Do Women Ask? Gender Differences in Applying for Internal Job Openings

by

Audrey G. Mang

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Authored by: Audrey G. Mang
MIT Sloan School of Management
May 1, 2023

Certified by: Roberto M. Fernandez
William F. Pounds Professor of Management
Professor of MIT Sloan School of Management, Thesis Supervisor

Accepted by: Eric So
Sloan Distinguished Professor of Financial Economics
Professor, Accounting and Finance
Faculty Chair, MIT Sloan PhD Program

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ABSTRACT

Gender differences in application behavior can contribute to gender inequality in hiring outcomes. People are unlikely to be selected for jobs if they do not put themselves forward to be considered for positions. This paper focuses on understanding supply-side mechanisms that may stifle female advancement; in particular, responding to ideas about how women behave in the labor market that would lead us to suspect that they are "leaning out" of opportunities. We study the internal labor market within a single firm to examine the extent of gender differences in application to internal job openings. Importantly, in determining the rates of application, we have the advantage of being able to observe the risk set of potential applications in this setting. Our findings show few differences in application rates by gender, even when considering variation in hierarchical distance of the opportunity or the level from which the candidate is applying. Despite existing theories sf constraints that differentially affect workers by gender, in this setting, there is very little evidence that women are not leaning into advancement opportunities, or that they're leaning in less than men.

Thesis supervisor: Roberto M. Fernandez
Title: William F. Pounds Professor of Management

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1 Introduction

Organizations often experience gender inequality in representation, especially as one looks up the hierarchy of the firm. In a 2018 study of 279 companies, it was reported that women comprise of 48% of entry level positions; that proportion decreases to 38% in the managerial level and continues to drop until reaching 22% of the C-suite (Yee et al. 2018). To understand how people end up at the top of organizations, it is crucial to think about how people advance in their career paths, or the subsequent steps that people take over time.

The trajectory of one's career can be influenced by a variety of factors. Past research has documented that job sex segregation can be affected by the behaviors and attitudes of multiple actors in the labor market. This paper focuses on understanding supply-side mechanisms that may stifle female advancement; in particular, responding to ideas about how women behave in the labor market that would lead us to suspect that they are "leaning out" of opportunities. We study the internal labor market within a single firm to examine the extent of gender differences in application to internal job openings. Importantly, in determining the rates of application, we have the advantage of being able to observe the risk set of *potential* applications in this setting. Our findings show few differences in application rates by gender, irrespective of whether the job opening is for a promotion, lateral move, or demotion.

2 Theoretical Background

Researchers have observed gender inequality in important workplace outcomes, such as career advancement (Eagly & Carli 2007) and compensation (Castilla 2008, Blau & Kahn 2017). There are many explanations and factors that contribute to this inequality, and it can be difficult to disentangle their effects. It is natural to look at the role of the firms and how the processes or biases from employers on the demand-side of the labor market create organizational barriers to female advancement. Glass ceilings (Cotter et al. 2001), sticky floors (Baert et al. 2016), and glass escalators (Budig 2002, Hultin 2003) are all metaphors that describe structural obstacles that disproportionately hinder women from climbing the corporate ladder compared to men.

One particularly fruitful area of research has been to look at hiring and promotion trends for men and women, because promotions over a career are exactly what can lead people to leadership positions. Even small differences in how men and women experience career growth can

result in notable gender stratification over time. Many studies have documented how women may face discrimination by employers or prospective employers in various ways, but it is not always clear which mechanism is responsible or how multiple mechanisms may interact. There can be bias in outreach or recruiting that creates a male-dominated applicant pool, intended or not (Lambrecht & Tucker 2019, Kuhn et al. 2020). For example, women and men may respond differently to seemingly neutral features surrounding the job posting, such as information provided, qualifications requested, or language used (Gee 2019, Abraham et al. 2023). Women may be less likely to receive an invitation to interview (Baert et al. 2016, Botelho & Abraham 2017), or they may be perceived to be less competent than equally qualified men (Foschi 1996, Goldin & Rouse 2000). Researchers also find gender bias in evaluation and perception; there may be a perceived "lack of fit" for women in executive roles due to the sex-stereotyping of leadership (Heilman, 1983, Martell et al. 1998, Eagly & Karau 2002). The potential sources of bias can widen when considering the role of search agencies and recruiting firms, which could possibly bring their own biases or differential treatment of men and women to the process (Fernandez-Mateo & Fernandez 2016). A survey of past work makes it clear that processes that affect the gender composition of candidates, and ultimately of hires, can happen at any stage and be carried through to the firm workforce.

However, addressing biases in demand-side practices may not be enough to eliminate gender inequality in career advancement. Scholars have noted that inequality can begin before there is any opportunity for discriminatory screening behavior (Fernandez & Abraham 2010, Fernandez & Campero 2017). The hiring process does not start at an observed application; there is a pool of prospective applicants that must select into the process by submitting an application. If candidate pools for high-level positions are disproportionately male to begin, even an equal rate of hire between men and women would result in fewer women in those positions (Hassink & Russo 2010). It is essential, therefore, to also study behavior from the supply-side of the labor market (applicants) that may contribute to women disproportionately applying to certain roles in the first place. Such supply-side gender differences could contribute to female underrepresentation in the workplace, even in the absence of screening or other biases against women.

Prior research has offered various ways that men and women are differentially constrained that may manifest as real behavior. To the extent that such supply-side behaviors affect the types of roles women and men choose to pursue (Fluchtmann et al. 2022), this could explain the

underrepresentation of women in certain job candidate pools. For example, women are found to have lower self-assessments compared to equally competent men (Exley & Kessler 2019), which may lead women to feel underqualified for the same job that a man would feel qualified to hold. Women also perceive higher expectations than men for the same job, which similarly affects their willingness to apply (Coffman et al. 2021). Women may have subdued career aspirations (Correll, 2001, 2004, Azmat et al. 2020) or lower professional confidence (Cech et al. 2011) in traditionally male-dominated fields, or women may steer away from those roles with male stereotypes altogether and choose ones with female stereotypes (Fernandez & Friedrich 2011). De Paola and colleagues (2017) find that women are less likely to apply for academic promotion in the Italian academy; Bosquet and colleagues (2019) find a similar result among French academics. Laboratory and field experiments have found that women are more likely to shy away from competitive situations (Niederle & Vesterlund 2007, Flory et al. 2015, Samek 2019), such as a highly sought-after promotion opportunity. Finally, minority job seekers may fear discrimination or "tokenization" in the application process (Kang et al. 2016), even in the absence of demand-side bias, which may make women unwilling to put themselves in the position to be discriminated against (Brands & Fernandez-Mateo 2017). Any of these mechanisms, and many others, can shape the way that men and women consider career opportunities such that they achieve different outcomes (Babcock & Laschever 2003). We do not necessarily need to posit screening bias to imagine how women may end up underrepresented in a firm.

3 Selection Issue

The literature is rich with compelling reasons why women may select out of job opportunities, but it remains an empirical challenge to study the search-to-apply stage of the hiring pipeline because it is difficult to observe all potential candidates. While previous studies have made great use of firm and recruitment data, there is a selection issue with studying submitted applications because we do not see who chose not to apply (Fernandez & Sosa 2005). Firms are constrained in their ability to determine who selects into the process because it requires information on potential applicants that eventually chose to *not* apply to a position. Instead, most studies must rely on post-application or post-hire data where these initial gender-sorting mechanisms are not observable. Therefore, while extant literature has proposed many behavioral explanations for supply-side

selection, few firm-level studies are able to support the claim that there is initial gender-sorting into the application process.

Understanding the search-to-apply stage is critical, since it creates the candidate pool that supplies every subsequent step of the pipeline. Past efforts to examine the search-to-apply stage have had to be quite creative to capture the pool of prospective applicants. For example, Fernandez and Friedrich (2011) consider a setting where every applicant is asked to rate their level of interest in all jobs, irrespective of which job they are actually pursuing. Barbulescu and Bidwell (2013) study MBA students' application behavior to broader job categories under the assumption that they have the option to apply to jobs in every category, so that zero applications to a job category is effectively "opting out" of that type of job. Flory and colleagues (2015) analyze a firm where applicants indicate interest via email and receive more job information before submitting a full application; those who send an initial email but do not follow up with an application are the people that dropped out of the pipeline at the search-to-apply stage. Parasurama et al. (2020) take a similar approach using data from LinkedIn. Fernandez-Mateo and Fernandez (2016) use data from an executive search firm to study the degree to which women's active choices to be considered in candidate pools depart from their representation when the search firm considers candidates passively. Haegele (2023) constructs internal career paths for employees in a German firm to study employee application to leadership positions. Each of these studies defines the set of potential applicants in a way so that non-applicants can be studied as well.

