PIPELINES AND SPRINKLER SYSTEMS: DOCUMENTING THE SPEED/FLEXIBILITY TRADEOFF IN HOW JOBS SHAPE PROMOTION

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Abstract

We draw on theories of internal labor markets and human capital pipelines to examine promotion patterns within large organizations. We introduce the idea of pipeline orientation to describe the way different jobs shape advancement. Specifically, we compare "pipeline" jobs that foster advancement into a highly circumscribed set of jobs with "sprinkler" jobs from which people are promoted into many different higher-level jobs. We first explain the factors shaping a job's pipeline orientation, then examine its implications for career advancement within internal labor markets. We argue that whether employees occupy pipeline or sprinkler jobs plays an important role in determining whether people make typical versus atypical moves as they are promoted. We further suggest that pipeline and sprinkler jobs engender a speed/flexibility tradeoff, as workers within pipeline jobs have less flexibility in where they could move next but are promoted more rapidly. We test these ideas with internal personnel data from a large corporation.

Keywords: promotions, jobs, internal labor markets, careers, mobility

INTRODUCTION

What does advancement look like in modern organizations? Do jobs sit along clearly defined pathways, with promotions taking people into the next logical role in a clear progression? Or do people instead follow a wide variety of paths, with promotion out of one job taking people in many different directions? We draw on elements of internal labor market theory (Doeringer & Piore, 1971) and pipeline theory (Brymer et al., 2014, 2019, 2024; Josefy et al., 2023) to suggest that different jobs within modern organizations have very different advancement patterns. While some jobs facilitate advancement into a narrow set of higher-level jobs, other jobs, often involving similar kinds of work and at similar hierarchical levels, will facilitate patterned mobility to a broad array of destination jobs. We build on this argument to develop new insights into how jobs affect mobility within contemporary internal labor markets, shaping whether people are promoted along typical or atypical paths and the pace at which they advance.

Internal labor market theory first introduced the idea that advancement within organizations might be patterned (Doeringer & Piore, 1971), arguing jobs were organized into ladders that facilitated promotion along specific paths (Baron et al., 1986; DiPrete, 1987) or that they were divided into different "mobility clusters" (Doeringer & Piore, 1971). According to internal labor market theorists, not all jobs were part of a ladder; roles outside those ladders were instead characterized as dead-end jobs offering little chance for advancement. Empirical studies confirmed that jobs varied in the extent to which they were placed on such promotion ladders (e.g., Baron et al., 1986), and that many jobs offered no clear next steps (e.g., Barnett et al., 2000).

Although internal labor market theory added substantially to our understanding of

mobility within organizations, we contend that two features of the literature may limit its capacity to fully describe mobility within modern organizations. First, research on internal labor market theory tended to focus on formal links between jobs, defined in organizational rules and processes, rather than realized patterns of mobility (Baron et al., 1986). This focus on formal rules raises questions about whether career paths actually follow the patterns that those formal structures define. Indeed, one of the few studies to explore realized mobility found that much mobility often takes people across the ladders created by the organizational structure (DiPrete, 1987). Second, the simple dichotomy between jobs that are on ladders versus not on ladders suggested that people do not advance from jobs outside ladders. We suggest that this dichotomy is not well suited to mobility patterns in real organizations, where there are often possibilities to advance in multiple different ways from many different jobs.

Changes in the way organizations manage their internal labor markets have likely heightened the importance of these limitations. Widespread adoption of open bidding systems now enables employees and managers located anywhere in the organization to find each other and create new job matches (Cappelli & Keller, 2014; Dlugos & Keller, 2021). Much mobility is therefore likely to depart from formally defined ladders, and employees who are outside those ladders will still have many opportunities for mobility. We seek to explore the resulting structure of advancement in this paper. In particular, we explore differences in the patterns of promotions coming out of different jobs. Rather than focusing on whether jobs are linked by organizationally-defined job ladders, we explore the extent to which realized promotions tend to take people between particular sets of roles.

In developing our theory, we draw on recent research on human capital pipelines (Brymer et al., 2014, 2019, 2024; Josefy et al., 2023). Pipeline theory highlights variation in the structure

of job mobility, noting that some mobility happens through diffuse matching processes in which people are recruited from a wide variety of sources, while other moves take place through "the sequenced flow and development of individuals repeated over time, disproportionately from specific labor sources into particular positions…" (Brymer et al., 2019, p. 209). Although pipeline theory has usually been applied to mobility between firms (e.g., Brymer et al., 2024; Josefy et al., 2023; Rocha & Pozzoli, 2025), its focus on uneven market structure–the idea that pipeline structures are more likely to be found between some roles but not others–also provides a valuable lens for understanding variety in advancement patterns inside organizations.

We develop theory on those advancement patterns by introducing "pipeline orientation" as a continuous job-level characteristic. We define jobs with high pipeline orientation as jobs from which people are repeatedly promoted to the same higher-level job(s). Where job ladders are usually defined based on administrative classifications reflected in job titles (Barnett et al., 2000; Baron et al., 1986; DiPrete, 1987), our definition focuses on whether realized moves out of a job tend to follow a specific pattern. Hence, while pipelines may often follow job ladders, we focus on realized moves that may or may not follow those structures.

Our central argument is that there can be substantial variation in jobs' pipeline orientations within an organization, from pipeline jobs that foster advancement into a highly circumscribed set of jobs, all the way to sprinkler jobs where people are promoted into a wide variety of different higher-level jobs. We expand on this idea by first exploring the factors likely to shape jobs' pipeline orientation, focusing on the role of skill specialization and social relationships within organizational units. We then develop theory on the career implications of a job's pipeline orientation. We argue that pipeline theory provides a valuable new lens for understanding when people make typical versus atypical moves within organizations (Cutolo &

Ferriani, 2024), emphasizing the powerful role that jobs play in shaping promotion typicality. We further argue that pipeline orientation will shape the rate at which people are promoted out of a job, as pipeline-oriented jobs help employees more quickly develop and demonstrate the skills needed for the next role. We hence propose that pipeline orientation creates a tradeoff between the speed of advancement versus the flexibility of advancement paths out of the job. Put simply, we expect pipeline jobs to facilitate faster promotion to a narrow set of jobs, while sprinkler jobs feed a wider range of promotion opportunities, but at a slower rate.

