Are Male Bosses Bad for Women's Careers? Evidence from a Multinational Corporation*

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Abstract

We study whether gender-based favoritism impedes women's career progression using data from a European multinational corporation. Leveraging manager reassignments, we show that manager gender does not affect gender differences, neither in wage growth nor in promotion rates. Remarkably, this holds across a wide range of countries and departments, i.e., workforces that differ substantially in terms of gender norms, occupations, and gender composition, but are all subject to the same management practices and corporate culture. Analyzing performance and potential ratings, we find that manager gender only matters in low-stakes decisions that do not affect managers' own career prospects.

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1 Introduction

Gender equity in the labor market has improved considerably, but convergence has slowed down and substantial gender disparities persist. In particular, men are still heavily over-represented in corporate leadership positions (Blau and Kahn, 2017; McKinsey & Company, 2019). While various factors help explain why the share of women declines rapidly with organizational hierarchy levels, an important concern is that the disproportionate share of men in top corporate ranks impedes the career progression of women due to gender-based favoritism.[1] Hence, if male managers favor male workers over their female colleagues, male leadership constitutes a structural disadvantage for women that reinforces gender pay gaps and perpetuates male leadership.

As interactions between employees and their direct managers are hidden behind firm boundaries, the concern that male leadership disadvantages women is largely grounded on anecdotal evidence (Lang, 2011; Annis and Gray, 2013). A notable exception is a recent study by Cullen and Perez-Truglia (2023, henceforth CPT), which provides causal evidence showing that male managers severely impede the career progression of their female subordinates at a bank in Southeast Asia because of exclusive social interactions—reminiscent of the notion of "old boys' club" dynamics. Recent studies have also uncovered similar patterns in public-sector organizations (Bircan, Friebel, and Stahl, 2024; Fortin, Markevych, and Rehavi, 2024). At the same time, many private-sector firms in high-income countries have invested significant resources to implement state-of-the-art management practices in order to improve productivity (Bloom and Van Reenen, 2007, 2010). As a central goal of these efforts is to ensure merit-based personnel decisions, it is unclear to what extent gender-based favoritism affects the career progression of male and female workers in well-managed firms.

In this paper, we analyze whether women face a penalty of having a male boss in a large European manufacturing firm that uses frontier technologies and state-of-the-art management practices. The fact that our firm operates establishments across the globe, and employs workers in a wide range of occupations allows us to analyze whether the role of gender-

[1] We refer to gender-based favoritism as the tendency for managers to use their power in order to favor workers of the same gender independent of true performance and potential (Prendergast and Topel, 1996). Such favoritism can be explicit or implicit. While explicit favoritism refers to deliberate choices based on conscious preferences, implicit favoritism refers to discriminatory actions based on unconscious biases or preferences (Bertrand, Chugh, and Mullainathan, 2005). Both types of favoritism can affect workers' careers through their managers' employee evaluations and endorsements, mentoring efforts, or inclination to offer raises or promotions. Note that we do not investigate overall discrimination against women by all managers, but rather whether the degree of implicit or explicit bias against women is higher among male managers.

based favoritism varies across a wide range of contexts that differ substantially in terms of gender norms, occupations, and gender composition, but are all subject to the firm's globally consistent management practices and corporate culture.

Our firm is a "typical" large corporation in developed economies in the sense that, (i) the share of female employees declines with each hierarchical rank, leading to substantial gender inequality while within-job pay gaps are small (Blau and Kahn, 2017), (ii) the firm uses structured processes for consistent hiring, compensation and promotion decisions, as well as transparent objective setting and performance reviews (Bloom and Van Reenen, 2011), and (iii) the firm actively attempts to promote gender equity in order to increase firm performance by reducing misallocation of human capital (Hsieh et al., 2019).[2]

The personnel data span the years 2013 to 2019 and include 2.7 million worker-month observations. They contain information on wages, hierarchical ranks, and workers' performance and potential ratings. Importantly, we are able to link each worker to his or her direct superior, who we refer to as *manager* or *boss*. In contrast to top executives, managers interact frequently with their workers, and play a pivotal role in their career progression. Among others, managers provide guidance and mentorship, evaluate workers' performance and potential, are involved in wage re-negotiations, can push for workers to be promoted, or refer workers to job opportunities within the organization.

In the first part of the paper, we estimate female penalties of having a male boss in career progression using within-worker variation in manager gender created by the rotation of managers across teams. Following CPT, we first estimate how the gender difference in career progression, measured by log wages and hierarchical ranks (1–10), evolves in response to four different types of manager transition events, i.e., from female to male, female to female, male to male, or male to female managers. To separate the effect of a change in manager *gender* from the effect of a change in manager, we compare transitions that imply a change in manager gender to gender-neutral transitions. Hence, the female penalty of having a male boss (henceforth FPMB) quantifies how women's careers evolve relative to men's after a

[2]For US firms, McKinsey & Company (2019) report female shares of 48%, 38%, and 22% at entry, middle management, and executive level, respectively. At our firm, the shares at comparable ranks in the U.S. are 45%, 41%, and 30%. Examples of structured management practices include the use of a globally consistent compensation framework where wage negotiations take place within job-specific wage bands (like over 70% of US firms (Culpepper and Associates, 2009)), or the use of a performance–potential grid for talent evaluation and development (The Talent Strategy Group, 2023). Regarding firms' diversity initiatives, all current Fortune 100 companies have publicly committed to fostering diversity, equity, and inclusion (HRdive, 2022), and about one third of all S&P 500 companies explicitly tie executive compensation to DEI metrics (Semler Brossy, 2022; Mercer, 2022).

female-to-male switch, as opposed to a female-to-female switch, and how they fare relative to men after a male-to-female switch, as opposed to a male-to-male switch.

We find that male bosses do not impede women's careers at our firm. That is, changes in manager gender have statistically insignificant and economically negligible effects on gender differences in wage growth and promotion probabilities. Even two and a half years after a manager transition, our estimate for the FPMB in wages is only 0.06%. Throughout this entire effect window, the high precision of our estimates allows us to rule out that the FPMB in wages exceeds 0.9% at the 5% significance level. The same holds for hierarchical ranks, where the estimated FPMB coefficients during the ten quarters following a change in manager gender range from -0.023 to 0.004 ranks, and where rank-FPMBs greater than 0.026 can be rejected at the 5% significance level.

While the event study coefficients show that changes in manager gender are unrelated to differences between workers' career trajectories leading up to manager transition events, we verify that the findings are not driven by (i) transitions that could theoretically be induced by individual workers, (ii) transitory events where the worker-manager link lasts for less than a year, and (iii) selective attrition. It is also important to note that our null results are not driven by mechanic career paths as there are substantial differences in career progression between workers conditional on worker and job characteristics, and managers have the most important voice in determining which workers climb the career ladder. These differences in career progression imply that our estimates are not only small in absolute value but also relative to the underlying variation in the data. At the 5% significance level, we can reject FPMBs of more than 10.0% of the within-worker standard deviation in log wages, or 6.0% of the standard deviation of ten-quarter wage growth. For hierarchical ranks, the corresponding ratios are 10.8% or 6.2%.

The precise null effect in our setting is in stark contrast to the afore-mentioned findings by CPT which imply that women face an FPMB in wages of as much as 12.3%, or 113.7% of the respective within-worker standard deviation. This qualitative discrepancy in results is particularly interesting given the close similarities in terms of methodology, type of data, period of analysis, and the intensity of social interactions that could give rise to gender-based favoritism in personnel decisions.

In the second part of the paper, we ask whether the existence or absence of gender-based favoritism can be rationalized by country- or occupation-level differences in workforce composition. To address this question, we leverage the fact that our firm is a large multinational corporation that operates establishments in a wide range of countries and consists of various

departments. This gives us variation in workforce composition conditional on firm-wide factors such as management practices, institutions, and corporate culture, which the firm implements consistently throughout the entire organization.

We first estimate FPMBs separately for 18 countries or country groups including the US, Scandinavia, Italy, Central America, China, Japan, and Southeast Asia. These countries differ substantially not only in terms of their economic development and labor market institutions, but also business cultures and social norms. However, even in the firm's establishments in East Asian countries, where after-work events and drinking with colleagues and superiors are a prominent part of corporate culture (e.g. Horak and Suseno, 2023), the elevated potential for gender-based favoritism through exclusive social interactions does not translate into female career penalties of having a male boss. Overall, for all but one country group, Eastern Europe, we find no evidence of statistically or economically significant FPMBs. In addition, the limited variation in point estimates is entirely unrelated to the substantial country-level variation in gender biases regarding women's rights and capabilities, as elicited in the World Value Survey.

We then separately estimate FPMBs for 12 different departments, such as R&D, Engineering, HR, Finance, Commercial, or Manufacturing. As establishments or countries, these departments can be viewed as sub-organizations that differ substantially in terms of occupations and the share of female workers while being subject to the same firm-wide management practices. As for the country-level analysis, there is no evidence of statistically or economically significant FPMBs in all departments.

Similarly, we can reject economically significant career FPMBs for all worker and manager age groups and across all hierarchical ranks. The universal absence of female career penalties of having a male boss across all parts of our multinational firm is indirect evidence that state-of-the-art management practices can effectively limit the kind of unfair and inefficient gender-based favoritism that may arise in settings with sub-par management practices.

In the third part of the paper, we study FPMBs in annual potential and performance ratings. While the firm's people management practices do not vary across departments, countries or time, these ratings differ in terms of their organizational impact and hence in the effective degree of manager discretion. The forward-looking potential rating is highly consequential for workers' future career progression and for the firm's future productivity through the allocation of workers to jobs. In contrast, the backward-looking performance rating mainly scales workers' annual bonus, but has a limited role in wage setting and promotion decisions. This difference in stakes is reflected in the talent review and development

process. On the one hand, managers have to justify each of their potential ratings to other managers and the HR department in subsequent strategy and coordination meetings. On the other hand, they have full discretion over their performance ratings subject to fitting a target distribution at a more aggregate level.

In line with the results for wages and promotions, we find that women's likelihood of receiving a high potential rating does not depend on the gender of their manager. However, relative to men, women receive significantly worse performance ratings when the manager is male rather than female. Interestingly, this is entirely driven by intermediate performance ratings, where decisions are less clear-cut and have a disproportionately low impact on workers' bonus pay. In other words, when the manager is male, women are more likely to receive an average instead of a medium-high performance rating, but not less likely to receive a very high performance rating. The FPMB in performance ratings implies a 1.5% female penalty of having a male boss in terms of bonus pay. However, as workers' annual bonus pay, in contrast to wages, only accounts for a small portion of total earnings, the FPMB in intermediate performance ratings has a negligible effect on annual earnings. More importantly, the systematic variation across outcomes corroborates the interpretation that differences in management practices and institutions can rationalize the existence or absence of female penalties of having a male boss.

Related Literature. Our paper contributes to several strands of the literature. Most importantly, we contribute to the large literature on gender inequality in the labor market, which identifies various factors underlying the gender gap in wages and career progression (e.g. Bertrand, 2011; Niederle and Vesterlund, 2011; Goldin, 2014; Card, Cardoso, and Kline, 2016; Azmat and Ferrer, 2017; Blau and Kahn, 2017; Kleven et al., 2019; Sarsons et al., 2021; Biasi and Sarsons, 2022; Egan, Matvos, and Seru, 2022; Hägele, 2024). In particular, we add to our understanding of the role of male-dominated leadership for gender disparities.

Closest to our study, Cullen and Perez-Truglia (2023) provide causal evidence on gender-based favoritism between workers and their direct managers in a Southeast Asian bank. Similarly, ongoing research by Bircan, Friebel, and Stahl (2024) and Fortin, Markevych, and Rehavi (2024) find female penalties of having a male boss in government-owned institutions. Studies using cross-firm variation find that a higher share of female managers is related to reduced gender inequality in career progression in the US, Norway and Uruguay (Kurtulus and Tomaskovic-Devey, 2011; Kunze and Miller, 2017; Ceni, Galván, and Parada, 2023). In

contrast, Bertrand et al. (2019) and Maida and Weber (2022) show that a larger share of women on executive boards of Norwegian and Italian firms has no effect on overall gender equity. Other studies find mixed results using data from specific settings such as academia (Bagues, Sylos-Labini, and Zinovyeva, 2017; Card et al., 2020; Hospido and Sanz, 2021) or schools (Grissom, Nicholson-Crotty, and Keiser, 2012; Biasi and Sarsons, 2022; Husain, Matsa, and Miller, 2024).

We contribute to this literature by providing the first causal evidence on whether gender-based favoritism can explain persistent gender inequality in career progression in well-managed private-sector firms. This setting is particularly relevant for at least two reasons. First, it is representative for many workers as large multinationals employ a substantial share of the workforce in developed economies. Second, it is an important benchmark to the extent that more and more firms will adopt today's state-of-the-art management practices due to competitive pressure and learning (Bloom et al., 2019).

Our second contribution leverages the fact that our multinational firm operates establishments in many countries and employs workers in a wide range of departments. This allows us to study whether the role of gender-based favoritism varies systematically across heterogeneous workforces, which differ in terms of occupations and social norms, but are subject to the same firm-wide institutions and management practices. The documented absence of heterogeneity is in line with the literature showing important headquarter (country) effects or, more generally, invariability in firms' decision making and management practices (Harrison and Scorse, 2010; Bloom, Sadun, and Van Reenen, 2012; DellaVigna and Gentzkow, 2019; Hjort, Li, and Sarsons, 2022).

Our third contribution is that we study gender-based favoritism not only in wages and hierarchical ranks, but also in managers' subjective performance and potential ratings of their employees. These rating decisions differ in their financial and organizational impact and thus the effective degree of manager discretion determined by decision processes and the need for formal and informal justification. This is related to the literature on managers and their performance and potential ratings (e.g. Lazear, Shaw, and Stanton, 2015; Frederiksen, Lange, and Kriechel, 2017; Frederiksen, Kahn, and Lange, 2019; Hoffman and Tadelis, 2021; Benson, Li, and Shue, 2023), as well as to a broader literature on favoritism in organizations and how they can be limited by the incentives implied by institutions, policies and management practices (Prendergast and Topel, 1996; Bloom and Van Reenen, 2011). In particular, our finding that gender-based favoritism is only observed in low-stakes decisions which do not affect managers' own career incentives is in line with Bandiera, Barankay, and Rasul (2009)

who find that managers stop favoring workers who they have social ties with once managers' earnings are tied to team performance.

Outline. The remainder of the paper is structured as follows. Section 2 provides more information about the firm and describes the data. Section 3 presents the estimation approach. Section 4 documents the absence of an FPMB in career progression. Section 5 studies whether career FPMBs are systematically related to variation in workforce composition. Section 6 analyzes whether an FPMB exists in managers' performance and potential ratings of their employees. Section 7 discusses our findings and concludes.

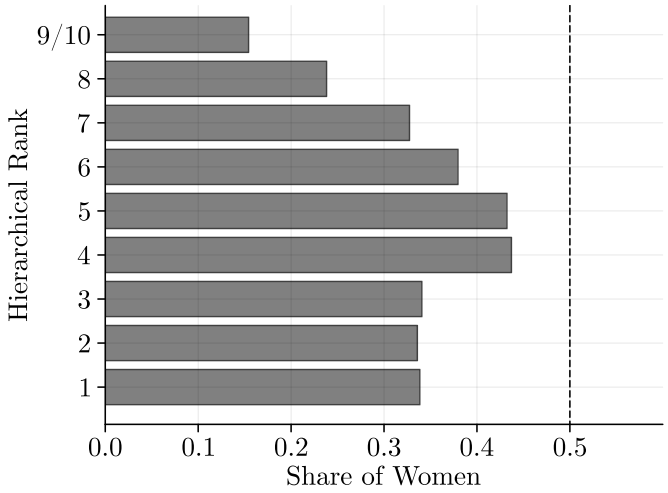
2 Data and Setting

2.1 The Firm

We use personnel data of a large multinational firm in the manufacturing sector. The firm ranks among the 250 largest European firms in terms of sales and employment and is an industry leader in an R&D-intensive sector. About a quarter of the firm's workforce is located in its home country, but it has establishments in more than 50 countries around the world. For example, around 20% of the workforce is located in the United States. Employees at the firm work in over a hundred occupations in different departments including engineering, R&D, manufacturing, sales, and various overhead areas such as finance, strategy, and human resources.

Like many corporations nowadays, the firm has a proactive HR department that manages various aspects of the company's workforce. Besides tracking and organizing employee data and making them accessible, the HR department designs and manages compensation schemes, administers the employee evaluation process, conducts succession planning for business-critical positions, guides personnel decisions, and manages talent development schemes. These workforce related institutions and management practices are implemented globally across all establishments. In addition, the HR department organizes workshops and events to promote the organization's corporate culture. This entails promoting diversity, equity, and inclusion (DEI), which—like most corporations in developed countries—our firm has publicly committed to. While no explicit quotas are enforced or targeted, the share of women in management positions is part of the firm's key performance indicators. The firm's

FIGURE 1: Gender Composition Across Hierarchical Ranks



Notes: This figure shows the share of women in each hierarchical rank. The bottom three ranks consist almost entirely of core production workers. Manager and specialist roles start at rank 4.

commitment to improve gender equality is reflected in its appearance on the survey-based lists of female-friendly workplaces published by Forbes (2023) and the Financial Times (2023).

Nevertheless, men still dominate the top ranks of the organizational hierarchy. Figure 1 shows that the share of women is low at the bottom (core production jobs), highest in entry-level white collar positions (ranks 4 and 5), and falls significantly when moving further up the hierarchy. This pattern is typical for many other firms. For the U.S., McKinsey & Company (2019) report female shares of 48%, 38%, and 22% at entry level, middle management, and C-level, respectively. At our firm, the shares at comparable ranks in the U.S. are 45%, 41%, and 30%. While the current gender composition across hierarchical ranks is highly path-dependent, reflecting past promotion decisions, women's promotion probability is still significantly lower than men's. In our data, women are 10% less likely to be promoted to a higher rank compared to men with the same job characteristics.

2.2 Workers and Managers

The most important feature of our dataset is that we observe the identity of each worker's direct superior, who we refer to as *manager* or *boss*. At each point in time, every worker has a single manager. On average, managers oversee just over 5 direct subordinates at a given point in time, with a median of 4 subordinates. The monthly probability of getting a new

manager is 3.9%, implying that, on average, workers remain with a particular manager for just over two years.

Managers and workers interact frequently and regularly. Among others, managers communicate the firm's and department's objectives to their workers and, once per year, define expectations together with their workers. Throughout the year, managers assign workers to tasks and oversee their progress. Besides providing regular feedback all year long and working together on projects, there are two mandatory meetings between worker and manager: a mid-year review and the end-of-year appraisal meeting.