In this paper, we tackle the selection issue by focusing on internal job applications in the context of an organization which posts job openings, as opposed to slotting people into jobs (Keller 2018). Past work has found that career advancement is often pursued and achieved through internal mobility (Bidwell & Mollick 2015), and in the descriptive section, we aim to show that this firm has a robust internal hiring process that facilitates movement within the firm. The unique benefit of limiting the scope to internal recruitment and looking specifically at which employees put themselves forward for opportunities within the firm is that we can capture both the candidate pool at risk of applying and the applicant pool that selects into the process. More specifically, the candidate pool is composed of the employees active at the time of the posting, and the actual internal applicants are the employees that actually submit an application. Furthermore, in this context, we have access to administrative data on prospective applicants (i.e., existing employees),

most notably, a reliable gender field, which is often not the case when studying those who did not apply to a firm.

4 Research Questions

Stemming from the gap we outlined above, our analysis is motivated by the following key research question: Do women put themselves forward less than men? Specifically, are women less likely to apply for internal job openings than men? To address this question, we turn to the application rates for internal postings by gender as the key dependent variable. In other words, are there gender differences in application rates for an internal job opportunity?

Further, we suspect that gender differences may vary by level of the organization or by the type of move that people are seeking. Applying for a demotion versus a lateral move versus a promotion can have drastically difference consequences on the trajectory of one's career. If there are gender differences in how people advance upwards (or not), this can make a difference in representation at higher levels of the organization. Therefore, we also aim to examine if women and men in this organization behave differently in response to demotion, lateral, and promotion opportunities.

5 Setting

5.1 Data

To answer these questions, we study application rates in the internal recruitment process of a multi-national biopharmaceutical company. In this firm, all job openings are posted for a minimum of three business days through the internal career portal, to which all active employees have access. The company uses a standard enterprise software for application posting and tracking common to firms this size, and employees can view job descriptions and apply to opportunities through this system. This is the same software used for external hiring, so all applicants receive the same information about the job opportunity. Furthermore, all employees are already integrated and familiar with the application interface, as they used the system when initially hired into the firm. All active employees have access to the job openings, and the official stance of the firm is to encourage people to seek out career growth opportunities internally through this process.

The internal recruitment process that takes place here is for full-time employees who fill a job opening in a competitive recruitment process.[1] This contrasts with an internal move, where a full-time employee is slated or moved to a new role (process as a transfer or a non-competitive, in-line promotion—these moves are *not* posted to the internal career portal). In the descriptive data section, we will show statistics to support that this internal recruitment process is part of a robust internal labor market that provides valuable insight into people's application decisions.

The data used in this study come from two datasets provided by the organization. The first is the annual employee census for years 2013 to 2018, reflecting information about each active employee at the time of collection. There are 12,676 employees over the six-year analysis period. Individual employees are identified by a unique employee ID number, and the dataset includes information on which role they were in at any given time. The second dataset is application data for open job postings from 2014 to 2017. Over the four years available, there are 8,046 applications submitted by 2,704 internal applicants. Unique applicants are identified by a candidate ID number (consistent for the same individual across applications). The dataset indicates both internal candidates and successful hires. Importantly, we have reliable gender information for both employees and applicants.

A key variable essential to our analysis is hierarchical level. In this firm, a Job Level is an organization-wide pay bracket designation for each role, both held and posted. The pay brackets are standardized across all functions and business units. Job Levels are further described as the following job bands: Individual Contributors (1-5); Managers (6-8); Senior Managers and Directors (9-11); Vice Presidents, Senior Vice Presidents, and Chief Executives (12-13). To uphold the anonymity of the firm, we report hierarchical findings using the organization-designated job bands, and we censor the counts for the top levels of the firm (Vice Presidents, Senior Vice Presidents, and Chief Executives). In the main analysis, however, we use Job Level to define key variables such as move type and origin job level.

[1] Slotting is a hiring process whereby candidates are identified and slotted into an open job, rather than invited to apply and potentially compete with other applicants (cf Keller 2018). There is a possible concern that job openings are officially posted but informally known to be associated with a slotted position, thus discouraging people from applying. In Appendix Section 12.5, we consider the possibility of slotted jobs in our data, and even after excluding those cases, we can replicate our results.

5.2 Internal Labor Market

The firm maintains a robust internal labor market that provides the setting for our analysis. As presented in Table 1, there are 8,264 job openings posted from 2014 to 2017, which attracted a total of 237,447 applications from both internal and external candidates. 4,113 (49.8%) of all job openings were filled, and 3,477 (42.1%) of all job openings attracted at least one internal applicant. In 1,268 (15.3%) job openings, the hired candidate was an internal applicant, reflecting the fact that in practice, employees used to internal career portal to apply to new job opportunities. We restrict our analysis to the 4,113 job postings that resulted in a successful hire.

Table 1. Job Openings and Applications Submitted (2014-2017)

	Number of Job Openings	Number of Applications
Total Job Openings	8,264	237,477
Filled Job Openings	4,113	119,408
Job Openings with an Internal Application	3,477	139,681
Job Openings Filled by an Internal Hire	1,268	25,423

Through this recruitment process, employees also competed with external candidates. Table 2 compares the counts and outcomes of applications from external and internal sources. 3.4% of applications observed during the study come from internal applicants, and 2.9% of unique applicants are active employees at the time of application. Yet despite the low proportion of internal applications compared to external considerations, 30.8% of hires are internal.[2] This suggests that internal applicants are better received in the hiring process and find success through internal career growth relative to the competition they meet from external sources.[3]

[2] Although we will get into much greater detail about this later, it is worth noting here that the gender composition of the external and internal applicant pools is different. There seems to be a relationship between internal and female; externally, women are underrepresented in application and hire, but internally, they are about equally or overrepresented.

[3] Analysis in Appendix Section 12.1 (logit models predicting hire) confirms that internal applicants are greatly favored over external candidates. Although not the focus of this paper, the evidence in Appendix Table A1 also shows females are more likely to be hired than males.

Table 2. Outcomes of External and Internal Applications (2014-2017)

	External	Internal
Number of applications	229,431	8,046
Percent Female	*42%*	*50%*
Number of unique applicants	91,642	2,704
Percent Female	*43%*	*52%*
Number of hires	2,848	1,269
Percent Female	*49%*	*56%*

Beyond counts of application, the level of jobs to which people apply is a crucial determinant of mobility and career outcomes. We observe application and hire from internal sources, but we want to be sure that this reflects growth to higher levels of the firm. To do so, we introduce hierarchy into our description by looking at counts of application by job band in Table 3. These counts are limited to job openings that are actually filled at some point in the period of analysis in order to describe actual growth patterns. While the vast majority of applications are external, internal applications are observed to jobs at every hierarchical grouping. In fact, internal applications make up at least 3.5% of the applications received for job openings at any given job band. For opportunities at the highest level of the organization (Vice President, Senior Vice President, and Chief Executives), applications from employees account for 4.2% of submissions. Applications are sparse at the top of the organization, which is expected given the structure of the organization and job level categorization.

Table 3. Applications by Job Band

Target Job Band	Target Job Levels	Number of Applications	Number of Internal Applications	Percent of Applications from Internal
Individual Contributors	1-5	66,299	2,756	4.2%
Managers	6-8	34,990	1,233	3.5%
Senior Managers/Directors	9-11	17,915	720	4.0%
VP/SVP/Chief Executives	12-13	204	11	5.4%
Total	**1-13**	**119,408**	**4,720**	**4.0%**

Note: Counts of applications to filled job openings over period 2014-2017.

