 and E7 present complementary robustness results using alternative specifications of the regressors and outcome variable. See Table 2 for my main results using managers' suppression of potential ratings as baseline measure of hoarding behavior. Controls: Female, age, German citizenship, firm tenure, educational qualification. Robust standard errors in parentheses.

Table B5: Effect of Manager Rotation by Transition Type and Incumbent Status

	Job transition		Internal application	
	Internal	External	Incumbent	Newly hired
	(1)	(2)	(3)	(4)
Manager Rotation	0.0111 (0.002)	0.0011 (0.001)	0.0190 (0.004)	0.0275 (0.004)
Outcome Mean	0.008	0.008	0.027	0.030
P-value of t-test	0.0000	0.0000	0.1301	0.1301
Observations	3xx,xxx	3xx,xxx	1xx,xxx	1xx,xxx

Notes: This table provides evidence in support of talent hoarding as underlying mechanism. Columns 1 and 2 illustrate the effect of manager rotations on workers' job transitions within the firm (Column 1) and out of the firm (Column 2). Consistent with talent hoarding, only internal transitions are affected by rotations. Columns 3 and 4 document the application effects of manager rotations for workers who have been in the team before the manager arrived (Column 3) and workers who in the past were hired by the rotating manager (Column 4). I do not find that rotations have larger effects for workers who the manager was able to select herself, which is what one would expect under manager-worker-specific match effects. Robust standard errors are clustered at the worker and rotation level. Controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects.

Table B6: Effect of Manager Rotation by Destination of Application

	Division		Functional area		Location	
	Same	Different	Same	Different	Same	Different
	(1)	(2)	(3)	(4)	(5)	(6)
Manager Rotation	0.01587 (0.002)	0.00709 (0.002)	0.01437 (0.002)	0.00813 (0.002)	0.01768 (0.002)	0.00437 (0.001)
Outcome Mean	0.01438	0.01434	0.01575	0.01310	0.01777	0.00963
P-value of t-test	0.0013	0.0013	0.0214	0.0214	0.0000	0.0000
Observations	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx

Notes: This table illustrates heterogeneity in the effect of manager rotations on worker applications by the destination of applications. Under talent hoarding, workers should disproportionately hold off on applications about which managers are likely to find out (e.g., because of proximity to the hiring manager). I assess three dimension of proximity compared to worker's current position: same versus different division (Columns 1 and 2), same versus different functional area (Columns 3 and 4), and same versus different location (Columns 5 and 6). Each coefficient stems from a separate regression based on Equation 3. Robust standard errors are clustered at the worker and rotation level. Controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects.

Table B7: Effect of Manager Rotation by Manager Characteristics

Panel A: Outgoing Manager							
Manager gender		Manager vs worker gender		Manager experience		Team absenteeism	
Male	Female	Same	Opposite	Low	High	Low	High
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Manager Rotation	0.02112 (0.003)	0.03554 (0.009)	0.02105 (0.003)	0.02900 (0.006)	0.02014 (0.005)	0.02691 (0.006)	0.02098 (0.003)
Outcome Mean	0.029	0.029	0.029	0.029	0.029	0.029	0.029
P-value of t-test	0.1080	0.1080	0.2264	0.2264	0.2891	0.2891	0.3698
Observations	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx
Panel B: Incoming Manager							
Manager gender		Manager vs worker gender		Manager tenure		Functional area	
Male	Female	Same	Opposite	Low	High	Same	Different
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Manager Rotation	0.02151 (0.003)	0.02532 (0.008)	0.02138 (0.003)	0.02396 (0.006)	0.02511 (0.005)	0.02171 (0.006)	0.02374 (0.005)
Outcome Mean	0.029	0.029	0.029	0.029	0.029	0.029	0.029
P-value of t-test	0.6361	0.6361	0.6744	0.6744	0.6252	0.6252	0.5305
Observations	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx

Notes: This table illustrates heterogeneity in the effect of manager rotations on worker applications by the characteristics of the outgoing manager (Panel A) and the incoming manager (Panel B). Each coefficient stems from a separate regression based on Equation 3, where the rotation event is restricted to managers with a given characteristic. Panel A compares application effects by the outgoing manager's gender (Columns 1 and 2), manager vs worker gender (Columns 3 and 4), bottom vs top quartile of manager experience (Columns 5 and 6), and the past absenteeism rate of the manager's team split at the sample median (Columns 7 and 8). Panel B compares application effects by the incoming manager's gender (Columns 1 and 2), manager vs worker gender (Columns 3 and 4), bottom vs top quartile of manager tenure at the firm (Columns 5 and 6), and whether the incoming manager was in the same vs different functional area before (Columns 7 and 8). In both panels, I find no statistical difference in the effect between each pair-wise comparison as indicated by the p-value of the corresponding t-test. Robust standard errors are clustered at the worker and rotation level. Controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects.

Table B8: Testing for Instrument Exclusion

Panel A: IV Estimates on Hiring by Rotating Manager's Ties to Destination						
Destination of Application Relative to Manager's ...						
	Division		Functional area		Location	
	Different	Same	Different	Same	Different	Same
	(1)	(2)	(3)	(4)	(5)	(6)
Applied	0.44231 (0.116)	0.50917 (0.070)	0.31052 (0.089)	0.57442 (0.076)	0.59534 (0.168)	0.44680 (0.062)
Outcome Mean	0.003	0.005	0.002	0.005	0.002	0.006
Observations	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx
Panel B: IV Estimates on Hiring by Rotating Manager's Quality						
	Turnover		Absenteeism		Performance	
	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)
Applied	0.48749 (0.068)	0.53386 (0.118)	0.55033 (0.104)	0.53563 (0.133)	0.57052 (0.128)	0.60847 (0.126)
Outcome Mean	0.008	0.008	0.008	0.008	0.008	0.008
Observations	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx
Panel C: IV Estimates on Hiring by Rotating Manager's Exposure to Workers						
	Exposure length in quarters					
	≤ 1	2-3	4-6	7-8	9-10	11-14
	(1)	(2)	(3)	(4)	(5)	(6)
Applied	0.47322 (0.220)	0.31729 (0.136)	0.52088 (0.190)	0.45054 (0.142)	0.46512 (0.207)	0.44879 (0.156)
Outcome Mean	0.008	0.008	0.008	0.008	0.008	0.008
Observations	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx

Notes: This table finds no evidence for a violation of the exclusion restriction regarding manager rotation as instrument for worker applications. Each panel presents two-stages least squares estimates of applying on getting hired based on Equation 5. Panel A estimates hiring outcomes for applications to which rotating managers have varying degrees of formal ties. Each column uses a different split of applications based on whether the application is to a different area of the firm, where area is defined as division (Columns 1 and 2), functional area (Columns 3 and 4), and location (Columns 5 and 6). Panel B estimates hiring outcomes by rotating managers' quality using past means for three outcomes: team turnover (Columns 1 and 2), team absenteeism (Columns 3 and 4), and manager's performance rating (Columns 5 and 6). Each column uses a different manager type to define the rotation event based on whether the team-level outcome is in the bottom or top quartile of the team distribution. Panel C estimates hiring outcomes by managers' length of exposure to workers. Each column uses a different split of workers based on the number of quarters the worker has been with the manager. Robust standard errors are clustered at the rotation and worker level. Controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects.

Table B9: Testing for Instrument Monotonicity

Panel A: Application Effects of Manager Rotations by Subgroup				
Sample	Observations	Baseline application rate	First-stage effect	Standard error
(1)	(2)	(3)	(4)	(5)
Age $\leq$ 40 years	1xx,xxx	0.04011	0.02451	(0.005)
Age $>$ 40 years	2xx,xxx	0.02149	0.02083	(0.003)
Tenure $\leq$ 5 years	9x,xxx	0.03572	0.02918	(0.006)
Tenure $>$ 5 years	2xx,xxx	0.02669	0.02019	(0.003)
Schooling $\leq$ 13 years	1xx,xxx	0.02100	0.01161	(0.004)
Schooling $>$ 13 years	2xx,xxx	0.03122	0.02575	(0.004)
Married	2xx,xxx	0.02694	0.02003	(0.003)
Not married	1xx,xxx	0.03351	0.02635	(0.005)
Parent	2xx,xxx	0.02794	0.02199	(0.003)
Non-parent	1xx,xxx	0.03351	0.02391	(0.006)
German citizen	3xx,xxx	0.02844	0.02289	(0.003)
Non-German citizen	3x,xxx	0.03395	0.01927	(0.010)
Team leadership	7x,xxx	0.02457	0.01699	(0.006)
No team leadership	3xx,xxx	0.03001	0.02364	(0.003)
High performance	2xx,xxx	0.02931	0.02785	(0.004)
Low performance	1xx,xxx	0.03066	0.01719	(0.004)

Panel B: Application Effects of Manager Rotations by Predicted Application Propensity				
	Never applied	Applied before	Low-application team	High-application team
	(1)	(2)	(3)	(4)
Manager Rotation	0.01792	0.04240	0.01813	0.02506
	(0.002)	(0.012)	(0.003)	(0.007)
Outcome Mean	0.019	0.113	0.022	0.062
Observations	3xx,xxx	4x,xxx	2xx,xxx	7x,xxx

Notes: This table finds no evidence for a violation of the monotonicity assumption regarding manager rotation as instrument for worker applications. Panel A presents first-stage effects of manager rotation on worker applications for several subpopulations of interest, as indicated by Column 1. Estimation is based on Equation 3 and conducted separately in each subpopulation. Column 2 contains the number of observations, Column 3 presents baseline application rates, Column 4 provides first-stage effects, and Column 5 contains robust standard errors, clustered at the rotation and worker level. I find that manager rotation has a positive and statistically significant first-stage effect (Column 4) for each subpopulation. Panel B presents first-stage effects of manager rotation on applying by workers' predicted application propensity. I use two approaches to predict workers' unobserved application propensity. Columns 1 and 2 split the sample by workers' own past application activity. Columns 3 and 4 split the sample by whether teams' leave-out application rates in the past were high or low. I find a significant and positive first-stage effect even for the subsets of workers who previously had a high propensity to apply (Columns 2 and 4). Robust standard errors are clustered at the rotation and worker level. Controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects.

C Theoretical Appendix

In this section, I provide the formal derivations for predictions 4 and 5 referenced in Section I.B.

Prediction 4. If $\beta_1 < \beta_2 \implies \Pr[i \text{ applies} | \beta = \beta_1] > \Pr[i \text{ applies} | \beta = \beta_2]$

This prediction implies that greater levels of talent hoarding reduce the number of workers who apply for a promotion.

Workers apply if $q(\alpha_i, \beta)b \geq c + \varepsilon_i$, where $\varepsilon_i \sim \Psi$ captures worker-specific heterogeneity. A worker's probability to apply can be expressed as $\Pr[i \text{ applies} | \beta_m] = \Psi(q(\alpha_i, \beta_m)b - c)$. Because workers' promotion probability is decreasing in talent hoarding ($\frac{\partial q}{\partial \beta} < 0$), if $\beta_1 < \beta_2$:

$$\begin{aligned} q(\alpha_i, \beta_1) &> q(\alpha_i, \beta_2) \\ \Psi(q(\alpha_i, \beta_1)b - c) &> \Psi(q(\alpha_i, \beta_2)b - c) \\ \implies \Pr[i \text{ applies} | \beta = \beta_1] &> \Pr[i \text{ applies} | \beta = \beta_2] \end{aligned}$$

Prediction 5. If $\alpha_1 < \alpha_2$ and $\beta_1 < \beta_2 \implies \frac{\Pr[i \text{ applies} | \alpha_2, \beta_1]}{\Pr[i \text{ applies} | \alpha_1, \beta_1]} > \frac{\Pr[i \text{ applies} | \alpha_2, \beta_2]}{\Pr[i \text{ applies} | \alpha_1, \beta_2]}$

This prediction implies that greater levels of talent hoarding change the composition of applicants, causing a lower share of workers with high productivity in the applicant pool.

Let $r(\alpha_i, \beta_m)$ be $\Pr[i \text{ applies} | \alpha_i, \beta_m] = \Psi(q(\alpha_i, \beta_m)b - c)$. We have assumed that $\frac{\partial^2 q}{\partial \beta \partial \alpha} < 0$, $\frac{\partial q}{\partial \beta} < 0$, $\frac{\partial q}{\partial \alpha} > 0$. We want to show that $\frac{\partial}{\partial \beta} \frac{r(\alpha_1, \beta)}{r(\alpha_2, \beta)} < 0$ for $\alpha_2 > \alpha_1$.

$$\begin{aligned} \frac{\partial}{\partial \beta} \frac{r(\alpha_2, \beta)}{r(\alpha_1, \beta)} &= \frac{\partial}{\partial \beta} \frac{\Psi(q(\alpha_2, \beta))}{\Psi(q(\alpha_1, \beta))} \\ &= \frac{\Psi(q(\alpha_2, \beta))\psi(q(\alpha_1, \beta))\frac{\partial q(\alpha_1, \beta)}{\partial \beta} - \Psi(q(\alpha_1, \beta))\psi(q(\alpha_2, \beta))\frac{\partial q(\alpha_2, \beta)}{\partial \beta}}{[\Psi(q(\alpha_1, \beta))]^2} \end{aligned}$$

Omitting the denominator since $[\Psi(q(\alpha_1, \beta))]^2 > 0$ leaves to show that

$$\Psi(q(\alpha_1, \beta))\psi(q(\alpha_2, \beta))\frac{\partial q(\alpha_2, \beta)}{\partial \beta} < \Psi(q(\alpha_2, \beta))\psi(q(\alpha_1, \beta))\frac{\partial q(\alpha_1, \beta)}{\partial \beta}$$

Rearranging leads to following expression

$$\underbrace{\frac{\frac{\partial q(\alpha_2, \beta)}{\partial \beta}}{\frac{\partial q(\alpha_1, \beta)}{\partial \beta}}}_{<0} < \underbrace{\frac{\Psi(q(\alpha_2, \beta))\psi(q(\alpha_1, \beta))}{\Psi(q(\alpha_1, \beta))\psi(q(\alpha_2, \beta))}}_{>0}$$

Since the left-hand side of the equation is below zero and the right-hand side of the equation is above zero, it holds that $\frac{\partial}{\partial \beta} \frac{r(\alpha_1, \beta)}{r(\alpha_2, \beta)} < 0$ for $\alpha_2 > \alpha_1$.

D Data Appendix

This appendix provides additional details on the data sources used in the analysis. It begins by describing the construction of the administrative dataset, which links personnel records, talent management data, and internal application data provided by the firm. It then outlines the implementation of the employee and manager surveys, including survey design, response rates, and benchmarking exercises to aid interpretation of the survey responses.

D.1 Administrative Data Used in the Analysis

This paper is based on a novel dataset combining personnel records and application data from a large manufacturing firm. To comply with the firm’s data protection protocols, all data processing was conducted within a secure data environment managed by the firm, where the dataset was assembled and anonymized.

The dataset integrates information from three internal data sources: (1) personnel records, (2) talent management data, and (3) job application data. These sources were linked using a unique employee identifier.