Managers play a pivotal role in workers' career progression in several ways. First, each year managers decide whose wages to increase by how much subject to a budget constraint given by the HR department. Second, managers have to advocate for a worker to be promoted to a higher hierarchical rank. Third, they also need to argue for a worker to be reassigned to a higher-paying job within a hierachical rank. For promotions to mid-level positions, managers have to get approval from the HR department, which naturally cannot grant every promotion demand. For top management roles, e.g., *Head of Sales North America*, a panel of managers decides how to fill existing positions or whether to create a new position at that level. Fourth, managers can use their personal networks to endorse their workers for internal vacancies if they seek to make a career change within the firm. However, managers are not involved in the formal hiring process, in which the hiring manager leads and assembles a panel that decides how to fill the vacancy. Fifth, managers serve as teachers and mentors to their workers. By assigning a certain worker to important and promising projects and providing guidance along the way, or simply by getting them in touch with other managers, they can substantially improve the career prospects of that worker (Lazear, Shaw, and Stanton, 2015; Frederiksen, Kahn, and Lange, 2019; Jarosch, Oberfield, and Rossi-Hansberg, 2021; Herkenhoff et al., 2024; Bircan, Friebel, and Stahl, 2024).

In sum, a worker's manager is the single most important person in the firm in terms of their career progression. However, their discretion is limited by the oversight of the HR department and their own career incentives. Ex-ante, managers need to justify promotion decisions to other managers in the department. Ex-post, they will be held accountable for their personnel decisions and the performance of their subordinates.

TABLE 1: Descriptive Statistics

	Mean	Std. Dev.	P25	P50	P75
Worker Characteristics					
Female	0.394	0.489	0.000	0.000	1.000
Age	40.9	9.3	33.0	40.0	48.0
Tenure	111.6	110.6	26.0	71.0	163.0
Hierarchical Rank	4.53	1.37	4.00	5.00	5.00
Wage [€]	53,360	43,129	26,345	43,278	72,644
Manager Characteristics					
Male Mngr.	0.712	0.453	0.000	1.000	1.000
Age Mngr.	44.7	8.1	39.0	45.0	51.0
Tenure Mngr.	138.2	115.2	41.0	110.0	207.0
Rank Mngr.	6.0	1.2	5.0	6.0	7.0
Wage Mngr. [€]	87,282	60,980	49,438	75,989	109,018
Team Characteristics					
Number of Coworkers	9.6	16.8	3.0	5.0	10.0

Notes: This table shows the mean, the standard deviation, and the 25th, 50th, and 75th percentile of selected variables for all workers in the sample. Tenure is expressed in months and hierarchical ranks range from 1 to 10. We convert all currencies to Euro using monthly exchange rates (IMF). Number of worker-month observations: 2,687,005. Appendix Table A.1 shows descriptive statistics for the subset of workers who are managers.

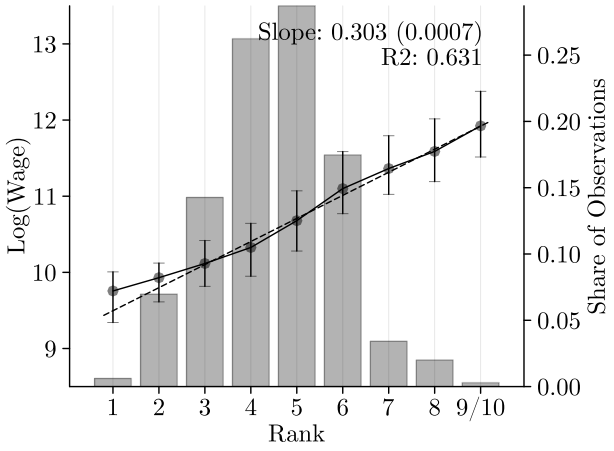
2.3 Data and Descriptive Statistics

Besides information on workers' direct superiors, our data contain information on workers' compensation, occupation, hierarchical rank (1–10), department, the work unit, establishment location, and certain demographic characteristics such as gender, age, or nationality. For our analysis, we restrict the data to regularly-employed active full-time employees aged 25 to 60.Our final sample consists of 2.7 million worker-month observations, 73 thousand unique workers and 17 thousand unique managers. Table 1 shows basic descriptive statistics.

Workers are on average 41 years old and have spent just over 9 years with the firm. While almost 40% of the firm's workforce is female, only 29% of workers have a female manager, reflecting the lower share of women in top ranks. The average number of coworkers is 9.6 and at least 75% of workers have ten or less coworkers in their team. Workers' managers are slightly older and more experienced, ranked above workers in the firm's hierarchy, and earn over 60% higher wages.

Figure 2 shows the distribution of hierarchical ranks and the average log wage in each rank along with the range between the 90th and 10th percentile of the rank-specific wage distribution. While the average difference in wages between adjacent ranks is about 30 log percent, there is significant overlap between wage bands of adjacent ranks. This creates

FIGURE 2: Wages and Hierarchical Ranks



Notes: This figure shows the average wage and the range between the 10th and 90th percentile for each hierarchical rank, and a linear fit. The share of observations in each hierarchical rank is plotted on the right vertical axis. Ranks 9 and 10 are grouped together.

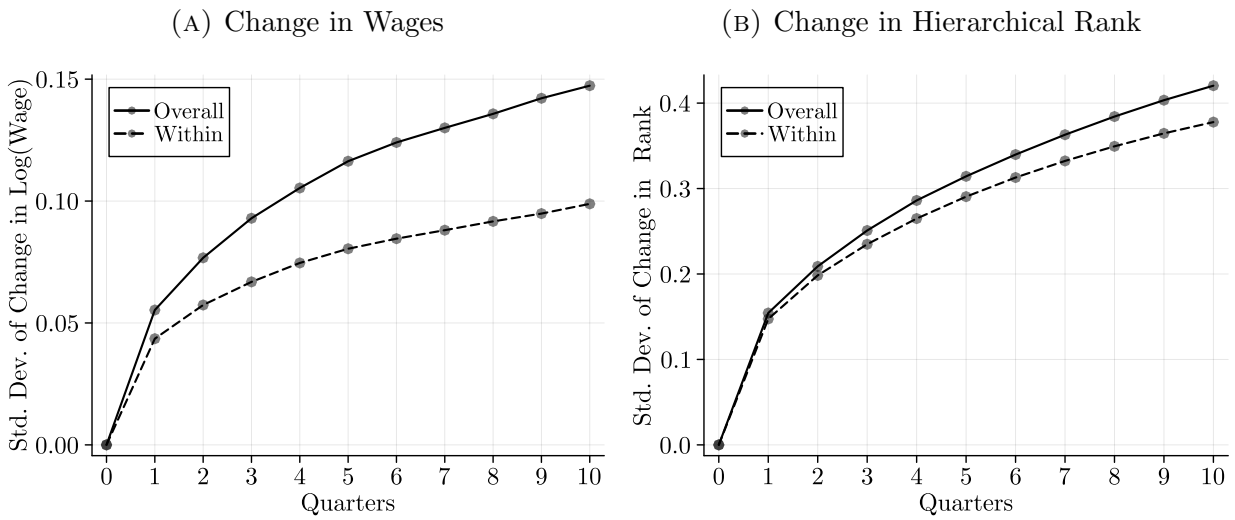
the possibility of large wage jumps within hierarchical ranks. For example, 83% of wage-promotions of at least 10% happen without a corresponding change in hierarchical rank in a six month window around the wage jump. Hence, workers can experience substantial wage increases even without a step up in hierarchical rank. On the flip side, a promotion does not automatically trigger an instant increase in wages, but comes with increased responsibilities and decision-making power within the organization.[3] Hence, we use both wages and hierarchical ranks to measure career progression.

Over a period of two and a half years, the average worker experiences an increase in log wages of 0.12 and an increase in hierarchical rank of 0.14 ranks. More importantly, Figure 3 shows that there is substantial variation in these measures of career progression. The solid line in Panel A shows that the cross-worker standard deviation of within-worker log wage growth amounts to about 0.15 when looking at a time horizon of two and a half years. The dashed line shows that only part of this variation in career progression comes from initial differences across jobs, departments, or age groups: when comparing wage changes among workers of the same age and tenure, and starting out in the same establishment, job, and department, the standard deviation of residual log wage growth is still 0.10.

Panel B uses the change in workers' hierarchical rank as an alternative measure of career progression. Again, there is substantial variation, and an even larger share cannot be

[3]About 36% of all rank-promotions are accompanied by a wage jump of at least 10% in the six-month window around the promotion event.

FIGURE 3: Variation in Career Progression



Notes: This figure visualizes the variation in career progression across (similar) workers. The solid lines show the standard deviation of the within-worker changes in log wages (Panel A) and hierarchical ranks (Panel B) between quarters t and $t+h$ for $h = 0, 1, \ldots, 10$. The dashed lines shows the residual variation after taking out country-by-period, department, job, age, and tenure fixed effects. To compute the residual variation, for each time horizon h, we residualize $\Delta Y_{it}^{h} \equiv Y_{i,t+h} - Y_{it}$ using the respective fixed effects at time t, and compute the standard deviation of these residuals.

accounted for by taking out differences across different parts of the firm or groups of workers. Hence, throughout the firm, there is plenty of variation in wage growth, i.e., the careers of some workers progress much faster than those of their coworkers. This also assures that there is substantial scope for managers to impact the career progression of their employees.

Note that this holds despite the fact that less than one fifth of all workers are covered by collective bargaining agreements (CBAs).[4] Importantly, CBAs only fix compensation for specific positions, but do not determine which workers are assigned to which positions and which workers are promoted to higher-paying jobs. That is, a large part of the variation in wage growth (Panel A of Figure 3) and all of the variation in rank growth (Panel B) is unaffected by the presence of CBAs.

3 Estimation Approach

Our goal is to analyze whether women face a career penalty of having a male boss. Hence, the question is not whether women's careers progress more slowly than men's, nor is it about

[4]We cannot observe which workers are covered by a CBA, but we know that the share of covered workers varies heavily across countries and, as expected, most CBA-covered workers work in European countries and in manufacturing jobs.

whether male or female bosses generally have a different impact on workers' careers. A female penalty of having a male boss (FPMB) represents an interaction effect of worker and manager gender, answering the question: are wage growth and promotion rates of female and male workers differentially affected by the gender of their manager?

The key issue complicating the estimation of a possible FPMB is that worker and manager gender are not matched randomly, especially in high-wage jobs. For example, if women were more likely to be supervised by male managers who happen to be good teachers and motivators, we would underestimate the FPMB because of unobserved manager heterogeneity. Similarly, if workers who exert a lot of effort were disproportionately male and sorted to male managers, we would overestimate the FPMB because of unobserved worker heterogeneity.

To eliminate bias from unobserved heterogeneity across different workers and across workers supervised by different managers, we exploit the panel structure of our linked worker-manager data. That is, we identify the female penalty of having a male boss from within-worker variation in manager gender over time while accounting for unobserved heterogeneity on the manager and worker level. Using an event study approach, we ask how the men's and women's wages evolve following a transition from one manager to another. This approach closely follows that proposed by Cullen and Perez-Truglia (2023, CPT) in their analysis of a Southeast Asian bank.

3.1 Variation in Manager Gender

Where do these transitions come from? The variation in workers being supervised by different managers over time is primarily due to manager rotation, which is beyond the control of individual workers. This practice of reassigning managers to different workers within an organization is widespread, especially in large corporations, as a means to develop well-rounded leaders.

For example, 79% of manager transitions occur without a simultaneous job change of the worker, and 81% take place while the worker remains in the same unit.[5] As a result, most manager transition events affect multiple workers at the same time. In particular, for 66% of the events, there is at least one coworker who experiences exactly the same manager transition in the same period. As managers are assigned directly to workers rather than units, it is common that two coworkers are reassigned from the same manager to two different

[5]The median unit consists of 10 workers and the average unit size is 60 workers. The distribution is skewed to the right because of a small number of large logistics units.

managers in the process of manager rotations. This is the case for an additional 11% of events.[6]

To use as much plausibly exogenous variation in manager gender as possible, our baseline estimates are based on all manager transition events where the match between the worker and the outgoing or incoming manager lasts for at least one quarter. This includes events where workers are reassigned to different managers while concurrently moving to different positions. For example, workers who are promoted to a higher-ranked position and thus assigned to a new manager do not choose the new manager. However, it is interesting to ask whether women's career progression slows down when the manager at the new position is male rather than female. According to HR managers at the firm, the change in manager is usually a by-product of the job change rather than vice versa. Importantly, the event study approach described below will allow us, by analyzing pre-trends, to test whether workers with strong wage growth are more likely to transition to managers of the same gender, possibly due to being more aware of the benefits of potential FPMBs. In addition, our robustness analysis confirms that the results do not change when we exclude events that coincide with a change in the worker's unit or job, or when focusing on manager transitions that affect multiple workers. We also show that restricting attention to even more persistent events does not change the results.

3.2 Event-Study Design

When a worker is assigned to a new manager, there are four possible combinations of old and new manager gender: female-to-male ($F2M$), male-to-female ($M2F$), female-to-female ($F2F$), and male-to-male ($M2M$). In our sample, we observe 76,213 manager transitions, among which there are 13,994 $M2F$ transitions, 12,345 $F2M$ transitions, 39,640 $M2M$ transitions, and 10,234 $F2F$ transitions. Appendix Tables A.2, A.3, and A.4 provide summary statistics by event status for workers, outgoing managers and incoming managers, respectively.[7]

More formally, let $\mathcal{E} = \{M2F, M2M, F2M, F2F\}$ be the set of transition events and let $G_m \in \{M, F\}$ be the gender of manager m, where $m(i,t)$ is the manager of worker i at time t.

[6]For example, if a manager is re-assigned to take on projects and supervise workers in a different area of the firm, his or her workers who remain in their positions are allocated to those managers who remain in their area.

[7]Around 56% of all workers experience at least one change in manager and the workers who never experience such a change are similar in terms of gender, age, tenure, wage, or hierarchical rank (Appendix Table A.2). In addition, workers with $M2F$ events are very similar to workers experiencing $F2M$ transitions. Outgoing and incoming managers are also very similar, but male managers have slightly higher tenure and wages.

We define $M2F_{it}$ as an indicator function that equals one if $G_{m(i,t-1)} = M$, $G_{m(i,t)} = F$, and $m(i, t-1) \neq m(i, t)$. All other events are defined analogously. We then regress the outcome Y_{it}, worker i's log wage or hierarchical rank in period t, on leads and lags of these four events interacted with worker gender. We control for worker fixed effects, α_i, manager fixed effects, α_m, gender-specific period fixed effects, $\alpha_{g(i)t}$, and country-by-period fixed effects, $\alpha_{c(it)t}$. This gives rise to the following estimation equation

$$Y_{it} = \sum_{E \in \mathcal{E}} \sum_{k \in \mathcal{K}} \Big(\phi_E^k female_i + \mu_E^k male_i \Big) B(E, i, t, k) + \alpha_i + \alpha_{m(i,t)} + \alpha_{g(i)t} + \alpha_{c(i,t)t} + \epsilon_{it} \quad (1)$$

where $\mathcal{K} = \{-(F+1), -F, \ldots, L, L+1\}$ indexes the set of binned leads and lags for each event $E \in \mathcal{E}$. The function $B(E, i, t, k)$ constructs the binned event indicators as follows:

$$B(E, i, t, k) \equiv \begin{cases} \sum_{s<3F} E_{i,t-s} & \text{if } k = -(F+1) \\ \sum_{s=3(k+1)-1}^{3k} E_{i,t-s} & \text{if } k = -1, \ldots, -F \\ E_{it} & \text{if } k = 0 \\ \sum_{s=3(k-1)+1}^{3k} E_{i,t-s} & \text{if } k = 1, \ldots, L \\ \sum_{s>3L} E_{i,t-s} & \text{if } k = L+1 \end{cases} \quad (2)$$

where $F = L = 10$, such that we consider an effect window of two and a half years before and after manager transition events. We use the term *binned* event indicators because we aggregate monthly leads and lags into quarterly leads and lags. For example, instead of estimating a separate coefficient for the 7^{th}, 8^{th} and 9^{th} monthly lags of a given event indicator, we abstract from within-quarter heterogeneity and estimate one coefficient for the sum of these three lags, $B(E, i, t, 3)$. This is done to speed up the estimation, address collinearity concerns, and improve the readability of the resulting event study graphs.

Following the recommendation by Schmidheiny and Siegloch (2023), we restrict the effect window by including absorbing bins that contain the sum of all observable events outside the effect window, i.e., more than F quarters before or L quarters after the event. This implicitly assumes that the dynamic treatment effects are constant in the distant past and future.[8] Standard errors are clustered at the worker and manager level.

[8]The alternative would be to drop observations outside the effect window which is not suitable for our setting with multiple events per unit with potentially overlapping effect windows.

FPMBs as Double Differences. Having estimated these eight sets of event study coefficients, the FPMB is constructed in a way that separates the effect of getting a boss with a different gender from the effect of getting a new boss. That is, we are interested in the gender-specific effect of an $F2M$ switch relative to an $F2F$ switch and, analogously, the gender-specific effect of an $M2F$ switch relative to an $M2M$ switch. For example, $\phi^k_{F2M} - \phi^k_{F2F}$ captures how wages of women who experience a transition from a female to a male manager evolve relative to the pre-switch period, compared to wages of women who transition from one female to another female manager. If this difference is negative, women's wage growth suffers when transitioning from a female to a male manager. However, the same may be the case for men. We therefore focus on how this difference ($F2M$ vs. $F2F$ for women) compares to the analogous difference for men. In particular, if the double difference

$$\Delta^k_{F2M} \equiv \underbrace{(\phi^k_{F2M} - \mu^k_{F2M})}_{\text{F2M: women – men}} - \underbrace{(\phi^k_{F2F} - \mu^k_{F2F})}_{\text{F2F: women – men}} \tag{3}$$

is negative, we interpret this as a female penalty of having a male boss (FPMB): replacing a female manager with a male manager (instead of another female manager) results in weaker wage growth for women relative to men k quarters after the transition. Similarly for $M2F$ relative to $M2M$ switches: if

$$\Delta^k_{M2F} \equiv \underbrace{(\phi^k_{M2F} - \mu^k_{M2F})}_{\text{M2F: women – men}} - \underbrace{(\phi^k_{M2M} - \mu^k_{M2M})}_{\text{M2M: women – men}} \tag{4}$$

is positive, we take this as evidence of an FPMB as women's wages grow more strongly than men's wages following a male-to-female transition (instead of a male-to-male transition). We will often combine those double differences into an "average" double difference,

$$\Delta^k \equiv (\Delta^k_{F2M} - \Delta^k_{M2F})/2 \tag{5}$$

and interpret $\Delta^k < 0$ as an FPMB k quarters after the transition. Intuitively, this composite measure quantifies how much women lose relative to men after a female-to-male switch, as opposed to a female-to-female switch, and how much they gain after a male-to-female switch, as opposed to a male-to-male switch.

Interpretation. A female penalty of having a male boss captures the tendency for managers to favor workers of the same gender. A couple of clarifying remarks may be helpful. First,

note that an FPMB can reflect explicit or implicit favoritism, i.e., choices based on conscious or unconscious preferences or biases (Bertrand, Chugh, and Mullainathan, 2005). Both types of favoritism can affect whether women's careers progress slower than men's through their managers' employee evaluations and endorsements, mentoring efforts, or inclination to grant raises or promotions.

Second, the FPMB does not attempt to investigate overall discrimination against women by all managers, but rather whether the degree of implicit or explicit bias against women is higher among male managers. If gender differences exist, but do not vary across workers of male and female managers, the FPMBs defined in Equations 3, 4, and 5 are zero. Hence, FPMBs measure the effects of differential biases by manager gender.