6 Empirical Approach

For each job posting, we define the risk set of potential applicants as the employees employed at the time the job opening is posted. Because we have narrowed our focus to the internal application process, we observe not only the employees that submitted an application, but also those that had the opportunity to do so, whether or not they actually applied.

The key dependent variable of interest is the rate of application, defined as the number of people that applied to a job opening divided by the number of people that could have applied. We aim to compare the internal application rates of female and male employees to examine if there is a gender difference in likelihood to apply. The two components of this calculation are (1) the numerator, or the number of submitted applications and (2) the denominator, or the employees that had the opportunity to apply. Therefore, when comparing application behavior between women and men, we need to look at the actual internal applicants as well as the overall employee population.

However, not all types of internal moves are the same. It is possible, and observed, for employees to apply or move to jobs that are at higher job levels, at the same level, or at lower levels—e.g., in the situation where they take a role in a different department. We carefully distinguish among the various types of internal advancement with respect to changes in Job Level in order to account for possible structural features. For example, if men and women have the same likelihood of applying for an internal opportunity, but women are more likely to apply laterally and men are more likely to apply for promotions, this behavior could have substantial effects on gender differences in advancement, and ultimately, representation in the executive suite, and long-run earnings. What matters is not only application but also application to attractive jobs that will bring about the career outcomes that we care about (e.g., higher earnings, management responsibilities, representation in leadership, etc.). Therefore, in our analysis, we aim to capture gender differences in application to the various types of internal moves as well.

7 Possible Structural Explanation

Before calculating application rates and towards a possible structural explanation, we want to better understand the populations of employees and applicants. The distribution of job openings and of employees across the levels of the organization may create a structural feature of the setting

where female and male employees see different types of job moves available to pursue. For an employee occupying a role at a lower rung in the organization, there are more potential promotions available to them (and fewer demotion opportunities) compared to someone employed at a higher level. Therefore, even if there are no gender differences at all in the propensity to apply to job openings, women being concentrated in lower levels of the organization can affect the application rate for different kinds of openings via this structural fact. To the degree that women are concentrated in lower levels of the organization, there are likely to be gender differences in application rates reflecting the fact that women face fewer demotion opportunities but more promotion opportunities. Much lab-based research has focused on the extent to which men and women's propensity to negotiate or pursue opportunities is intrinsic to the person with the goal of "fixing the women" (Recalde & Vesterlund 2020). However, isolating the influence of these structural factors is critical for understanding the ways in which real-world institutional patterns contribute to gender differences in observed application behavior.

In particular, we need to consider how the availability of job openings and the gender composition of the firm interacts with the firm hierarchy. Recall that our empirical approach enlists the number of women and men available to apply as the denominator of our application rates. If there is a level difference in where women and men are employed at the firm, this difference will be reflected in the denominator of the calculation.

First, we look at where people are employed in the organization. This determines the Job Level from which they apply, which we call the "origin job level." Inequality and changes in the gender composition of Job Levels throughout the organization may reveal that the sets of demotion, lateral, and promotion opportunities for consideration are different for female and male employees. Table 4 shows the growth and gender composition by job band for 2013 and 2018. The firm grew overall 15% in number of employees over the course of the study. This growth was driven by the middle and top levels of the firm (Managers, Senior Managers, and Directors), which reflects that there are application and advancement opportunities available. In 2013, the overall firm was 52% female. A closer look at the gender composition of the firm taking hierarchy into consideration reveals that there is slight variance in the proportion of women at each level. Women make up 58% of Individual Contributors (Levels 1-5), 50% of Managers (Levels 6-8), and 44% of Senior Managers & Directors (Levels 9-11). In each subsequent year to 2018, the overall gender breakdown remains very close to 50-50, with no major shift in representation by job level in any

given year. The differential growth in the composition of the firm has not been apparently gendering. Most importantly, here we can see that women are concentrated at lower levels of the organization, often more represented than men. First, this supports the motivation of the study; while women make up 52% of the firm, they account for only 33% of positions at the highest levels. This is also important because where people are directly affects which opportunities are available to them. Employees at lower levels will actually have more opportunities because they are more able to apply for promotions, thus impacted the calculated application rates.

Table 4. Firm Gender Composition over Time

Job Band	Job Levels	Percent Change (2013 - 2018)	Percent Female (2013)	Percent Female (2018)
Individual Contributors	1-5	-2%	58%	54%
Managers	6-8	23%	50%	50%
Senior Managers/Directors	9-11	33%	44%	45%
VP/SVP/Chief Executives	12-13	3%	33%	35%
Total	**1-13**	**15%**	**52%**	**50%**

Next, we are interested in where job openings are in the organization. We call the Job Level of the internal job opening the "target job level." Just as it matters where people are in the firm because it affects their relative position to openings, it is also important to look at where the job openings are to see what opportunities people are considering in their application behavior. Table 5 categorizes the job openings posted from 2014 to 2017 into the target job band based on the target job level. There is a non-trivial number of opportunities for positions in middle and upper management: 61% of job openings are for jobs in levels 6-11 (Managers, Senior Managers, and Directors).

Table 5. Job Openings by Target Job Band

Target Job Band	Target Job Levels	Number of Job Openings	Percent of All Job Openings in Job Band	Percent Female Employees (2013)
Individual Contributors	1-5	626	38%	54%
Managers	6-8	607	37%	50%
Senior Managers/Directors	9-11	403	25%	45%
VP/SVP/Chief Executives	12-13	7	0%	35%
Total	**1-13**	**1,643**	**100%**	**50%**

Note: Counts of filled job openings over period 2014-2017.

Finally, we want to get a sense of where employees are actually applying. Table 6 shows the observed internal applications by target job band. Internal applications are observed in each job band, and there is no observed drop off in participation from any gender in any hierarchical grouping. Overall, women submit 51% of the observed internal applications and at least 45% of applications in any given job band.

Table 6. Observed Internal Applications by Target Job Band

Target Job Band	Target Job Levels	Number of Applications	Number of Female Applications	Percent Female
Individual Contributors	1-5	1,824	949	52%
Managers	6-8	983	513	52%
Senior Managers/Directors	9-11	653	312	48%
VP/SVP/Chief Executives	12-13	11	5	45%
Total	**1-13**	**3,471**	**1,779**	**51%**

Note: Counts of applications to filled job openings over period 2014-2017.

8 Application Rate Analysis

8.1 Restricted Risk Set

The foundation of this analysis rests on defining an appropriate risk set of internal candidates for each job opening. We aim to capture the employees that would reasonably consider whether or not to apply for the job. Too broad a definition leads to unreasonable features; for example, zero restrictions would put the CEO in the risk set for entry level positions. However, strict assumptions about the jobs people are willing to consider may be too limiting to account for the way people navigate their careers in today's world, and we do not want to impose certain expectations.

Table 7 presents the complete accounting by detailed job level of all internal applications in our analysis period. The most empirically common application trend is one level up (+1), accounting for 34.2% of internal applications. The second most common is application to a lateral position (level change 0), accounting for 33.3%. But there are also observed applications to demotions (10.7%) and to promotions for more than one level above (21.8%). Female employees are not applying exclusively to lower or higher positions. Women are present everywhere, although application numbers do get thin at the tails and should not be overanalyzed. If anything, they are overrepresented in application to promotion and well-represented in application to lateral moves.

Table 7. Observed Internal Applications by Job Level Change

Job Level Change	Number of Internal Applications	Number of Female Internal Applications	Percent Female
-5	4	0	0%
-4	3	2	67%
-3	13	7	54%
-2	72	31	43%
-1	279	109	39%
0	1,155	589	51%
+1	1,187	636	54%
+2	533	274	51%
+3	153	86	56%
+4	52	33	63%
+5	13	8	62%
+6	5	2	40%
+7	2	2	100%
Total	**3,471**	**1,779**	**51%**

Notes: Job Level Change is the Target Job Level minus Origin Job Level.
Counts of applications to filled job openings over period 2014-2017.