Personnel Records. The personnel records include detailed demographic and employment information. The following variables were extracted: employment status, date of birth, gender, marital and family status, parental leave status, date of entry into the firm, highest educational degree attained, citizenship, position, functional area, division, work location, contractual working hours, number of direct reports, reporting distance to the CEO, managerial autonomy, base pay, bonus payments, absenteeism, exit date (if applicable), retirement date, manager ID, and team ID. To create a quarterly panel dataset, the data were collapsed to the employee-by-quarter level, keeping the first observation of an employee in a given quarter.

Talent Management Data. From the firm’s internal talent management systems, I obtained information on individual performance and potential ratings, nominations to talent development programs, and worker assignments to trainings.

Job Application Data. The application tracking system provides data on all internal applications submitted by employees. Extracted variables include application date and status, application outcomes (e.g., rejection, interview, offer), vacancy ID, hiring manager ID, hierarchy level of the vacancy, as well as the division, functional area, and location associated with each vacancy.

The three data sources were linked using a unique employee id within the firm’s secure data environment.

D.2 Employee Survey

All employees in my sample were invited to share their perspectives on the internal labor market at the firm. The survey yielded over 15,000 responses, corresponding to a response rate of approximately 50%. A summary of the survey content and key findings is presented in Section II.C. This

appendix section provides additional information on the survey’s implementation and instrument.

D.2.1 Survey Implementation

The survey was conducted using the firm’s established procedures for internal employee surveys. It was formally approved by the firm’s data protection officer and the workers’ council. Invitations to participate were distributed via email by the Human Resources department. Appendix Figure D1 shows the full text of the invitation email.

The survey was administered through the firm’s secure online platform. Upon accessing the survey link, respondents were prompted to provide informed consent for their responses to be recorded and analyzed. The median completion time was 13 minutes. To ensure data reliability, I restrict the analysis to respondents who spent at least five minutes completing the survey. Appendix Table D1 compares respondents to the overall population and finds that both groups are very similar in terms of their characteristics.

Figure D1: Invitation to Participate in Employee Survey

Dear colleagues,

To guarantee a continuous improvement of the internal job market at [COMPANY], we are interested in your feedback on how you go about your career planning and job search. Your participation in this survey will help us to improve HR practices.

Please keep in mind that all answers will be collected anonymously and cannot be traced back to you. This survey was approved by the workers’ council under the number [XXX].

The estimated duration of this survey is 10-15 minutes. Please [click here](#) to begin the survey.

If you have any questions, please feel free to email [XXX].

We thank you for your support!

Best regards,
[XXX]

Notes: This figure presents the wording of the survey invitation sent to employees.

Table D1: Comparison of Analysis Sample to Respondents of Employee Survey

	Sample	Survey
	(1)	(2)
Female	0.21	0.24
German	0.90	0.94
Age <30 years	0.10	0.12
Age 30-39 years	0.30	0.32
Age 40-49 years	0.31	0.26
Age >=50 years	0.30	0.28
Tenure <= 2 years	0.10	0.14
Tenure 3-5 years	0.12	0.18
Tenure 6-9 years	0.12	0.17
Tenure >=10 years	0.56	0.51
Engineering	0.48	0.41
Finance	0.08	0.05
Marketing and Sales	0.11	0.07
Observations	3xx,xxx	1x,xxx

Notes: This table compares average characteristics of employees in my analysis sample (Column 1) to employees who responded to the employee survey (Column 2). The sample of survey respondents is restricted to only contain responses who took at least five minutes to complete the survey.

D.2.2 Survey Instrument

A. Please rate following six statements. “Actively applying for positions at [Company] ...” {I strongly agree, I agree, Undecided, I do not agree, I totally do not agree}

A.1 “... increases future promotion chances.”

A.2 “... does not matter since jobs are only posted proforma.”

A.3 “... would cause negative consequences by my current supervisor.”

A.4 “... is seen as disloyal to my current team.”

A.5 “... is appropriate once employees are unsatisfied with their job.”

A.6 “... should only be done after checking in with one’s direct supervisor.”

B. Which job characteristics are most important to you? Please select the two most important characteristics from the following list. {Potential for training, Potential for promotion, Pay, Flexible hours, Location, Meaningful tasks, Familiar tasks, Challenging tasks, Good relationship with colleagues, Good relationship with supervisor}

C. Did someone recommend an open position to you in the past 12 months?

C.1 Yes

C.2 No

D. You indicated that someone recommended one or more open positions to you. Who recommended these positions to you? Please select all that apply.

D.1 Colleagues within your team

D.2 Colleagues outside of your team

D.3 Your supervisor

D.4 The supervisor responsible for the open position

D.5 Your HR responsible

D.6 Family or friends

E. At the end of this survey, we are interested in your personal opinion about current challenges and potential improvements with respect to careers at [Company].

E.1 What were the reasons why you decided in the past not to apply for internal job openings at [Company]? {free-text response}

E.2 What are the main challenges that you have encountered in your career development at [Company]? {free-text response}

E.3 What are some of the ways that [Company] could be helpful to you as you are planning your career? {free-text response}

D.3 Manager Survey

To provide direct evidence on managers' incentives and talent hoarding behavior, I conducted a survey among managers in my sample. The survey achieved a response rate of 62%, resulting in over 3,000 completed responses. A summary of the survey design and key findings is provided in Section II.D. This appendix section offers additional details on the survey implementation and questionnaire. It also presents the raw response distributions for the main survey questions used in the analysis and includes several benchmarking exercises to aid interpretation.

D.3.1 Survey Implementation

The survey was implemented using the firm's standard procedures for internal employee surveys. Prior to launch, it received formal approval from both the firm's data protection officer and the workers' council. Managers were invited to participate via e-mail sent by the Human Resources department. Appendix Figure D2 displays the wording of the invitation email.

The survey was administered through the firm's secure online survey platform. Upon accessing the survey link, respondents were prompted to provide informed consent for their responses to be recorded and analyzed. The median completion time was 14 minutes. To ensure data quality, the analysis sample is restricted to respondents who spent at least five minutes completing the survey. Appendix Table D2 shows that respondents are similar to the overall population in terms of their characteristics.

Several features suggest that the managers' interest and trust in the survey was high. While 62% of managers responded to the survey overall, 61% responded before a reminder was sent. Appendix Table D3 compares the demographics of managers who responded before a reminder was sent (Column 1) to those who responded afterwards (Column 2). I find that the characteristics of both groups of managers are very similar. In unreported results, I also find that the likelihood to respond before the reminder was sent is not correlated with managers' propensity to report talent hoarding using either of my two survey-based measures.

Table D2: Comparison of Managers in Analysis Sample to Respondents of Manager Survey

	Sample	Survey
	(1)	(2)
Female	0.10	0.16
German	0.92	0.89
Age <30 years	0.01	0.01
Age 30-39 years	0.17	0.22
Age 40-49 years	0.40	0.34
Age >=50 years	0.42	0.43
Tenure <= 2 years	0.03	0.02
Tenure 3-5 years	0.06	0.04
Tenure 6-9 years	0.11	0.16
Tenure >=10 years	0.75	0.78
Engineering	0.40	0.33
Finance	0.08	0.05
Marketing and Sales	0.12	0.07
Observations	7x,xxx	3,xxx

Notes: This table compares average characteristics of managers in my analysis sample (Column 1) to the managers who responded to the manager survey (Column 2). The sample of survey respondents is restricted to only contain responses who took at least five minutes to complete the survey.

Table D3: Summary Statistics of Managers Who Responded Before and After a Reminder was Sent

	Before Reminder	After Reminder
	(1)	(2)
Female	0.17	0.15
German	0.89	0.87
Age <30 years	0.02	0.01
Age 30-39 years	0.23	0.22
Age 40-49 years	0.34	0.33
Age >=50 years	0.41	0.44
Tenure <= 2 years	0.02	0.02
Tenure 3-5 years	0.04	0.03
Tenure 6-9 years	0.16	0.16
Tenure >=10 years	0.77	0.79
Engineering	0.33	0.33
Finance	0.05	0.06
Marketing and Sales	0.07	0.07
Observations	2,xxx	1,xxx

Notes: This table compares average characteristics of managers who responded to the manager survey before a reminder was sent (Column 1) and those who responded after a reminder was sent (Column 2).

Figure D2: Invitation to Participate in Manager Survey

Dear colleagues,

Leaders at [COMPANY] play an important role in teamwork and the individual success of all members. In order to better understand how leaders can be supported in their important work, we would like to understand how the role of leaders in the development of employees at [COMPANY] is perceived and experienced. We invite you to support us by participating in this survey. Your feedback will help us to improve leadership development and HR processes.

The survey will take no more than 10 minutes of your time. To participate, please click on the link below.

[Link]

Please note that your participation is voluntary. All responses are collected anonymously and cannot be traced back to your name. The results of this survey do not allow any individual conclusions to be drawn. The results of the survey will not be used to monitor performance or behavior. This survey has been approved by the workers' council and is registered under the number [XXX].

If you have any questions, please contact [XXX].

Thank you for your support!

With best regards,
[XXX]

Notes: This figure presents the wording of the survey invitation sent to managers.

D.3.2 Survey Instrument

A. Where do you think leaders can create the most impact for [Company]? Please rate the impact that leaders can create. {Very high impact, high impact, low impact, very low impact}

A.1 Strategic orientation

A.2 Vision

A.3 Operational efficiency

A.4 Talent development

A.5 Culture and morale

A.6 Innovation

B. When it comes to leaders' compensation and promotion prospects, how important do you think is a record of success in each of the following? Please rate the importance. {Very important, important, somewhat important, not important}

B.1 Strategic orientation

B.2 Vision

B.3 Operational efficiency

B.4 Talent development

B.5 Culture and morale

B.6 Innovation

C. What are the most effective ways that leaders can support their employees' career development? Please select all that apply.

C.1 Training: Offer and recommend relevant trainings that can help employees enhance their skills and knowledge

C.2 Open dialogue: Establish a regular dialogue about career goals

C.3 Career planning: Introduce a career planning process that provides clear guidance for employees to take next steps in their career

C.4 Visibility: Ensure that decision-makers outside the team are aware of talented employees

C.5 Encouragement: Encourage employees to pursue new job opportunities throughout the organization

C.6 Information about job opportunities: Notify employees of job vacancies in other areas of the organization

D. What are the reasons that may prevent leaders from investing time and effort towards their employees' career development? Please select all that apply.

D.1 Leaders' lack of knowledge about career development opportunities, trainings etc.

D.2 Limited resources to invest in employee development

D.3 Risk of losing talent, because developing employees makes them more attractive to others

D.4 Need to prioritize short-term targets over long-term employee development

D.5 Lack of interest on the part of employees

E. Under which circumstances would leaders be more likely to support employees' career development? Please select all that apply.

- E.1** If the employee would develop within the team
- E.2** If replacing employees who leave the team would be easier
- E.3** If leaders who develop talent were to receive more visibility and recognition
- E.4** If leaders who develop talent were more likely to be promoted
- E.5** If leaders who develop talent would receive financial incentives

F. Please rate your agreement with the following statements. {I strongly agree, I agree, I do not agree, I totally do not agree}

F.1 "A leader's direct intervention (e.g., encouragement, increasing visibility) has a large impact on employees' career development."

F.2 "Leaders' impact on employees' long-term career development is valued at least as much as their impact on team performance."

F.3 "Talent development entails a conflict of interest for leaders, because more developed employees are more likely to leave the team."

G. How often might leaders find themselves in situations where they need to dissuade a team member from exploring opportunities in another department due to immediate team needs or performance goals?

- G.1** Never
- G.2** Sometimes
- G.3** Often
- G.4** Very often

H. At the end of the survey, we would like to ask for your expert assessment. Based on your experience, which specific actions or strategies would be most effective in assisting leaders in their role? {Free-text response}

Finally, we would like to ask for some background information about you, for statistical purposes.

I. Are you female?

- I.1** Yes
- I.2** No

J. How old are you?

- J.1** Below 30
- J.2** 30-39
- J.3** 40-49
- J.4** 50 or above

K. How many years have you been at [Company]?

- K.1** Less than 1

K.2 1-2

K.3 3-5

K.4 6-9

K.5 10 or more

L. How many years of leadership responsibility at [Company] do you have?

L.1 Less than 1

L.2 1-2

L.3 3-5

L.4 6-9

L.5 10 or more

M. How big is the team that you currently lead?

M.1 3 or less people

M.2 4-5 people

M.3 6-9 people

M.4 10+ people

N. What best describes your functional area? {Dropdown}

O. Which leadership level best describes your current position? {Dropdown}

D.3.3 Response Distributions for Key Survey Questions

This section reports the full response distributions for the key survey questions analyzed in the main text. The tables below present the raw frequencies across answer categories for each item.

Table D4: Perceived Impact of Leaders (Question A)

Area of Impact	Very High	High	Low	Very Low
A.1 Strategic orientation	0.20	0.30	0.36	0.14
A.2 Vision	0.17	0.28	0.41	0.14
A.3 Operational efficiency	0.34	0.50	0.14	0.02
A.4 Talent development	0.40	0.47	0.11	0.02
A.5 Culture and morale	0.55	0.38	0.06	0.01
A.6 Innovation	0.09	0.48	0.37	0.06
Observations 3,xxx				

Notes: This table presents the share of managers who selected the respective answer choice in response to Question A: *Where do you think leaders can create the most impact for {Company}? Please rate the impact that leaders can create.* Each row represents one dimension the respective dimension of interest. Each column presents one of four response options: *Very high impact*, *High impact*, *Low impact*, and *Very low impact*. Because respondents could only choose one response option for each dimension, the shares in each row sum to one.

Table D5: Record of Success is Important (Question B)

Area of Impact	Very High	High	Low	Very Low
B.1 Strategic orientation	0.29	0.49	0.18	0.04
B.2 Vision	0.19	0.46	0.28	0.07
B.3 Operational efficiency	0.52	0.38	0.08	0.02
B.4 Talent development	0.16	0.24	0.45	0.15
B.5 Culture and morale	0.52	0.32	0.12	0.04
B.6 Innovation	0.18	0.50	0.26	0.06
Observations 3,xxx				

Notes: This table presents the share of managers who selected the respective answer choice in response to Question B: *When it comes to leaders' compensation and promotion prospects, how important do you think is a record of success in each of the following? Please rate the importance.* Each row represents one dimension the respective dimension of interest. Each column presents one of four response options: *Very important*, *Important*, *Somewhat important*, and *Not important*. Because respondents could only choose one response option for each dimension, the shares in each row sum to one.

Table D6: Ways Leaders Can Support Employee Career Development (Question C)

Support Strategy	Selected
C.1 Training: Offer and recommend relevant trainings to enhance skills	0.69
C.2 Open dialogue: Establish regular discussions about career goals	0.83
C.3 Career planning: Provide structured career guidance	0.57
C.4 Visibility: Ensure decision-makers recognize talented employees	0.84
C.5 Encouragement: Motivate employees to explore new opportunities	0.62
C.6 Information: Notify employees of job vacancies within the company	0.32
Observations 3,xxx	

Notes: This table presents the share of managers who selected the respective answer choice in response to Question C: *What are the most effective ways that leaders can support their employees' career development? Please select all that apply.* Because respondents could choose multiple answers, the shares do not sum to one.