We explore this speed versus flexibility tradeoff in a quantitative case study of internal mobility from a large healthcare organization. We find substantial variation in the extent to which different jobs feed a narrow set of highly typical promotions versus a more diffuse set of atypical promotions. We also find that this variation in the range of promotion destinations reflects differences in jobs' skills and their distribution throughout the organization. We then show that these job-level differences in pipeline orientation are highly consequential for people's careers. We find that cross-job variation in promotion typicality is 10 times greater than cross-person variation, and that cross-job variation is mainly explained by differences in jobs' pipeline orientation. We also confirm that pipeline orientation is positively related to the rate of promotion out of the job, particularly when the job also recruits from a narrow set of roles. A series of robustness checks suggests that this finding is unlikely to be driven by selection effects.

We aspire to make a number of contributions to the literature on careers and human capital. First, we introduce the idea of pipeline orientation as an important job-level characteristic that shapes career advancement within organizations. Prior research on internal labor markets has not, to our knowledge, empirically analyzed differences in the paths that people take to advance out of different jobs. We move beyond the simple dichotomy of "job

ladders" versus "dead-end jobs" to demonstrate a continuum of pipelines versus sprinkler jobs, all of which facilitate advancement, albeit with a different mix of flexibility versus speed of promotion. We demonstrate the importance of job-level differences in shaping typicality within careers and identify a novel characteristic of jobs that shapes people's advancement prospects. In doing so, we also show how job characteristics such as task content, functional size, and organizational distribution shape subsequent career paths. Our analyses also underscore the enduring presence of substantial structure within internal mobility despite the introduction of market-like processes over the last few decades.

Second, we contribute to the literature on human capital pipelines by providing the first empirical analysis of pipelines within organizations. In doing so, we provide empirical evidence for one of the core tenets of pipeline theory–that there is significant variation in the extent to which mobility across different jobs follows highly structured patterns versus more diffuse paths. Together, these findings demonstrate the presence of a speed/flexibility tradeoff in the way that different jobs facilitate advancement.

LITERATURE AND THEORY

Human Capital Pipelines within Organizations

The pipeline construct was originally introduced to explore variation in recruitment strategies (Brymer et al., 2014). A pipeline forms between a hiring organization and a school or firm when the organization repeatedly hires from that school or firm, either as a deliberate strategy or organically as recruitment patterns emerge over time (Josefy et al., 2023). Although such pipelines narrow the range of candidates considered, Brymer et al. (2014) argued that closer ties to specific sources of human capital improve the flow of information between candidates and the firm and ease the assimilation of new hires.

A subsequent paper refined the definition of pipelines, extending the concept to within-organization human capital flows (Brymer et al., 2019). This updated definition described pipelines as "the sequenced flow and development of individuals repeated over time, disproportionately from specific labor sources into particular positions within firms, occupations, and geographies" (Brymer et al., 2019, p. 209). We examine these sequenced flows within organizations, exploring the patterns that emerge as people advance repeatedly along specific pathways into more senior jobs. We focus in particular on differences across jobs in their tendencies to foster such structured mobility.

Cohen defines jobs as a "bundle of tasks performed by employees under administrative job titles" (Cohen, 2013, p. 432). As her definition emphasizes, jobs are defined by administrative titles, so that many people may occupy the same job where they hold the same titles, and those jobs exist independently of the people occupying them. We define the pipeline orientation of a job as the extent to which realized promotions out of that source job feed into a narrow set of destination jobs. We focus on the pipeline orientation of source jobs because we are interested in how different kinds of roles shape subsequent advancement. Our focus on advancement also explains why we conceptualize pipeline orientation in terms of promotions, defined as moves into jobs that offer more pay, responsibility, and status (Spilerman & Lunde, 1991). Although much mobility within organizations also happens through lateral moves (Bidwell & Keller, 2025; Campion et al., 2022; Dohmen et al., 2004), promotions are more clearly associated with career advancement (Ng et al., 2005; Seibert et al., 2001) due to their implications for long-term pay (Baker et al., 1994; McCue, 1996). Our primary interest lies in examining the structural patterns of these advancement pathways.

We propose that internal promotion pipelines will emerge for the same reasons that they

appear in external labor markets. Brymer et al. (2014) argue that organizations hire through pipelines because it helps to "reduce many of the search, information, and integration costs inherent in labor market acquisition" (p. 489). More recent work suggests that pipelines may also form unintentionally, as social ties shape mobility patterns (Josefy, Harrison, & Howard, 2023). We similarly propose that a mixture of strategic benefits and informal social processes will shape internal pipelines.

First, managers may hire out of the same role repeatedly because that source role does a particularly good job of preparing people for the destination job. Jobs vary in how they develop incumbents' knowledge, skills, and abilities (KSAs) because of differences in the tasks that they require (Burton et al., 2016; Cohen, 2013), with different tasks fostering different KSAs through on-the-job learning (Doeringer & Piore, 1971; Gibbons & Waldman, 2006). Where hiring managers find that a source job is particularly well suited to preparing people for their role, they are likely to draw repeatedly on that job in their hiring.