Empirically, we observe internal applications to positions up to five levels lower or seven levels higher than the origin job level. Therefore, we impose a refinement of the eligibility definition to mirror that range of Job Level changes and consider only the set of potential applications where the difference between the origin job level and the target job level is between -5 and +7. Based on this refinement, we can explicitly define each move type as follows. A "demotion" describes an application to a job opening that is one to five levels lower than the applicant's origin job level. A "lateral" move describes an application where the origin job level is the same as the target job level. A "promotion" describes an application to a job opening that is one to seven levels higher than the applicant's origin job level. For each job posting, we define the risk set of potential applicants as the set of people employed at the time of the job posting and occupying a role within the -5 to +7 range of job level changes.[4] The risk set includes those employees who actually submit an application, with a binary variable to indicate an observed application as the key dependent variable.

Based on the refinement above, we end up with 10,963,717 potential applications that could have been submitted to a job opening during the analysis period. With this risk set as the denominator and the set of observed applications as the numerator, we compare the application rates of female and male employees to internal job openings, also considering the origin job level and type of move (demotion, lateral, or promotion).

8.2 Comparison of Application Rates

To calculate application rates, we start with the numerator, or the number of observed applications. Panel A of Table 8 shows that there are 3,471 observed applications, skewed towards promotions (56.0%), with a moderate number of lateral applications (33.3%) and few towards demotions (10.7%). Women submit 51.3% of applications, accounting for a higher proportion of promotion applications and a lower proportion of demotion applications than men.

In Panel B of Table 8, we consider the denominator, or the number of potential applications based on eligible employees at the time of the job posting. There are 10,963,717 potential applications, 50.2% of which come from female employees. However, the gender composition of

[4] In Appendix Section 12.2, we use an alternative restriction of the risk set to the range of -1 and +1 job level changes and replicate the analysis. The main findings are the same.

potential applications by move type reveals the need to look at hierarchical structure. Because women are concentrated in lower levels of the organization, there are more opportunities for promotions available. Women see 52.1% of promotions openings and 48.1% of demotion openings. This points again to the structural effect in job opportunities that we posited above.

Comparing Panel A and Panel B of Table 8, we see that given where women are employed at the time of job posting, women apply to demotions less than the availability (40.2% vs. 48.1%). The proportion of women in the risk set of lateral moves is nearly indistinguishable from the proportion of women in the candidate pool of lateral moves (51.0% vs. 50.0%). Women apply to promotions somewhat more than the availability (53.5% vs. 52.1%). Overall, women participate more than men in the internal application process compared to their risk of participation (51.3% vs. 50.2%).

In Panel C of Table 8, we compare application rates by gender. Women are slightly more likely to apply in general, although slightly less likely to apply for demotions. This initial comparison of rates is a gross analysis that controls for nothing but captures the importance of including structural components for the main analysis.

Table 8. Internal Application Rates by Gender

	Panel A Observed internal applications (Numerator)				
Move type	Total	Percent of All Move Types	Female	Male	Percent Female
Demotion (-5 to -1)	371	10.7%	149	222	40.2%
Lateral	1,155	33.3%	589	566	51.0%
Promotion (+1 to +7)	1,945	56.0%	1,041	904	53.5%
Total	**3,471**	**100%**	**1,779**	**1,692**	**51.3%**

	Panel B Potential internal applications (Denominator)				
Move type	Total	Percent of All Move Types	Female	Male	Percent Female
Demotion (-5 to -1)	4,491,475	41.0%	2,162,482	2,328,993	48.1%
Lateral	1,267,383	11.6%	634,059	633,324	50.0%
Promotion (+1 to +7)	5,204,859	47.5%	2,709,305	2,495,554	52.1%
Total	**10,963,717**	**100%**	**5,505,846**	**5,457,871**	**50.2%**

	Panel C Internal application rates		
Move type	Female Rate (x100)	Male Rate (x100)	Female - Male Rate
Demotion (-5 to -1)	0.0069	0.0095	-0.0026
Lateral	0.0929	0.0894	0.0035
Promotion (+1 to +7)	0.0384	0.0362	0.0022
Total	**0.0323**	**0.0310**	**0.0013**

Note: Observed and potential applications to filled job openings over period 2014-2017.

9 Main Analysis

9.1 Controls

In addition to capturing the risk set of applicants, another benefit of working with the internal labor market is that we observe strong and standardized controls for applicants based on the employee information collected and tracked by the organization. We have complete information about age and job tenure of all employees. Also, for each year, we observe the performance rating received by their direct manager, which are standardized into rating groups across the entire firm. Therefore, we can add these characteristics of the employees as controls for the internal applicants into our regression analysis.

In Table 9, we present the age[5] and job tenure[6] statistics of employees, observed applications, and potential applications by gender. In 2018, on average, the female employees are younger and have shorter job tenure than the male employees. Observed internal applicants tend to be younger and have shorter job tenure than the firm overall, while observed female internal applicants apply with longer job tenure than observed male internal applicants.

[5] Applicant age is derived from employee date of birth and date of application. Date of birth is missing for 8% of employees, but there is no difference in the gender breakdown of employees with that missing information (i.e., women are not more or less likely than men to have missing age). There are no missing age observations for the set of observed or potential internal applications.

[6] Job tenure is derived as the difference between employee start date at the firm and date of application. Job tenure data is complete for all observations.

Table 9. Age and Job Tenure by Gender

	Panel A Employees (2018)				
	Obs	Mean	SD	Min	Max
Age	**6,899**	**43.49**	**9.01**	**20.04**	**73.71**
Female	3,428	42.88	8.93	20.04	70.58
Male	3,471	44.09	9.04	22.93	73.71
Job Tenure	**7,508**	**2.08**	**2.12**	**0**	**14.44**
Female	3,743	1.96	1.97	0	14.44
Male	3,765	2.19	2.26	0	14.25

	Panel B Observed internal applications				
	Mean	SD	Min.	Max.	Obs.
Age	**3,471**	**37.12**	**8.60**	**21.54**	**65.54**
Female	1,779	36.92	8.66	21.54	65.54
Male	1,692	37.33	8.54	21.87	60.65
Job Tenure	**3,471**	**1.73**	**1.40**	**0**	**11.46**
Female	1,779	1.86	1.41	0	10.17
Male	1,692	1.59	1.37	0	11.46

	Panel C Potential internal applications				
	Obs	Mean	SD	Min	Max
Age	**10,963,717**	**42.28**	**8.74**	**20.16**	**79.45**
Female	5,505,846	41.64	8.68	20.16	71.30
Male	5,457,871	42.92	8.75	20.82	79.45
Job Tenure	**10,963,717**	**2.02**	**1.90**	**0**	**13.88**
Female	5,505,846	1.90	1.72	0	13.88
Male	5,457,871	2.14	2.07	0	13.69

Notes: Date of birth missing for 609 employees. No difference in gender breakdown of observations with missing age.
Potential applications restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.
Counts of observed and potential applications to filled job openings over period 2014-2017.

The firm evaluates its employees on an annual basis. Based on feedback from key stakeholders (e.g., other managers, project leaders, team members, internal customers, peers, and direct reports), direct managers will determine an overall performance rating that is discussed with the employee and used to make compensation and promotion decisions. That overall performance rating is categorized into five ratings: 1 (lowest) to 5 (highest). By organizational policy, less than twenty percent of employees can achieve a rating of 4 or 5. This variable can be missing from the dataset if an employee was not rated—for example, if they recently joined the firm or a department and could not be fully evaluated during the review period.

In Table 10, we present the breakdown of employees, observed applications, and potential applications into performance ratings based on the last rating received before application. In 2018, 84% of employees were given a rating. 62% of employees receive a rating of 3. Women account for a larger proportion of employees evaluated as 4 and 5 performers and for a smaller proportion of employees evaluated as 1 and 2 performers. The proportion of observed and potential applications from each rating mirrors the distribution of employees. Overall, actual observed applicants do not seem to be very selected at all. 62% of employees as well as internal applicants are rated 3, and 20% of employees compared to 22% of internal applicants are rated 4 or 5. More women than men receive a rating of 4 or 5, among both employees and internal applicants.[7]

[7] Gender differences in performance evaluation is another relevant mechanism through which women and men may reach different levels of achievement in an organization (Foschi 1996). While not the focus of this paper, the performance rating process in this firm can certainly have an effect on application behavior and hiring outcomes, as it is a common metric used to provide feedback to employees and evaluate applicants. If anything, the rating system in this analysis favors women.