Table D7: Barriers to Leaders Investing in Employee Career Development (Question D)

Barrier	Selected
D.1 Lack of knowledge about career development opportunities	0.54
D.2 Limited resources to invest in employee development	0.75
D.3 Risk of losing talent if employees become more attractive to others	0.45
D.4 Need to prioritize short-term targets over long-term development	0.66
D.5 Lack of interest on the part of employees	0.41
Observations 3,xxx	

Notes: This table presents the share of managers who selected the respective answer choice in response to Question D: *What are the reasons that may prevent leaders from investing time and effort towards their employees' career development? Please select all that apply.* Because respondents could choose multiple answers, the shares do not sum to one.

Table D8: Circumstances Encouraging Leaders to Support Employee Career Development (Question E)

Circumstance	Selected
E.1 If the employee would develop within the team	0.42
E.2 If replacing employees who leave the team would be easier	0.68
E.3 If leaders who develop talent were to receive more visibility and recognition	0.52
E.4 If leaders who develop talent were more likely to be promoted	0.22
E.5 If leaders who develop talent would receive financial incentives	0.21
Observations 3,xxx	

Notes: This table presents the share of managers who selected the respective answer choice in response to Question E: *Under which circumstances would leaders be more likely to support employees' career development? Please select all that apply.* Because respondents could choose multiple answers, the shares do not sum to one.

Table D9: Agreement with Statements on Leadership and Career Development (Question F)

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
F.1 Impact is large	0.46	0.50	0.03	0.01
F.2 Impact is valued	0.06	0.30	0.53	0.11
F.3 Conflict of interest	0.10	0.45	0.38	0.07
Observations 3,xxx				

Notes: This table presents the share of managers who selected the respective answer choice in response to Question F: *Please rate your agreement with the following statements.* Each row represents one of the following three statements. F.1: *A leader's direct intervention (e.g., encouragement, increasing visibility.* F.2: *Leaders' impact on employees' long-term career development is valued at least as much as their impact on team performance.* F.3: *Talent development entails a conflict of interest for leaders, because more developed employees are more likely to leave the team.* Each column presents one of four response options: *I strongly agree, I agree, I do not agree, and I totally do not agree.* Because respondents could only choose one response option for each statement, the shares in each row sum to one.

Table D10: Frequency of Leaders Dissuading Team Members from Exploring Other Opportunities (Question G)

Response	Selected
G.1 Never	0.25
G.2 Sometimes	0.62
G.3 Often	0.11
G.4 Very Often	0.02
Observations 3,xxx	

Notes: This table presents the share of managers who selected the respective answer choice in response to Question G: *Where do you think leaders can create the most impact for {Company}? Please rate the impact that leaders can create.* Because respondents could only choose one response option for each statement, the shares in each row sum to one.

D.3.4 Benchmarking of Survey Findings

Responses to the manager survey suggest that talent development is perceived as a relatively low-priority responsibility within the firm. To contextualize and assess the robustness of this finding, this section presents three benchmarking exercises that help interpret the strength and validity of these perceptions.

Comparison Across Managerial Responsibilities. The first exercise demonstrates that talent development stands out relative to other manager responsibilities. One potential concern is that the reported low valuation of talent development reflects a general tendency among respondents to assign low importance to all managerial tasks. If so, the fact that 40% of managers consider talent development important for their career prospects (Question B) might actually signal relatively high valuation. To assess this, I compare responses across six core managerial responsibilities evaluated in Questions A and B of the survey: strategic orientation, vision, operational efficiency, talent development, culture and morale, and innovation (see Appendix Tables D4 and D5 for response distributions).¹

Panel B of Appendix Figure D3 shows that only 40% of managers view a record of success in talent development as “very important” or “important” for their own promotion and compensation prospects, the lowest of all responsibilities. The next lowest category, “vision,” was selected by 66% of managers. In contrast, 87% of managers report that they have a “very high” or “high” impact on talent development (Panel A), producing a 47 percentage point gap between perceived impact and perceived reward. This gap is larger than for any other responsibility. In comparison, the analogous gaps are considerably smaller or even of opposite sign for other responsibilities: operational efficiency (-6 p.p.), team morale (8 p.p.), innovation (-11 p.p.), strategic orientation (-28 p.p.), and vision (-20 p.p.). Talent development thus stands out as the domain where perceived personal impact is strong but perceived organizational valuation is weak.

Comparison Across Question Formats. The second exercise probes robustness across questions to address the concern that results are driven by the wording of certain questions. In addition to asking managers about how much specific aspects of their role are rewarded (Question B), I also included a robustness question that elicits the agreement with the statement “Leaders’ impact on employees’ long-term career development is valued at least as much as their impact on team performance” (Question F.2). This question was designed to offer respondents a simpler comparison by focusing on only two aspects of manager responsibilities. Note that team performance is a natural comparison because it is typically the most salient aspect of middle managers’ responsibilities.

Only 36% of respondents agreed with this statement (Appendix Table D9), a share nearly identical to the 40% who viewed talent development as important in Question B. Among those who believed operational efficiency (as a proxy for team performance) is highly valued, only 41% said

¹Question A asked managers, “Where do you think leaders can create the most impact for [Company]?”, while Question B asked “When it comes to leaders’ compensation and promotion prospects, how important do you think is a record of success?”.

the same about talent development (Appendix Figure D4).² This consistency across survey formats reinforces the conclusion that managers perceive talent development as undervalued relative to other responsibilities.

To further probe robustness, I also compare the share of managers who agree with the statement “A leader’s direct intervention (e.g., encouragement, increasing visibility) has a large impact on employees’ career development” (Question F.1) to the share of managers who chose “Very high impact” or “High impact” when rating their impact on talent development in Question A (see Appendix Table D4 for the raw response distribution). The agreement share for the statement in F.1 is 96% (Bar 3 of Figure 1), similarly high to the 87% agreement share in Question A (Bar 5 of Figure 1). This comparison further corroborates the validity of the survey instrument.

Social Desirability Bias and Comparison Across Statements. A third potential concern is that my estimates are contaminated by response biases, in particular social desirability bias and survey pessimism. However, three factors suggest this is unlikely to meaningfully distort the interpretation of results.

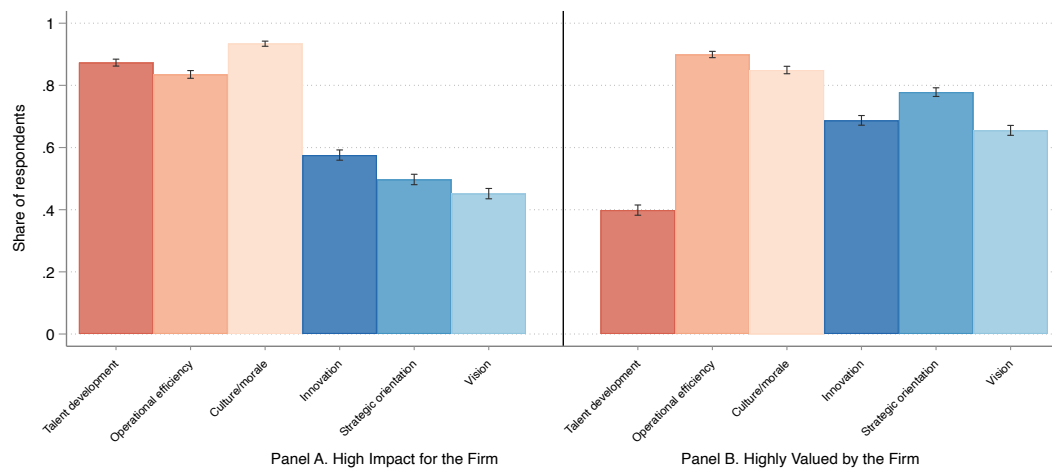
First, managers were not asked about their own values, but rather to assess the firm’s emphasis on different managerial tasks. There is no strong reason to believe that respondents would systematically underreport the firm’s valuation of talent development. If anything, one might expect the opposite. Moreover, the survey was framed in neutral language and introduced as anonymous, reducing incentives to tailor responses to social expectations (see Section II.D).

Second, comparison across agreement-style questions suggests that managers do not avoid agreement generally. For instance, 96% of respondents agreed that a leader’s intervention can shape career outcomes (F.1), and 55% agreed with a more sensitive statement in F.3: “Talent development entails a conflict of interest for leaders, because more developed employees are more likely to leave the team.” The fact that a majority agreed with a potentially self-incriminating statement further suggests that social desirability bias is not dominating the pattern of responses.

Third, to the extent that social desirability bias is present, it likely leads to an understatement of talent hoarding behaviors or perceived organizational misalignment. Thus, any remaining bias would make the observed results conservative rather than overstated.

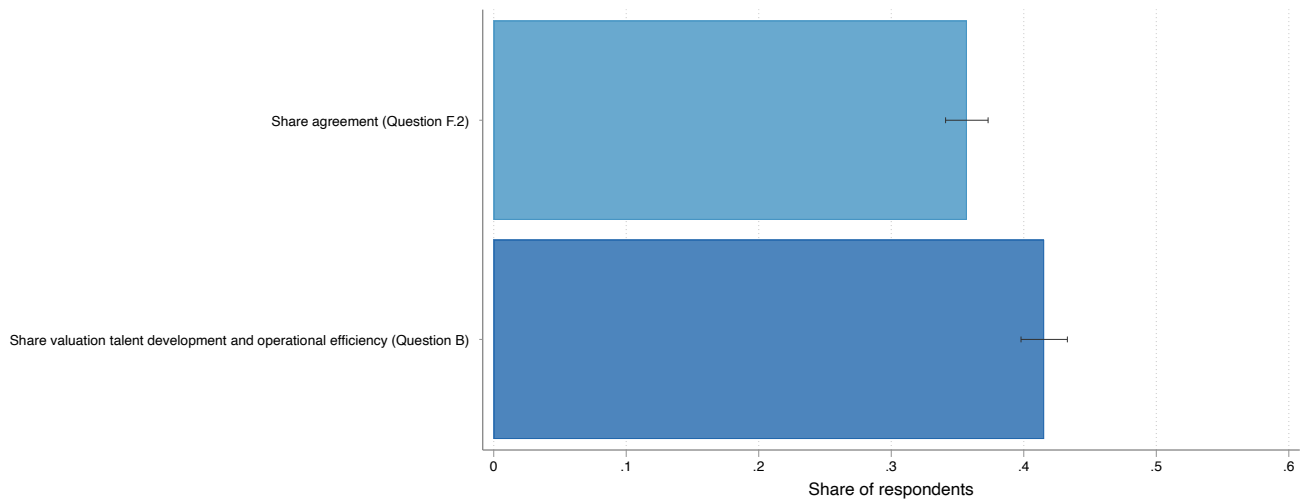
²Since team performance is not explicitly included in Question B, I use operational efficiency as a proxy. While not identical, the two concepts are closely related, particularly in the context of the manufacturing firm I study, where the performance of many teams is evaluated based on the timely and efficient development of products.

Figure D3: Perceived Impact and Valuation Across Managerial Responsibilities



Notes: This figure summarizes managers' perceptions of how their efforts with respect to talent development are rewarded versus how much impact they believe they can have on the firm, based on responses from the manager survey. Panel A draws on Question A of the survey (see Appendix Table D4 for the full question wording and response distribution). Each bar shows the share of managers who report that leaders can have a very high or high impact on the firm with respect to a given managerial responsibility. Panel B draws on Question B of the survey (see Appendix Table D5). Each bar shows the share of managers who report that a record of success in the respective responsibility is considered very important or important for their own compensation and promotion prospects. See Appendix Section D.3 for more information on the manager survey. 95%-level confidence intervals are displayed. N=3,xxx.

Figure D4: Perceived Valuation of Talent Development Across Question Formats



Notes: This figure draws on two separate questions from the manager survey to assess how managers perceive the firm’s valuation of their efforts toward talent development. The first bar reports the share of managers who agreed with the statement in Question F.2: “Leaders’ impact on employees’ long-term career development is valued at least as much as their impact on team performance.” See Appendix Table D9 for the full response distribution. The second bar is based on Question B and shows the share of managers who rated talent development as highly valued among those who also rated operational efficiency as highly valued, providing a benchmark for comparison. See Appendix Table D5 for the full response distribution. Although the questions differ in format and framing, both yield a consistent insight: only a minority of managers perceive talent development to be strongly valued by the firm. See Appendix Section D.3 for more information on the manager survey. 95%-level confidence intervals are displayed. N=3,xxx.

E Supplementary Results and Robustness

This appendix provides supplementary analyses and robustness checks that support the empirical findings presented in the main text. It is organized in three parts. First, I provide additional detail and validation for the managerial talent hoarding measure, which is based on deviations between private performance ratings and public potential ratings. Second, I present a series of robustness checks for the manager-level analysis discussed in Section III. These include alternative measures of hoarding incentives, hoarding outcomes, and placebo tests using unrelated organizational barriers. Third, I examine the robustness of the worker-level results discussed in Section IV, including sensitivity analyses of the rotation design and a discussion of alternative mechanisms that could plausibly explain the observed patterns.

E.1 Construction and Validity of the Talent Hoarding Measure

This appendix section provides further detail and validation for the measure of managerial talent hoarding introduced in Section III. As discussed in the main text, the measure builds on the firm’s internal performance and potential ratings, leveraging the institutional difference that performance ratings are meant to be private, while potential ratings are shared broadly and are meant to signal a worker’s readiness for promotion.

Motivation.— Identifying managerial talent hoarding is challenging because hoarding often occurs through interpersonal interactions and is not directly observable in administrative data. The empirical strategy in this paper leverages measures of worker visibility to infer talent hoarding based on the systematic suppression of publicly observable signals of worker talent. This approach is motivated by survey evidence from both workers and managers. Workers identify suppression of visibility as a key channel through which managers engage in hoarding behavior (see Section I.A). Consistent with this notion, 84% of managers report that making workers visible outside the team is among the most important actions they can take to influence career advancement (Appendix Figure E1).³ Survey responses also suggest that such managerial actions are highly consequential: workers who report being subject to talent hoarding in the form of retaliation are 5.1 percentage points (56%) less likely to receive a job recommendation from their manager ($p=0.000$), and 4.6 percentage points (13%) less likely to receive a recommendation from anyone in the firm ($p=0.000$). These findings motivate the use of visibility-related assessments as a meaningful way to detect strategic hoarding behavior.

Constructing Manager-Level Deviations.— Building on the institutional difference in visibility between performance and potential ratings, I construct a manager-level measure of talent hoarding by estimating a model of expected potential ratings based on observed performance ratings and

³Other response options included establishing an open dialogue with workers about their career development (84%), allowing workers to participate in trainings (69%), encouraging employees to pursue other job opportunities (62%), providing guidance for career planning (58%), and notifying workers about internal job opportunities outside the team (32%). Since there is no objective benchmark for how to interpret these percentages, this question provides qualitative evidence that supports the conceptual relevance of visibility-related actions.

worker characteristics:

$$\text{potential}_{imt} = \beta_1 \text{performance}_{imt} + \beta_X X_{it} + \beta_t + \varepsilon_{imt} \quad (1)$$

where potential_{imt} is the potential rating given by manager m to worker i in quarter t , performance_{imt} is the corresponding performance rating, X_{it} includes worker demographics and job controls, and β_t captures quarter fixed effects. The residuals from this regression capture deviations between actual and predicted potential ratings. A residual below zero indicates that the manager assigns higher potential ratings than expected given the worker’s performance and characteristics, suggesting that the manager may be inflating visibility. A residual above zero implies that the manager systematically assigns lower-than-expected potential ratings, consistent with suppressing visibility and engaging in talent hoarding behavior. I compute the average residual at the manager level across all workers and quarters, which provides a time-invariant measure of each manager’s tendency to systematically underrate or overrate worker potential. The median manager is observed during 75% of my sample period. For those, who are present during the entire sample period, the median number of worker ratings that is used for identifying hoarding is over 70, enhancing its reliability and reducing noise. See Panel A of Appendix Figure E2 for summary statistics of how performance and potential ratings are distributed in my sample.