Finally, since we as researchers—just like the workers and their managers in our data—lack an objective measure of performance, we do not know whether male bosses treat their workers differently based on gender, or whether female bosses do so, or whether both exhibit such behavior. Hence, a potential female penalty of having a male boss could also signify a male penalty of having a female boss or a male advantage of having a male boss. We use the term female penalty of having a male boss as it reflects the general concern that male over-representation in leadership positions is a disadvantage for women, and because of the large literature documenting discrimination against women (e.g. Bohren, Imas, and Rosenberg, 2019; Sarsons et al., 2021; Egan, Matvos, and Seru, 2022). Nevertheless, whatever the underlying discriminatory patterns of favoritism may be, $\Delta^k < 0$ means that women's careers would benefit (relative to their male colleagues) from having more female managers.

4 FPMBs in Career Progression

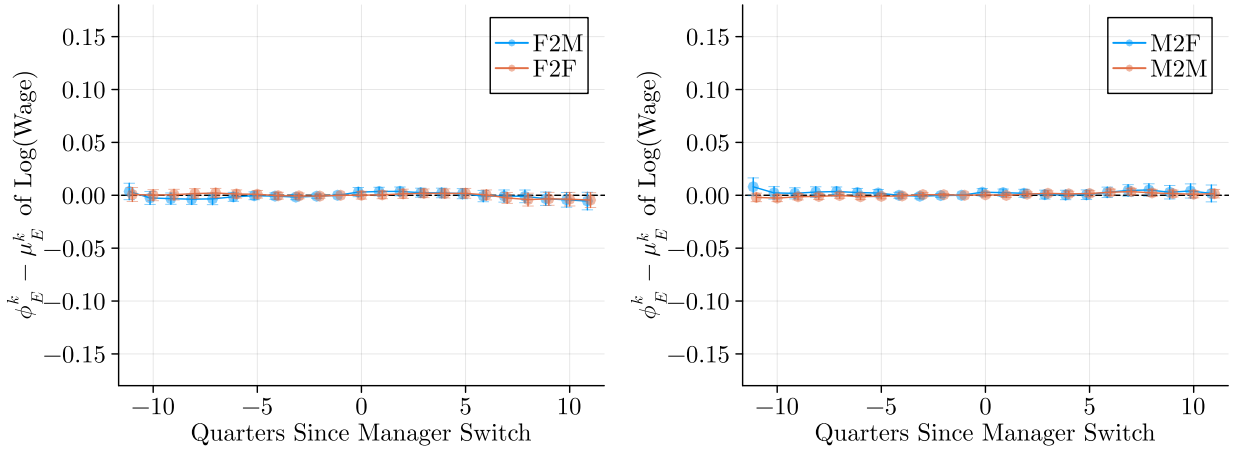
This section presents the results on the effects of manager gender on career progression of male and female workers, measured using both wages and hierarchical ranks. Following CPT, the vertical axes of all plots span two within-worker standard deviations of the outcome variable in either direction to facilitate the interpretation of magnitudes relative to the variation in our data, across outcomes, and across studies.

4.1 Wages

As workers' wages are the most comprehensive and commonly used measure for career progression, we start with wages. Figure 4 plots the estimated change in the gender wage

FIGURE 4: Effects of Manager Transitions on Gender Differences in Wages

(A) $F2M$ and $F2F$: Women – Men (B) $M2F$ and $M2M$: Women – Men



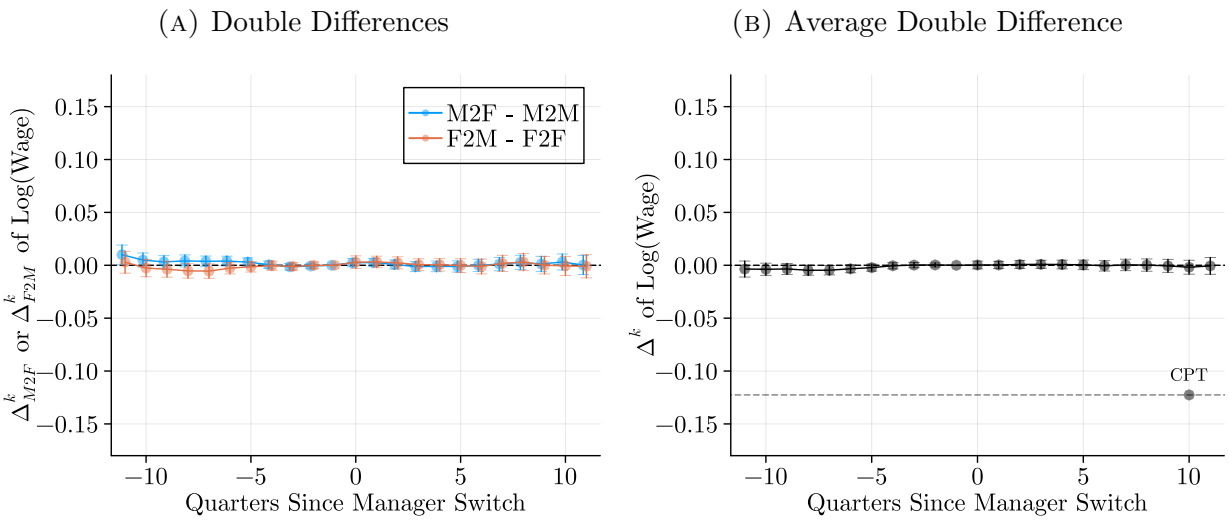
Notes: This figure shows the difference between the change in women's wages and the change in men's wages relative to the period prior to the manager switch for each type of manager transition based on the estimation of Equation 1 using workers' log wages as the outcome variable. The within-worker standard deviation of log wages is 0.09 and the standard deviation of the ten-quarter (within-worker) change in log wages is 0.15. The error bars display the 95% confidence bands.

gap (women – men) around each of the four manager transition events. Panel A focuses on events where the outgoing manager is female. The two lines capture the two terms in Equation 3, i.e., the change in the gender gap in log wages before and after $F2M$ and $F2F$ switches. Panel B focuses on the components in Equation 4, i.e., manager changes where the outgoing manager is male.

For all four types of events, there is no sign of differential pre-trends in wage differences between men and women leading up to a manager transition. This suggests that men and women do not sort to managers of their own or opposite gender depending on prior wage growth. More importantly, the post-transition coefficients already foreshadow the key finding of our analysis: men and women are not differentially affected by any type of manager transition. While this outcome might be anticipated for gender-neutral transitions between managers of the same gender, it also holds true for transitions involving a change in manager gender. Our estimates are precise enough that the 95% confidence bands allow us to reject effects of manager gender on gender gaps of more than 1.5% in absolute value over a period of two and a half years.

Figure 5 shows our main objects of interest, the sets of double-difference coefficients that measure the FPMB in wages. The blue line in Panel A plots Δ^k_{M2F}, the evolution of women's wages relative to men's wages around the change from a male to a female manager ($M2F$),

FIGURE 5: FPMBs in Wages



Notes: This figure shows the two sets of double differences (Panel A) and the average double difference (Panel B) based on the estimation of Equation 1 using workers' log wages as the outcome variable. The black dot on the dashed horizontal line shows the FPMB estimated by CPT translated to log wages. CPT estimate an FPMB of 0.54 pay grades and report that a difference of one pay grade corresponds to a difference in log wages of 0.227 (see their Appendix C.1). Hence, an FPMB of 0.54 pay grades translates into an FPMB in log wages of 0.123 ($= 0.54 \times 0.227$). The within-worker standard deviation of log wages is 0.09 and the standard deviation of the ten-quarter change in log wages is 0.15. The error bars display the 95% confidence bands.

and relative to this difference the control group of workers who transition from a male to another male manager ($M2M$). Recall that, for transitions from male to female managers, we interpret positive coefficients of the double difference as a female penalty of having a male boss. The orange line in Panel A depicts Δ^k_{F2M}, the female-male wage differential around the change from a female to a male manager ($F2M$), relative to the control group who transitions from a female to another female manager ($F2F$). Here, negative coefficients correspond to an FPMB in wages. Panel B shows the average double difference, Δ^k, where negative coefficients indicate an FPMB. The average double difference is the most comprehensive measure of the FPMB as it combines estimates based on all four events.

Our estimates reject the hypothesis that women in our data face a statistically significant wage penalty of having a male boss. Ten quarters after the manager transition, the point estimate for the average double difference in wage effects is -0.06% with a standard error of 0.41%. The precisely estimated coefficients allow us to put tight bounds on the sequence of average double-difference coefficients: Throughout all ten quarters following a change in manager gender, the 95% confidence intervals never include values outside of $[-0.9\%, 0.7\%]$, such that female wage-penalties of more than 0.9% can be rejected at the 5% significance level.

Given that our point estimates are essentially zero, it is uninformative to relate their magnitude to some benchmark. However, the bounds of the tight confidence bands reveal that our estimates reject even moderate female wage penalties of having a male boss. That is, even if the true FPMB was equal to the most extreme value covered by our 95% confidence bands, 0.9% after 10 quarters, one would have to reject substantial FPMBs. For example, the value does not exceed (i) 6% of the average log wage growth over ten quarters, (ii) 10% of the within-worker standard deviation in log wages, (iii) 6% of the standard deviation in ten-quarter log wage growth, or (iv) 5% of the P95–P5 range of the variation in ten-quarter log wage growth across workers starting out with the same job, demographics and manager.

Note that this null effect was not to be expected based on what we know about managers' impact on workers' careers and the fact that there is substantial variation in career progression across workers—even when comparing workers who share the same age, tenure, job characteristics, and manager (Figure 3).

A complementary way of contextualizing our results is to compare our results to those in CPT who estimate the female wage penalty of having a male boss for employees of a Southeast Asian bank. Recall that we employ their estimation approach and that the structure of the two data sets is highly similar.[9] In stark contrast to our precisely estimated null effect, the double difference estimates in CPT imply a female wage penalty of having a male boss of 12.3% ten quarters after a manager transition, as illustrated by the black dot on the dashed horizontal line in Panel B. The difference in results remains large when interpreting estimates in relation to the respective within-worker standard deviation of the outcome variables. While our point estimate corresponds to 0.07% of the within-worker standard deviation in log wages (0.09), CPT's point estimate exceeds 100% of the within-worker standard deviation in pay grades in their data.[10] To take statistical uncertainty into account, we can also compare the bounds of the respective 95% confidence bands. While our bound of the FPMB does not exceed 10% of the within-worker standard deviation of log wages, CPT's estimates reject FPMBs below 70% of the within-worker standard deviation in pay grades.

[9] In contrast to CPT, we prefer the term female penalty of having a male boss rather than male-to-male advantage. However, one is nothing but the flip-side of the other.

[10] As CPT data do not have access to precise wage information, they use 26 distinct pay grades as their outcome variable and show, based on wage data from one cross-section, that the average difference in log wages between adjacent pay grades is roughly 0.23.

4.2 Hierarchical Ranks

While wages are the key object of interest, it is important to investigate whether manager gender plays a role in rank-promotion decisions. A worker's hierarchical rank is arguably a more direct measure of influence within the organization. After all, one key question is why women do not climb firms' hierarchy ladders as quickly as men and whether male leadership is both cause and consequence of this phenomenon. As promotions occur less frequently, we may fail to detect the impact of manager gender on this aspect of career progression when analyzing the average FPMB in wages.[11] As there are only ten hierarchical ranks and the majority of large wage jumps occur independent of rank-promotions, women may climb the firm's wage ladder without climbing up hierarchical ranks, whereas men may do both. In this case, women may experience a rank-FPMB even though there is no wage-FPMB.

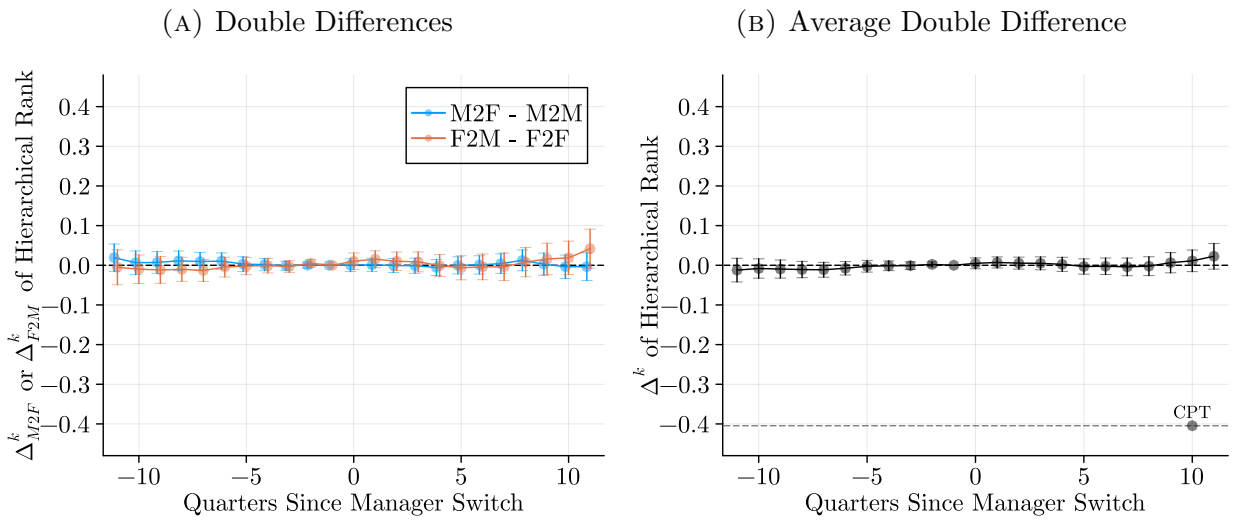
In Figure 6, we examine whether an FPMB exists in rank-promotions by using the worker's hierarchical rank (1–10) instead of the log wage as the dependent variable. Panel A shows the two double differences and Panel B shows the average double difference. We again find no evidence that women are less likely to be promoted than men when the manager is male rather than female. If anything, the point estimates suggest a very small female advantage of having a male boss at the end of the effect window of two and a half years. However, all coefficients are economically and statistically indistinguishable from zero. The 95% confidence bands for the average double difference rule out rank-FPMBs of over 0.026 hierarchical ranks two and a half years after a manager transition. This corresponds to 11% of the within-worker standard deviation in hierarchical ranks.

The black dot on the dashed horizontal line again depicts the result from CPT translated to our hierarchical rank variable using the relationship between ranks and wages in the respective data. The stark difference in results observed for wages carries over when using hierarchical ranks as our outcome variable. This is interesting because a worker's hierarchical rank is a much coarser outcome and changes much less often than wages. Hence, the difference to CPT does not reflect differences in the discreteness of the outcome variables.

In sum, we can reject significant female career penalties of having a male boss in our data from a large European corporation. This holds for both channels through which manager impact workers' careers. Relative to female managers, male managers neither favor men in wage re-negotiations within hierarchical ranks, nor do they promote fewer women up the firm's hierarchical ladder.

[11] The average monthly promotion probability is 0.6% and 81.3% of all workers never experience a rank-promotion in our sample period.

FIGURE 6: FPMBs in Hierarchical Ranks



Notes: This figure shows the two sets of double differences (Panel A) and the average double difference (Panel B) based on the estimation of Equation 1 using workers' hierarchical ranks as the outcome variable. The black dot on the dashed horizontal line shows the FPMB estimated by CPT translated to units of our hierarchical rank variable using the relationship between pay grades and wages in CPT (slope of 0.227, see their Appendix C.1) and the relationship between hierarchical ranks and wages in our data (0.303, see Figure 2). That is, CPT's estimated FPMB of 0.54 pay grades after ten quarters implies an FPMB in log wages of 0.123, which corresponds to 0.40 ($= 0.54 \times (0.227/0.303)$) hierarchical ranks in our data. The within-worker standard deviation of hierarchical ranks is 0.24 and the standard deviation of the ten-quarter change in hierarchical ranks is 0.42. The error bars display the 95% confidence bands.

4.3 Robustness

Our finding that manager gender does not affect differences between men and women in career progression is robust to various alternative specifications. For each robustness check, we focus on the average double difference in order to maximize statistical power and for ease of interpretation.

Variation in Manager Gender. Some manager transition events coincide with a change in job or unit, e.g., because workers apply to new positions through the internal job market. The flat pre-trends in our baseline estimates already inform us that workers who experience manager transition events are not selected based on their past career trajectory. Nevertheless, if there were a female wage penalty of having a male boss ($\Delta^k < 0$), we would mistakenly estimate a null effect if workers who experience disproportionately low wage growth in the future actively sort themselves to managers of the same gender.

We thus test whether potentially worker-induced variation in manager gender biases our results by excluding all manager transition events that coincide with a job or unit change,

or that only affect a single worker. A job or unit change occurs when a worker moves to a new job or unit between $t-1$ and t. Single worker events are those cases where a worker does not have any colleague who also changes from the same manager in period $t-1$ to the same manager in period t. To exclude variation from the subset of manager transitions that coincide with such moves, we set the respective transition events to zero. This affects about 21% of all events that coincide with a job change, 19% of all events that coincide with a change in work units, and 34% of all events that only involve a single worker.[12]

Appendix Figure A.1 shows that none of these alternative specifications leads to significant changes in the event study coefficients. Note that this is not particularly surprising given the flat pre-trends in our baseline estimates, but also because any bias from endogenous worker-manager matches would have to exactly offset the true effect in order to rationalize the precise null effect we estimate based on all manager transition events.

Persistence of Manager Changes. Recall that the event-study approach estimates the FPMB off of manager changes but not necessarily off of *persistent* manager changes. If workers are assigned new managers very frequently, a switch to a male manager may not translate into substantially more time spent under a male manager relative to a switch to a female manager. In addition, if most managers stay with their teams only for short episodes and if it takes time to build personal relationships that give rise to gender-biased favoritism, our estimation strategy would underestimate the FPMB from longer episodes under the same manager.

In the first two and a half years following a manager switch, workers spend on average 1.65 years with their new superior and 2.06 years with managers of the new gender.[13] Relative to workers experiencing a gender-neutral $M2M$ switch, workers with an $M2F$ switch spend on average 1.78 more years with a female manager over the following two and a half years. Similarly, $F2M$ switches expose workers to an extra 1.70 years under a male manager relative to $F2F$ switches.

While different manager switches do translate into substantial variation in exposure to male or female managers, we need to make sure that less persistent events do not cover up sizeable FPMBs following more persistent changes in manager gender. In our baseline

[12] While we do not have access to application data from the internal job portal, we know from conversations with HR personnel at the firm that such worker-induced moves rarely occur within work units and usually entail a change in workers' job codes. Appendix Table A.5 shows very similar distributions of event types for these more restrictive subsets of manager transition events.

[13] Appendix Figure A.2 traces out the survival function for worker-manager pairs over the ten quarters following a manager switch.

specification, we follow CPT and include all manager transitions where workers and managers spend at least one quarter together before and after the switch. We now include only those manager transitions where the new and old manager-worker pair lasts for at least six or twelve months. Appendix Figure A.3 shows that our null result extends to these more persistent manager switches, leaving us confident that our findings are not an artifact of attenuation bias due to transitory manager switches.