Table 10. Performance Rating Group by Gender

	Panel A Employees (2018)			
Rating	Total	Percent of Total	Female	Percent Female
5 (high)	161	2%	90	56%
4	1,324	18%	678	51%
3	4,659	62%	2,286	49%
2	130	2%	55	42%
1 (low)	4	0%	1	25%
No Rating	1,230	16%	633	51%
Total	**7,508**	**100%**	**3,743**	**50%**

	Panel B Observed internal applications			
Rating	Total	Percent of Total	Female	Percent Female
5 (high)	94	3%	50	53%
4	667	19%	366	55%
3	2,135	62%	1,144	54%
2	76	2%	35	46%
1 (low)	0	0%	0	-
No Rating	499	14%	184	37%
Total	**3,471**	**100%**	**1,779**	**51%**

	Panel C Potential internal applications			
Rating	Total	Percent of Total	Female	Percent Female
5 (high)	245,015	2%	126,582	52%
4	1,988,436	17%	1,014,317	51%
3	6,980,786	59%	3,492,647	50%
2	227,539	2%	113,424	50%
1 (low)	10,239	0%	7,025	69%
No Rating	1,511,702	13%	751,851	50%
Total	**10,963,717**	**92%**	**5,505,846**	**50%**

Notes: Observed and potential applications to filled job openings over period 2014-2017. Potential applications restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.

9.2 Logit Regression Models

Table 11 presents logit regression models to predict internal application for male and female employees[8], with robust standard errors clustered at the employee level. Coefficients are reported as odds ratios. Model 1 is a baseline model, regressing application on the dummy variable for gender and with year of application fixed effects. The effect of gender is not significant. Model 2 controls for move type, with lateral as the reference category. Application to lateral moves is most likely, followed by application to promotions and then application to demotions. However, the effect of gender remains insignificant. Model 3 controls for origin job level as a continuous variable, and Model 4 controls for origin job level as a series of dummies. The effect of origin job level is significant—being higher up in the organization decreases the likelihood of application—but controlling for origin job level as a continuous variable or series of dummy variables does not change the effect or significance of gender or move type on application. In each of these models, there is no evidence that women are more or less likely to apply than men.

Next, we add terms interacting the controls with gender to determine if the likelihood of application in pursuit of a certain type of move reveals a significant gender effect. Table 12 presents three additional models with various interaction terms included. If women are less likely to apply for promotions, we would expect there to be a negative interaction term for promotions from women. Model 5 controls for move type and move type interacted with gender, still using lateral as the reference category. The effects of move type remain the same after including the gendered interaction terms, which themselves are not significant. Model 6 adds a control for origin job level as a continuous variable, which has no substantial impact on the significance of any effects. In Model 7, we add the interaction term between origin job level and gender, which is not significant. Across all three models, no gender effect is significant at the 5% level. There is no evidence here that women are stunting their own advancement by underselling themselves.

We add the previously discussed controls to the analysis: age, job tenure, and performance rating. In Table 13, we add job tenure and applicant age in Model 8, as well as performance rating group in Model 9. These models show that the older the employee, the less likely to apply, but job tenure and past performance rating have no statistically significant effect on application.

[8] Recall that we limit the risk set of potential internal applications to employees who would be applying to job openings with job level change -5 to +7 to be conservative, while reflecting empirical application behavior.

Table 14 continues the extended analysis by including gendered interaction terms with the added controls. After including the interaction between gender and job tenure as well as gender and applicant age in Model 10, we see that the effect of gender on application remains insignificant. There is a small, but statistically significant positive effect of *job tenure x female*. Model 11 shows that including interaction terms with gender and performance rating group, the direct effect of gender remains insignificant, the significance of *job tenure x female* weakens, and the significance of the other gendered interaction is insignificant. With the additional applicant controls we observe through the firm's data on its employees (i.e., our risk set of applicants), we continue to see few differences between application behavior of women and men in our focal firm.

Table 11. Logit Models Predicting Internal Application (Odds Ratios)

VARIABLES	Model 1	Model 2	Model 3	Model 4
Female	1.041	1.011	0.965	1.016
	(0.0810)	(0.0779)	(0.0751)	(0.0768)
Move type (ref: Lateral)				
Demotion		0.0909***	0.121***	0.110***
		(0.0103)	(0.0155)	(0.0152)
Promotion		0.407***	0.282***	0.290***
		(0.0217)	(0.0220)	(0.0267)
Origin job level *(1=low, 13=high)*			0.786***	
			(0.0222)	
Origin job level fixed effects	No	No	No	Yes
Constant	0.000367***	0.00105***	0.00468***	0.000655***
	(3.31e-05)	(0.000109)	(0.00111)	(7.82e-05)
Observations	10,963,717	10,963,717	10,963,717	10,963,717

Notes: Robust standard errors in parentheses, clustered at the employee level.
*** p<0.001, ** p<0.01, * p<0.05
Risk set restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.
All models include year fixed effects.

Table 12. Logit Models Predicting Internal Application (Odds Ratios) with Interaction Terms

VARIABLES	Model 5	Model 6	Model 7
Female	1.040	0.968	0.617
	(0.112)	(0.106)	(0.225)
Move type (ref: Lateral)			
Demotion	0.107***	0.143***	0.151***
	(0.0171)	(0.0245)	(0.0280)
Promotion	0.403***	0.273***	0.257***
	(0.0323)	(0.0291)	(0.0329)
Move type x gender (ref: Lateral x female)			
Demotion x female	0.695	0.691	0.620
	(0.155)	(0.154)	(0.155)
Promotion x female	1.019	1.066	1.195
	(0.107)	(0.115)	(0.182)
Origin job level *(1=low, 13=high)*		0.785***	0.753***
		(0.0224)	(0.0346)
Origin job level x female			1.087
			(0.0599)
Constant	0.00104***	0.00469***	0.00587***
	(0.000120)	(0.00117)	(0.00198)
Observations	10,963,717	10,963,717	10,963,717

Notes: Robust standard errors in parentheses, clustered at the employee level.
*** p<0.001, ** p<0.01, * p<0.05
Risk set restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.
All models include year fixed effects.

Table 13. Logit Models Predicting Internal Application (Odds Ratios) – Additional Controls

VARIABLES	Model 3	Model 8	Model 9
Female	0.965	0.915	1.020
	(0.0751)	(0.0710)	(0.0800)
Move type (ref: Lateral)			
Demotion	0.121***	0.121***	0.0948***
	(0.0155)	(0.0154)	(0.0107)
Promotion	0.282***	0.282***	0.415***
	(0.0220)	(0.0221)	(0.0292)
Origin job level *(1=low, 13=high)*	0.786***	0.827***	0.932**
	(0.0222)	(0.0247)	(0.0246)
Job tenure		1.000	1.000
		(6.00e-05)	(4.96e-05)
Applicant age		0.951***	0.939***
		(0.00537)	(0.00490)
Performance rating (ref: Rating 3; 1=low, 5=high)			
Rating 5			1.054
			(0.130)
Rating 4			1.063
			(0.0720)
Rating 2			1.180
			(0.257)
Constant	0.00468***	0.0280***	0.0140***
	(0.00111)	(0.00787)	(0.00398)
Observations	10,963,717	10,963,717	9,441,776

Notes: Robust standard errors in parentheses, clustered at the employee level.

*** p<0.001, ** p<0.01, * p<0.05

Risk set restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.

All models include year fixed effects.