Managers may also hire internally through pipelines because of the social relationships that form between roles (Josefy et al., 2023). As Brymer et al. (2014) note, new hires create connections between source and destination jobs which may then reduce information asymmetries in future hiring. Potential candidates can learn more about the job through discussions with their former colleagues, and the hiring manager can use those same social ties to get more detailed information about the candidates.

Often, these pipelines of advancement may take people between jobs that are closely related within the organization's administrative structure, much as a job ladder would. Jobs that belong to the same administrative structure likely share similar KSAs in their job requirements and foster social connections among employees and their prospective hiring managers. However,

pipelines need not follow those administrative delineations, as similarities to and connections with other jobs may also lead pipelines to form.

While these dynamics foster repeated promotion along specific pathways, a set of opposing forces can foster more diffuse mobility patterns. As Brymer et al. (2014) emphasize, pipelines can unduly restrict the breadth of human capital entering a role. Managers may often use unstructured, open-bidding processes to seek out a broader internal talent pool from a variety of roles. Similarly, idiosyncratic pathways can develop as different employees look to establish novel job matches (Weller et al., 2019). Such diffuse mobility patterns are particularly likely when there is not a clear next step out of a job, based on the match with KSAs or social connections. People are then likely to advance into a much broader range of different roles, reflecting both differences in their own preferences and idiosyncratic variation in the opportunities available to them.

Our core contention in this paper is that these contrary forces will generate varying levels of structure in internal mobility patterns. We propose that some jobs will have a high pipeline orientation, fostering promotion to a narrow set of subsequent destinations. At the other end of the continuum, we suggest that there will also be jobs with a low pipeline orientation, i.e., "sprinkler jobs". Though recognizing that not every firm's job structure is identical (Burton, 2012), classical internal labor market theory (Doeringer & Piore, 1971) has typically considered jobs that fall outside of the ladder as "dead-end jobs" with few advancement opportunities. We instead suggest that jobs that are not on a dedicated pipeline or job ladder can still systematically facilitate advancement. Specifically, we conjecture that such roles will form "sprinkler jobs" that facilitate advancement to a broad range of higher-level jobs. Figure 1 illustrates this job-level variation.

We develop this argument in stages. First, we build theory about why jobs may vary in their level of pipeline orientation. We then discuss the implications of our arguments for how people advance within organizations, outlining how a job's pipeline orientation can shape both the typicality and rate of incumbents' subsequent promotions.

Determinants of Pipeline Orientation

Task demands and pipeline orientation. Firms often hire through pipelines because they find that specific sources are particularly effective in developing the KSAs that they need, reducing integration costs in the new role (Brymer et al. 2019). The KSAs developed in different jobs are therefore likely to shape the promotion pathways that those jobs foster.

Specifically, we propose that pipeline orientation will be higher in jobs involving a narrower set of tasks. The more limited the tasks a job requires, the narrower the KSAs it develops in incumbents. Since hiring managers prefer candidates whose prior experience is a good fit for their role, people coming out of narrowly specialized roles are likely to be attractive for the small number of destination roles that also rely on those KSAs. In contrast, jobs that provide a wider set of KSAs may prepare workers for a broader range of future opportunities, facilitating sprinkler mobility. Thus, the narrower the set of tasks that a job involves, the narrower the set of roles to which job incumbents will likely advance. We propose that:

H1: Jobs with narrower task content will have higher pipeline orientation than those with broader task content.

Organizational distribution and pipeline orientation. The same arguments also have implications for how the structure of the organization might affect advancement pathways. Research on internal labor markets has shown that jobs within organizations are often grouped into higher-level categories such as "occupational groups" (DiPrete, 1987) or "functions"

(Bidwell & Mollick, 2015) and “subfunctions” (Bidwell & Keller, 2025). Generally, jobs within the same functional specialization are expected to have similar task content and require similar skills. Functional boundaries can therefore shape which future opportunities employees are likely to pursue. People are generally better prepared for other roles within the same functional specialization because those jobs are more likely to share similar KSAs, and people are therefore more likely to pursue such roles (Keller & Dlugos, 2023). Mobility tends therefore to be more common within functions or occupational groups compared to across them (Bidwell et al., 2023; Bidwell & Mollick, 2015).

If job incumbents face fewer barriers when advancing within the same function, jobs in smaller functions are likely to have fewer other roles to move into. Jobs within those smaller functions are therefore more likely to feed a narrower set of more senior jobs. We propose:
H2: Jobs located in smaller functions will have higher pipeline orientation than those located in larger functions.

Pipelines are also shaped by social relationships, as new hires foster ties between the source and destination role, allowing candidates to learn more about job opportunities and hiring managers to learn more about the candidates (Brymer et al. 2014). Reaping these relational benefits requires social cohesion in the source job though, allowing promoted employees to retain relationships with their former colleagues. One possible determinant of that cohesion is the distribution of the role across different organizational units, such as departments or divisions.

Some roles may be highly concentrated within a few organizational units. For example, R&D scientists may reside in a relatively small number of research departments, and production workers may be concentrated in manufacturing facilities. That organizational concentration helps build relationships among people in those jobs, relationships that may persist as people are

promoted along pipelines. Other roles, such as administrative assistants or financial analysts, may be distributed across a broad range of organizational units. People in those roles are less likely to work closely with others with the same job title. As a consequence, hiring people out of one of those roles is less likely to strengthen relationships with others within the role.

Where pipelines rely on relationships for their value, we therefore propose that pipeline orientation will also be stronger when roles are more organizationally concentrated. Specifically: *H3: Jobs with a narrower distribution across organizational units will have higher pipeline orientation than those with a broader distribution across organizational units.*

Our predictions focus on job-level determinants of pipeline orientation. A natural question, though, is whether multiple pipeline jobs might cluster together to form sequenced advancement paths. For example, if pipeline jobs tend to involve more specialized tasks, as we argued above, it is likely that they will recruit out of similarly narrow, and hence pipeline-oriented, jobs. Similarly, the same organizational concentration that supports pipeline promotions out of a job should also foster pipeline hiring into that same job, as proximate employees and managers develop a shared idea of the roles that it makes sense to hire from. Although we do not explicitly develop a theory about such sequencing of pipeline jobs, we explore their presence in our analysis.