Selective Attrition. While we do not observe an effect of manager gender when treatment intensity in terms of time spent together is high, we need to address the concern of selective attrition out of manager-worker pairs or the firm altogether. If women who would experience a female penalty of having a male boss quickly leave male managers by (a) applying for a different job internally or (b) by leaving the firm altogether, we would underestimate the average FPMB.

To test for differential attrition by worker and manager gender, we ask whether the likelihood of leaving the manager or the firm changes differentially for men and women following the four manager transition events. In contrast to the previous event study analyses, we employ a local projection approach where we estimate the gender-specific effect of the four transition events on an indicator variable that equals one if the worker is still with the newly assigned manager k quarters after the transition. Doing this for $k = 1, 2, \ldots, 10$ quarters traces out inverse survival functions for each transition event and for men and women. As with the event-study approach, we then combine the eight sets of coefficients into average double differences to check whether women are more likely to leave the manager or firm when the manager is male.

In particular, we estimate equations of the following form for $k = 1, 2, \ldots, 10$:

$$Y_{it}^{k} = \sum_{E \in \mathcal{E}} \left(\phi_E^k E_{it} female_i + \mu_E^k E_{it} male_i \right) + X_{it}'\beta + \alpha_{m(i,t)} + \alpha_{g(i)t} + \alpha_{c(it)t} + \epsilon_{it} \qquad (6)$$

where Y_{it}^{k} is an indicator variable taking value one if the worker's manager in $t+3k$ is different from the manager in t, or if the worker has left the firm in $t + 3k$. The vector of control variables X_{it} includes job and department fixed effects when analyzing firm exit where we cannot include a worker fixed effect. When analyzing the probability of leaving the manager, X_{it} is simply a worker fixed effect. The rest of the variables are defined as in Equation 1. Note also that this estimation approach yields virtually the same result for wages as the event study design as shown in Appendix Figure A.6.

We do not use the event study approach for two reasons. First, analyzing whether workers leave a particular manager requires one to construct the outcome variable as a function of the manager at the time of the manager transition event. In the event study approach, however, we cannot do this separately for all leads and lags of the events because workers can have multiple events involving different managers.[14] Second, firm exit is observed at most once per worker and precisely when workers exit the sample such that we cannot control for a worker fixed effect in the propensity to leave the firm or analyze pre-trends.

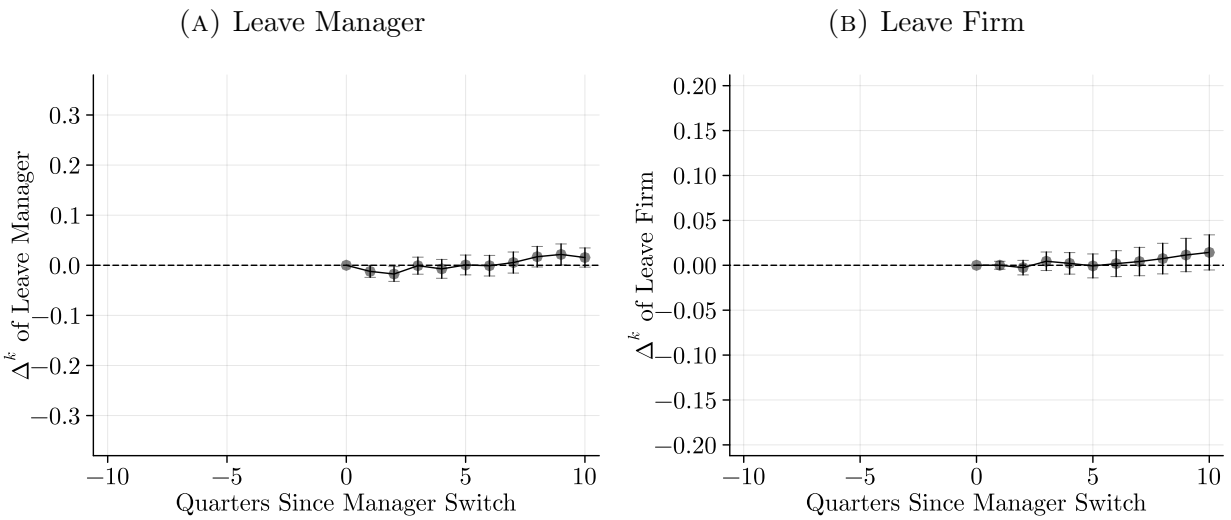
Figure 7 shows the estimation results. Panel A shows the average double differences for changing the manager over a period of ten quarters. We find no evidence of selective attrition, in particular in the first year after switching to a new manager. Given that about 60% of workers have been assigned to a different manager ten quarters after a manager change (see Appendix Figure A.2), the estimated coefficient of 1.6% is small. Hence, while there seems to be some evidence for statistically significant differential attrition after two years, the magnitude of the coefficient is economically insignificant at around 0.01.

Panel B shows that we also do not find evidence for selective attrition out of the firm. Here, the mean of the dependent variable at horizon 10 is roughly 28% compared to the final statistically insignificant coefficient of 1.6%. Hence, the fact that we do not find a female penalty in career progression is not simply a result of those women leaving the firm who would have experienced such a penalty had they stayed around.

Proximity. As our firm has many establishments all over the world, workers and manager do not need to work in the same location. In fact, about 15% of workers have superiors located in a different establishment. While these workers and managers interact frequently as part of their job, they do not have the opportunity to socialize over lunch or during coffee breaks. Hence, there is less room for potentially exclusive social interactions which have been shown to be an important source of gender-based favoritism. On the flip side, implicit favoritism due to biased beliefs may be more relevant in settings where managers have less information about their workers. Bohren, Imas, and Rosenberg (2019) show that discrimination against women declines as evaluators become more informed.

[14] Simply using an indicator for whether the worker changes to a new manager between t and $t+1$ independent of who the manager in t is, is not feasible as the leads and lags of the transition events would perfectly predict the outcome of switching managers. And even if this were possible, the results would be difficult to interpret as the results could be driven by workers who switch managers more than once even though we are only interested in the first switch.

FIGURE 7: Robustness: Leaving the Manager or the Firm



Notes: This figure shows the average double difference from estimating local projections for an indicator variable taking value one if the worker's manager in $t+3k$ is different from the manager in t, $Y_{it}^k = \mathbb{1}\{m(i,t+3k) \neq m(i,t)\}$, where k denotes quarters, or if the worker has left the firm k quarters after the transition. In Panel B, we replace the worker fixed effect by job, department, and age fixed effects. The within-worker standard deviation of changing managers between consecutive months is 0.19 and the standard deviation of the indicator variable for leaving the firm equals 0.11. The error bars display the 95% confidence bands.

We thus analyze whether our estimate of the FPMB differs between workers who share the same location with their manager and those that work in separate locations by interacting the event variables in Equation 1 with indicators for working the same location. Appendix Figure A.4 shows that our estimate of the FPMB in wages and hierarchical ranks is essentially zero for both high- and low-proximity cases. If anything, the statistically insignificant point estimates for low-proximity cases would imply a larger FPMB suggesting that the impact of social interactions may be dominated by information frictions and unconscious biases.

Indirect Superiors. Finally, while the gender of workers' direct superiors does not matter for gender wage gaps, one may ask whether the gender of workers' indirect superiors, i.e., the superiors of the direct superiors, matters. While we know that direct superiors have the most impact on workers' careers, indirect superiors may also have an important voice, particularly for promotions.

To test for differential biases among indirect superiors, we run the same event study analysis as before, but with the indirect superiors. Appendix Figure A.5 shows that there is again no female penalty of having a male boss for wages.

5 FPMBs across Different Contexts

Our baseline results show that, on average, there is no female career penalty of having a male boss in our firm. Given that this is a highly desirable result, can we understand why there is no gender-based favoritism in this setting? To shed light on this, we now analyze the role of workforce composition as opposed to global management practices—a catch-all term we use to refer to firm-specific institutions, culture, and processes. This distinction is crucial since management practices reflect firms' choices and, in contrast to workforce composition, can be adjusted more easily and more quickly.

To address this question, we leverage the fact that (i) our firm is a large multinational corporation that operates establishments in a wide range of countries and consists of various departments, and (ii) the firm uses a globally consistent set of management practices in all establishments and departments. This allows us to analyze whether female career-penalties of having a male boss differ significantly and systematically across heterogeneous workforces that are all exposed to the same management practices, or whether our null result holds universally despite differences in workforce composition, pointing to an important role for institutionalized practices. Besides heterogeneity across countries and departments, we also investigate heterogeneity by manager age, worker age, and hierarchical rank.

5.1 Empirical Approach

In order to study heterogeneity in FPMBs across a wide range of sub-groups, we estimate a set of binary interactions for each dimension of heterogeneity in order to keep the estimation feasible. Consider a categorical variable H with discrete and finite support $\mathcal{H}$, such as countries or departments. We then study each category h separately as if it was a binary interaction where $-h$ denotes all realizations of H not equal to h. That is, for each realization $h \in \mathcal{H}$, we estimate the following model:

$$\begin{aligned} Y_{it} = &\sum_{E \in \mathcal{E}} \sum_{k \in \mathcal{K}} \Big(\phi^k_{E,h} female_i + \mu^k_{E,h} male_i \Big) B\big(\mathbb{1}_{H=h} \times E, i, t, k\big) \\ &+ \sum_{E \in \mathcal{E}} \sum_{k \in \mathcal{K}} \Big(\phi^k_{E,-h} female_i + \mu^k_{E,-h} male_i \Big) B\big(\mathbb{1}_{H \neq h} \times E, i, t, k\big) \\ &+ \alpha_i + \alpha_{m(i,t)} + \alpha_{g(i)t} + \alpha_{c(i,t)t} + \epsilon_{it} \end{aligned} \tag{7}$$

where the binned event indicators $B\big(\mathbb{1}_{H=h} \times E, i, t, k\big)$ and $B\big(\mathbb{1}_{H\neq h} \times E, i, t, k\big)$ are defined as in Equation 2. Note that we differentiate between h and $-h$ at the time of the manager transition rather than at time t when the outcome is realized. In addition, we set manager transitions to zero if they coincide with a change in H. This means, for example, that we only study manager transition events where workers are in the same country or department just before and just after the switch.

For each sub-group h in $\mathcal{H}$, we construct the average double difference measure of the FPMB using the coefficients with the subscript h, Δ_h^k, where each set comes from a separate regression. In the following, we focus on the cumulative female-penalty of having a male boss ten quarters after the change in manager gender for each sub-group of workers. That is, we show estimates of Δ_h^{10}, i.e., the average double difference ten quarters after the manager switch, for all groups $h \in \mathcal{H}$ in one figure. We focus on the end of the effect window to allow as much time as possible for any potential effect to unfold. Appendix Figure A.7 shows that the average effects across all post periods, Δ_h^{post}, are qualitatively similar, but slightly smaller in absolute value. Appendix Figures A.8 and A.9, show the ten-quarter and average pre-transition coefficients, Δ_h^{-10} and Δ_h^{pre} respectively. As in the baseline estimates, there is no evidence of statistically significant and economically meaningful pre-trends in these group-specific average double differences.

5.2 Countries

Figure 8 shows estimates of the average double difference in wages and hierarchical ranks ten quarters after the manager transition for 18 countries and regions. With the exception of Eastern Europe, which comprises around 2.5% of the firm's total workforce, all country-specific point estimates for wages are statistically insignificant and no single point estimate is particularly large.[15] Only for two out of the 18 countries do we estimate an FPMB of more than 2.5%, and no confidence band includes the estimate of 12.3% documented by Cullen and Perez-Truglia (2023) for a South-East Asian firm. For hierarchical ranks, we find no statistically significant point estimate in any country, although the estimates are less precise. Note also that the point estimate for Eastern Europe is just above zero, suggesting that any potential FPMB in wages does not extend into promotion decisions. Overall, our null result for female penalties of having a male boss holds not only across establishments in

[15] To simplify the exposition, we sometimes refer to both countries and regions as countries or regions.

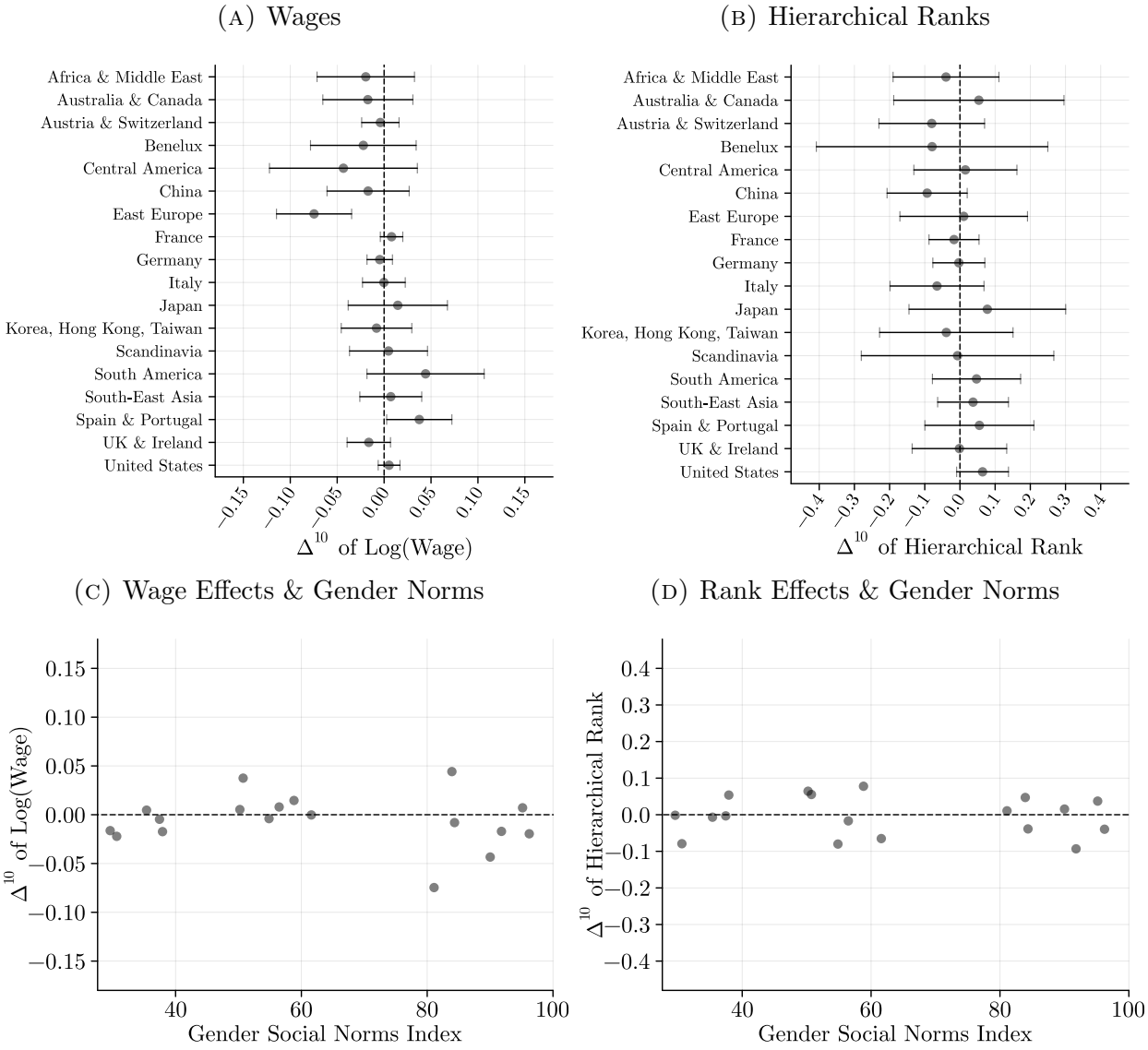
European or North American high-income countries, but also in middle-income regions like China, Latin America, or South-East Asia.

Countries and regions differ not only in terms of their economic development and labor market institutions, but also in terms of social norms, in particular gender norms. For example, while after-work drinking with superiors and colleagues is typically informal and optional in Western countries, it is often a crucial part of corporate culture in East Asian countries, intended to reinforce group cohesion and hierarchical relationships, and frequently considered an extension of professional responsibilities. Research in sociology and business ethics as well as abundant anecdotal evidence suggests that such corporate drinking culture exacerbates male favoritism by creating networking and bonding opportunities that are predominantly male-dominated, excluding women from informal mentoring, and career advancement opportunities (Nemoto, 2013; Georgiadou and Syed, 2021; Horak and Suseno, 2023). However, the estimates for East Asian and Western high-income countries do not reflect these country-level differences in social norms in the workplace.

To examine the potential link between FPMBs and gender norms more systematically, we relate our country-specific estimates to the Gender Social Norms Index (GSNI, United Nations Development Programme, 2023), which measures, based on data from the World Value Survey, the fraction of a country's population with biased views on whether men and women have equal rights and capabilities.[16] Approximately one third of the firm's workforce is located in low-GSNI, i.e., low-bias, countries such as the UK, Scandinavia or Germany, where less than 40% of the population believes that women do not possess equal rights and capabilities. Conversely, one third of the firm's workforce is in high-GSNI countries such as China, Mexico or South Korea, where more than 75% of the population exhibit such gender biases. Strikingly, Panels C and D, which plot the GSNI against the FPMB estimates, show that the limited variation in the estimated average double differences appears entirely unrelated to the prevalence of biased norms in the respective countries' populations. For promotion decisions, there seems even less systematic relation between our estimates and the GSNI. The same holds for the relationship with GDP per capita (Appendix Figure A.11).

[16] Appendix Figure A.10 shows that the firm's workforce is spread out fairly evenly across countries in terms of this Gender Social Norms Index (GSNI, United Nations Development Programme, 2023). The GSNI of a given country is calculated as the proportion of World Value Survey respondents in that country who exhibit at least one bias in seven survey questions on whether men and women have the same rights and abilities in different dimensions (politics, education, business, physical integrity). Note that, in contrast to the Gender Progressivity Index used by Kleven (2023) to study the relationship between gender norms and child-related gender earnings inequality, the GSNI does not focus on gender norms regarding child care obligations and within-household specialization.

FIGURE 8: Career-FPMBs across Countries



Notes: This figure shows heterogeneity in the average double difference 10 quarters after a manager switch across countries. Panel A uses log wages and Panel B uses hierarchical ranks as outcome variables. Panels C and D show the bivariate relationship between the point estimates in Panels A and B and the countries' Gender Social Norms Index (GSNI) which is based on the World Value Survey and published by the United Nations Development Programme (2023). The GSNI measures the share of respondents in each country who exhibit at least one bias in seven survey questions on whether women have equal rights and capabilities. The average shares for country groups are weighted based on the number of observations in our dataset. Countries lacking WVS data (e.g., Austria) are excluded from these group averages. The error bars display the 95% confidence bands.

5.3 Departments

Departments such as R&D, Engineering, HR, Finance, Commercial, or Manufacturing perform distinct sets of tasks in the firm's production function and therefore comprise different sets of occupations that attract workers who differ in terms of skill sets, personality traits, and gender. Appendix Table A.6 shows that, in our firm, 70% of all employees and 56% of managers in Human Resources are women. In contrast, the share of female workers in Engineering is as low as 14%, with the share of female managers at 13%. These compositional differences may also lead to differences in the potential importance of gender based favoritism.