Table 14. Logit Models Predicting Internal Application (Odds Ratios) – Additional Controls with Interaction Terms

VARIABLES	Model 7	Model 10	Model 11
Female	0.617	0.552	0.659
	(0.225)	(0.267)	(0.341)
Move type (ref: Lateral)			
Demotion	0.151***	0.150***	0.101***
	(0.0280)	(0.0276)	(0.0165)
Promotion	0.257***	0.255***	0.448***
	(0.0329)	(0.0329)	(0.0529)
Origin job level *(1=low, 13=high)*	0.753***	0.787***	0.955
	(0.0346)	(0.0384)	(0.0443)
Job tenure		1.000**	1.000
		(0.000103)	(8.26e-05)
Applicant age		0.955***	0.931***
		(0.00870)	(0.00801)
Performance rating (ref: Rating 3; 1=low, 5=high)			
Rating 5			1.012
			(0.185)
Rating 4			1.004
			(0.105)
Rating 2			1.625
			(0.499)
Move type x gender (ref: Lateral x female)			
Demotion x female	0.620	0.626	0.888
	(0.155)	(0.156)	(0.199)
Promotion x female	1.195	1.206	0.865
	(0.182)	(0.185)	(0.125)
Origin job level x female	1.087	1.108	0.956
	(0.0599)	(0.0629)	(0.0516)
Job tenure x female		1.000***	1.000*
		(0.000118)	(9.99e-05)
Applicant age x female		0.991	1.016
		(0.0109)	(0.0108)
Performance rating x gender (ref: Rating 3 x female)			
Rating 5 x female			1.079
			(0.268)
Rating 4 x female			1.117
			(0.153)
Rating 2 x female			0.539
			(0.233)
Constant	0.00587***	0.0358***	0.0175***
	(0.00198)	(0.0144)	(0.00761)
Observations	10,963,717	10,963,717	9,441,776

Notes: Robust standard errors in parentheses, clustered at the employee level.
*** p<0.001, ** p<0.01, * p<0.05
Risk set restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.
All models include year fixed effects.

9.3 Within-Person Fixed Effects

Missing from the analyses so far is addressing the fact that there is unobserved heterogeneity between the subjects. We do not have random assignment, but we can leverage the fact that people are at risk multiple times over the analysis period and that we do in fact observe multiple applications from one person. Table 15 categorizes applicants based on their observed application behavior. We have seen earlier that the pool of observed applicants is 51% female. Here, we note that women also make up 54.3% of single applicants and 54.0% of repeat applicants. This suggests that women are proportionately represented in the subset of employees that are particularly active or persistent in the internal labor market.

Table 15. Types of Internal Applicants

Subset	Total	Female	Percent Female
Observed Internal Applicants	1,629	882	54.1%
Applicants with a Single Application	960	521	54.3%
Applicants with Multiple Applications	669	361	54.0%

Note: Counts of applicants with applications to filled job openings over period 2014-2017.

We can consider the differences across types of applicants, particularly for the distinction between "single applicants" (those who submit exactly one application) and "repeat applicants" (those who submit more than one application over the analysis period).[9] Using the latter subset, we can add within-person fixed effects to remove some of the unobserved factors across the employees of the firm, so long as they remain unchanged for an individual between application submissions. The results are presented in Table 16, where we test two different specifications: linear probability in Model 12 and conditional logit in Model 13. The results are substantially the same across the two parameterizations. Within-person and among the people are apply more than

[9] There is an existing line of research on the mechanisms that might contribute to differences in these categories. Brands & Fernandez-Mateo (2017) and Fernandez-Mateo et al. (2022) observe situations where women are less likely to reapply to opportunities after experiencing a rejection. We speculate that there is another story about willingness to apply again, which could reasonably be gendered. For example, perhaps if you are rejected once, you are less likely to apply a second time, due to discouragement, fear of rejection, expectation of discrimination, etc. But among the people that do reapply, women are seeking promotions at higher rates than men.

once, application to promotion and demotion is less likely than lateral. Because we do not observe gender changing over time within any employee, there is no main effect of *female*. However, through the gendered interaction terms, we can consider if the within-person effect is different for men and women. In the conditional logit model (Model 13), we see that female repeat applicants are more likely to apply for promotions in both models, and in the conditional logit model, less likely to apply to demotions and more likely to apply to promotions than male repeat applicants. If anything, this shows that these women have their eyes on opportunities even higher than comparable men. Overall, we can account for some of the unchanging unobserved heterogeneity in this population, and this still does not show any evidence that women are leaning out of advancement opportunities.

Table 16. Within-Person Fixed Effects for Repeat Applicants

VARIABLES	Model 12: Linear Probability	Model 13: Conditional Logit (Odds Ratios)
Move type (ref: lateral)		
Demotion	-0.00726***	0.214***
	(0.000895)	(0.0197)
Promotion	-0.00853***	0.170***
	(0.00135)	(0.0119)
Move type x gender (ref: lateral x female)		
Demotion x Female	0.000717	0.605***
	(0.00106)	(0.0856)
Promotion x Female	0.00290	1.679***
	(0.00153)	(0.163)
Origin job level *(1=low, 13=high)*	-0.00206***	0.458***
	(0.000340)	(0.0318)
Origin job level x female	0.000714	1.221*
	(0.000398)	(0.107)
Constant	0.0182***	
	(0.000721)	
Observations	844,038	844,038
Number of employees	669	669

Notes: Robust standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05

Risk set restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.

Within-person fixed effects based on unique employee number.

All models include year fixed effects.

10 Conclusion

10.1 Summary

We observe the internal job openings posted to all employees and filled during the period 2014 to 2017 at a large, multi-national biopharmaceutical company. We then extract the risk set of internal applicants—employees working at the firm at the time of the job posting—and with refinements to eligibility requirements to be considered "at risk," we analyze the likelihood of application to an internal job opening. Our driving question is whether there is a gender difference in that likelihood. Such a gender difference is not just the rate at which men and women apply, but also the trajectory of those applications, i.e., whether they apply to promotions, lateral positions, or demotions. We could observe the same rates of application, but, for example, if men are more ambitious in applying to higher positions and women are more likely to apply laterally, then we would still see differences in advancement. Thus, we are careful to consider the structural features of the firm, both by controlling for origin job level of the applicant and the relative level of the job opening. Beyond hierarchical structures, we include controls for applicant age, job tenure, and performance evaluation, as well as robustness checks to consider geographic and departmental mobility. Ultimately, we do not find any evidence that women are apply to internal opportunities differently than men.

The key contribution of this paper is the investigation of gender differences in selecting into the advancement process. By focusing on the internal labor market, we can observe the search-to-apply stage and determine if men and women are putting themselves forward to be considered for growth opportunities in the same way. As is often the case, we observe that women are concentrated at lower levels of the organization. However, we find no evidence of gender differences in the likelihood of applying for internal job openings in this firm. We find little evidence of women being under-selected once they apply (see Appendix Section 12.1). Combined, these findings suggest that the relative absence of women in higher levels of the organization is not explained by gendered application behavior on the supply side. In this setting, internal mobility cannot account for gender inequality observed at the top of the organization.

10.2 Limitations

This is a detailed analysis of one firm. We do not claim generalizability of our findings to all women, to all organizations, or to external application. This is an established company in the

biopharmaceutical industry, where women are highly educated and make up the majority rather than a small token of employees. Compared to the overall pipeline described in the introduction (48% women at the entry level to 20% women in the C-suite), the Pharmaceuticals & Medical Products industry experiences a weaker glass ceiling, with 56% women at the entry level down to 28% women in the C-suite (Yee et al. 2018). While this reveals the same broad trend, the magnitude is not as severe as other industries (such as Food and Beverage Distribution and IT Services and Telecom), and consistent with the firm data, this industry is able to attract entry-level women.

This firm also has an active internal labor market where people are encouraged to advance and likely witness their peers and coworkers making job changes. There are formal processes for evaluation, application, promotion, and hiring, which is not always the case in organizations. The career portal itself is also an important feature to keep in mind. Formalization of the application and hiring process in this way can often provide transparency and signal a degree of procedural justice that may encourage women to apply more actively (Gee 2019, Lemons 2003). The high representation of women in this firm and amongst realized hires can also increase the willingness to apply of the female employees. Being familiar with this firm's processes and exposed to other advancing women is a specific contextual consideration that can contribute to the high levels of participation of women in this firm.

Our findings could certainly be a feature of this particular setting. We also do not attempt to prove or test underlying mechanisms behind application decisions. However, we hope to contribute to the conversation with this detailed case. One particularly area of focus has been to study the supply-side, i.e., the applicants in the advancement pipeline, to understand if and how women and men might be different in planning their careers or pursuing job opportunities. The benefit of focusing on one firm with rich internal employee data is that we are able to observe processes that we do not normally get to see, namely the set of prospective applicants at risk for job opportunities.