Interpretation as Measure of Talent Hoarding.— Figure III.B shows the distribution of the manager-level residual means. The distribution is centered around zero (mean = 0.018, median = -0.006) with substantial variation (SD = 0.212). This pattern indicates that while many managers do not systematically deviate from predicted values, a sizable subset consistently underrates or overrates worker potential. To analyze meaningful variation in managerial behavior, I classify managers in the top tercile of the hoarding measure (mean deviation above 0.1036) as hoarding-prone based on the visibility suppression this measure detects. I use this definition in the main analysis and verify that results are not sensitive to the specific cutoff choice. Appendix Table E5, Appendix Table E7, and Appendix Figure E4 confirm that findings are robust when using the continuous hoarding measure, a median split, or an alternative quantile-based definition.

Appendix Table E1 complements the information provided by Figure III.B and summarizes the distribution of the hoarding measures, showing the mean, median, and standard deviation for managers who fall into the bottom, middle, and top tercile of the distribution. These summary statistics further underscore that while most managers do not suppress talent visibility, a substantial share does systematically shade down worker talent in public ratings.

Managers with stronger hoarding tendencies are significantly less likely to publicly recognize top-performing workers. The estimates from the linear probability model of actual potential ratings on performance ratings and worker characteristics suggests that a manager with a hoarding measure of zero has a 66.5% likelihood of assigning high potential to a worker who received the top performance rating. In contrast, for a manager whose hoarding measure is one standard deviation above the mean and who is thus hoarding-prone, this likelihood is 22.5 percentage points lower. This dif-

ference illustrates the substantial difference in potential ratings that is captured by the constructed hoarding measure. Panel B of Appendix Figure E2 corroborates this notion and shows that across all performance ratings managers at higher deciles of the hoarding measure are less likely to rate their workers as having high potential.

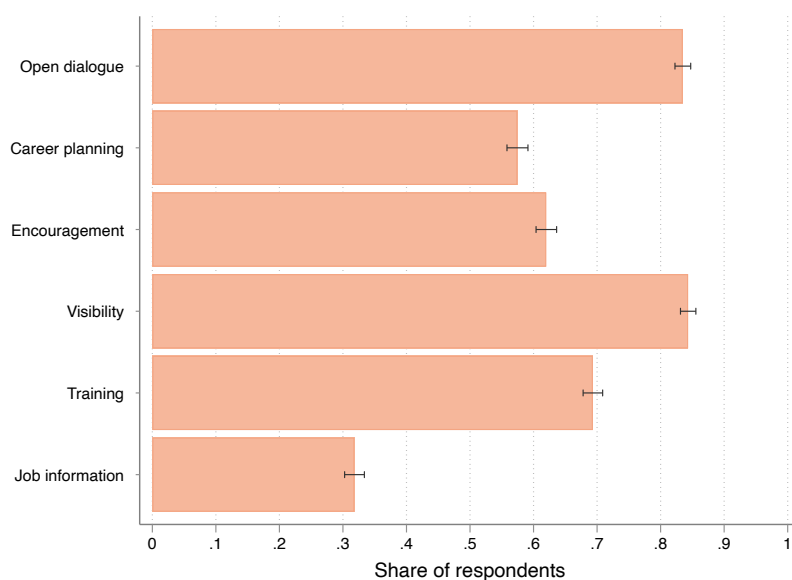
Validity of the Measure.— To validate the measure, I assess its stability and predictive value. First, I show that managers’ mean deviation is reasonably stable over time. When using earlier years to estimate a manager’s mean deviation, its correlation with the manager’s deviation based on later years is strongly positive (0.58). This finding suggests the measure captures persistent managerial behavior rather than temporary deviations or measurement error.

Several additional tests suggest that my measure indeed captures managerial hoarding actions. First, the underrating of potential that the measure captures does not appear to result from managers’ involuntary mistakes. I find no statistically detectable difference in managers’ hoarding probability based on the extent of experience they have in leading (and rating) a team. The underrating also does not appear to result from managers’ accurate assessment of worker potential. When managers with high propensities to hoard talent rotate, underrated workers not only experience increases in applications and hiring, but are also likely to perform well in subsequent positions, demonstrating that the low potential rating was inaccurate. In addition, while low potential ratings could in theory stem from the fact that managers have an incentive to hire low-potential workers to avoid the possibility of losing talent, this is not confirmed in the data. I find that talent hoarding effects occur both for incumbent workers and workers who are newly hired by a rotating manager (Columns 3 and 4 of Appendix Table B5) .

A further placebo test examines whether the hoarding measure has predictive power in settings where talent hoarding should be less pronounced. This test helps rule out the concern that the hoarding measure simply reflects broader unobserved differences in managerial style or quality. If the hoarding measure were just a proxy for such general managerial traits, we would expect to see effects on a wide range of worker outcomes, including external job exits. Under the interpretation that managers suppress potential ratings to limit internal visibility and deter job applications, however, we would expect this behavior to affect workers’ internal, but not external career transitions, which are generally invisible to current managers and less subject to interference. Appendix Table E2 supports this: manager rotations have strong effects on internal applications and job transitions for managers with a high propensity to hoard talent (Columns 1 and 3), but no discernible effect on external job transitions out of the firm (Column 5). This placebo result strengthens the interpretation of the hoarding measure as capturing targeted managerial efforts to retain talent within the team, rather than reflecting unrelated confounding factors.

Taken together, this appendix section supports the validity of the talent hoarding measure by demonstrating that it is stable, systematically varies across managers, and is not confounded by noise or managerial skill.

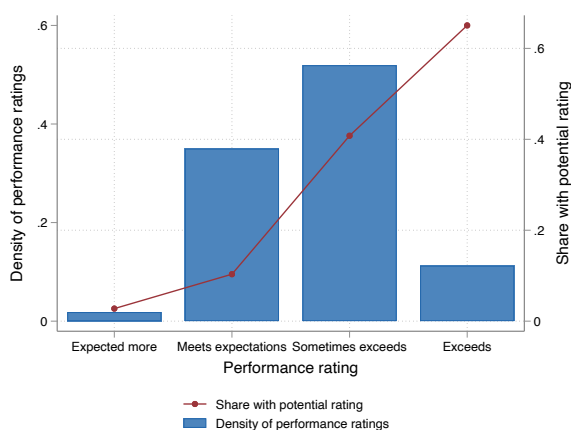
Figure E1: Manager-Reported Ways to Impact Workers' Careers



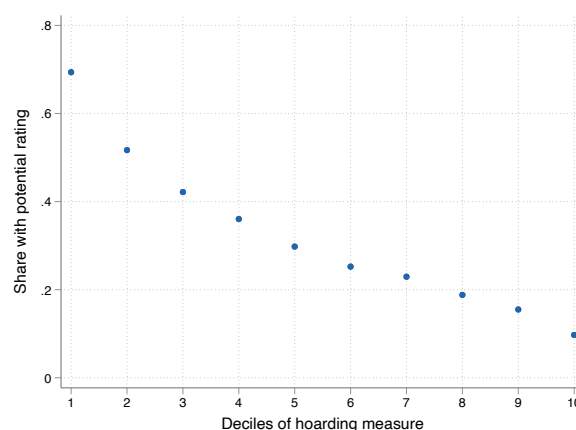
Notes: This figure uses responses from the manager survey to depict manager-reported incentives and actions with respect to talent development. Panel A shows the share of managers who indicated that a given condition would make managers more likely to support workers' career development. Each bar shows the share of managers who chose a given action as an effective way through which managers can impact their workers' career development. Managers were allowed to choose multiple answers. See Appendix Table D6 for the full question wording and response distribution. See Appendix Section D.3 for more information on the manager survey and the exact question wording. 95%-level confidence intervals are displayed. Controls: Female, age, German citizenship, firm tenure, function. N=3,xxx.

Figure E2: Correlations Between Potential, Performance, and Hoarding Measure

Panel A. Potential by Performance Rating



Panel B. Potential by Hoarding Decile



Notes: This figure presents the distributions of and correlations between performance ratings, potential ratings, and the hoarding measure based on the deviation between actual and predicted potential ratings. Panel A presents the density of performance ratings (left axis) and the share of workers with a potential rating for a given performance rating. Note that potential rating is a binary variable. Panel B presents the share of workers with a potential rating by decile of their manager's hoarding measure. N=3xx,xxx.

Table E1: Summary Statistics for Manager-Level Talent Hoarding Measure

	Mean	Median	Std. Dev.
Bottom Tercile	-0.2217	-0.1941	0.1049
Middle Tercile	-0.0016	-0.0061	0.0567
Top Tercile	0.2578	0.2188	0.1363
Full Sample	0.0102	-0.0061	0.2115
Observations	6,xxx		

Notes: This table summarizes the distribution of the manager-level talent hoarding measure, defined as the average residual between actual and predicted potential ratings from Equation 1. Managers are grouped into terciles based on this measure: the bottom tercile (inflating visibility) includes managers with residuals below $\hat{A}0.099$, the middle tercile includes residuals between $\hat{A}0.099$ and 0.1036 , and the top tercile (suppressing visibility) includes managers with residuals above 0.1036 . The table reports the median, mean, and standard deviation of the hoarding score in each group. See Figure III.B for the full distribution and Appendix Section E.1 for additional details. Sample includes $N = 6,xxx$ managers.

Table E2: Placebo Test: Manager Hoarding Measure and Career Outcomes

	Panel A		Panel B		Panel C	
	Internal Applications		Internal Transition		External Transitions	
	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Manager Rotation	0.0344	0.0144	0.0166	0.0101	-0.0014	0.0020
	(0.006)	(0.005)	(0.004)	(0.003)	(0.002)	(0.002)
Outcome Mean	0.029	0.029	0.008	0.008	0.008	0.008
Observations	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx

Notes: This table presents a placebo test evaluating whether the talent hoarding measure predicts outcomes in settings where hoarding behavior should not matter. Each coefficient stems from a separate regression based on Equation 3. Each panel compares rotations of managers with high versus low propensity to hoard, defined based on the top and bottom terciles of the manager-level hoarding score distribution. The outcomes of interest are internal applications (Panel A), internal job transitions within the firm (Panel B), and external job transitions out of the firm (Panel C). Robust standard errors are clustered at the worker and rotation level. Controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects.

E.2 Robustness of Manager-Level Results

Section III.C analyzes whether talent hoarding behaviors—measured using both administrative data and the manager survey—are more prevalent among managers with stronger incentives to hoard talent. This appendix section provides additional detail on the construction of key variables and presents a series of robustness checks to validate the main findings.

E.2.1 Measures of Hoarding Incentives in the Administrative Data

This subsection provides additional details on the construction of the three baseline measures of managers’ incentives to hoard talent. It also presents robustness checks based on alternative versions of these measures.

As outlined in the conceptual framework in Section I.B, hoarding behavior is expected to be more likely when: (1) managers have stronger financial incentives tied to team performance, (2) the cost of losing team members is higher (e.g., in smaller teams), and (3) the visibility of individual talent is lower. I proxy for variation in these dimensions using the following measures:

Financial Incentives. I construct two measures of managers’ financial incentives. The primary measure, used in the main analysis, is the share of total compensation that is performance-related, based on the firm’s internal compensation records. This continuous variable reflects the relative strength of incentive alignment. As a robustness check, I also use the logarithm of the total amount of performance-related pay, which captures the absolute magnitude of the incentive. Additionally, I apply a categorical measure based on the firm’s internal leadership classification system. This system categorizes managerial positions into those with high versus low shares of compensation tied to team performance, and is used by the firm for internal purposes.

Team Size. To proxy for the cost associated with worker departures, I use the number of team members overseen by a manager. The main analysis uses team size in levels. I also test robustness to using the logarithm of team size, as well as a binary indicator for managing a small team (bottom quartile of the distribution, defined as three or fewer members).

Talent Visibility. I proxy for talent visibility using the firm’s internal classification of functional areas into high- and low-visibility categories. High-visibility functions include engineering, quality management, and project management, where individual performance (e.g., through patents or milestone completions) tends to be externally observable. In contrast, low-visibility functions—such as HR, finance, and logistics—offer fewer externally verifiable signals of individual contributions.

Appendix Table E3 reports summary statistics for the three baseline measures used in the main specifications. The table shows substantial heterogeneity in hoarding incentives across managers. On average, managers receive roughly one-third of their compensation through performance-related pay, with a quarter receiving 50% or more. The average team size is seven, and about 25% of managers oversee teams of three or fewer. Just under half of managers work in low-visibility functions, highlighting that many operate in contexts where individual talent is less externally observable.

As a complement to the main results in Table 2, which rely on my baseline measures of hoarding incentives, Appendix Table E4 presents regression estimates using alternative constructions of the

incentive variables. Across all four columns, the estimated relationships are directionally consistent with the baseline results and quantitatively comparable when scaled for comparability, as I discuss below.

Columns 1 and 2 of Appendix Table E4 present alternative measures of financial incentives. Column 1 of Appendix Table E4 uses a binary indicator for whether a manager is classified by the firm as having a high share of compensation based on team performance. Managers with high performance-related pay are 9.4 percentage points more likely to be hoarding-prone, consistent with the direction and magnitude of the baseline result in Table 2, where the predicted difference between the 90th and 10th percentile of the continuous measure is 13.0 percentage points. Column 2 of Appendix Table E4 uses the logarithm of performance-related pay and finds that a 1% increase in pay is associated with a 0.041 percentage point increase in hoarding propensity, yielding a predicted difference between the 90th and 10th percentile of 8.3 percentage points.

Columns 3 and 4 of Appendix Table E4 focus on alternative proxies for the cost of worker departure. Column 3 of Appendix Table E4 uses a binary indicator for leading a small team (three or fewer members) and finds an 11.4 percentage point increase in hoarding propensity, similar to the predicted difference between the 90th and 10th percentile of 13.1 percentage points for the continuous team size measure in Table 2. Column 4 of Appendix Table E4 uses the log of team size and finds that a 1% increase in team size reduces the probability of hoarding-prone behavior by 0.10 percentage points, with a predicted difference between the 90th and 10th percentile of 16.6 percentage points, again reflecting a similarly sized effect (note that the sign difference in the reported estimate reflects stronger incentives to hoard in smaller teams).

Overall, these results confirm that the main findings are robust to alternative specifications of the hoarding incentive measures. Both the signs and magnitudes are consistent with the baseline results presented in Table 2, supporting the conclusion that managerial incentives are systematically associated with observed hoarding behavior.