However, Panels A and B of Figure 9 show that there is no evidence for statistically significant FPMBs in any of the firm's departments. Again, no single point estimate would imply an FPMB in wages above 2.0%. Panel B shows a qualitatively similar but more noisy picture for hierarchical ranks. Panels C and D show that the factors that contribute to the variation in female shares across departments do not rationalize the limited variation in the estimated department-specific average double differences.

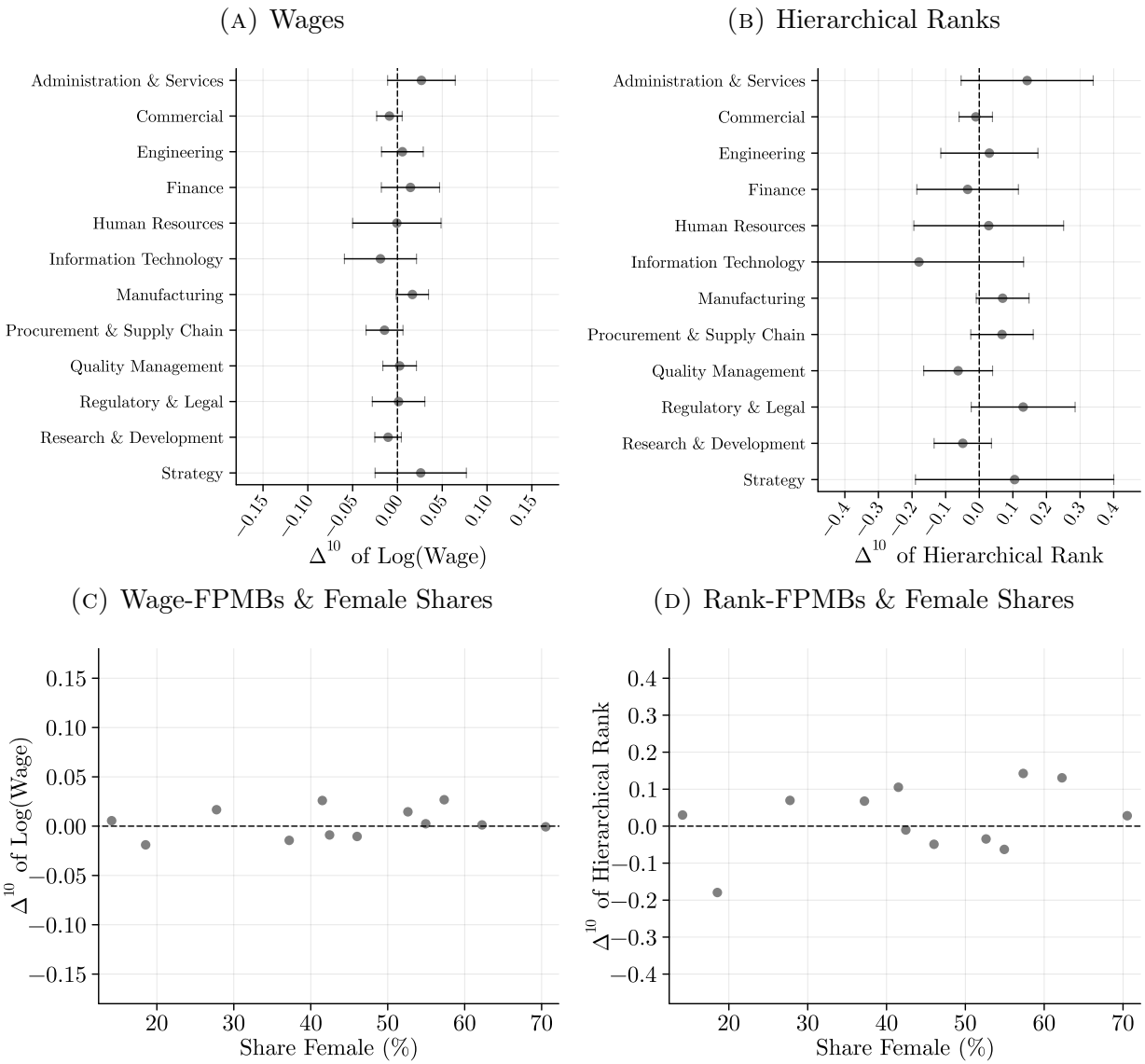
5.4 Hierarchical Ranks, Manager Age, and Worker Age

Next, we investigate heterogeneity across hierarchical ranks. In higher ranks, personal relationships, mentoring, or trust are arguably more relevant and individual performance is often more difficult to observe, which may be conducive to gender-based favoritism. At the same time, relatively few employees work in such high-rank positions, such that any potential FPMB at the top of the firm's hierarchy would not show up in the average FPMB.

Given that gender norms change over time (e.g., Brewster and Padavic, 2000; Scarborough, Sin, and Risman, 2019), we also ask whether there are significant FPMBs for workers with older managers. Finally, we analyze whether career penalties of having a male boss exist for young women who typically bear the bulk of the burden associated with child care. Even independent of taste-based favoritism, this would lead to FPMBs if male bosses are worse at creating family-friendly work environments that allow workers to be productive despite scheduling constraints due to child care obligations.

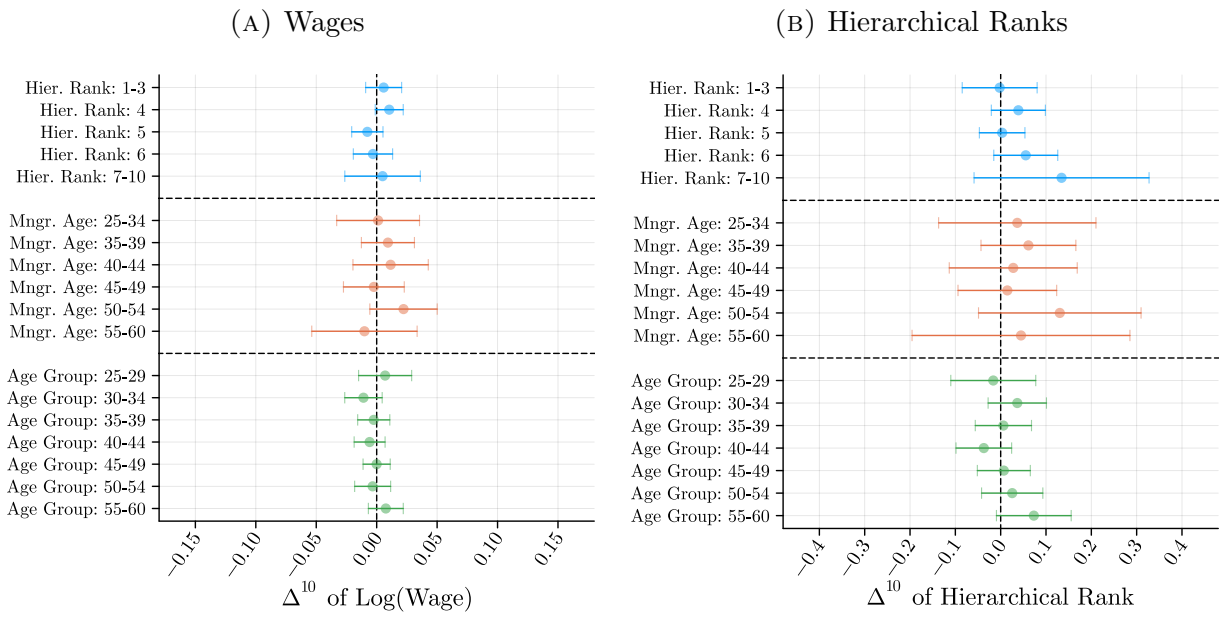
However, Figure 10 shows that there is no heterogeneity in our estimates along any of these three dimensions. No single point estimate is statistically significant or implies an economically meaningful FPMB.

FIGURE 9: Career FPMBs across Departments



Notes: This figure shows heterogeneity in the average double difference 10 quarters after a manager switch across departments. Panel A uses log wages and Panel B uses hierarchical ranks as outcome variables. Panels C and D show the bivariate relationship between the point estimates in Panels A and B and the departments' shares of female employees. The error bars display the 95% confidence bands.

FIGURE 10: Heterogeneity by Hierarchical Rank, and Worker and Manager Age



Notes: This figure shows heterogeneity in the average double difference 10 quarters after a manager switch by the worker's hierarchical rank, manager age, and worker age. Panel A uses log wages and Panel B uses hierarchical ranks as outcome variables. The error bars display the 95% confidence bands.

5.5 Implications

In sum, we do not find female career penalties of having a male boss in a wide range of contexts within our firm. In addition, the variation in estimated FPMBs across countries, departments, hierarchical ranks, and worker or manager age is not only quantitatively small, but also entirely unsystematic.

This lack of systematic variation across heterogeneous workforces within the firm is hard to rationalize with positive selection into our firm. Even though the workers at our firm may well hold less biased gender norms compared to the population from which they are hired, this would still translate into muted but systematic variation in FPMBs unless the firm exclusively hires workers who would never engage in any form of gender-based favoritism.

Hence, while firm-level factors must be critical in explaining our results, the specific composition of our firm's workforce is unlikely to play a significant role. Instead, the universal absence of female career penalties of having a male boss is indirect evidence that the firm's globally consistent management practices and intent to promote diversity effectively limit gender-based favoritism.

6 FPMBs in Performance and Potential Ratings

In this section, we turn our attention to managers' subjective performance and potential evaluations of their employees. This complements the analysis of wage and promotion decisions in two ways. First, while promotion and wage decisions require coordination and approval, the annual rating decisions are made solely by workers' direct superiors. This allows us to directly study one of the many ways managers influence workers' careers. Second, these rating decisions differ in terms of visibility and impact on future personnel decisions, and therefore in the degree of managers' effective discretion via their own career incentives.

6.1 Rating Process

At the end of the first quarter of every calendar year, workers' direct superiors hand out two distinct ratings, one for past performance and one for future development potential. Performance ratings are backward-looking and determine workers' annual bonus pay whereas potential ratings are forward-looking and impact career progression and talent development. The use of such two-dimensional employee ratings is very common, particularly in large firms (Benson, Li, and Shue, 2023).

The performance rating evaluates to what extent a worker has achieved their objectives that were agreed upon at the beginning of the preceding year. Managers rate workers' performance on a 5-point scale ranging from 'far below expectation' to 'far above expectation'. We refer to these as *(very) low*, *average*, and *(very) high*. Appendix Table A.7 shows the distribution of these ratings. The majority of workers receive the *average* rating, 10.6% and 19.7% receive the intermediate ratings *low* and *high*, and only 1.2% and 2.7% of workers receive the extreme ratings of *very low* and *very high*, respectively. While the HR department provides benchmark rating distributions, it remains up to the manager whether to adjust ratings in this calibration step and, importantly, which ratings to adjust. After submitting the final performance ratings, managers communicate the performance rating to their employees, and explain the rationale behind their decision in a mandatory appraisal meeting. It is important to note, however, that performance ratings do not require formal approval by HR or higher management.[17]

[17]This process is standard. According to a global survey of more than 300 companies conducted by The Talent Strategy Group (2023), a consultancy, over 80% of companies have formal review and evaluation processes. Among these companies, more than half evaluate workers annually, and the majority of firms employ a five- or six-point scale for performance ratings. Calibrations of performance ratings are used

The potential rating indicates whether a manager believes that a worker would be willing and capable to perform well in higher-ranked positions with more complexity and responsibilities. Workers can have development potential only within, beyond, or far beyond their current role. We refer to these as *low*, *high*, and *very high* potential ratings. Appendix Table A.7 shows that about 18.4% of workers are believed to have high potential, and about 1.6% of workers are viewed to have very high potential, so to be fit for roles far beyond their current role. While the potential rating is also determined by the manager, there are some important differences compared to performance ratings. First, there is no recommended share of so-called "high potentials" to target each year. Second, while managers have to justify performance ratings to their employees, potential ratings require more internal justification, as managers are supposed to get informal feedback from peer managers and higher management. In addition, the potential rating needs to be discussed and confirmed in talent development and succession meetings which take place later in the year and involve the HR department and other managers. As a consequence, the potential rating is only implicitly communicated to workers. Instead, workers and managers make plans for future development, e.g., through performance improvement, skill acquisition, or building a strategy on how to get to the next level.

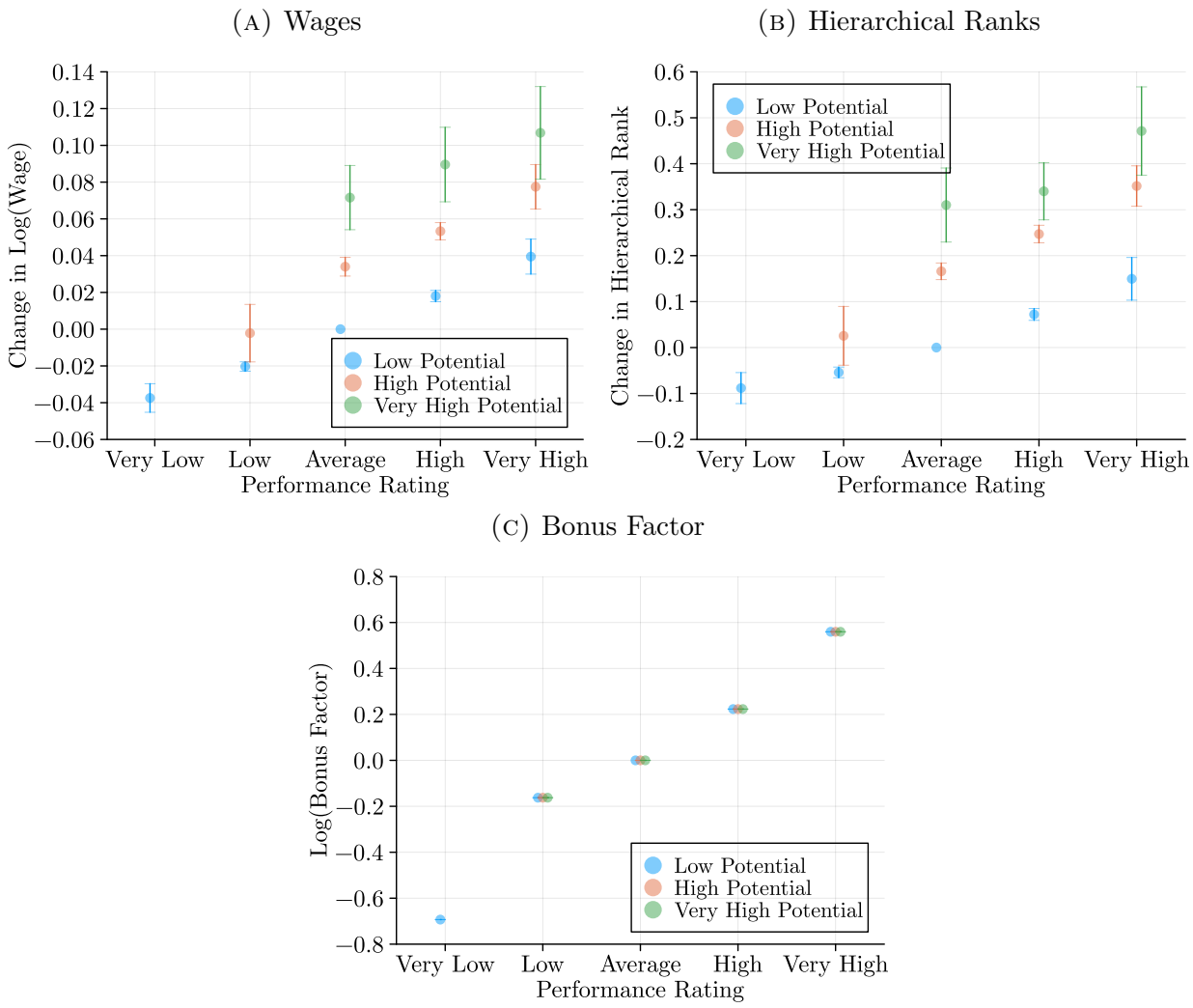
6.2 Career Impact of Performance and Potential Ratings

Performance and potential ratings play an important role for subsequent career progression and current bonus pay, as can be seen from Figure 11. Panels A and B show how differences in ratings translate into differences in wage and rank growth over the following ten quarters among workers who are observationally equivalent at the time of the rating. In particular, we regress the change in log wages or hierarchical ranks between the last month before and 30 months after the evaluation period on a wide range of control variables and a set of rating indicators—one for each combination of performance and potential rating. The mode combination of average performance and low potential is the reference category.[18] The performance rating is displayed on the horizontal axis and the different colors represent the three potential ratings.

by around 80% of firms with a structured performance evaluation process and are supposed to improve comparability across the firm.

[18]The regression accounts for year-specific age, country, department, unit, and job fixed effects at the time of the rating.

FIGURE 11: Impact of Performance and Potential Ratings



Notes: This figure shows the impact of all combinations of the annual performance and potential ratings on three different outcomes. The values on the horizontal axis indicate the performance rating and the different colors indicate the potential rating. Rating combinations with fewer than 30 observations are excluded. Panel A shows the average ten-quarter wage growth between $t-1$ and $t+30$. Panel B shows the average difference in the probability of receiving a rank-promotion between $t-1$ and $t+30$ relative to the reference group, where t is the period the rating is finalized and communicated (March). These differences are estimated by regressing the respective outcome variable on indicators for each combination of ratings and controlling for age, job, unit, country, and department fixed effects. We exclude the coefficients for rating combinations with less than 40 observations. All included combinations have at least 400 observations. The error bars display the 95% confidence bands. Panel C shows the difference in the individual log bonus factor relative to the reference group of workers with average performance ratings (and low potential rating).

Both higher performance and potential ratings are associated with significantly higher wage growth and promotion probabilities. However, differences in potential ratings are more predictive of future career progression than differences in past performance.[19] For example, compared to the reference group with average performance and low potential, a high potential rating predicts a wage increase after ten quarters by 3.4% while a high performance rating increases wages only by about 1.8%. In almost all cases, workers would prefer a higher potential rating over a better performance rating for their career progression. For promotions to higher hierarchical ranks, this difference is even more pronounced.

In contrast, performance ratings are key for determining workers' annual bonus pay. Workers' annual bonus payments are partly contracted and partly contingent on the performance rating. Just like the wage, the targeted bonus amount is part of the contract and can be re-negotiated at any time. It specifies the annual amount a worker will receive on top of their base wage if firm-level and individual performance is as expected. On average, the contracted annual bonus target accounts for roughly 10.1% of total earnings.[20] This amount is scaled up or down by an aggregate factor to align the overall amount of bonus pay with the firm's overall performance, and an individual factor that is a function of workers' performance rating for the past year.

The mapping from performance rating to individual bonus factor is public knowledge, implying that, conditional on the aggregate and individual performance factor, the actual bonus payment must not fall below the contracted amount. Panel C of Figure 11 shows the difference in individual log bonus factors between all observed combinations of performance and potential ratings. Note that there is no variation in bonus pay across potential ratings after conditioning on the performance rating. Compared to workers with an average performance rating, workers with a high or very high performance rating can expect 22 and 56 log percent higher bonus pay, respectively. In contrast, receiving a low or very low rating lowers the individual bonus factor by 16 and 69 log percent.