Pipelines and Individual Advancement

We believe pipeline orientation matters because of its consequences for how people advance. The clearest set of implications regards promotions' typicality. Move typicality describes whether a given move follows a well-established path, often defined in terms of the frequency with which that move takes place within a broader population (Cutolo & Ferriani, 2024). For example, a move from Marketing Specialist to Brand Manager is typical because it is a path that many

follow. A move from Marketing Specialist to Production Manager would be atypical because few people make such a move.

Promotion typicality is closely related to pipeline orientation, but refers to a different level of analysis. As a move-level variable, promotion typicality assesses whether a particular upwards move follows a common pattern. Pipeline orientation, by contrast, is a job-level variable, measuring whether all of the moves out of a source job tend to be more versus less typical. By definition, promotions out of pipeline jobs will likely be more typical, as those moves tend to take incumbents to jobs that many others are also moving into. Because sprinkler jobs tend to take incumbents to a diverse set of destination jobs, those promotions will likely be more atypical.

Although we know that pipeline orientation will predict move typicality, the strength of the relationship is unclear. Much work on typicality has speculated about the influence of individual characteristics, with Zuckerman et al. (2003) and Leung (2014) noting that atypical moves can reflect poor performance, while Crossland et al. (2014) highlight people's taste for novelty and experimentation in shaping typicality. Such perspectives emphasize how different people starting in the same job may choose typical or atypical moves to their next role, as when somebody in a marketing role makes an atypical move into a finance job, even though most of their colleagues advance into other marketing roles. In such cases, the jobs that people are coming out of may have relatively little influence on the typicality of their moves.

Our focus on jobs' pipeline orientations reflects our belief that jobs may often be a powerful influence on move typicality. Hence, while we do not explicitly hypothesize a relationship between pipeline orientation and promotion typicality, reflecting the similarity in their definitions, we highlight this relationship as an important implication of pipeline theory.

Specifically, we emphasize that there is much less flexibility in the promotion pathways out of pipeline jobs. We will also empirically explore how much variation in promotion typicality reflects pipeline orientation compared to other factors, such as individual differences.

Pipeline Jobs and the Speed/Flexibility Tradeoff in Advancement

As well as shaping *where* people are promoted to, we propose that pipeline orientation will also shape *how quickly* people are promoted. There are grounds to believe that jobs with a high pipeline orientation might have slower rates of advancement: because people in pipeline jobs are usually promoted into a narrower range of jobs, their mobility is more likely to be constrained by a lack of opportunities within those destination jobs (Blum et al., 1997; Mercan & Schoefer, 2020). People leaving pipeline jobs, by contrast, can take advantage of a much wider range of opportunities, potentially allowing them to move more quickly. We suggest, though, that the greater ease of matching from pipeline jobs will help people to be promoted more rapidly, leading to a tradeoff between the reduced career flexibility experienced within pipeline jobs versus the greater advancement speed.

We believe pipeline orientation may lead to more rapid promotions because it alleviates two important matching challenges (Weller et al., 2019): searching for opportunities and developing and demonstrating the skills necessary for the next role. Pipeline theory suggests that individuals in pipeline jobs will be able to more quickly identify suitable advancement opportunities. Learning about available opportunities (Mortensen & Pissarides, 1999), networking with potential hiring managers, and figuring out how to make a strong application (Keller, 2018) can all take a substantial amount of time. Because pipeline jobs feed a limited set of higher-level jobs, they allow employees to conduct more focused and efficient searches than individuals in sprinkler jobs, who must invest the time to search more broadly for opportunities

that fit their skills and interests.

It is also likely easier for employees in a pipeline job to demonstrate their suitability for the next role. Managers hiring along a pipeline can expect employees in the source job to have acquired a specific set of KSAs through their job. Employees in a pipeline job may also benefit from the taken-for-grantedness of the promotion path that they are following, as managers will be more familiar with what it means to come from that job and more likely to accept them as legitimate candidates (Rivera, 2020).

In contrast, employees from sprinkler jobs are likely to face more skeptical hiring managers. Lacking familiarity with the employee's current job, those managers will be uncertain that the employee will have developed the skills necessary for the job they are trying to fill. Such concerns will be exacerbated where the source job's tasks have a less clear overlap with the new role, as tends to be the case with sprinkler jobs. Such sprinkler job employees may therefore need to do more to persuade those hiring managers that they have the KSAs necessary for their next role. Should they need to develop greater experience in specific areas to demonstrate their suitability for the role, their advancement will be further delayed.

In sum, compared to employees in sprinkler jobs, employees in pipeline jobs will have to spend less time searching for new jobs and convincing managers they are qualified for a promotion. Moreover, they will be considered more qualified having spent less time in their current role. Taken together, these arguments suggest while pipeline-oriented jobs offer incumbents a more restricted range of potential advancement opportunities, incumbents of pipeline-oriented jobs will nevertheless advance more rapidly. Specifically, we propose:

H4: Employees will be promoted faster from jobs with higher pipeline orientation.

These effects of pipeline orientation on promotion rates, as described in H4, may depend in part

on how the focal source job recruits. We proposed that employees advance more rapidly out of pipeline-oriented jobs because it is easier for them to develop and demonstrate the skills necessary to advance. Yet, that speed should also depend on how well prepared they were on entering the job. That preparation will itself depend on how the source job recruits.