Table E3: Summary Statistics for Baseline Measures of Talent Hoarding Incentives

	Mean	Std.dev	p10	p25	p75	p90
Performance-related share of compensation	0.36	0.24	0.12	0.18	0.49	0.81
Number of workers in team	6.71	3.98	2.35	3.71	8.83	12.18
Binary indicator for low visibility	0.45	0.50	0.00	0.00	1.00	1.00
Observations	6,xxx					

Notes: This table presents manager-level summary statistics for the three baseline measures of talent hoarding incentives: (1) the share of total compensation that is performance-related, (2) the number of team members overseen by the manager, and (3) a binary indicator for low talent visibility, defined as working in a functional area with limited visibility of individual achievements. Talent visibility is classified according to the firm's internal categorization of functional areas. High-visibility functions include engineering, quality management, and project management, while low-visibility functions include areas such as human resources, finance, and logistics. See Appendix Section E.2.1 for details on the construction of these incentive measures.

Table E4: Robustness to Alternative Incentive Measures

<u>Outcome variable</u>	<u>Top tercile hoarding measure</u>			
	(1)	(2)	(3)	(4)
1{High financial incentive}	0.0940 (0.014)	– –	– –	– –
Log(financial incentive amount)	– –	0.0410 (0.008)	– –	– –
1{Small team}	– –	– –	0.1144 (0.014)	– –
Log(team size)	– –	– –	– –	-0.1006 (0.011)
Outcome Mean	0.3000	0.3000	0.3000	0.3000
Predicted difference p90-p10	0.0940	0.0832	0.1144	-0.1656
Observations	6,xxx	6,xxx	6,xxx	6,xxx

Notes: This table examines the robustness of the main findings on the relationship between managerial hoarding incentives and hoarding behavior by using alternative measures of hoarding incentives. Column 1 uses a binary indicator based on the firm's internal classification of whether a manager receives a high share of compensation tied to team performance. Column 2 uses the logarithm of the total amount of performance-based pay to capture the absolute magnitude of financial incentives. Column 3 uses a binary indicator for managers leading a small team, defined as three or fewer direct reports (bottom quartile of the team size distribution). Column 4 uses the logarithm of the number of direct reports. Each coefficient is estimated separately based on a linear model for managers' hoarding propensity using an OLS regression of the indicator that managers are hoarding-prone, defined by their mean deviation between predicted and actual potential ratings being in the top tercile of the manager distribution, on one incentive measure at a time. The predicted difference p90-p10 refers to the predicted difference in the outcome between the 90th and 10th percentiles of the continuous regressors (between values 1 and 0 for binary indicators), holding all other covariates at their mean values. See Table 2 for my main results using the baseline incentive measures. See Appendix Section E.2.1 for definitions of the incentive measures and Appendix Table E3 for their distribution in the sample. Controls: Female, age, German citizenship, firm tenure, educational qualification. Robust standard errors in parentheses.

E.2.2 Measures of Hoarding Actions Based on Potential Ratings

In the main analysis in Section III.C, I define a manager as hoarding-prone if the deviation between their actual and predicted potential ratings places them in the top tercile of the manager-level distribution (see Figure III.B). This classification identifies managers who systematically underrate their workers in public potential ratings.

To assess the robustness of this outcome definition, Appendix Table E5 presents results using three alternative specifications of the hoarding outcome. First, Columns 1 to 3 use a more selective threshold, classifying a manager as hoarding-prone if their deviation falls in the top quartile of the distribution. Columns 4 to 6 use a broader definition, focusing on whether the deviation exceeds the median. Finally, Columns 7 to 9 avoid discretization altogether by using the continuous deviation between actual and predicted potential ratings.

Across the different specifications, results remain consistent in sign, significance, and economic magnitude with those in the baseline model (Table 2). For example, in the main specification, a 1 percentage point increase in the performance-related share of compensation increases the probability of being classified as hoarding-prone by 0.19 percentage points (Column 1 of Table 2). In Appendix Table E5, this effect is similar across alternative outcome definitions: 0.16 percentage points using the top quartile threshold (Column 1), 0.24 percentage points using the above-median threshold (Column 4), and an increase of 0.091 units in the continuous hoarding measure (Column 7). Given that the standard deviation of the continuous hoarding measure across managers is 0.212 (see Appendix Table E1), the estimated effect of 0.091 units corresponds to approximately 0.43 standard deviations, which is roughly comparable to the magnitude implied by the binary classification.⁴

Comparable patterns emerge for the other two incentive proxies. Larger team size is consistently associated with lower hoarding behavior. For instance, in my main specification, a one-person increase in team size is associated with a 1.33 percentage point decrease in the probability of being hoarding-prone (Column 2 of Table 2), which is similar to the 1.42 percentage point decrease using the top quartile threshold (Column 2 of Appendix Table E5). The magnitudes of the coefficients are smaller when using the above-median or continuous outcome, but the sign and significance persist (Columns 5 and 8 of Appendix Table E5). Likewise, managers in low-visibility functional areas consistently exhibit higher hoarding behavior, with coefficients between 0.0143 and 0.0420 (Columns 3, 6, and 9 of Appendix Table E5), similar in direction and magnitude to the baseline estimate of 0.0397 (Column 3 of Table 2).

Taken together, these results confirm that the main findings are not sensitive to the specific cutoff or outcome construction. The sign, statistical significance, and the economic magnitude of the estimated relationships are broadly aligned across alternative definitions of the hoarding outcome. As an additional robustness check, Section E.2.3 presents results using an alternative measure of hoarding behavior based on managers' suppression of access to high-visibility training opportunities.

⁴For a rough comparison, the distance between the median of the distribution of the continuous hoarding measure (-0.006) and the top-tercile cutoff (0.1036) is approximately 0.11 units, or 0.52 standard deviations.

Table E5: Robustness Checks Using Alternative Hoarding Outcomes Based on Potential Ratings

Outcome variable:	Top quartile			Above median			Continuous		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial incentive (share)	0.1578 (0.031)	-	-	0.2424 (0.034)	-	-	0.0912 (0.015)	-	-
Team size	-	-0.0142 (0.001)	-	-	-0.0075 (0.002)	-	-	-0.0027 (0.001)	-
Talent visibility	-	-	0.0420 (0.012)	-	-	0.0341 (0.014)	-	-	0.0143 (0.006)
Outcome Mean	0.2501	0.2501	0.2501	0.4999	0.4999	0.4999	0.0102	0.0102	0.0102
Predicted difference p90-p10	0.1085	-0.1395	0.0420	0.1667	-0.0736	0.0341	0.0627	-0.0266	0.0143
Observations	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx

Notes: This table examines the robustness of the main findings on the relationship between managerial hoarding incentives and hoarding behavior by using alternative specifications of the outcome variable capturing managerial hoarding behavior. Columns 1 to 3 use a binary indicator for whether the deviation between a manager's actual and predicted potential ratings falls in the top quartile of the distribution, rather than the top tercile used in the baseline analysis (Table 2). Columns 4 to 6 use a binary indicator for whether the deviation is above the median. Columns 7 to 9 use the continuous deviation between actual and predicted potential ratings as the outcome variable. Each coefficient is estimated separately based on a linear regression of hoarding propensity on one incentive measure at a time. The incentive variables include the share of performance-based compensation (Columns 1, 4, and 7), team size (Columns 2, 5, and 8), and an indicator for low talent visibility (Columns 3, 6, and 9). The predicted difference p90-p10 refers to the predicted difference in the outcome between the 90th and 10th percentiles of the continuous regressors (between values 1 and 0 for binary indicators), holding all other covariates at their mean values. See Table 2 for baseline results using the top-tercile indicator as the outcome. See Appendix Section E.2.1 for definitions of the incentive measures and Appendix Table E3 for their distribution in the sample. Controls: Female, age, German citizenship, firm tenure, educational qualification. Robust standard errors in parentheses.

E.2.3 Measures of Hoarding Actions Based on Training Assignments

This section parallels the robustness analyses in the preceding appendix sections but uses an alternative measure of managerial hoarding actions: whether managers restrict access to high-visibility training programs. I first describe how this hoarding measure is constructed and then assess robustness to alternative definitions of both outcome and regressors.

Construction of Hoarding Measure. In each quarter, roughly 2% of workers in my sample are assigned by their manager to a high-visibility training. These trainings are prestigious in-person sessions organized by a centralized and well-recognized unit within the firm. They enhance a worker’s visibility beyond the team: participant lists are widely circulated internally, and workers often list these trainings on their CVs. Survey responses suggest that access to these programs is commonly used as a mechanism through which managers can suppress worker visibility. For example, one worker describes “[Supervisors] keep employees in their positions by preventing further development, rejecting training courses, and increasing workloads to prevent capacity for new tasks and development measures” (Appendix Table B1).

To capture this dimension of talent hoarding, I follow the approach in Section III.B and estimate an OLS regression that predicts training assignment based on performance ratings and observable worker characteristics (Equation 1), replacing the potential rating as the dependent variable. For each manager, I then compute the average deviation between actual and predicted training assignments across all workers and quarters. This approach yields a manager-level hoarding measure. The distribution of this score is approximately centered around zero, with a median of 0.0062 and a standard deviation of 0.052. I classify a manager as hoarding-prone if this average deviation lies in the top tercile of the distribution (mean deviation above 0.021), which is designed to reflect systematic under-assignment of workers to visibility-enhancing trainings.

Robustness to Alternative Incentive Measures. Appendix Table E6 presents regression results using the training-based hoarding outcome while varying the construction of the incentive measures. Columns 1 and 2 of Appendix Table E6 present alternative measures of financial incentives. Column 1 of Appendix Table E6 uses a binary indicator for whether a manager is classified by the firm as having a high share of compensation based on team performance. Managers with high performance-related pay are 15.8 percentage points more likely to be hoarding-prone, consistent with the direction and magnitude of the baseline result in Appendix Table B4, where the predicted difference between the 90th and 10th percentile of the continuous performance-related pay measure is 13.8 percentage points. Column 2 of Appendix Table E6 uses the logarithm of performance-related pay and finds that a 1% increase in pay is associated with a 0.040 percentage point increase in hoarding propensity, yielding a predicted difference between the 90th and 10th percentile of 8.2 percentage points.

Columns 3 and 4 of Appendix Table E6 focus on alternative proxies for the cost of worker departure. Column 3 of Appendix Table E6 uses a binary indicator for managing a small team (defined as three or fewer direct reports) and finds a 7.9 percentage point increase in hoarding propensity, somewhat smaller than, but directionally aligned with, the predicted difference between the 90th

and 10th percentile of 14.0 percentage points for the baseline specification using the continuous measure of team size in Appendix Table B4. Column 4 of Appendix Table E6 uses the logarithm of team size and finds that a 1% increase in team size reduces the probability of hoarding-prone behavior by 0.098 percentage points, with a predicted difference between the 90th and 10th percentile of 16.1 percentage points, similar to the magnitude in the baseline specification (i.e., 14.0 percentage points). Note that the sign difference in the reported estimate reflects stronger incentives to hoard in smaller teams.

Robustness to Alternative Outcome Definitions. Appendix Table E7 presents regressions using three alternative definitions of the training-based hoarding outcome. Columns 1 to 3 use a more selective threshold (top quartile), Columns 4 to 6 use a broader threshold (above median), and Columns 7 to 9 use the continuous deviation as the outcome.

Across alternative outcome specifications, the results remain consistent in direction, statistical significance, and economic magnitude relative to the baseline estimates in Appendix Table B4. For example, in the main model, a 1 percentage point increase in the share of performance-related compensation is associated with a 0.20 percentage point increase in the likelihood of being hoarding-prone (Column 1 of Appendix Table B4). In Appendix Table E7, the corresponding effect is 0.22 percentage points when using a top quartile threshold (Column 1). The effects using the other two outcomes are smaller, but consistent in direction. Based on the above-median definition of the outcome (Column 4), I find a 0.05 percentage points effect. Using the continuous hoarding measure, I find a 0.0086 unit increase (Column 7). Given that the standard deviation of the continuous score is 0.0521, this estimate corresponds to approximately 0.17 standard deviations.⁵

Results using the other two incentive proxies (i.e., team size and talent visibility) also yield estimates that are consistent with the baseline analysis. Larger team size is negatively associated with hoarding behavior in both cases: the predicted difference between the 90th and 10th percentile is -0.1334 when using the quartile cutoff (Column 2 of Appendix Table E7) and -0.1267 when using the median (Column 5 of Appendix Table E7), closely matching the baseline estimate of -0.1403 (Column 2 of Appendix Table B4). Similarly, managers in low-visibility functions show consistently higher hoarding behavior, with coefficients between 0.0261 and 0.0306 across binary specifications (Columns 3 and 6 of Appendix Table E7).

Taken together, using a definition of talent hoarding based on training assignments rather than potential ratings yields similar results, corroborating the main analysis in Section III.

⁵The distance between the median of the continuous hoarding measure based on training assignments (0.0062) and the top-tercile threshold (0.021) is 0.0148 units or 0.28 standard deviations, suggesting that the effect is roughly comparable to the magnitude implied by the binary classification.

Table E6: Robustness to Alternative Training Measures

Outcome variable:	Top tercile training measure			
	(1)	(2)	(3)	(4)
1{High financial incentive}	0.1576 (0.014)	— —	— —	— —
Log(financial incentive amount)	— —	0.0402 (0.008)	— —	— —
1{Small team}	— —	— —	0.0792 (0.014)	— —
Log(team size)	— —	— —	— —	-0.0978 (0.010)
Outcome Mean	0.3001	0.3001	0.3001	0.3001
Predicted difference p90-p10	0.1576	0.0816	0.0792	-0.1610
Observations	6,xxx	6,xxx	6,xxx	6,xxx

Notes: This table examines the robustness of the main findings on the relationship between managerial hoarding incentives and hoarding behavior by using both alternative measures of hoarding incentives and an alternative outcome variable. Specifically, the outcome captures whether managers withhold access to high-visibility training opportunities from their workers, as described in Appendix Section E.2.3. Column 1 uses a binary indicator based on the firm's internal classification of whether a manager receives a high share of compensation tied to team performance. Column 2 uses the logarithm of the total amount of performance-based pay to capture the absolute magnitude of financial incentives. Column 3 includes a binary indicator for managers leading a small team, defined as three or fewer direct reports (bottom quartile of the team size distribution). Column 4 uses the logarithm of the number of direct reports. Each coefficient is estimated separately based on a linear model for managers' hoarding propensity using an OLS regression of the alternative hoarding outcome on one incentive measure at a time. The predicted difference p90-p10 refers to the predicted difference in the outcome between the 90th and 10th percentiles of the continuous regressors (between values 1 and 0 for binary indicators), holding all other covariates at their mean values. See Appendix Table B4 for the main results using the baseline incentive measures and the same training-based hoarding outcome. See Appendix Section E.2.1 for definitions of the incentive measures and Appendix Table E3 for their distribution in the sample. Controls: Female, age, German citizenship, firm tenure, educational qualification. Robust standard errors in parentheses.