In sum, performance ratings mainly affect annual bonus payments, whereas potential ratings are a key input in the decisions about which workers to assign to leadership positions within the organization. As bonus pay accounts for only about one tenth of the firm's total wage bill and does not affect future wage payments, performance rating are a relatively

[19] The rationale behind this discrepancy is that firms do not want to promote workers with good performance in their current job, but workers with good expected performance at the next level, in order to avoid the fallacy of the so-called Peter Principle (Peter and Hull, 1969; Benson, Li, and Shue, 2019).

[20] Appendix Figure A.12 shows the distribution of the targeted and actually realized share of bonus pay in total earnings across the firms hierarchy.

low-stakes decision compared to potential ratings, which are highly consequential for the firms personnel decisions and thereby future productivity.

6.3 Estimation Approach

We now analyze whether there exist female penalties of having a male boss in terms of potential ratings, performance ratings, and bonus pay. As afore-mentioned, we have access to information on workers' bonus pay for a subset of 111,078 of the 225,175 worker-year observations. We thus focus on this subsample with non-missing rating and bonus information throughout this section.[21]

Our approach mirrors the one used for studying FPMBs in career progression. As ratings and bonus pay are determined only once per year, we apply an analogous event study approach to a yearly dataset. In particular, manager transition events occur when a worker changes managers between consecutive evaluation periods. The effect window covers three years before and after the manager transitions.

For performance and potential ratings, we estimate a set of linear probability models—one for each possible realization of the respective rating. Figure 12 shows how the likelihood of receiving different ratings changes for women relative to men when the manager is male rather than female.

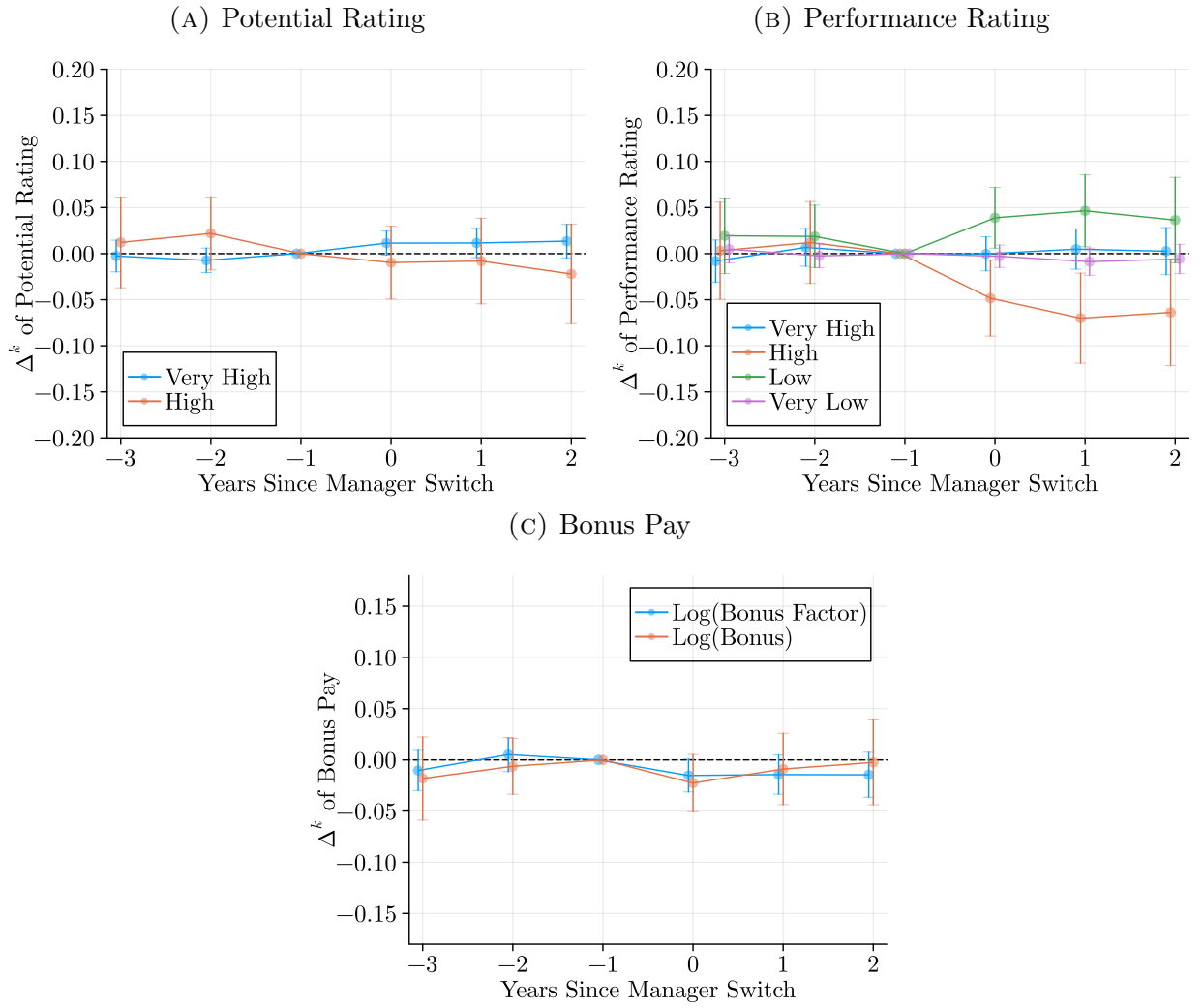
6.4 Results

Potential Ratings. In line with the main results in Section 4, Panel A of Figure 12 shows that there is no FPMB in potential ratings. If anything, the point estimates would suggest that, following a manager transition to a male manager, the probability that female workers receive a *very high* rating increases. However, these point estimates are statistically indistinguishable from zero.

Performance Ratings. In contrast, Panel B documents a female penalty of having a male boss in performance ratings. Compared to men, women are less likely to receive a *high* and more likely to receive a *low* rating when evaluated by a male boss, rather than a female one. Compared to men, women's probability of receiving a *high* (but not *very high*) performance rating decreases by up to 7.0 percentage points after a transition to a male manager. Similarly, women are 4.6 percentage points more likely to receive a *low* rating when

[21] Appendix Table A.8 shows the descriptive statistics for this annual subsample.

FIGURE 12: Event Study Estimates: Performance and Potential Ratings



Notes: This figure shows average double differences for different realizations of workers' potential and performance ratings in Panels A and B. The scale of the vertical axes corresponds to two within-worker standard deviations in the indicator for very low performance, 0.10, which is the lowest value among all performance rating indicators (Very High: 0.13, High: 0.30, Low: 0.25). The indicator for very high potential has a within-worker standard deviation of 0.09 (High: 0.27). The error bars display the 95% confidence bands.

the manager is male. Given that the baseline probabilities for receiving a *high* or *low* rating are 19.7% and 10.6%, these effects are substantial changes in the probability mass distribution of performance ratings. Importantly, the figure also shows that women's relative likelihood of receiving a *very low* or *very high* rating is unaffected by the gender of the manager.

Hence, women receive relatively worse performance ratings from male managers, and this effect is entirely driven by intermediate rather than extreme ratings, i.e., by decisions at the margin between an *average* rating and *low* and *high* ratings, rather than by workers whose performance is at the margin to *very low* or *very high* ratings. Extreme decisions differ from intermediate decisions in at least three ways that may rationalize this. First, the financial stakes are higher due to the non-linearity in the performance-contingent bonus factor. While the bonus factor increases by 25% when workers receive a *high* rather than an *average* rating, it goes up by 75% (56 log percent) when the worker receives a *very high* rating. Second, extreme ratings, by construction, are more visible and require more justification. Third, there is arguably less ambiguity in extreme cases, making it harder to justify an inappropriate rating. Hence, higher stakes and salience likely lead managers to pay more attention to extreme decisions which reduces the potential impact of implicit discrimination due to unconscious biases (Bertrand, Chugh, and Mullainathan, 2005).

Impact of Rating FPMBs. A natural question to ask is how this FPMB in (intermediate) performance ratings and the substantial impact of performance ratings on wages and rank-promotions (Figure 11) can be reconciled with the lack of an FPMB in career progression documented in Section 4. To see why both sets of results are consistent, we scale the shift in the probability mass distribution of performance ratings implied by the average double difference coefficients in Panel A of Figure 12 with the impact of each performance rating on ten-quarter wage growth. For each realization r of the performance rating, we multiply the FPMB one year after a manager transition, Δ_r^1, with the impact of that rating on ten-quarter wage growth relative to the average rating, β_r. The sum over all realizations of the performance rating, $\sum \Delta_r^1 \beta_r$, measures the direct wage effect of the FPMB in performance ratings. This yields a value of only 0.26%.[22] This is comfortably within the narrow 95% confidence band, $[-0.9\%, 0.7\%]$, of the average double difference for our baseline estimates, which captures all channels through which managers impact career progression of their workers (Panel B of Figure 5). Intuitively, the direct wage effects of performance ratings

[22] We compute the β_r values by averaging the rating impacts reported in Figure 11 over potential ratings weighted by the number of workers in each rating cell.

are not large enough for moderate shifts in the probability mass distribution of performance ratings to generate sizeable effects on wage growth or the likelihood of getting promoted.

This is not the case for bonus pay. Recall that the performance rating's bonus impact, the bonus factor, is an order of magnitude greater than the wage impact (Panel C of Figure 11). Compared to a 1.8% increase in wage growth over a period of ten quarters, a *high* performance rating increases current bonus pay by 25%. We use a similar approach to transform the FPMB in performance ratings into an FPMB in workers' individual bonus factor. In particular, we estimate a single event study with the individual log bonus factor as the outcome variable.

Panel C of Figure 12 shows that women's performance-induced bonus factor declines by 1.5% relative to men's bonus factor when the manager is male rather than female. This FPMB is borderline statistically significant at the 5% level and statistically significant at the 10% level. The orange line shows that the average double difference for the actual bonus pay closely tracks that for the bonus factor.

Given that bonus pay does not account for more than 20% of pay for 95% of workers (see Appendix Figure A.12), the FPMB in bonus pay does not translate into a meaningful FPMB in total earnings, not even in the short run. For the average worker, the 1.5% FPMB in bonus pay increases the FPMB in earnings by only 0.3%.

7 Discussion and Conclusion

Is male leadership in firms self-perpetuating because male bosses favor male employees at the expense of women? Using personnel data of a large European multinational firm, this paper presents causal evidence on this question from a typical labor market setting.

The first result of our analysis is that we reject the hypothesis that women experience significant career penalties of having a male boss: neither do women's wages fall behind men's wages, nor are women less likely to be promoted to higher hierarchical ranks when their manager is a man. This result is fundamentally different from the findings in Cullen and Perez-Truglia (2023) who present convincing evidence that careers of women at a Southeast Asian bank progress substantially slower when the manager is male because of so-called "old boys' clubs dynamics", i.e., exclusive social interactions between male workers and male bosses during or after work that lead to gender-specific favoritism. Our null result implies that opportunities for social interactions between workers and their managers are necessary but, fortunately, not sufficient for gender-based favoritism to affect workers' career progression.

The second result of our analysis is even more striking: Leveraging the breadth of our data, we show that the limited variation in our estimated female career penalties of having a male boss is entirely unrelated to variation in workforce composition within our firm. That is, the neutrality of manager gender for gender gaps in career progression holds almost universally across different countries and departments, which differ significantly in terms of gender norms, and gender and occupational composition respectively. Hence, compositional differences are unlikely to rationalize the discrepancy between our results and those in Cullen and Perez-Truglia (2023).[23]

Instead, our results suggest that firm-specific factors, such as management practices and corporate culture, play an important role. Corporate management practices vary significantly across countries and firms, and are a crucial determinant of firm productivity (Bloom and Van Reenen, 2007; Bloom et al., 2014). Although firms' primary objective is to maximize profitability, achieving this goal requires fostering equity and fairness in personnel decisions to optimally allocate workers to jobs (Hsieh et al., 2019). Put differently, a central goal of good management practices is to hire, compensate, and promote workers based on ability rather than gender, race, tenure, or social connections. Hence, any finding of gender-based favoritism implies that the management practices and institutions in the respective settings are sub-par. Such sub-par management practices are particularly common in developing countries, small firms, and publicly-owned organizations (Bloom and Van Reenen, 2010).

In contrast, our large European corporation would rank towards the top of the management score distribution and uses the same set of management practices throughout all departments and establishments. The absence of gender-based favoritism throughout our firm is thus consistent with the firm's efforts to purge personnel decisions of favoritism and promote workforce diversity. While future research will have to determine which policies are necessary to limit favoritism, three aspects of the firm's people management practices seem particularly relevant.

First, the firm promotes diversity, equity, and inclusion as a central part of its corporate culture. Events to raise awareness of implicit discrimination, mentoring programs, or networks for underrepresented groups make issues surrounding inclusion and fairness in personnel decisions particularly salient. The emphasis on diversity is also reflected in the fact that gender balance is a key performance indicator affecting executive compensation, and that

[23]Similar to Cullen and Perez-Truglia (2023), other studies document also document FPMBs for teachers (Biasi and Sarsons, 2022; Husain, Matsa, and Miller, 2024) and other public sector employees (Bircan, Friebel, and Stahl, 2024; Fortin, Markevych, and Rehavi, 2024).

alignment with the firm's corporate culture is an important requirement for promotions into management roles.

Second, employees' annual bonus pay is linked to their individual performance relative to clearly defined and agreed-upon individual objectives. While managers' performance ratings of their employees are subjective, they need to be justified and are tracked to guide future personnel decisions. In addition, managers receiving performance-contingent bonus pay have an incentive promote workers based on ability instead of social connections. This is in line with Bandiera, Barankay, and Rasul (2009) who show that managers do not favor workers based on social connections if they receive performance-pay.

Third, personnel decisions follow standardized processes, involve different stakeholders within the organization, and are guided by easily accessible employee data, including information on past and current performance and potential ratings.[24] Transparency and the need for justification limit managers' effective discretion in personnel decisions and thereby prevent managers from favoring certain workers independent of their ability.

Data on managers' annual performance and potential ratings of their subordinates allow us to analyze outcomes with varying degrees of financial and organizational impact, where managers have different levels of formal and informal discretion. Consistent with the absence of female career penalties of having a male boss, manager gender does not matter for gender gaps in high-stakes potential ratings and highly visible extreme performance ratings. Interestingly, however, we do find evidence that gender biases differ between male and female managers for intermediate performance ratings, i.e., those decisions with the lowest financial stakes and no need for justification in front of other stakeholders. This difference across outcomes with varying degrees of financial and organizational impact, and formal and informal discretion, corroborates the notion that corporate institutions can eliminate structural disadvantages of male leadership for women's careers.

In this sense, our null result is a constructive one. While differences in individual gender biases between male and female managers may persist, the necessary tools to stop them from translating into favoritism in personnel decisions exist. To the extent that firms have an intrinsic incentive to adopt good management practices to succeed in a competitive environment, one may expect that self-perpetuating male leadership will become less prevalent

[24]For example, internal vacancies must be announced via an internal job portal, promotion decisions to higher ranks have to be discussed and agreed upon by a panel of managers and HR business partners, and managers have to justify the potential evaluations of their subordinates vis-à-vis other stakeholders.

simply because favoritism is costly (e.g. Becker, 1957; Ashenfelter and Hannan, 1986; Black and Strahan, 2001).

On the flip side, cross-firm dispersion in management quality within countries is rather persistent (Bloom et al., 2019; Scur et al., 2021). While the 500 largest firms in the US—which are most similar to our firm—employ almost one quarter of the US workforce (US Census Bureau, 2021), future research will have to determine whether our results for a large multinational corporation translate to other firms based in developed economies, and in particular to smaller firms without pro-active HR departments. In addition, it will be important to identify which management practices are particularly successful in reducing favoritism, and whether corporate culture plays an important role above and beyond specific practices and procedures.

Finally, it is important to emphasize that our results show that the gender composition of managers does not explain gender gaps in career progression and the relatively low share of women at the top of the firm's hierarchy. Even at our seemingly well-managed firm, women may still face structural disadvantages, including discrimination by both male and female managers. The findings in this study only rule out that female career penalties are higher under male managers, which would make male leadership self-perpetuating.

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A Additional Tables and Figures

Table A.1: Descriptive Statistics for Managers

	Mean	Std. Dev.	P25	P50	P75
Female	0.328	0.470	0.000	0.000	1.000
Age	43.8	7.8	38.0	44.0	50.0
Tenure	120.0	104.9	35.0	92.0	177.0
Rank	5.97	1.09	5.00	6.00	6.00
Wage [€]	86,905	59,050	48,692	79,690	110,198
Nr. Subordinates	5.1	5.7	2.0	4.0	6.0

Notes: This table shows the mean, the standard deviation, and the 25th, 50th, and 75th percentile of selected variables for managers. Tenure is expressed in months and hierarchical ranks range from 1 to 10. We convert all currencies to Euro using monthly exchange rates (IMF).

Table A.2: Descriptive Statistics for Different Manager Transitions

	Ever Had Event?		Current Event				
	No	Yes	No Event	M2M	M2F	F2M	F2F
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nr. of Workers	32,077	40,994	73,071	24,761	12,952	11,328	7,515
Nr. of Obs.	774,780	1,912,225	2,610,792	39,640	13,994	12,345	10,234
Female	0.394	0.394	0.393	0.299	0.489	0.490	0.644
	(0.489)	(0.489)	(0.488)	(0.458)	(0.500)	(0.500)	(0.479)
Age	40.9	40.9	40.9	40.4	40.1	39.8	39.0
	(9.8)	(9.1)	(9.3)	(9.1)	(9.1)	(9.0)	(9.2)
Tenure	102.2	115.3	111.9	106.2	97.6	93.9	86.9
	(116.1)	(108.1)	(110.8)	(104.7)	(102.1)	(99.5)	(97.6)
Wage [€]	51,915	53,946	53,381	53,447	53,269	53,287	47,948
	(46,146)	(41,831)	(43,104)	(47,558)	(42,185)	(41,216)	(33,548)
Rank	4.47	4.56	4.53	4.59	4.55	4.60	4.40
	(1.37)	(1.38)	(1.38)	(1.41)	(1.38)	(1.35)	(1.18)
Number of Coworkers	9.2	9.8	9.6	8.1	10.9	10.5	7.1
	(14.2)	(17.7)	(16.8)	(12.8)	(23.1)	(21.6)	(11.8)

Notes: This table shows the mean and standard deviation of selected variables among workers with and without any event (columns 1-2) and across different event types (columns 3-7). The statistics in columns 4-7 are computed in the month just before the manager transition.