In particular, we suggest that the advancement benefits of a job's pipeline orientation are stronger when that job recruits from a narrower set of jobs itself. Jobs that recruit from a narrower set of roles will likely bring in a more homogeneous, coherent set of recruits. That coherence should help those workers to get up to speed more quickly and demonstrate their readiness for a promotion. Moreover, if a pipeline job tends to be filled by a narrower set of other roles, it is easier for managers to understand the KSAs of the incoming employees, making it easier to train and develop them. Importantly, these benefits of coherence should be particularly strong within pipeline jobs. Having a closely aligned background is beneficial in a pipeline-oriented job because that job is preparing the employee for a specific, highly related next role. Sprinkler jobs lack such closely related next jobs, limiting the value of coherent recruiting in preparing incumbents for the next role.

We therefore propose that the effects of pipeline orientation will be moderated by how a given job is entered. We expect to see a negative interaction between a job's pipeline orientation and the breadth of the roles that the job recruits from, with jobs that recruit from a broader array of roles less able to benefit from pipeline orientation. Specifically, we propose that:

H5: The relationship between a focal job's pipeline orientation and promotion rate will be negatively moderated by the breadth of jobs that the focal job recruits from, such that pipeline orientation has a more positive effect on promotion rates when the job also recruits from a more focused set of jobs.

RESEARCH CONTEXT

We study mobility patterns using personnel records for the non-executive US workforce of BigCo, a large healthcare organization (data from the same site also appears in Baek et al., 2022; Bidwell & Keller, 2025; Keller et al., 2021). Using data from a single organization raises important generalizability concerns, as mobility patterns may be shaped by idiosyncratic processes and cultural beliefs within the organization. Unfortunately, we lack large cross-employer datasets that include reliable granular data on how people move across jobs. We therefore follow many other articles in examining processes of internal career progression through a quantitative case study of a single firm (e.g., Baker et al., 1994; Bidwell, 2011; Dencker, 2009; DiPrete, 1987; Keller, 2018; Kleinbaum, 2012).

Most employees at BigCo work in white-collar professional, technical, and managerial roles, although 18% are in roles classified as "Operatives (semi-skilled)." Altogether, BigCo employed approximately 40,000 workers distributed across 2,937 different jobs in our data. These jobs were classified into 20 functions such as "Marketing" and "R&D" which grouped jobs with broadly similar task content, and further subdivided into 158 subfunctions, such as "Market Research" and "Patent Liaison." The company was also divided into different organizational units, business units, and divisions that reflected the reporting structure within the company.

BigCo had a well-developed internal labor market, with around 20% of employees moving to another job within the organization annually (a further 10% leave the organization each year). Of these internal moves, around half were promotions, defined as mobility into a different job with an increase in pay grade. Our analyses focus on these promotions. We exclude lateral moves because our definition of pipelines is based on promotions, reflecting our interest

in pathways of advancement. Including lateral moves in our measure of pipeline orientation would also exacerbate concerns about reverse causality, as people may be more likely to move laterally out of roles with poor promotion prospects (that said, robustness checks find similar effects using a definition of pipeline orientation that includes lateral moves).

The processes governing mobility at BigCo were similar to those described in interviews at other organizations. Moves were governed by a decentralized, posting system (Keller, 2018). As Baron, Davis-Blake and Bielby (1986) emphasize, such an unstructured system is the antithesis of a structured ladder "in which each job promote[s] to no more than two specific jobs at a higher level, based on clearly specified criteria" (p. 257). Instead, every internal vacancy was supposed to be posted, allowing any employee to apply and be considered for the role (although many moves also took place without the job opening being posted (Keller, 2018)).

In interviews with 26 managers, we found that people in BigCo were putting a lot of effort into finding internal matches. Employees searched for new roles using both formal and informal channels and sought to build relationships with hiring managers. Hiring managers also actively searched for candidates. We explore how these decentralized matching processes gave rise to a mixture of focused and diffuse mobility patterns.

Data

We were given access to annual year-end snapshots for the years 2009-2016, recording the job that each employee occupied at year-end, as well as data on job performance and other covariates. During the period covered by our study, employees were organized into 2,937 different jobs, defined as positions that share the same job title, indicating that they involved similar responsibilities and received similar rewards. The number of incumbents in a job varied considerably: the median job had 11 incumbents in a year, but over 1,100 employees shared the

most widely held job title.

We exclude from our analyses jobs that have fewer than 10 promotions throughout the entire sample period[1]. We are interested in whether promotions out of a given job tend to be concentrated into a smaller number of destination jobs versus a broader number, and we need an adequate number of promotions to calculate this relatedness reliably. To ensure we study promotions between two distinct jobs, we also dropped 90 observations where the pay grade increased without a change in job identifier, and 10,398 moves associated with job relabeling– when everyone in a given job received the same new job title. We also dropped a small number (3,333) of moves that were associated with internships and formal rotation programs at BigCo. This exclusion allows us to focus on how pipeline relationships between jobs shape advancement even when that mobility is governed by the same processes as more diffuse mobility. This sampling criterium yields 536 jobs for our analyses. Our results are robust to including moves associated with relabeling, internships, and rotational programs.

Main Variables

Promotion. We define a *promotion* as a move into a job in a higher pay grade (Bidwell, 2011; Spilerman & Lunde, 1991). Jobs at BigCo were organized into 38 pay grades, of which 24 were present in our data (the missing pay grades, largely at the bottom and the top of the hierarchy, either did not have performance data or did not have jobs with sufficient promotions to calculate our main variables). These pay grades helped to define pay and corresponded to titles such as Manager 1, Manager 2, Director, etc. 15.4% of our sample was promoted each year, on average.