Notably, another limitation of this set-up is that we are restricting the analysis to internal applicants. The prospective applicants are already particular in that they have chosen to apply and work at this firm in the first place—and have further been successful in doing so. We do not claim that this population of workers is representative of the workforce or even of the external labor market in this industry. There are significant differences in the information, signals, and firm-

specific skills of the internal versus external labor market; for example, within the internal labor market, the firm and the applicants have a better idea of performance, fit, and expectations, since they are already engaged in an employment relationship (Bidwell 2011). It has also been documented that the paths, strategies, and returns to internal versus external mobility are not the same (Bidwell & Mollick 2015). We cannot say that the supply-side behavior we observe in this firm would be consistent with external applicants, even those applying to the same positions. However, we do consider the internal labor market a valuable focus of study, as it is still a common pathway for advancement in this firm and in many careers in general. Organizations will often lean on their existing employees to fill positions through the internal labor market and will often experience higher performance and lower turnover as a result (Bidwell & Keller 2014, Benson & Rissing 2020). Therefore, studying the behavior of internal applicants within this firm can still provide a clearer understanding of how gender differences in long-term career outcomes arise.

10.3 Discussion

The results of no results may seem anticlimactic; however, we believe this case can challenge our assumptions and contribute to our understanding of the barriers to female representation. The conversation around gender equality in the workplace often circles around the topic of advancement. We will not experience equality at the top of organizations if women are not progressing upwards in their careers in a similar trajectory as men; therefore, much work has been done to theorize explanations for the observed and persistent inequality. The literature has many ideas of gendered constraints that women face in terms of advancing in the workplace, many of which propose that supply-side behavior is different in the way women and men pursue jobs. Despite genuine efforts to support DEI resources and to address bias in the system, we still commonly observe glass ceilings, including at the firm in this case. We turn to the job seekers to understand how their behavior might factor in.

There is often a confidence or ambition story at the center of supply-side explanations. For many reasons, we might suspect that women are less likely to apply to advancement opportunities. Women are hypothesized to have a subdued taste for leadership responsibilities compared to men (Haegele 2023) or to be less confident than men in their abilities (Sterling et al. 2020). In fact, in popular media, there has been encouragement for women to "lean in" (Sandberg 2013) and to "stop thinking so much and just act" (Kay & Shipman 2014). If women are constrained by their

preferences for leadership, ambition, or confidence in getting ahead, we would expect to see lower application rates to those opportunities.

Women could also be responded to certain aspects of the application process; for example, past work has found that women are less likely to compete (Niederle & Vesterlund 2007, Flory et al. 2015, Samek 2019), which could be a factor in the decision to opt into a competitive interview and evaluation process during hiring. Fear of discrimination or reaction to past rejection (Brands & Fernandez-Mateo 2017, De Paola et al. 2017, Dlugos & Keller 2021) could also contribute to women's reluctance to apply. Finally, there is research that suggests women and men respond differently depending how the opportunity is presented (Gee 2019, Castilla & Rho 2023) and the assumptions they make about the job. We might think that women are less likely to apply for any and all of these hypothesized and documented reasons. However, we simply do not observe the empirical outcomes that would serve as evidence for these supply-side processes.

Furthermore, beyond the binary decision to apply, we can also consider the types of opportunities to which women and men apply. We may observe that women apply to jobs at the same rate as men, but gender differences in long-term outcomes could arise if women and men are selecting into different opportunities (e.g., Fernandez & Campero 2017, Barbulescu & Bidwell 2013). We attempt to test this possibility by considering the hierarchical features of the firm and internal labor market. If women are less likely to apply to promotion opportunities than men, they may experience different advancement trajectories within the firm, even if application rates look the same across genders. In this scenario, men would reach higher levels of the organization than women over the long run, even with the same baseline application trends. Yet, even after considering the types of applications in terms of hierarchical movement, we do not see gender differences in application.

The findings in this analysis also have implications for firms and organizational efforts; policies and programs that are crafted solely on the assumption that women lack the confidence or ambition to get ahead may be an inefficient use of resources in tackling gender inequality at the top. Books and career advice that urge women to "lean in" might be missing another part of story. We do not reject the existing theories, nor do we argue that supply-side constraints are not worth studying. However, in this setting, there is very little evidence that women are not leaning into advancement opportunities, or that they're leaning in less than men. If women are facing barriers that have the potential to constrain their application behavior as theorized, women are overcoming

them so that we do not observe gender differences at this firm. The efforts that focus on empowering women are certainly important and often well-intended, but, as seen in this case, it would not be enough to change the application behavior of the women in this firm.

11 References

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12 Appendix

12.1 Predicting Hire

While we focus on application rates, hire rates are still an interesting question worth investigating, as it can reveal a demand-side process that may affect gender inequality in advancement. The firm data used in this study allow for such analysis. Starting with the set of observed applications, we can use logit models to predict hire, presented in Appendix Table A1. We find that, once they apply, internal applicants are 14.96 times more likely to be hired than external applicants, even after controlling for target job level. Adding in gender to the model, women are 44.8% more likely to be hired than men. There is no additional gender effect for female internal applicants or *target job level x female*. These results confirm that internal applicants are seriously considered and even favored in this process, as well as further motivate our study of supply-side processes (as women are more likely than men to advance internally), supporting our focus on the internal recruitment process.

Table A1. Logit Models Predicting Hire (Odds Ratios)

VARIABLES	Model A1	Model A2	Model A3	Model A4
Internal	14.96***	14.97***	14.57***	15.40***
	(0.586)	(0.577)	(0.564)	(0.863)
Target job level *(1=low, 13=high)*		1.086***	1.091***	1.095***
		(0.00800)	(0.00805)	(0.0102)
Female			1.357***	1.448***
			(0.0457)	(0.116)
Target job level x female				0.994
				(0.0115)
Internal x female				0.903
				(0.0680)
Constant	0.00938***	0.00624***	0.00537***	0.00518***
	(0.000455)	(0.000401)	(0.000358)	(0.000398)
Observations	237,477	237,477	237,477	237,477

Notes: Robust standard errors in parentheses, clustered at the job opening level.
*** p<0.001, ** p<0.01, * p<0.05
All models include year fixed effects.

12.2 Alternative Risk Set Restriction

We can use an alternative rule to construct the restricted risk set whereby we consider potential applications as job moves with -1, 0, or +1 job level change. In this case, demotions are defined as application to jobs one level below the job at which the applicant is employed. Similarly, lateral moves are application to the same job level, and promotions are application to jobs one level above. The logit models predicting application in Appendix Table A2 reveal that there is no direct effect of gender on likelihood to apply. All applicants are less likely to apply to demotions than lateral moves, but there is no significant difference between application to lateral jobs and promotions. Compared to men, women are further less likely to apply to demotions than laterals. However, there are no additional gendered effects on the interaction terms for promotion moves and origin job level. There is little evidence that women are less likely to ask.

Table A2. Logit Models Predicting Application (Odds Ratios) – Alternative Risk Set

VARIABLES	Model A5	Model A6	Model A7	Model A8
Female	1.035	1.030	0.955	0.614
	(0.0878)	(0.0872)	(0.0824)	(0.209)
Move type (ref: Lateral)				
Demotion		0.262***	0.301***	0.385***
		(0.0320)	(0.0381)	(0.0696)
Promotion		1.030	0.917	0.848*
		(0.0541)	(0.0521)	(0.0746)
Origin job level *(1=low, 13=high)*			0.742***	0.711***
			(0.0205)	(0.0313)
Move type x gender (ref: Lateral x female)				
Demotion x female				0.586**
				(0.142)
Promotion x female				1.161
				(0.131)
Origin job level x female				1.090
				(0.0574)
Constant	0.000605***	0.000779***	0.00471***	0.00588***
	(4.61e-05)	(6.36e-05)	(0.00092)	(0.00165)
Observations	3,696,216	3,696,216	3,696,216	3,696,216

Notes: Robust standard errors in parentheses, clustered at the employee level.

*** p<0.001, ** p<0.01, * p<0.05

Risk set restricted to applications with Job Level change -1 to +1.

Demotion defined as a job opening one level lower than origin job level.

Lateral defined as a job opening at the same level as origin job level.

Promotion defined as a job opening one level higher than origin job level.

All models include year fixed effects.