Table E7: Robustness Checks Using Alternative Hoarding Outcomes Based on Training Assignment

Outcome variable:	Top quartile			Above median			Continuous		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial incentive (share)	0.2215 (0.032)	-	-	0.0471 (0.035)	-	-	0.0086 (0.004)	-	-
Team size	-	-0.0136 (0.001)	-	-	-0.0129 (0.002)	-	-	-0.0004 (0.000)	-
Talent visibility	-	-	0.0306 (0.012)	-	-	0.0261 (0.014)	-	-	0.0044 (0.001)
Outcome Mean	0.2501	0.2501	0.2501	0.4999	0.4999	0.4999	0.0062	0.0062	0.0062
Predicted difference p90-p10	0.1524	-0.1334	0.0306	0.0324	-0.1267	0.0261	0.0059	-0.0039	0.0044
Observations	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx	6,xxx

Notes: This table examines the robustness of the main findings on the relationship between managerial hoarding incentives and hoarding behavior by using alternative specifications of the outcome variable, based on managers' assignment of workers to high-visibility training opportunities. Columns 1 to 3 use a binary indicator for whether the deviation between a manager's actual and predicted training assignments falls in the top quartile of the distribution, rather than the top tercile used in the baseline analysis (Appendix Table B4). Columns 4 to 6 use a binary indicator for whether the deviation is above the median. Columns 7 to 9 use the continuous deviation between actual and predicted training assignments as the outcome variable. Each coefficient is estimated separately based on a linear regression of hoarding propensity on one incentive measure at a time. The incentive variables include the share of performance-based compensation (Columns 1, 4, and 7), team size (Columns 2, 5, and 8), and an indicator for low talent visibility (Columns 3, 6, and 9). The predicted difference p90-p10 refers to the predicted difference in the outcome between the 90th and 10th percentiles of the continuous regressors (between values 1 and 0 for binary indicators), holding all other covariates at their mean values. See Appendix Table B4 for baseline results using the top-tercile indicator based on the training assignment outcome. See Appendix Section E.2.3 for more information on the construction of this hoarding measure. See Appendix Section E.2.1 for definitions of the incentive measures and Appendix Table E3 for their distribution in the sample. Controls: Female, age, German citizenship, firm tenure, educational qualification. Robust standard errors in parentheses.

E.2.4 Robustness Tests Based on the Survey Data

This section complements the preceding analysis based on administrative data by describing the construction and distribution of hoarding incentive measures in the survey data. It also discusses robustness to alternative specifications of these measures.

Measures of Hoarding Incentives. Due to data protection constraints, the survey could not directly elicit the share of performance-related compensation for each manager, as is possible in the administrative records. Instead, I rely on survey responses to Question Q.O, which captures each manager’s leadership type. The firm internally uses this classification to determine whether a manager receives a high or low share of compensation tied to team performance, making this measure conceptually comparable to the binary indicator in the administrative analysis (Column 1 of Appendix Table E4). To construct a more granular continuous measure, I use the administrative data to calculate the average share and total amount of performance-related pay for each combination of leadership type and functional area. I then assign respondents a share of performance pay using their leadership type, which yields 22 unique values ranging from 0.21 to 0.63 (Appendix Table E8).

Team size was reported in categorical buckets to preserve respondent anonymity. I convert these categories to continuous values by assigning midpoint values to each range, and use a value of 13 for the top-coded group (*10 or more*), the average team size in that category from the administrative data. The third incentive measure, which is an indicator for working in a low-visibility functional area, is constructed analogously to the administrative analysis using the firm’s internal function classification. Appendix Table E8 reports summary statistics for these three incentive measures. I find substantial variation across managers, which is consistent with the patterns observed in the administrative data.

Robustness Exercise. Appendix Table E9 assesses the robustness of the survey-based findings by varying the definition of managerial hoarding incentives. The two outcome variables capture whether managers engage in hoarding behavior, based on survey questions described in Appendix Tables D10 and D7. Columns 1 to 4 use an indicator for whether respondents report that managers feel the need to dissuade team members from pursuing external opportunities. Columns 5 to 8 use an indicator for whether the risk of losing talent discourages managers from investing in their workers’ career development.

Columns 1, 2, 5, and 6 of Appendix Table E9 focus on financial incentives. Columns 1 and 5 use a binary indicator for whether a manager is classified by the firm as having a high share of compensation based on team performance. Managers with high performance-related pay are 8.4 percentage points and 8.5 percentage points more likely to report hoarding actions, broadly consistent with the direction and magnitude of the baseline result in Table 3, where the predicted difference between the 90th and 10th percentile of the continuous measure was 3.4 percentage points and 4.1 percentage points. Columns 2 and 6 of Appendix Table E9 use the logarithm of performance-related pay and find that a 1% increase in performance-related pay is associated with a 0.052 and 0.060 percentage point increase in reported hoarding behavior, yielding a predicted

difference between the 90th and 10th percentile of 0.88 percentage points. Note that the magnitude of this effect is smaller likely due to the presence of measurement error in imputing the amount of financial incentive from the administrative data; nonetheless, despite the presence of measurement error, the effect is still positive and statistically significant.

Columns 3, 4, 7, and 8 of Appendix Table E9 focus on alternative proxies for the cost of worker departure. Columns 3 and 7 use a binary indicator for leading a small team (bottom quartile) and find an 8.7 percentage point and 7.7 percentage point increase in reported hoarding behavior, in line with the predicted difference between the 90th and 10th percentile of 4.6 percentage points and 7.5 percentage points for the continuous team size measure in Table 3. Columns 4 and 8 of Appendix Table E9 use the log of team size and find that a 1% increase in team size reduces the probability of reported hoarding behavior by 0.033 percentage points and 0.041 percentage points, yielding a predicted difference between the 90th and 10th percentile of -7.2 percentage points and -9.1 percentage points. The sign of the coefficient in Columns 3 and 7 naturally flips, as smaller teams imply stronger incentives to hoard, whereas team size in levels or logs increases with weaker incentives.

Finally, effect sizes are remarkably stable across the two different survey-based measures of hoarding behavior. For example, comparing Column 3 and Column 7 of Appendix Table E9, both specifications using the small-team indicator yield effects around 0.08. Likewise, the financial incentive variables show similar magnitudes across the two outcomes, reinforcing the robustness of the findings.

While the magnitudes of the estimated effects naturally differ depending on the specification of the incentive measures, I find that the sign and statistical significance of the results are highly robust across all models. The magnitudes are economically similar and consistently aligned with my interpretation that talent hoarding behaviors are more frequent among managers who face stronger incentives to retain talent.

Table E8: Summary Statistics for Baseline Measures of Talent Hoarding Incentives (Survey)

	Mean	Std.dev	p10	p25	p75	p90
Performance-related share of compensation	0.25	0.08	0.22	0.22	0.25	0.34
Number of workers in team	8.72	4.44	1.50	4.50	13.00	13.00
Binary indicator for low visibility	0.37	0.48	0.00	0.00	1.00	1.00
Observations	3,xxx					

Notes: This table reports manager-level summary statistics for the three baseline measures of hoarding incentives based on the survey data: share of managers' total compensation that is performance-related, the size of the team the manager is responsible for, and whether talent visibility is low in the manager's functional area. The share of performance-related compensation is constructed by assigning each respondent the average share for their leadership type and functional area, based on the firm's internal compensation records. Team size is measured as a continuous variable by assigning the midpoint of each categorical range provided in the survey's four response buckets. Talent visibility is classified according to the firm's internal categorization of functional areas. High-visibility functions include engineering, quality management, and project management, while low-visibility functions include areas such as human resources, finance, and logistics. See Appendix Section E.2.4 for details on the construction of these incentive measures.

Table E9: Robustness to Alternative Incentive Measures Using Survey Data

Outcome variable:	Dissuade workers from leaving			Risk of losing talent				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1{High financial incentive}	0.0841 (0.035)	-	-	-	0.0851 (0.047)	-	-	-
Log(financial incentive amount)	-	0.0517 (0.023)	-	-	-	0.0597 (0.030)	-	-
1{Small team}	-	-	0.0873 (0.020)	-	-	-	0.0769 (0.025)	-
Log(team size)	-	-	-	-0.0333 (0.010)	-	-	-	-0.0419 (0.012)
Outcome Mean	0.7506	0.7506	0.7506	0.7506	0.4461	0.4461	0.4461	0.4461
Predicted difference p90-p10	0.0841	0.0088	0.0873	-0.0719	0.0851	0.0102	0.0769	-0.0905
Observations	3,xxx	3,xxx	3,xxx	3,xxx	3,xxx	3,xxx	3,xxx	3,xxx

Notes: This table examines the robustness of the survey-based findings on the relationship between managerial hoarding incentives and hoarding behavior by using alternative measures of hoarding incentives. The outcome variables are based on two distinct survey questions. Columns 1 to 4 use a binary indicator for whether respondents report that managers feel the need to dissuade workers from pursuing external opportunities due to immediate team needs. The survey question reads: *How often might leaders find themselves in situations where they need to dissuade a team member from exploring opportunities in another department due to immediate team needs or performance goals?* See Appendix Table D10 for the distribution of responses. Columns 5 to 8 use a binary indicator based on whether respondents report that the risk of losing talent discourages managers from investing in employee career development. The corresponding question reads: *What are the reasons that may prevent leaders from investing time and effort towards their employees' career development?* See Appendix Table D7 for response distributions. Each coefficient is estimated separately using an OLS regression of the respective outcome on a single incentive measure at a time. Columns 1 and 5 use a binary indicator for receiving a high share of compensation tied to team performance, based on the firm's internal classification. Columns 2 and 6 use the log of total performance-based compensation. Columns 3 and 7 use a binary indicator for managing a small team (bottom quartile of the team size distribution), and Columns 4 and 8 use the log of team size. The predicted difference p90-p10 refers to the predicted difference in the outcome between the 90th and 10th percentiles of the continuous regressors (between values 1 and 0 for binary indicators), holding all other covariates at their mean values. See Table 3 for the main results using the baseline incentive measures. See Appendix Section E.2.4 for further detail on the construction of the incentive measures and Appendix Table E8 for their distribution in the survey sample. Controls: Female, age, German citizenship, firm tenure, educational qualification. Robust standard errors in parentheses.

E.2.5 Placebo Test for Survey-Based Analysis of Talent Hoarding

This appendix subsection assesses the robustness of the survey-based measure of talent hoarding used in the main analysis (Panel B of Table 3). This measure is based on whether managers indicate that they refrain from investing in employee development because of the “risk of losing talent if employees become more attractive to others.” This response captures the core logic of talent hoarding: managers may deliberately withhold developmental opportunities to avoid making valuable employees more mobile.

A potential concern is that the proxies I use for hoarding incentives—(1) a higher share of performance-related pay, (2) smaller team size, and (3) low talent visibility in the manager’s functional area—could also correlate with broader organizational frictions unrelated to hoarding, such as resource constraints, informational gaps, or short-term performance pressures. To address this, I conduct a placebo test using the same survey question but focus on alternative response options. If my proxies simply capture general managerial challenges, we would expect them to correlate with a broad set of barriers to employee development. Appendix Table D7 lists all available response options and their frequencies.

Appendix Table E10 presents the results. In each panel, Column 1 replicates the main result using “risk of losing talent” as the outcome. Columns 2 to 5 examine other responses: limited resources, lack of employee interest, lack of knowledge, and “need to prioritize short-term targets over long-term development.” Across all panels, I find a robust and specific association between the proxies for managers’ hoarding incentives and the “risk of losing talent” response. In contrast, there is no consistent relationship between hoarding incentives and the other response options.

Panel A uses the share of performance-related pay as the incentive measure. Managers with higher performance-related compensation are more likely to report talent hoarding behavior. The coefficient for the short-termism response is positive but not statistically significant. This is consistent with the idea that a higher share of performance-related pay may be correlated with greater pressure to prioritize short-term outcomes.⁶ For the remaining response options in Panel A, I find negative but statistically insignificant coefficients.

Panel B focuses on team size. Managers of smaller teams are more likely to report hoarding behavior. There is no evidence that team size predicts other development barriers other than a negative association with the “lack of knowledge” response. This may reflect the fact that larger teams expose managers to more varied development needs, increasing their awareness of training resources. However, neither of the other two incentive measures (Panels A and B) are correlated with lack of knowledge, suggesting that measures of talent hoarding do not systematically conflate talent hoarding and information constraints.

⁶Garicano and Rayo (2016) show that short-termism arises when firms are unable or unwilling to evaluate long-term contributions, causing managers to focus on immediate metrics (e.g., quarterly targets) at the expense of long-run value. This misalignment affects decisions such as underinvestment in R&D and is conceptually distinct from talent hoarding. While short-termism results from performance evaluation systems that emphasize short-run outcomes, leading managers to deprioritize long-term value creation, talent hoarding stems from managers’ incentive to retain high-performing employees within their own teams, even when those employees could create more value elsewhere in the firm.

Panel C examines talent visibility. Managers in low-visibility functional areas are more likely to report the risk of losing talent as a barrier to development. Interestingly, they are *less* likely to cite other barriers, such as limited resources or lack of employee interest. These patterns suggest that managers in low-visibility areas are especially concerned about retention, relative to other broader organizational constraints. Moreover, these patterns further support the conclusion that my baseline measures of talent hoarding do systematically capture other organizational frictions.

It is also worth noting that short-termism, understood as a consequence of evaluation criteria set by upper management (Garicano and Rayo, 2016), should not be expected to vary systematically with team size or visibility. These factors shape the incentives to hoard talent but do not determine the time horizon of managerial performance evaluation. Consistent with this, survey responses referencing short-term pressures often cite top-down demands, such as working in “firefighting mode” or facing “quick-win requirements” from senior leadership as underlying determinants.

Overall, the placebo analysis supports the interpretation that my survey-based measure captures the relationship between hoarding incentives and hoarding behavior, rather than general organizational barriers.

Table E10: Heterogeneity in Reports of Organizational Barriers by Incentives

Panel A: Financial incentive (share)					
	Risk of losing talent	Prioritize short-term goals	Lack of knowledge	Limited resources	Lack of employee interest
	(1)	(2)	(3)	(4)	(5)
Financial incentive (share)	0.3226 (0.156)	0.0912 (0.147)	-0.2507 (0.151)	-0.2040 (0.147)	-0.1701 (0.147)
Outcome Mean	0.4461	0.6625	0.5394	0.7476	0.4110
Observations	2,xxx	2,xxx	2,xxx	2,xxx	2,xxx
Panel B: Team size					
	Risk of losing talent	Prioritize short-term goals	Lack of knowledge	Limited resources	Lack of employee interest
	(1)	(2)	(3)	(4)	(5)
Team size	-0.0065 (0.002)	-0.0001 (0.002)	-0.0050 (0.002)	0.0010 (0.002)	0.0020 (0.002)
Outcome Mean	0.4461	0.6625	0.5394	0.7476	0.4110
Observations	3,xxx	3,xxx	3,xxx	3,xxx	3,xxx
Panel C: Talent visibility					
	Risk of losing talent	Prioritize short-term goals	Lack of knowledge	Limited resources	Lack of employee interest
	(1)	(2)	(3)	(4)	(5)
Talent visibility	0.1443 (0.056)	0.0753 (0.055)	-0.0098 (0.055)	-0.1053 (0.052)	-0.2462 (0.052)
Outcome Mean	0.4461	0.6625	0.5394	0.7476	0.4110
Observations	3,xxx	3,xxx	3,xxx	3,xxx	3,xxx

Notes: This table probes robustness of my survey-based analysis of the impact of hoarding incentives on managers' reported talent hoarding by focusing on manager reports of alternative organizational barriers as alternative outcomes. While Panel B of Table 3 shows that stronger hoarding incentives are related with a higher propensity to cite the risk of losing talent in response to the question ' , this table expands this analysis to include the other response options: the need to prioritize short-term targets (Column 2), managers' lack of knowledge about development opportunities (Column 3), limited resources (Column 4), and lack of employee interest (Column 5). See Appendix Table D7 for the raw response distribution. Each coefficient is estimated separately based on a linear model for the outcome of interest using an OLS regression on the respective measure of hoarding incentives, which are the share of the performance-related portion of manager compensation (Panel A), team size (Panel B), and an indicator for being in an area with low talent visibility (Panel C). See Appendix Section E.2.4 for more information on how these incentive measures were constructed. Controls: Female, age, German citizenship, firm tenure, educational qualification. Robust standard errors in parentheses. N=3,xxx.