Pipeline orientation is a continuous variable that measures the concentration of

[1] We note that this sampling criteria filters out jobs that are at higher pay grades, as jobs in those pay grades tend to have fewer promotions out of them. Because of this, our sample does not contain jobs that are at the top pay grade of any job subfunction.

destination jobs that people are promoted into out of the focal source job. Jobs with high pipeline orientation advance people repeatedly into a small number of destination jobs, while jobs with low pipeline orientation promote people into a broad range of destination jobs.

We calculated *pipeline orientation* using an entropy calculation, which is commonly used in management research to measure compositional diversity (e.g. Harrison & Klein, 2007; Hoskisson, Hitt, Johnson, & Moesel, 1993), although our measure has the opposite sign to entropy as it reflects a *lack* of diversity in destination roles. The measure is calculated as: $\sum_{j=1}^{N} p_i \ln p_i = \sum_{j=1}^{N} (\frac{m_{ij}}{m_i}) \ln(\frac{m_{ij}}{m_i})$, where m_i is the total number of promotions out of source job *i* in all years, m_{ij} is the total number of promotions into a destination job *j* from the source job *i* in all years, and N is the number of unique destination jobs that the source job *i* feeds into. A high value of pipeline orientation indicates that most promotions from the focal job take workers to a focused set of destination jobs. Low pipeline orientation indicates promotions take people to many different jobs. We standardize (z-score) the measure to ease interpretation, subtracting raw scores from sample mean and dividing this difference by sample standard deviation.

Note that we calculate a time-invariant measure using data from all promotions during the period of our data. Pipelines are defined in terms of repeated moves over time (Brymer et al., 2019, p. 209), so we base our measure on patterns of mobility observed over a long period. We checked the stability of jobs' pipeline orientations by comparing scores calculated using the first 4 years of our data with scores calculated using the second 4 years. The correlation across time periods was 0.63, indicating substantial stability. Supplementary analyses also found our results were robust using a time-varying construction of this measure (see Appendix Table A2).

We also calculated two alternative measures of pipeline orientation to confirm the robustness of our results. One measure included only those promotions that also involved a

change in organizational units, dropping promotions that might not have involved significant changes in job responsibility. Our results were similar using these measures (see Appendix Table A3). Another version of pipeline orientation included lateral moves and demotions out of the job as well as promotions. Our results were also robust to this alternative measure (see Appendix Table A4).

Task content breadth. Our first hypothesis examines whether jobs with a narrower task content have a higher pipeline orientation. We measured this *task content breadth* using the job descriptions in BigCo's job catalog.

To analyze these job descriptions, we first removed common stop words such as "a", "and" and "the" and transformed words into their standardized, stemmed form. We then calculated the distribution of each word across different job descriptions, again using an entropy calculation. To arrive at a breadth measure at the job level, we averaged the word-level entropy score across all words that appear in a job's description. A job with narrow task content is therefore one described with words that appear in few other job descriptions. A job with broad task content is described with words that tend to appear in many other job descriptions. To ease interpretation, we standardize the variable so that a one unit increase in the measure translates to a one standard deviation increase in within-sample task content breadth.

Average function size. Our second hypothesis examines whether jobs in smaller functional specializations have a higher pipeline orientation. We measure *function size* as the average logged number of people within each of the 20 functions[2] across years. Descriptive analysis confirmed the importance of these functional boundaries in structuring advancement,

[2] We also experimented with measuring the size of functional specializations using the smaller subfunction category instead. We found that function size was a better fit for our models. This likely reflects the way that subfunctions are rather narrowly defined boundaries that do not necessarily reflect the entire range of opportunities available to job incumbents.

with 83.5% of promotions taking place within the same function.

Organizational distribution. Our third hypothesis examines whether jobs that are more narrowly distributed across organizational units have a higher pipeline orientation. We measure that distribution in terms of jobs' spread across business units. On a yearly basis, BigCo was organized into around 50 Business Units, with a median number of 282 employees and 83 unique jobs each.[3] We calculated the *organizational distribution* of employees within each job title across these business units, again using an entropy measure. A high value means a job is widely distributed among a large number of business units, while a low value means a job is narrowly distributed among a small number of business units. We again standardize the measure.

Promotion typicality. We also examine the tendency of individual promotions to follow along typical paths. For a given promotion out of source job *i* into destination job *j,* we define *promotion typicality* as the proportion of all promotions out of source job *i* during our entire observation period that ended up in destination job *j* (see Leung 2014). For example, typicality of 1 means that all promotions from source job *i* went to destination job *j*. Typicality of 0.2, on the other hand, means that moves from *i* to *j* accounts for only 20% of promotions from source job *i*.

Job recruiting breadth. Our final hypothesis examines how the effects of pipeline orientation vary with the breadth of jobs from which the focal source job recruits. We measure *job recruiting breadth* as the diversity of roles that people entering the focal source job are promoted from, again using an entropy measure. As Table 1 Panel A shows, job recruiting breadth has a -0.32 correlation with pipeline orientation, indicating that pipeline jobs tend to have narrower recruiting breadth, but that there is substantial variation within the relationship.

Control Variables

[3] We also tried using a measure of jobs' distribution across individual teams (defined as the group of people managed by a single person), but found much weaker effects at that level.

Job level controls. We control for several job-level variables that might affect mobility. First, we created measures of job ladders to help distinguish formal relationships between jobs from the realized mobility that we track through pipelines. As seen in Table 2, each job title in BigCo was defined by a job stem (e.g., "Communications", "Public Relations"), a job role (e.g., "Specialist", "Manager", "Director"), and a job sub-step (e.g., "1", "2", "3", etc.). We use these structures to construct ladders of organizationally linked jobs. We define long job ladders as the set of all jobs that have the same job stem (e.g., "Communications Specialist", "Communications Director", etc.). Short job ladders then connect jobs that share the same job role (e.g., "Communications Director 1," "Communications Director 2").