12.3 Geographic Location

This firm has an international presence, with many global offices and workers. Our conservative risk set assumes that an application from one geographic region to another is a reasonable consideration. While we believe this to be true, since we empirically and anecdotally observe people making job transitions across offices and regions, it is also valid to think that a major shift in location makes application to a given job opportunity within the firm less likely. It can also be the case that there is variation in behavior by region, such that gender differences in application are hidden by combining all regions together. Finally, men and women may have different family and life responsibilities that may differentially constrain their willingness to relocate for work. To check that our results are not confounded by these geographic factors, we look more closely at the application trends by geographic region.

Appendix Table A3 provides the analysis of where actual employees, observed applications, and potential applications in our risk set are taking place. We see that 60% of employees in 2018 work from an office located in North America and 40% from the rest of the world.[10] On aggregate, the North American offices, and offices outside of North America maintain equal numbers of women and men. In Panel B, we see that North American employees are overrepresented in the set of observed applications, while the rest of the geographic regions are underrepresented. Finally, in Panel C, the risk set mirrors the geographic breakdown of the firm.

[10] For confidentiality reasons, we cannot disclose exact geographic locations, but this firm does have a global presence.

Table A3. Geographic Location by Gender

	Panel A Employees (2018)			
Region	Total	Percent of Total	Female	Percent Female
North America	4,493	60%	2,239	50%
Rest of World	3,015	40%	1,504	50%
Total	**7,508**	**100%**	**3,743**	**50%**

	Panel B Observed internal applications			
Region	Total	Percent of Total	Female	Percent Female
North America	3,070	88%	1,588	52%
Rest of World	401	12%	191	48%
Total	**3,471**	**100%**	**1,779**	**51%**

	Panel C Potential internal applications			
Region	Total	Percent of Total	Female	Percent Female
North America	7,153,600	65%	3,560,667	50%
Rest of World	3,810,117	35%	1,945,179	51%
Total	**10,963,717**	**100%**	**5,505,846**	**50%**

Note: Observed and potential applications to filled job openings over period 2014-2017.

In Appendix Table A4, we observe the actual application trends that would move an applicant from one region to another. Out of the 3,471 observed applications, 115 are from an employee that is in a different region than the job opening to which they apply. 46% of those applications are from women.

Table A4. Observed Internal Application to a Different Geographic Region

	All Internal Applications	Percent Female	Number of Internal Applications to a Different Region	Percent of Applications	Percent Female
Demotion	371	40%	8	2%	13%
Lateral	1,155	51%	31	3%	52%
Promotion	1,945	54%	76	4%	47%
Total	**3,471**	**51%**	**115**	**3%**	**46%**

Note: Counts of applications to filled job openings over period 2014-2017.

We replicate the main logit model to predict application on certain populations of the risk set in Appendix Table A5. In Model A9, we limit to applicants from North America. In Model A10 (and Model A11), we limit the risk set to potential applications where the country (region) of the applicant matches the country (region) of the job opening, suggesting a risk set where employees are only considering internal opportunities in the same country (region). In Model A12, we restrict the analysis to only applications from and to North America. In none of the geographic refinements do we find a significant effect of gender on application.

Table A5. Logit Models Predicting Internal Application (Odds Ratios) – Geographic Changes

VARIABLES	Model A9: North American Applicants	Model A10: Within Country	Model A11: Within Region	Model A12: Within North America
Female	1.011	1.012	0.988	1.008
	(0.0860)	(0.0800)	(0.0773)	(0.0863)
Move type (ref: Lateral)				
Demotion	0.135***	0.123***	0.123***	0.132***
	(0.0189)	(0.0163)	(0.0162)	(0.0185)
Promotion	0.270***	0.287***	0.283***	0.276***
	(0.0231)	(0.0221)	(0.0222)	(0.0228)
Origin job level	0.766***	0.794***	0.788***	0.773***
	(0.0234)	(0.0216)	(0.0217)	(0.0228)
Constant	0.00683***	0.00744***	0.00723***	0.00804***
	(0.00173)	(0.00172)	(0.00169)	(0.00199)
Observations	7,153,600	5,818,102	6,412,826	5,710,845

Notes: Robust standard errors in parentheses, clustered at the employee level.
*** p<0.001, ** p<0.01, * p<0.05
Risk set restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.
All models include year fixed effects.

12.4 Job Department

As with many companies, there is gender segregation across departments (e.g., Barbulescu & Bidwell 2013). For example, at this firm, the IT group is male-dominated, while admin is female-dominated. Nevertheless, 39% of observed internal applications are connecting employees to job openings in different departments to the one from which they apply, so department is not an absolute barrier to mobility.

Under the same reasoning as above, we want to consider how application trends and transitions may vary based on the job department of both the applicant and the opportunity. In

Appendix Table A6, we report the type of job moves observed applications in actual internal applications regarding changes in job level. This table indicates that 39% of observed applications are connecting employees to job openings in a different job department, 54% of which are from women, suggesting that people at this firm do consider internal openings in other departments as desirable job transitions.

Table A6. Observed Internal Application to a Different Job Department

	All Internal Applications	Percent Female	Number of Internal Applications to a Different Department	Percent of Applications with this Move Type	Percent Female
Demotion	371	40%	151	41%	58%
Lateral	1,155	51%	379	33%	53%
Promotion	1,945	54%	831	43%	54%
Total	**3,471**	**51%**	**1,361**	**39%**	**54%**

Note: Counts of applications to filled job openings over period 2014-2017.

In Appendix Table A7, we replicate the logistic analysis adding origin job department fixed effects (Model A13) and limiting the risk set to applications within the same department (Model A14). The effect of gender is not significant in either model specification, so the department from which the applicant applies, as well as the trends for applicants seeking job opportunities within their department do not reveal a gender difference in application.

Table A7. Logit Models Predicting Internal Application (Odds Ratios) – Departmental Changes

VARIABLES	Model A13	Model A14: Within Department
Female	0.925	0.926
	(0.0735)	(0.0763)
Move type (ref: lateral)		
Demotion	0.118***	0.163***
	(0.0154)	(0.0297)
Promotion	0.286***	0.439***
	(0.0233)	(0.0333)
Origin job level *(1=low, 13=high)*	0.818***	0.825***
	(0.0237)	(0.0216)
Origin job department fixed effects	Yes	No
Constant	0.00210***	0.0271***
	(0.000557)	(0.00636)
Observations	10,963,717	700,592

Notes: Robust standard errors in parentheses, clustered at the employee level.
*** p<0.001, ** p<0.01, * p<0.05
Risk set restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.
All models include year fixed effects.

12.5 Slotted Jobs

The possible issue of slotted jobs would affect interpretation of our results. If job postings are informally or internally known to be associated with slotted jobs, employees may not apply to opportunities that to which they would have applied had the process been an open and competitive process. If there is a gender difference in likelihood to be slotted into a job, this difference will be carried through to our interpretation in a way that does not reflect a truly open labor market in which people apply to compete. To address this concern, we identify potential cases of job slotting

as job postings with exactly one internal applicant. There are 969 such cases out of 8,264 job openings (or 11.7% of all job postings over the course of the analysis) and only 403 of these result in the hire of that applicant (4.8% of job postings). When we exclude these cases and rerun the logit models in Appendix Table A8, we find that there is no significant effect of gender or of any gendered interaction term on application.

Table A8. Logit Models Predicting Internal Application (Odds Ratios) – Remove Possible Slotting Cases

VARIABLES	Model A15	Model A16	Model A17
Female	0.985	0.955	0.902
	(0.0933)	(0.0894)	(0.0848)
Move type (ref: Lateral)			
Demotion		0.0918***	0.136***
		(0.0127)	(0.0215)
Promotion		0.423***	0.286***
		(0.0278)	(0.0252)
Origin job level *(1=low, 13=high)*			0.732***
			(0.0245)
Constant	0.000544***	0.00165***	0.00934***
	(4.62e-05)	(0.000160)	(0.00208)
Observations	4,423,240	4,423,240	4,423,240

Notes: Robust standard errors in parentheses, clustered at the employee level.
*** p<0.001, ** p<0.01, * p<0.05
Risk set restricted to applications with Job Level change -5 to +7 to reflect observed internal applications.
All models include year fixed effects.
Excludes job openings that attract exactly one internal applicant (674 queues remaining for analysis).