TABLE A.3: Descriptive Statistics for Different Manager Transitions: Outgoing Managers

	Ever Had Event?		Current Event				
	No	Yes	No Event	M2M	M2F	F2M	F2F
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	0.381	0.317	0.325	0.000	0.000	1.000	1.000
	(0.486)	(0.465)	(0.468)	(0.000)	(0.000)	(0.000)	(0.000)
Age	44.4	43.8	43.9	44.7	44.5	42.8	42.4
	(8.0)	(7.7)	(7.8)	(7.7)	(7.7)	(7.6)	(7.6)
Tenure	118.8	123.1	122.7	135.5	121.0	108.1	106.9
	(106.6)	(104.6)	(105.1)	(111.9)	(105.0)	(91.3)	(92.6)
Wage [€]	74,923	88,639	86,646	97,489	104,717	91,312	84,469
	(46,404)	(59,958)	(57,218)	(69,492)	(69,140)	(61,765)	(53,871)
Rank	5.7	6.0	6.0	6.2	6.3	6.1	5.9
	(0.9)	(1.1)	(1.1)	(1.3)	(1.2)	(1.1)	(1.1)
Number of Subordinates	3.1	5.1	4.9	7.9	7.7	6.3	6.2
	(3.2)	(5.7)	(5.5)	(10.0)	(8.9)	(7.2)	(5.7)

Notes: This table shows the mean and standard deviation of selected variables among managers with and without any event (columns 1-2) and across different event types (columns 3-7). Statistics refer to the manager just before the transition. The statistics in columns 4-7 are computed in the month just after the manager transition.

TABLE A.4: Descriptive Statistics for Different Manager Transitions: Incoming Managers

	Ever Had Event?		Current Event				
	No	Yes	No Event	M2M	M2F	F2M	F2F
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	0.381	0.317	0.325	0.000	1.000	0.000	1.000
	(0.486)	(0.465)	(0.469)	(0.000)	(0.000)	(0.000)	(0.000)
Age	44.4	43.8	43.9	43.8	41.7	43.3	41.4
	(8.0)	(7.7)	(7.8)	(7.8)	(7.6)	(7.8)	(7.7)
Tenure	118.8	123.1	122.9	125.6	98.7	110.7	97.2
	(106.6)	(104.6)	(105.0)	(109.7)	(88.2)	(99.5)	(88.8)
Wage [€]	74,923	88,639	86,944	94,863	90,151	100,393	82,270
	(46,404)	(59,958)	(58,236)	(75,693)	(62,434)	(65,936)	(54,989)
Blue Collar	0.007	0.003	0.004	0.005	0.009	0.003	0.010
	(0.081)	(0.057)	(0.060)	(0.072)	(0.092)	(0.056)	(0.097)
Rank	5.7	6.0	6.0	6.1	6.0	6.2	5.9
	(0.9)	(1.1)	(1.1)	(1.3)	(1.2)	(1.2)	(1.1)
Number of Subordinates	3.1	5.1	4.9	7.1	5.7	6.8	5.4
	(3.2)	(5.7)	(5.5)	(8.0)	(6.4)	(8.2)	(5.0)

Notes: This table shows the mean and standard deviation of selected variables among managers with and without any event (columns 1-2) and across different event types (columns 3-7). Statistics refer to the manager just after the transition. The statistics in columns 4-7 are computed in the month just after the manager transition.

TABLE A.5: Distribution of Event Types

	Distribution of Events				Nr. of Events
	M2M	*M2F*	*F2M*	*F2F*	
Baseline (All Events)	0.518	0.184	0.163	0.134	69,410
Excl. Unit Changes	0.519	0.183	0.161	0.137	56,497
Excl. Job Changes	0.517	0.184	0.161	0.138	56,030
Excl. Single Worker Events	0.525	0.184	0.156	0.135	45,747

Notes: This table shows the distribution of the four possible event types and the number of events for different restrictions on which events are considered. Single worker events are manager transitions where only one worker is assigned from one particular manager to another particular manager in a given period.

Table A.6: Summary Statistics for Heterogeneity Analysis

	Female	Age	Male Mngr.	Coworkers	Wage	Rank
A. Countries						
Africa & Middle East	0.452	38.2	0.668	4.4	35,458	4.98
Australia & Canada	0.593	42.9	0.558	3.3	66,730	4.96
Austria & Switzerland	0.319	41.0	0.761	6.0	98,163	4.57
Benelux	0.505	39.2	0.584	4.7	60,579	4.69
Central America	0.450	40.4	0.683	24.8	16,626	4.38
China	0.515	33.2	0.620	5.5	26,350	4.79
East Europe	0.639	39.6	0.533	4.7	30,137	5.01
France	0.509	41.8	0.642	10.7	43,658	4.14
Germany	0.283	43.2	0.814	11.7	67,593	4.52
Italy	0.476	43.4	0.551	6.4	47,068	4.41
Japan	0.273	42.5	0.887	10.5	57,528	4.58
Korea, Hong Kong, Taiwan	0.365	37.8	0.734	5.3	38,887	4.34
Scandinavia	0.531	45.7	0.587	2.1	72,019	5.20
South America	0.463	39.5	0.673	13.6	30,908	4.36
South-East Asia	0.549	36.9	0.544	11.2	20,975	4.39
Spain & Portugal	0.475	43.0	0.655	12.6	45,381	4.41
UK & Ireland	0.425	41.3	0.634	6.2	48,018	4.26
United States	0.434	43.1	0.672	6.9	78,573	4.72
B. Departments						
Administration & Services	0.566	43.7	0.718	7.6	53,267	4.10
Commercial	0.423	39.2	0.697	6.8	45,851	4.97
Engineering	0.139	42.4	0.866	8.0	60,204	4.54
Finance	0.524	39.4	0.604	5.0	57,573	5.07
Human Resources	0.704	39.8	0.440	3.6	69,494	5.31
Information Technology	0.180	42.0	0.829	6.1	72,596	5.45
Manufacturing	0.274	41.4	0.806	23.2	39,799	3.18
Procurement & Supply Chain	0.370	41.7	0.725	7.7	45,884	4.03
Quality Management	0.548	40.1	0.506	6.7	56,324	4.61
Regulatory & Legal	0.622	41.8	0.487	3.7	83,020	5.74
Research & Development	0.457	41.3	0.649	5.5	72,826	4.92
Strategy	0.413	41.7	0.699	5.0	95,730	6.03
C. Hierarchical Rank						
1-3	0.339	41.1	0.754	20.9	32,383	2.63
4	0.437	38.0	0.679	8.5	34,720	4.00
5	0.433	40.3	0.676	6.0	49,176	5.00
6	0.380	43.8	0.723	4.2	84,858	6.00
7-10	0.287	47.0	0.786	2.8	148,760	7.46
D. Manager Age Groups						
25-34	0.419	37.3	0.650	11.5	35,652	3.83
35-39	0.431	38.2	0.645	8.4	41,641	4.36
40-44	0.422	40.2	0.682	8.1	50,211	4.59
45-49	0.379	42.0	0.731	11.1	58,070	4.67
50-54	0.358	43.1	0.759	9.7	63,321	4.76
55-60	0.348	44.3	0.810	9.4	68,795	4.75
E. Age Groups						
25-29	0.436	27.3	0.671	11.2	30,794	3.89
30-34	0.421	32.1	0.683	9.6	37,954	4.32
35-39	0.415	37.0	0.699	9.0	48,329	4.63
40-44	0.398	42.0	0.720	9.3	58,718	4.78
45-49	0.370	47.0	0.731	9.6	65,175	4.77
50-54	0.351	51.9	0.750	9.5	69,848	4.71
55-60	0.333	57.1	0.746	9.1	71,996	4.58

Notes: This table shows summary statistics across sub-groups of the workforce in terms of countries, departments, hierarchical ranks, manager age, and worker age.

TABLE A.7: Frequency Distribution of Performance and Potential Ratings

	Potential			
Performance	Low	High	Very High	Total
Very Low	0.012	0.000	0.000	0.012
Low	0.103	0.002	0.000	0.106
Average	0.565	0.087	0.005	0.657
High	0.110	0.080	0.008	0.198
Very High	0.009	0.015	0.003	0.027
Total	0.800	0.184	0.016	

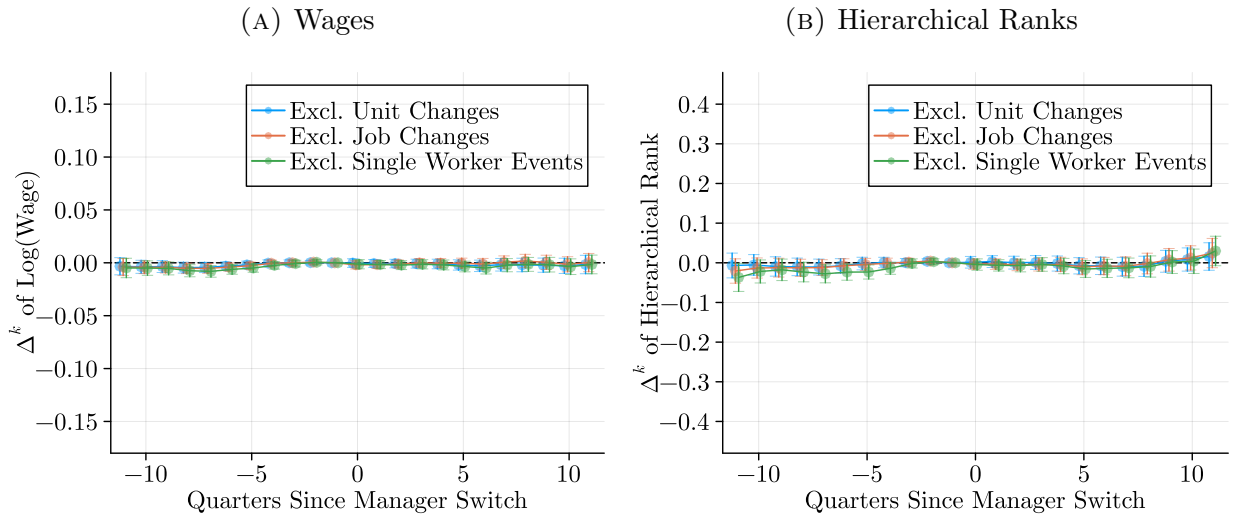
Notes: This table shows the joint and marginal frequency distributions of performance and potential ratings.

TABLE A.8: Descriptive Statistics for Annual Data

	Mean	Std. Dev.	P25	P50	P75
Worker Characteristics					
Female	0.400	0.490	0.000	0.000	1.000
Age	41.7	9.3	34.0	41.0	49.0
Tenure	123.4	113.7	32.0	88.0	182.0
Hierarchical Rank	4.72	1.52	4.00	5.00	6.00
Wage [€]	64,757	45,908	35,777	56,064	84,924
Manager Characteristics					
Male Mngr.	0.700	0.458	0.000	1.000	1.000
Age Mngr.	45.5	8.1	40.0	46.0	51.0
Tenure Mngr.	149.6	117.5	49.0	122.0	221.0
Rank Mngr.	6.3	1.3	5.0	6.0	7.0
Wage Mngr. [€]	103,953	72,359	63,235	90,331	125,810
Team Characteristics					
Number of Coworkers	7.7	10.6	2.0	5.0	9.0

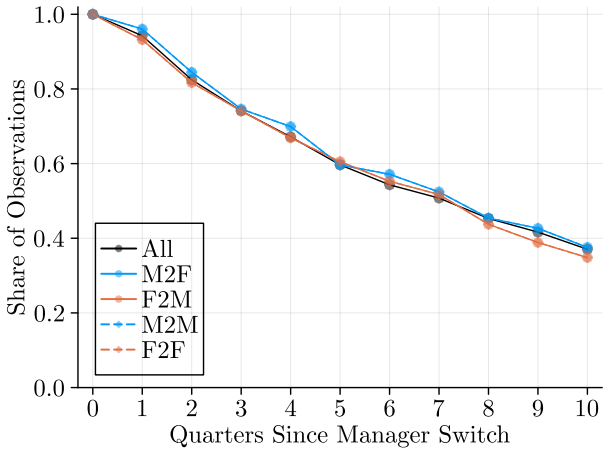
Notes: This table shows the mean, standard deviation, the 25th, 50th, and 75th percentile of selected variables for the sample of worker-years with non-missing information on ratings and bonus pay ($N = 111,078$). Data are from March of each year.

FIGURE A.1: Robustness: Excluding Events with Concurrent Changes in Job or Unit, or Events Affecting only One Worker



Notes: This figure shows the average double differences estimated using only events that do not go along with a change in the worker's job or unit, or that affect only one worker. Panel A show the effect on log wages and Panel B on hierarchical ranks. The error bars display the 95% confidence bands.

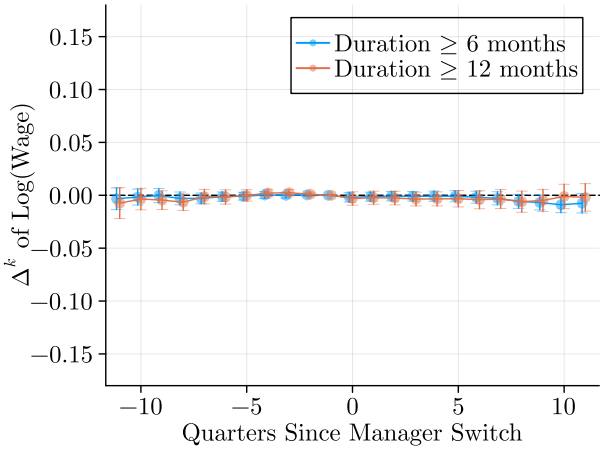
FIGURE A.2: Persistence of Manager-Worker Pairs



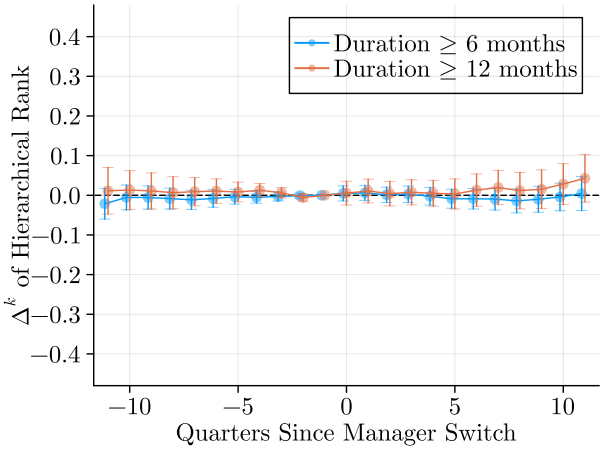
Notes: This figure shows the share of newly formed worker-manager pairs that last for 1, 2, . . . , 10 quarters following the event. Only observations with a manager transition event in the current period are included. The black lines show the results for all events, the blue and orange solid lines show the results following $M2F$ and $F2M$ events. The blue and orange dashed lines show the results following $M2M$ and $F2F$ events.

FIGURE A.3: Robustness: Excluding Transitory Events

(A) Wages



(B) Hierarchical Ranks

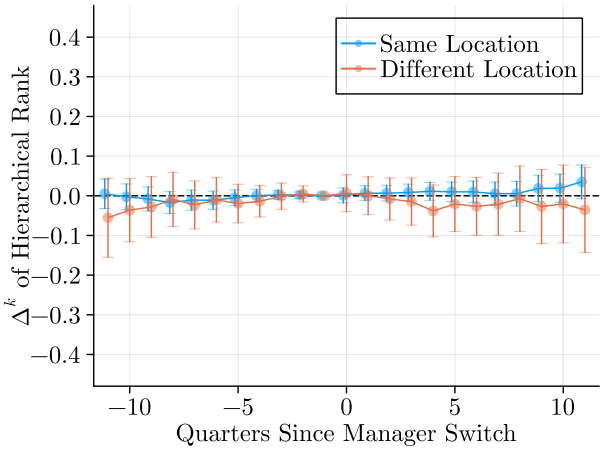


Notes: This figure shows the average double differences estimated using only events that involve worker-manager pairs that last for at least 6 or 12 months. Panel A shows the effect on log wages and Panel B on hierarchical ranks. The error bars display the 95% confidence bands.

FIGURE A.4: Robustness: Spatial Proximity of Workers and Managers

(A) Wages

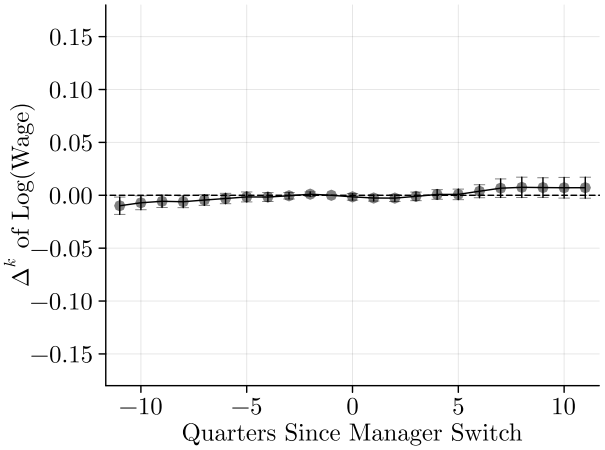
(B) Hierarchical Ranks



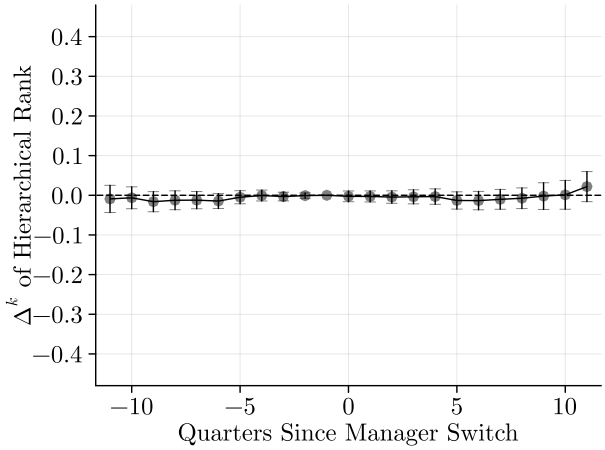
Notes: This figure shows separate average double differences depending on whether the worker and his or her manager work in the same location. Panel A shows the effect on log wages and Panel B on hierarchical ranks. The error bars display the 95% confidence bands.

Figure A.5: Robustness: Indirect Superiors

(A) Wages



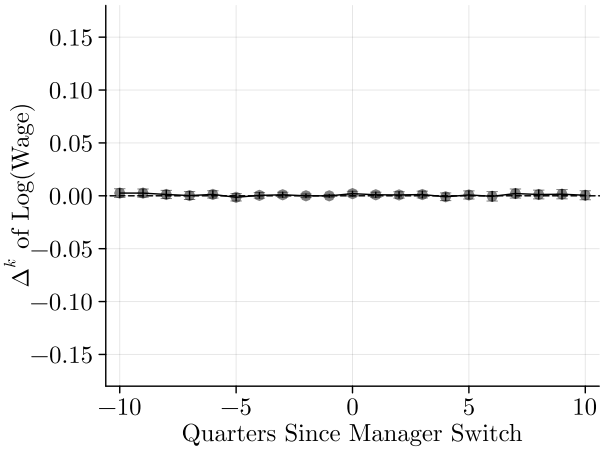
(B) Hierarchical Ranks



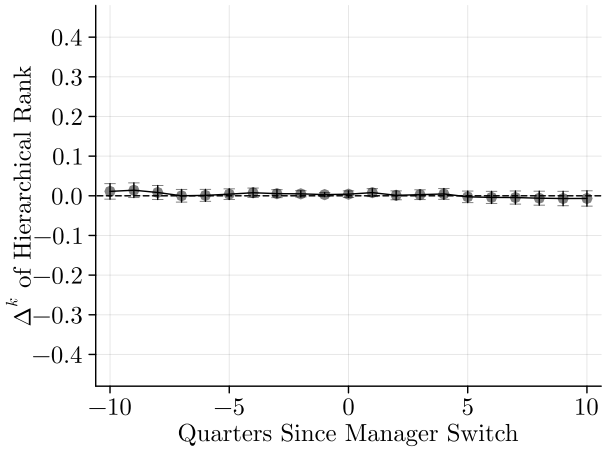
Notes: This figure shows the average double differences estimated using indirect superiors instead of direct superiors to define manager switching events. Panel A shows the effect on log wages and Panel B on hierarchical ranks. The error bars display the 95% confidence bands.