E.3 Robustness of Worker-Level Results

Section IV presents evidence that manager rotations increase workers' likelihood of applying to internal job openings, consistent with a reduction in talent hoarding. This section probes the robustness of the worker-level findings. In particular, I assess the sensitivity of the results to (i) alternative control sets, (ii) alternative measures of hoarding incentives, and (iii) alternative definitions of worker outcomes. Finally, I explore potential alternative mechanisms that could explain the observed application responses.

E.3.1 Alternative Control Sets

I first document that my worker-level results are not sensitive to a specific set of covariates. Column 1 of Appendix Table E11 shows the raw effect of manager rotations on applications and only controls for quarter fixed effects. Column 2 adds demographic controls (i.e., gender, age, German citizenship, educational qualifications, marital status, and family status). Column 3 controls for position characteristics instead of demographics (i.e., function, division, location). Column 4 uses my baseline set of controls, which include in addition to quarter fixed effects female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, and number of direct reports. Column 5 adds controls for worker evaluations (i.e., performance and potential ratings) and workers' past internal mobility. This exercise demonstrates that the estimated effect of manager rotations remains stable across specifications, regardless of the control set used. The fact that the effect of manager rotations on worker applications does not vary a lot based on the specific set of controls used provides further evidence in support of the assumption that manager rotations appear orthogonal to worker characteristics.

E.3.2 Alternative Measures of Worker Quality

I assess whether the heterogeneity in rotation effects across worker subgroups is robust to alternative definitions of worker quality. The main analysis in Figure 6 uses a composite quality index based on predicted internal hiring probabilities. To test robustness, I replicate the analysis using two additional continuous measures: educational attainment (measured in years) and past performance ratings (measured in numbers ranging from 1 to 4). Each measure is standardized to have mean zero and standard deviation one, and I estimate separate regressions interacting the standardized variable with the manager rotation indicator.

Appendix Figure E3 presents the results. Panel A reports the baseline effect of manager rotations, which increase internal job applications by 2.3 percentage points. Panel B shows that a one-standard-deviation increase in the composite quality index is associated with an additional 1.2 percentage point increase in application likelihood ($p=0.000$). Panel C reports a similar result for educational attainment, with a 0.8 percentage point increase ($p=0.004$), and Panel D shows that past performance ratings predict an increase of 0.6 percentage points ($p=0.039$) following a

rotation. Across all specifications, more productive workers experience significantly larger application responses to manager rotations, consistent with the prediction that they face stronger talent hoarding *ex ante*.

E.3.3 Alternative Specifications of Manager Hoarding Propensity Measure

Next, I assess the robustness of the results to alternative ways of measuring managers' talent hoarding propensity. The main analysis in Figure 6 uses a continuous measure based on the average deviation between actual and predicted potential ratings. To test robustness, I discretize the distribution of this measure at various thresholds: the top tercile, the top quartile, and the top half, which aligns with the definition of hoarding-prone managers used in Section III, facilitating comparability across empirical exercises. In each case, I estimate how the effect of manager rotations differs when the departing manager is classified as hoarding prone by including an interaction between the rotation indicator and an indicator for being above the respective threshold.

Across all specifications, the estimated application effects are larger when the departing manager is classified as hoarding prone, supporting the interpretation of this measure as capturing meaningful variation in talent hoarding behavior. While the confidence intervals in the discretized specifications are wider and include zero, reflecting the increased estimation noise, the magnitudes of the estimated effects are broadly comparable to those from the continuous specification. For example, the rotation effect increases by 1.3 percentage points for workers under managers in the top tercile ($p=0.061$) and 1.4 percentage points for workers under managers in the top quartile ($p=0.056$), versus 0.6 percentage points per standard deviation in the continuous specification ($p=0.033$).

E.3.4 Alternative Measures of Higher-Level Positions

While the main analysis defines higher-level positions as those associated with a pay increase, I obtain highly similar results when using a content-based definition of job hierarchy, based on the multidimensional ranking developed in Haegele (2024). This alternative measure captures variation in formal responsibility by combining three features of a job: (i) the number of direct reports, (ii) the reporting distance to the CEO, and (iii) the level of managerial autonomy. Appendix Table E12 replicates the main analysis using this alternative hierarchy measure.

Across all columns, the magnitude and interpretation of the effects closely mirror the baseline effect. Column 1 of Appendix Table E12 shows that manager rotations increase applications to higher-level positions by 1.13 percentage points when job level is defined by hierarchical rank, which is nearly identical to the baseline effect of 1.06 percentage points using the pay-based definition (Column 1 of Table 5, Panel B). Similarly, the effect of applying on being hired into a higher-level role is 46.8% under the alternative hierarchy measure (Column 2 of Appendix Table E12), compared to 46.2% in the baseline specification (Column 2 of Table 5, Panel B). Finally, a sizable share of marginal applicants would go on to outperform their new peers: the effect on being hired and performing above the team average is 17.8% under the alternative hierarchy definition (Column 3 of Appendix Table E12), versus 20.1% in the baseline specification (Column 3 of Table 5, Panel B).

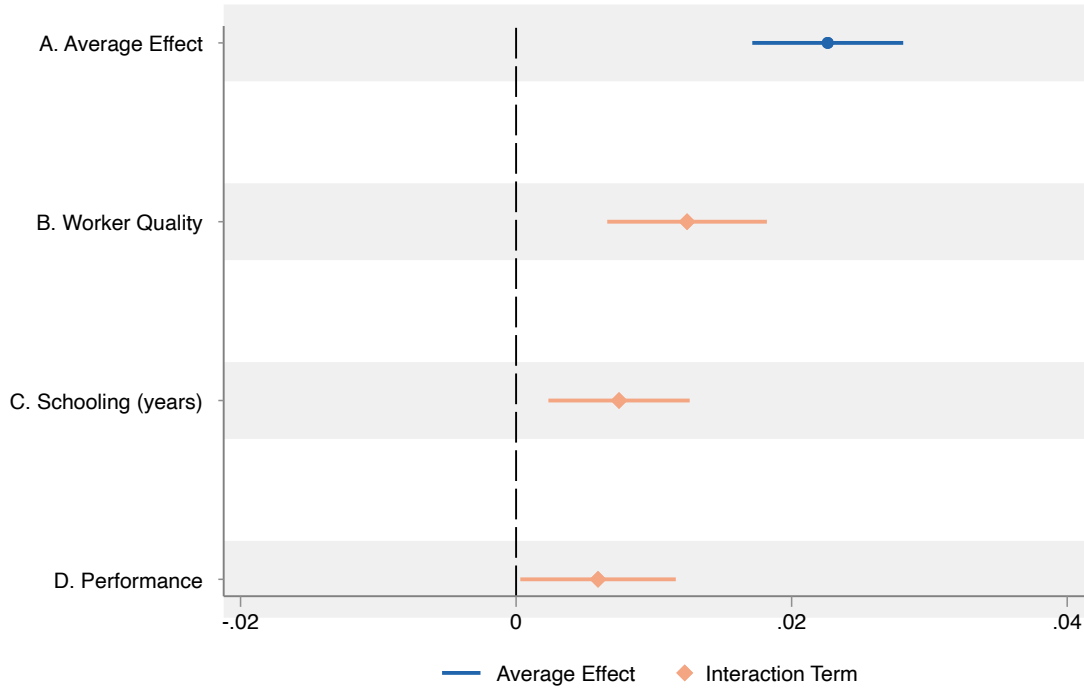
Taken together, these findings confirm that the core results are robust to using a more a hierarchy-based classification of job level.

Table E11: Robustness in Application Effects

	No	Employee	Position	Baseline	Baseline +
	Controls	Demographics	Controls	Controls	Rating + Mobility
	(1)	(2)	(3)	(4)	(5)
Manager Rotation	0.0222	0.0220	0.0228	0.0226	0.0234
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Outcome Mean	0.0290	0.0290	0.0290	0.0290	0.0290
Observations	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx	3xx,xxx

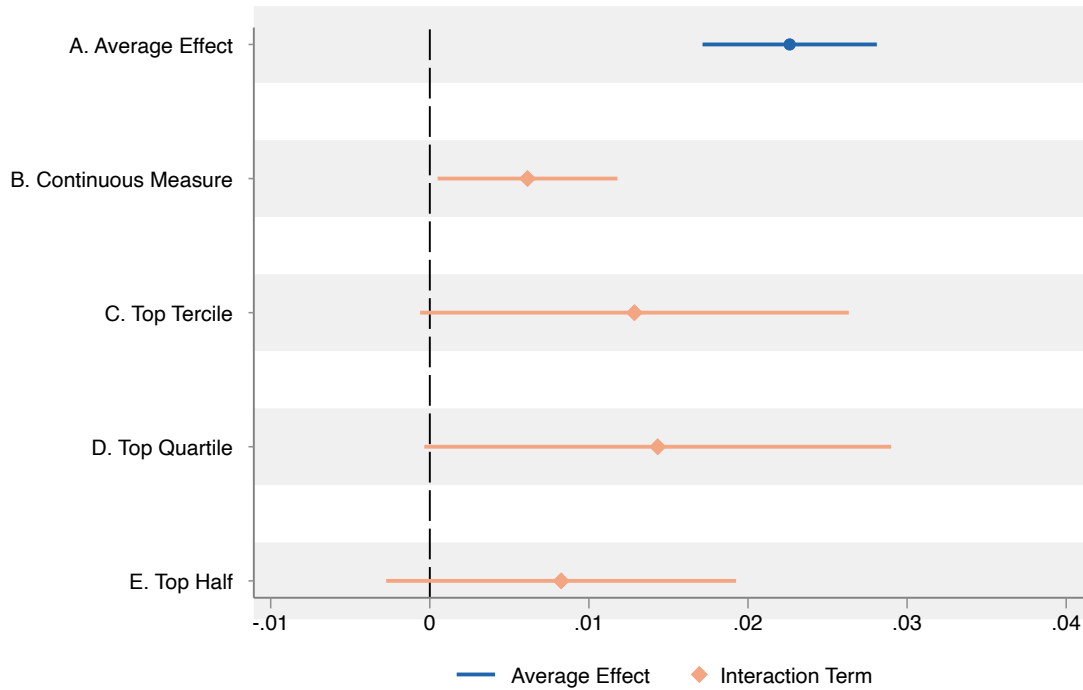
Notes: This table presents results from robustness exercises using different sets of controls to estimate the effect of manager rotations on worker applications. Column 1 presents the raw estimates, which only control for quarter fixed effects. Column 2 controls for quarter fixed effects and employee demographics, including gender, age, German citizenship, educational qualifications, marital status, and family status. Column 3 controls for quarter fixed effects and for employees' position characteristics (i.e., function, division, location). Column 4 contains my baseline set of controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects. Column 5 adds controls for worker evaluations (i.e., performance and potential ratings) and workers' past internal mobility. Robust standard errors are clustered at the worker and rotation level.

Figure E3: Robustness of Rotation Effects to Alternative Measures of Worker Quality



Notes: This figure examines whether the effect of manager rotations on worker applications varies consistently across alternative measures of worker quality. The outcome is an indicator for whether a worker applied to an internal job in a given quarter. Each coefficient stems from a separate regression based on Equation 3. Panel A shows the baseline average effect of a manager rotation (in blue). The orange coefficients show the effect of the rotation interacted with a standardized (mean-zero, SD=1) version of the respective proxy for hoarding incentives. Panel B presents my baseline specification which uses a standardized composite index of worker quality (constructed as the predicted value from an OLS regression of internal hiring probabilities on worker characteristics). Panel C uses a standardized measure of years of schooling. Panel D uses a standardized measure of past performance ratings. Robust standard errors are clustered at the worker and rotation level. 95%-level confidence intervals are shown. Controls include: gender, age, German citizenship, education, marital and family status, parental leave, firm tenure, division, function, location, full-time status, hours worked, number of direct reports, and quarter fixed effects. $N = 3xx,xxx$.

Figure E4: Robustness to Alternative Measures of Manager Hoarding Propensity



Notes: This figure examines whether the effect of manager rotations on worker applications varies consistently across alternative specifications of the manager hoarding propensity measure. The outcome is an indicator for whether a worker applied to an internal job in a given quarter. Each coefficient stems from a separate regression based on Equation 3. Panel A shows the baseline average effect of a manager rotation (in blue). The orange coefficients show the interaction of the rotation effect with different versions of the manager hoarding propensity measure. Panel B uses the continuous version of the hoarding measure, defined as the average deviation between predicted and actual potential ratings. Panels C to E show results when discretizing this variable. Panel C uses an indicator for whether the manager is in the top tercile of the distribution, Panel D uses the top quartile, and Panel E uses the top half. In each case, the orange point represents the interaction of the rotation indicator with the respective indicator for being hoarding prone. Robust standard errors are clustered at the worker and rotation level. 95%-level confidence intervals are shown. Controls include: gender, age, German citizenship, education, marital and family status, parental leave, firm tenure, division, function, location, full-time status, hours worked, number of direct reports, and quarter fixed effects. $N = 3xx,xxx$.

Table E12: Robustness to Alternative Definition of Higher-Level Positions

	Applied	Hired	Hired + Perform
	OLS	IV	IV
	(1)	(2)	(3)
Manager Rotation	0.0113 (0.002)	– –	– –
Applied	– –	0.4675 (0.079)	0.1782 (0.060)
Outcome Mean	0.0118	0.0027	0.0013
Observations	3xx,xxx	3xx,xxx	3xx,xxx

Notes: This table reports the effects of manager rotations on worker career outcomes using an alternative classification of higher-level positions based on job hierarchy rankings. Positions are classified as higher-level if they have a hierarchy rank of 10 or above, following the hierarchy measure developed in Haegele (2024), which incorporates number of direct reports, reporting distance to the CEO, and managerial autonomy. Each column presents results from a separate regression. Each coefficient is based on a separate regression. Column 1 reports the first-stage effect of manager rotation on applications based on Equation 3. Column 2 reports estimates from a two-stages least squares regression on landing a position that instruments for applying with manager rotation based on Equation 5 which represents the LATE. Column 3 estimates a similar two-stages least squares regression, but use an indicator for landing a position *and* performing better than the leave-out team average one year later as outcome variable. Robust standard errors are clustered at the worker and rotation level. Controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects.