We use these definitions to create three variables. *On long job ladder* takes a value of 1 if a job is part of a long job ladder and is not the most senior job on that ladder (indicating that further mobility along that ladder is possible). *On short job ladder* takes a value of 1 if a job is part of a short job ladder and is not the most senior job on that ladder. *Within-ladder promotion rate* measures the proportion of all promotions from the focal source job that feeds into a destination job within the same long job ladder.

We also measured other job characteristics. Jobs with more incumbents may see more variance in advancement destinations and the likelihood of advancement. We therefore control for *job size (logged),* which is the logged number of individuals with the same job title in a given year. We control for whether a job is a *managerial job* with an indicator variable. To account for differences in responsibility that employees have relative to their peers in the same pay grade, we also control for *subordinate number vs pay grade mean* which is number of subordinates an individual has minus the average of the pay grade. We also control for the *grade ratio* to account for the availability of easily identifiable opportunities for advancement (Stewman & Konda,

1983). We define the grade ratio as the ratio of unique employees working in jobs within the same subfunction one pay grade above the focal job divided by the number of unique employees working in the same subfunction in the same pay grade, reflecting the tendency (noted above) for most promotions to take place within the relatively narrowly defined subfunctions. All models include *pay grade* fixed effects to account for different promotion opportunities at different levels, such as when individual contributors at lower levels have more linear careers and more frequent promotions.

In our job level analyses, we average time-varying covariates across years to form *average job size*, *average number of subordinates*, and *average grade ratio*. For *pay grade*, we use a continuous version of the variable to conserve statistical power and include a squared term to account for potential non-linearity in promotion patterns across pay grades. When investigating the determinants of pipeline orientation, we also control for the *average total compensation (logged)* of a job and *total promotions (logged)* to control for the baseline number of promotions associated with a job.

When investigating how pipeline orientation affects promotions out of the job, we also include *subfunction* fixed effects, as certain core functions (regardless of size) might have more well-defined career paths and rapid rates of promotion, while peripheral functions are less structured. We also include *year* fixed effects in all models to account for general time trends.

Individual level controls. Our analyses of promotion rates include several individual-level characteristics. Promotion is often tied to performance, so we account for each employee's annual *standardized performance*. Because the scale that BigCo used to assess performance changed from a single 9-point scale to two 4-point scales during our period of observation, we created a standardized performance measure. Specifically, we summed the two components of

the 4-point scales to make a single 8-point scale. We then standardized ratings on both this 8-point scale and the earlier 9-point scale by the scale that was being used and the year (i.e. we transformed the original values to have a mean of zero and a standard deviation of one within the observations that used the same rating scale and were from the same year). We use this standardized measure as our performance measure. A higher rating means better performance. To account for any remaining differences across the scales we also included a dummy variable which equals one if the original performance rating was on a 9-point scale (*performance scale dummy*). We also include *standardized compensation* as a control, calculated by z-score standardizing an individual's compensation within their pay grade for the entire sample period.

To control for the effect of firm-specific and general work experience, we control for *organization tenure at job entry*, which counts the individual's tenure in the organization when entering the current job, and *outside experience*, which is measured using a scale that BigCo provided to us (1 = less than one year, 2= between 1 and 3 years, 3= between 3 and 6 years, 4= between 6 and 11 years, 5= 11 and 16 years, and 6= more than 16 years). In all models, we include dummy variables for each possible value of the number of months in the job to allow for flexible time dependence in promotion rates (denoted by *Time in Job FE*[4]). We also control for how the current job was entered on the basis that this may affect subsequent mobility (Bidwell, 2011). Specifically, we control for whether the job was *entered by promotion, entered by hire,* or *entered by lateral move.* The residual category is largely demotions and acquisitions.[5]

Table 1 provides summary statistics and pairwise correlations of all key variables

[4] While in many cases we know the precise date that an individual entered the job, in some cases, the personnel records only indicate the year they entered. In these instances, we set their entry to the middle of the year (30th of June). Our results are also robust to simply dropping these observations. We dropped any left censored observations for which we do not observe the job entry date or year.

[5] We also explored putting in a dummy for the most senior job within a subfunction, as promotion out of those jobs may be more difficult. We found, though, that all of the most senior jobs across each subfunction had been dropped when we excluded jobs with fewer than ten promotion events.

included in the main analysis.

RESULTS

Determinants of Pipeline Orientation

We begin by exploring the determinants of pipeline orientation. Figure 2 plots the kernel density of *pipeline orientation* across the jobs in our sample, confirming that there is meaningful heterogeneity in advancement pathways out of different jobs. Figure 3 then depicts how this heterogeneity varies within and across the ten different paygrades (Panel A) and eleven subfunctions that have at least 10 jobs, sorted from lowest to highest average total compensation (Panel B). Perhaps surprisingly, there is little apparent relationship between how subfunctions pay and their pipeline orientation, nor a strong relationship between hierarchical level and pipeline orientation. Across each pay grade, some jobs have a very high pipeline orientation, indicating that almost everybody is promoted into the same subsequent jobs. Yet there are also many sprinkler jobs, from which people are regularly promoted into several different jobs. We also illustrate this heterogeneity in Table 2, which provides examples of jobs in the same subfunctions and pay grades that have different levels of pipeline orientation.

We also explored the role of job ladders in shaping pipeline orientation. Within our sample, 58% of promotions took place along long job ladders and 48% along short job ladders that are embedded within those long job ladders, indicating that much mobility does take place between jobs that are linked administratively, but also that many moves do not follow those paths. Figure 3 Panel C uses box plots to separately graph the distribution of pipeline orientation for jobs that are on and off long and short job ladders, as defined above. The figure demonstrates that the distribution of pipeline orientation is quite similar for jobs on and off job ladders, indicating that those ladders play only a modest role in shaping pipelines within this organization. This pattern of mobility supports the idea of studying realized patterns of mobility

through pipelines as a distinct construct from administratively defined job ladders.