Figure A.6: Local Projections

(A) Wages

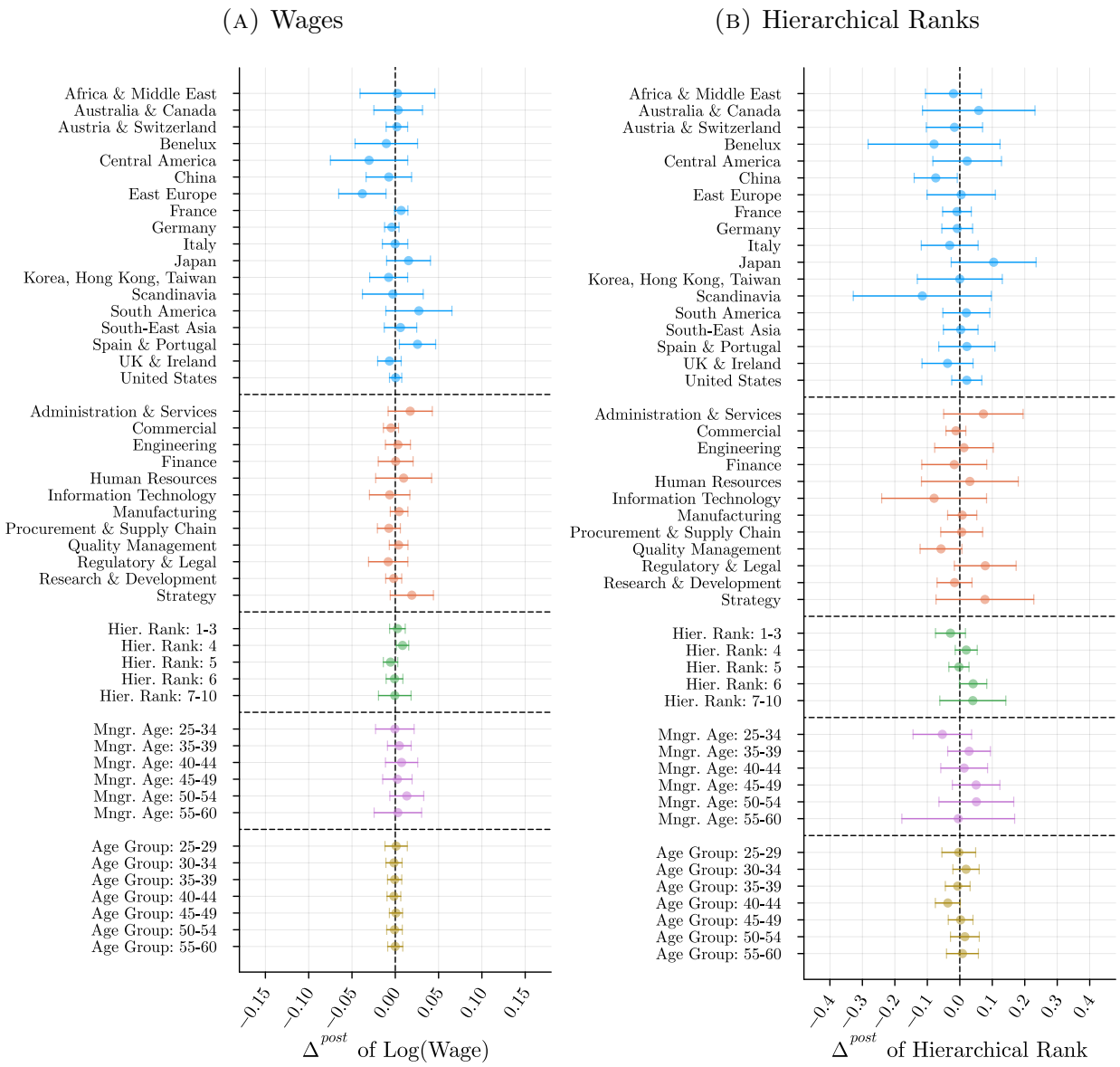


(B) Hierarchical Ranks



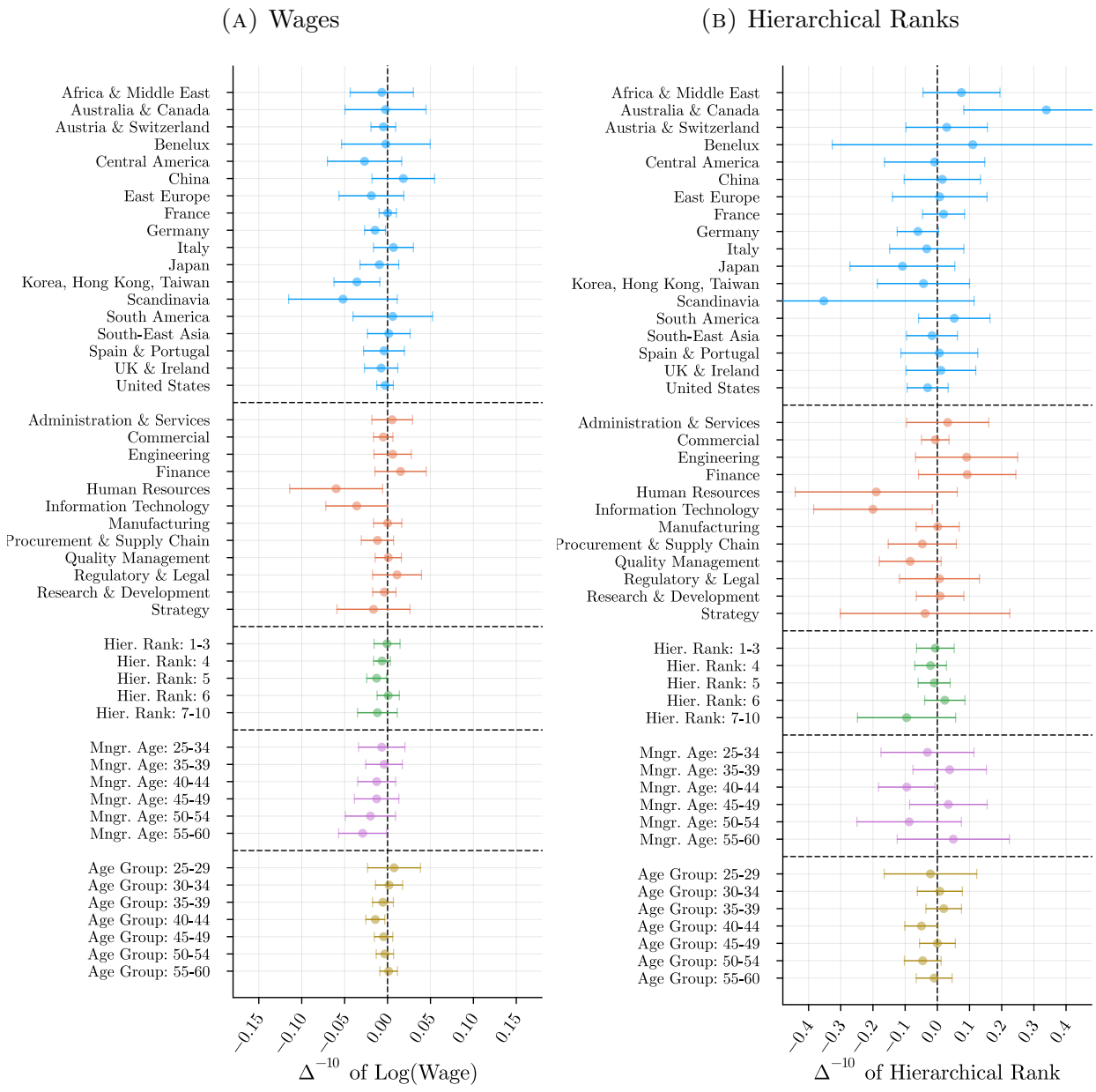
Notes: This figure shows the average double difference from estimating local projections for the change in log wage or hierarchical rank between period $t + h$ and period $t - 1$. The error bars display the 95% confidence bands.

FIGURE A.7: Heterogeneity Analysis: Average of Post-Transition Coefficients



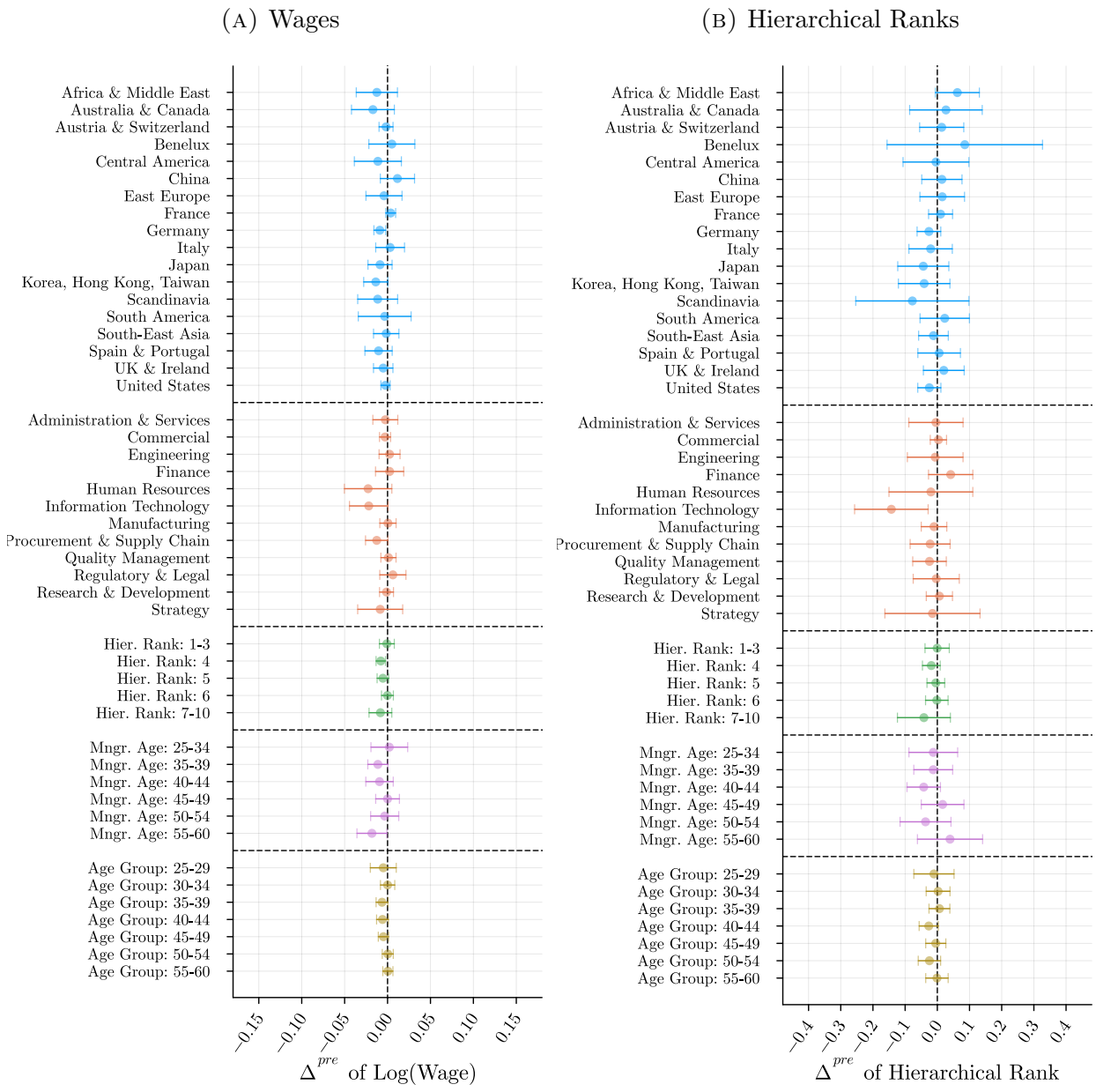
Notes: This figure shows the average of the estimated post-event coefficients, Δ^{post}, for each sub-group used in the heterogeneity analysis. A positive estimate indicates that women experience higher wage growth during the ten quarters after the time of the event. For wages, 3 of 48 coefficient means (6.25%) are statistically significant at the 5% level. For hierarchical rank as the outcome variable, 1 of 48 coefficients means (2.08%) are statistically significant. The error bars display the 95% confidence bands.

FIGURE A.8: Pre-Trends in Heterogeneity Analysis: 10-Quarter Pre-Transition Coefficients



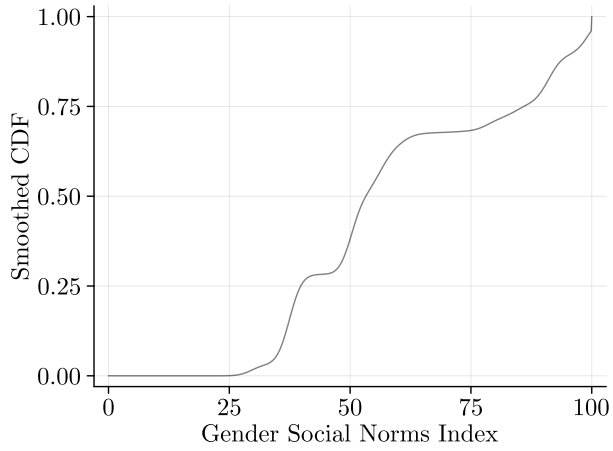
Notes: This figure shows the leading estimate of the average double difference 10 quarters prior to the event, Δ_h^{-10}, for each sub-group used in the heterogeneity analysis. A positive estimate indicates that women experience lower wage growth than men between ten quarters prior to the event and the time of the event. For wages, 6 of 48 coefficients (12.5%) are statistically significant at the 5% level (only 3 of 48 coefficients (6.25%) are both statistically and economically significant, i.e. larger than 0.02 in absolute value). For hierarchical rank as the outcome variable, 3 of 48 coefficients (6.25%) are statistically significant. The error bars display the 95% confidence bands.

FIGURE A.9: Pre-Trends in Heterogeneity Analysis: Average of Pre-Transition Coefficients



Notes: This figure shows the average of the estimated pre-event coefficients, Δ^{pre}, for each sub-group used in the heterogeneity analysis. A positive estimate indicates that women experience lower wage growth during the ten quarters after the time of the event. For wages, 3 of 48 coefficient means (6.25%) are statistically significant at the 5% level. For hierarchical rank as the outcome variable, 1 of 48 coefficients means (2.08%) are statistically significant. The error bars display the 95% confidence bands.

FIGURE A.10: Cumulative Distribution of the Gender Social Norms Index

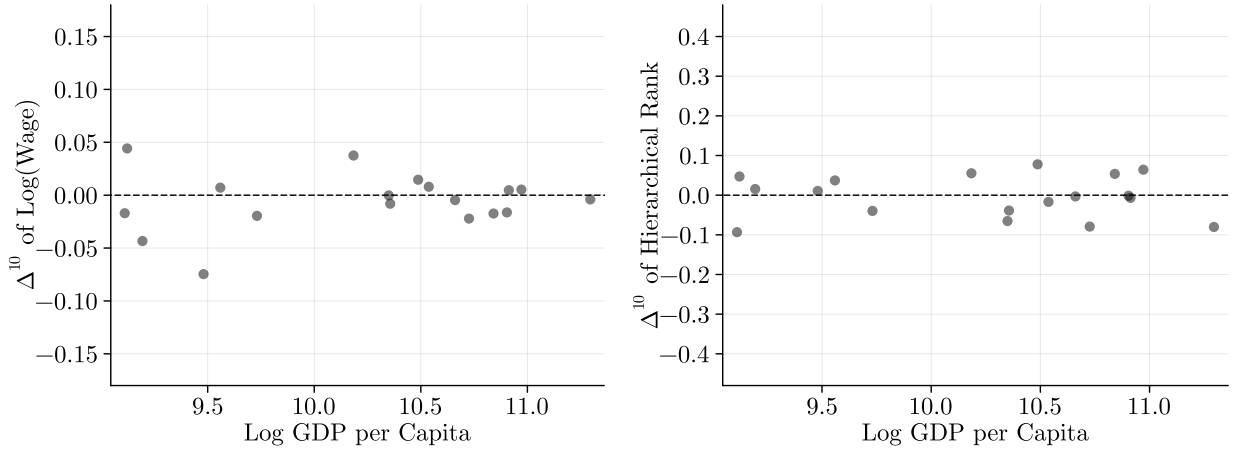


Notes: This figure shows the empirical cumulative distribution of the Gender Social Norms Index (GSNI) for workers in our firm (United Nations Development Programme, 2023). Each worker is assigned the GSNI value from their country of residence. The GSNI measures the proportion of World Value Survey respondents in a country who exhibit at least one bias in seven survey questions regarding gender equality in politics, education, business, and physical integrity. Workers from countries without a reported GSNI are excluded. To protect the firm's identity, we add noise to each observation, drawn from a normal distribution with a standard deviation of 2.

FIGURE A.11: Career-FPMBs across Countries: Relationship with GDP

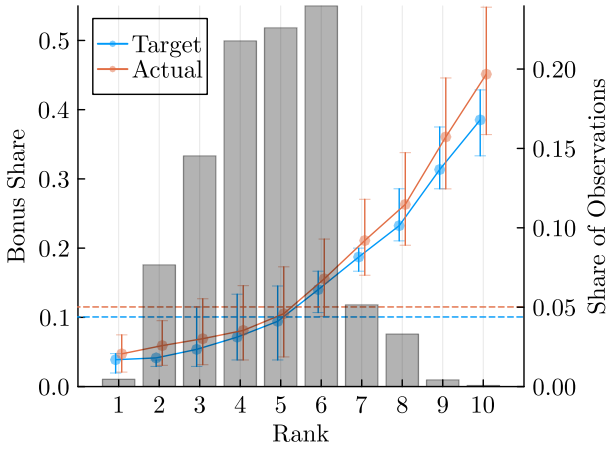
(A) Wage Effects & GDP per Capita

(B) Rank Effects & GDP per Capita



Notes: This figure shows heterogeneity in the average double difference 2.5 years after a manager switch across countries. Panels A and B show the bivariate relationship between the estimates for log wages or hierarchical ranks and the countries' log GDP per capita. The averages for country groups are weighted based on the number of observations in our dataset.

FIGURE A.12: Relationship between Bonus Share and Hierarchical Rank



Notes: This figure shows the average targeted and actual bonus share by hierarchical rank along with the range between the 10th and 90th percentile. The share of observations by hierarchical rank is plotted on the right y-axis.