E.3.5 Alternative Mechanisms Underlying Rotation Design

Having demonstrated that the observed application effects of manager rotations are robust across a wide range of empirical specifications and measurement approaches, I now turn to an important question: could these effects be driven by mechanisms other than a reduction in talent hoarding?

The analysis in Section IV.B is consistent with talent hoarding being a key driver of worker responses to manager rotations; however, it remains possible that worker responses could also reflect factors unrelated to talent hoarding. For instance, managers and workers may jump ship because of bad news about the future outlook of the team, or may depart after the completion of a major milestone. Other alternative mechanisms such as worker loyalty, match effects, and role-model effects could also produce the observed worker responses. In this section, I conduct a series of additional robustness checks to assess the potential importance of such alternative mechanisms.

Bad news about the future or unpleasant working conditions.— I begin by testing whether a negative shock, such as bad news about the future outlook of the unit or unpleasant working conditions, could underlie the effect of manager rotations on worker applications. Under such a mechanism, one would expect to see effects on other team-level outcomes besides applications, such as team performance and morale. Appendix Figure A2 estimates an event study around manager rotations and rejects economically significant changes in key outcomes, including team-level absenteeism and performance-related bonus pay, suggesting that rotations are not correlated with deteriorating conditions within the team.

Results from two placebo tests further contradict patterns that one would expect from such shocks. First, under a correlated shock that makes managers and workers want to leave the team, one would expect increased worker applications even for managers' unsuccessful attempts to leave the team. However, Panel A of Appendix Figure E5 finds no effect of managers' unsuccessful rotations on worker applications. Second, because coworkers are more similar in their career opportunities to a worker, one would also expect the correlation between coworker rotations and worker applications in the presence of such a shock to be larger than that between manager rotations and worker applications. Panel B of Appendix Figure E5 estimates the impacts of rotations of the most senior teammate and shows that these events have much smaller impacts on worker applications.

In addition, if the documented increase in internal applications is driven by teammates jumping ship, one would expect to see at least some effect on external transitions. However, I do not find that manager rotations yield increases in exit from the firm (Panel B of Figure 5). Moreover, if teammates want to jump ship because of the long-term future outlook of the team, one should expect the increase in applications to persist for several quarters, particularly given that in the internal labor market, it can take several quarters for suitable vacancies to become available. Instead, the observed application responses are transitory. It is also unclear why workers in smaller teams, those that are harder to replace, and those under hoarding-prone managers would be more susceptible to such a shock, as suggested by the heterogeneity results presented in Figure 6.⁷

⁷Managers' hoarding propensities are quite stable over time and are unlikely to be driven by a correlated shock.

Completion of a milestone or project.—If most teams were to work on fixed project schedules together, the completion of a milestone could be another key channel for correlated shocks. Several institutional features imply that such milestones are not likely to be relevant in this setting. First, manager rotations are not designed to coincide with increases in job vacancies or team dissolution that would indicate systematic rotation patterns due to common milestones in the firm. Second, the vast majority of positions at the firm are not project-based. Even in areas where project-based work is more common, projects are not normally staffed within a team, but often have employees from different teams in one project, meaning that it is not common that an entire team and their manager will finish a milestone at the same time. To empirically test for this channel, I exclude workers in jobs related to project management (where the bulk of project-based work occurs) from my event study analysis. This robustness test yields very similar application patterns (Panel B of Appendix Figure E6), suggesting that my results are not likely to be driven by project cycles. These findings are also consistent with the absence of effects on external transitions. If milestone completion were to drive responses to rotations, one would expect some effect on external transitions.

Loyalty.—In principle, manager rotations could induce workers to apply if they feel a strong sense of loyalty toward their manager. While loyalty undoubtedly represents an important part of interpersonal relations in the workplace, I do not find evidence that this mechanism drives the particular increase in applications around manager rotations. Loyalty is typically assumed to compound over time; however, Appendix Figure E7 finds no evidence that rotation effects vary by the length of time a worker was exposed to the rotating manager. Instead, rotations increase applications even for workers who have been exposed to their manager for one quarter or less. While one could have also expected that loyalty is particularly strong if the worker was personally hired by the manager, Appendix Table B5 finds similar effects for workers who were hired by the rotating manager and those who were already in the team. Moreover, one would expect loyalty effects to also result in increases in external transitions. However, Panel B of Figure 5 shows that while internal and external transitions trend identically prior to the rotation, manager rotations do not yield an increase in worker’s external transition out of the firm.

Worker-Manager Specific Match Effects.—Workers may have refrained from applying prior to a manager rotation because of match effects, which could occur because the manager provided favorable task assignments or offered better training opportunities. Several pieces of evidence suggest, however, that standard match effects cannot explain the increase in applications around a manager rotation. Similar to loyalty, match effects should increase worker applications for positions outside the team because the value of their default option falls when the manager leaves. However, I find no impact of manager rotations on external transitions. Under match effects, one would also expect rotations to be more impactful for workers who were hired by that manager, relative to workers who were already on the team when that manager arrived. This is because the manager would have had the ability to select new workers based on match quality. Instead, Appendix Table B5 documents that manager rotations have very similar effects on both groups. While one would also expect that match effects compound over time, I find that application effects of manager rotations

do not depend on workers’ exposure time to their manager (Appendix Figure E7). Finally, it is difficult to rationalize why match effects would give rise to the observed heterogeneity across different workers, for instance in terms of larger rotation effects for workers under hoarding-prone managers. Evidence discussed in Section III suggests that match effects are likely smaller, not larger, under hoarding-prone managers, for example because they deter workers’ participation in trainings.

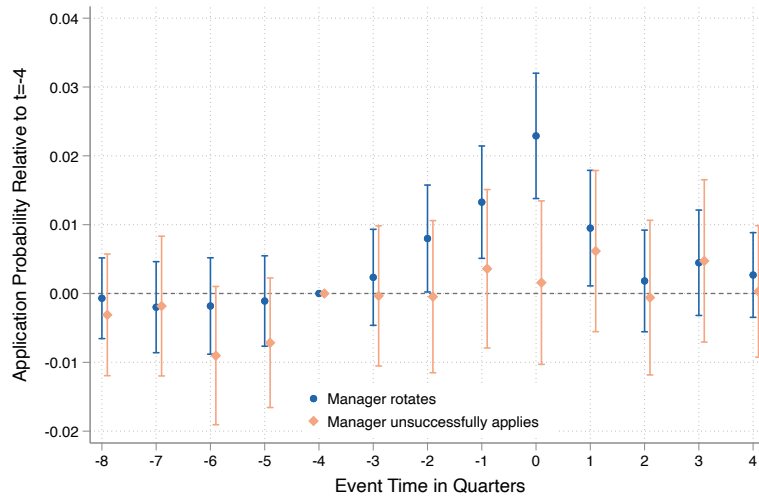
Salience and Role-Model Effects.—Information-based mechanisms could also explain why rotations affect worker applications. For instance, managers who pursue rotations may generate information flows that make career planning more salient. However, since managers’ unsuccessful rotation attempts do not increase applications even though workers likely find out about them, such a channel does not appear to operate through the salience of career planning. Successful manager rotations, on the other hand, could increase applications by providing information about the success likelihood of applications. If this were the case, one would expect that the increase in applications would persist, rather than quickly dissipate, given that few vacancies are available each quarter. Similarly, when I focus on manager rotations that are induced by the outgoing manager leaving the firm, which are less likely to increase information or salience about *internal* career transitions, I find similar application patterns relative to my baseline results (Panel A of Appendix Figure E6).

Role-model effects are often found to be particularly impactful if role models are similar in attributes to affected individuals (Porter and Serra, 2020, Meier et al., 2020), but homophily does not appear to play an important role in my setting. First, motivated by the previous literature on homophily by gender, I show that the rotation of a manager with the same gender yields a similar and statistically indistinguishable application response relative to the rotation of a manager with the opposite gender (Panel A of Appendix Table B7). Second, if observing others navigate their career is a key underlying factor of rotation effects, such a role-model effect should not be limited to managers. Since coworkers are more similar to workers than their managers with respect to their career opportunities, one would likely expect larger effects for observing coworkers rotate. However, Panel B of Appendix Figure E5 finds much smaller, rather than larger, effects of coworker rotations relative to manager rotations. These findings indicate that any role-model effects that are at play likely operate through channels that differ from those documented in prior research.

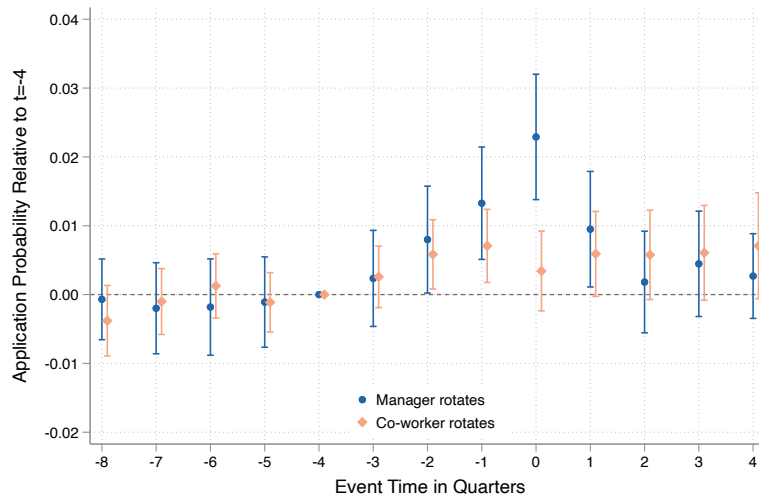
These additional analyses suggest that several plausible alternative explanations for the observed application effects around manager rotations are unlikely to be the dominant factors in my setting. Instead, the findings are in line with the view that reduced incentives to hoard talent are a primary driver of increased internal job applications.

Figure E5: Placebo Tests for Effects of Manager Rotations

Panel A. Results by Outcome of Manager Application



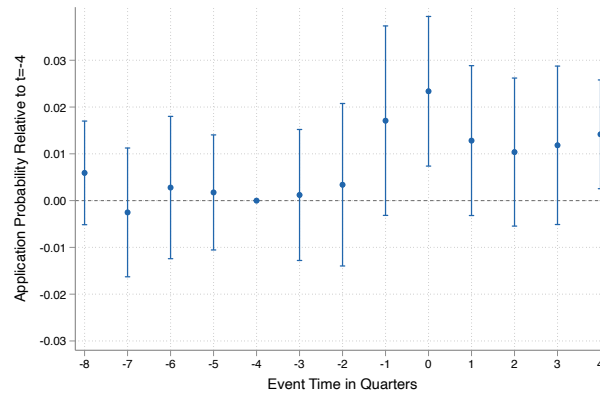
Panel B. Results by Type of Rotating Teammate



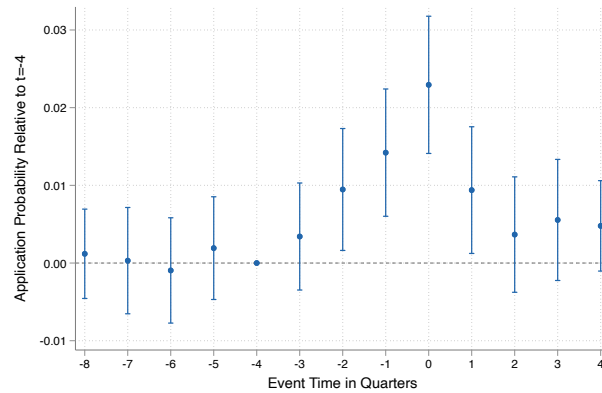
Notes: This figure presents placebo tests for manager rotations. Estimates stem from event study regressions, in which the outcome is an indicator that the worker applied to any internal position in a quarter and event time is defined relative to the occurrence of a rotation event. The specification includes worker and quarter fixed effects, but no other controls. I bin event time dummy variables at $t = -8$ and $t = 4$ and cluster standard errors at the worker and rotation level. 95%-level confidence intervals are displayed. The mean application rate as of $t = -4$ is 0.027. The sample includes those who have not experienced a manager rotation. Panel A compares a successful manager rotation (in blue) to a placebo event, in which a manager applied for an internal job rotation, but did not land the position and stayed in the team (in orange). Panel B compares a manager rotation (in blue) to the rotation of the most senior coworker (in orange).

Figure E6: Effects of Alternative Rotation Events

Panel A. Manager Exits as Event

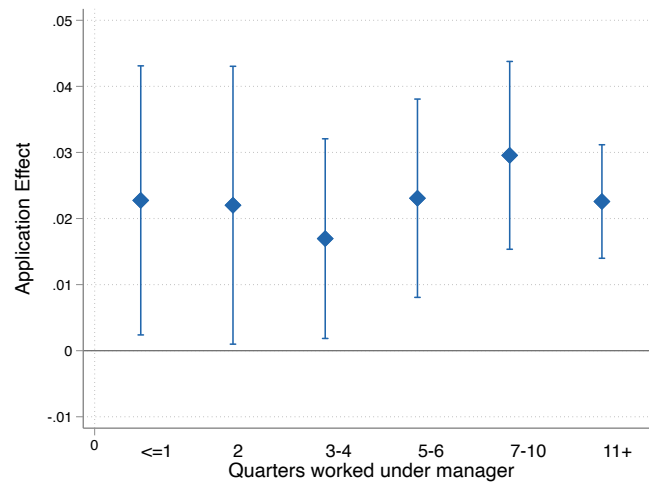


Panel B. Sample Without Project Management



Notes: This figure presents robustness tests for the mechanisms underlying manager rotations. Panel A focuses on manager rotations that were induced by the outgoing manager exiting the firm. Panel B focuses on manager rotations based on internal switches, but excludes workers from the analysis sample who work in project management positions and are most likely to work in projects with fixed milestones. Estimates stem from event study regressions, in which the outcome is an indicator that the worker applied in a quarter and event time is defined relative to the occurrence of a rotation event. The specification includes worker and quarter fixed effects, but no other controls. I bin event time dummy variables at $t = -8$ and $t = 4$ and cluster standard errors at the worker and rotation level. 95%-level confidence intervals are displayed. The mean application rate as of $t = -4$ is 0.027. The sample includes those who have not experienced a manager rotation.

Figure E7: Effect of Manager Rotations by Workers' Exposure Length to Manager



Notes: This figure assesses heterogeneity in the effect of manager rotation on applications by workers' length of exposure to the rotating manager. Each coefficient stems from a separate regression based on Equation (3). Worker subgroups are defined by the number of quarters a worker has worked under the manager. Baseline application rates are 0.031 (≤ 1), 0.029 (2), 0.032 (3-4), 0.033 (5-6), 0.030 (7-10), and 0.024 (11+). The total number of observations are 3x,xxx (≤ 1), 3x,xxx (2), 5x,xxx (3-4), 3x,xxx (5-6), 5x,xxx (7-10) and 1xx,xxx (11+). The coefficients are not statistically distinguishable from each other (the lowest p-value from pairwise comparisons is 0.2180). Robust standard errors are clustered at the worker and rotation level and 95%-level confidence intervals are displayed. Controls: Female, age, German citizenship, educational qualifications, marital status, family status, parental leave, firm tenure, division, function, location, full-time, hours, number of direct reports, and quarter fixed effects.

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