Table 3 then reports OLS regressions predicting pipeline orientation to test H1-3. Model 1 includes our control variables. We find that jobs that involve managing more subordinates have lower pipeline orientation, consistent with managerial jobs having a generalist orientation (Custodio et al. 2014). We also find a curvilinear relationship between pay grade and pipeline orientation, with pipeline orientation being concentrated among more junior and more senior roles. We also find a significant positive coefficient on *average grade ratio* and significant negative coefficient on *job recruiting breadth*. These relationships are consistent with baseline expectations that jobs with more immediate advancement opportunities having higher pipeline orientation, and jobs that recruit widely being less pipeline oriented.

Model 2 then tests our main hypotheses. We find significant support for H1 ($b = -.11$, $p<0.01$), with a one standard deviation increase in *task content breadth* associated with a 0.1 standard deviation fall in *pipeline orientation*. We also find significant support for H2 ($b = -.12$, $p < 0.001$), with a one standard deviation increase in *average function size* associated with a 0.1 standard deviation decrease in *pipeline orientation*. The effect of *organizational distribution* (H3) is highly significant and substantively important ($b = -.36$, $p < 0.001$). A one standard deviation increase in the distribution of jobs across business units is associated with a 0.33 standard deviation decline in *pipeline orientation*. This effect is consistent with our argument that coherent social relationships are important to the formation of pipelines.

Model 3 then adds our measures for whether jobs are on job ladders. We find no significant relationship between *on long ladder* and *pipeline orientation,* but a significant positive relationship between *on short ladder* and *pipeline orientation* ($b = 0.26$, $p < .001$). These variables together only increase the r-squared value by 1.1%, suggesting that job ladders play

only a minor role in explaining pipeline orientation. The effects of *task content breadth*, *average function size,* and *organizational distribution* are little changed by including these controls.

Model 4 then explores whether jobs along the same career path tend to have similar pipeline orientation, so that pipeline jobs feed pipeline jobs and sprinkler jobs feed sprinkler jobs. We probe this sequencing with a new variable, called *average source job pipeline orientation.* This variable provides the average (by advancement moves) pipeline orientation of all of the jobs that feed the focal job. A small number of jobs (21) never received any promotion into the job and are therefore dropped in this regression model. We find a highly significant ($b = 0.36$, $p < 0.001$) effect on *pipeline orientation*, indicating that jobs along the same career path do indeed have similar pipeline orientation. This result indicates that jobs with high pipeline orientation tend to cluster along career paths, providing a sequence of pipeline jobs.

Taken together, these results support our arguments that pipelines are more likely to emerge in jobs that have more specialized skills, are located in smaller subfunctions, and are distributed across a narrower set of jobs. We go on to explore the consequences of this pipeline orientation for career outcomes.

Do Pipelines Explain Promotion Typicality at BigCo?

As we noted in our theory section, pipeline orientation should, by definition, lead to increased promotion typicality out of the job. We conducted analyses to assess the strength of this relationship, though, exploring the importance of pipeline orientation in explaining variation in promotion typicality. We explore the determinants of that typicality in Table 4.

We first explore the broader role of jobs in shaping promotion typicality. An important theme in our paper is that move typicality is often shaped by differences in the jobs that people are leaving. We test this assumption using linear mixed effect models (Rabe-Hesketh &

Skrondal, 2008). Such models predict an outcome (promotion typicality in our case) using both fixed effects and random effects. For the fixed effect variables, the model estimates the individual coefficients associated with each value of the fixed effect, similar to ordinary least squares regression. For random effect variables, the model only estimates the variance of fixed differences across different random effect levels such as (in our case) individuals and jobs. These models can help evaluate the relative importance of different categorical variables in explaining variation in outcomes, even when those variables may be correlated with one another (De Stefano et al., 2022; Mollick, 2012; Quigley & Graffin, 2017). We note that random effect estimates do not allow us to make claims regarding specific individual-level or job-level characteristics. These estimates are, however, helpful in evaluating the relative variance explained by individual- and job-level characteristics on aggregate.

Table 4 presents the results of these models. Each observation represents a promotion that takes place within our data. The dependent variable is the typicality of that promotion. Model 1 includes only random effects at the individual and job level, allowing us to assess the relative roles of individual characteristics versus job-level characteristics in shaping move typicality. Those random effects should incorporate all fixed individual-level characteristics, including personality, ability, preferences, etc., as well as all job-level characteristics.

We find that cross job-level differences in *promotion typicality* (variance = 0.042) are many times higher than cross individual-level differences (variance = 0.0034). These results indicate that people leaving the same job will tend to have similar levels of promotion typicality, so that advancement out of some jobs tends to be highly typical, while other jobs tend to see promotion into a wide range of atypical roles. The relatively weak variance in individual-level effects implies that, within this organization at least, there are very limited cross-individual

differences in propensity to repeatedly engage in typical or atypical moves (such as we might expect if some people had a higher taste for variety or were actively trying to craft a generalist profile). These analyses therefore support our baseline assumption that differences between jobs play an important role in shaping the typicality of promotion pathways.

Model 2 inserts additional random effects to examine the role of higher-level structures such as job subfunction, pay grade, and job ladders in explaining variation in promotion typicality. We find that all of these random effects explain substantially more variation in promotion typicality than individual differences. However, cross job-level differences remain the predominant factor that explains variation in promotion typicality.

We include our *pipeline orientation* variable in Model 3. We find a highly significant effect of *pipeline orientation* ($b = 0.186$, $p < 0.001$). A one standard deviation increase in *pipeline orientation* is associated with a 0.46 standard deviation increase in *promotion typicality*. Perhaps more important, we find that *pipeline orientation* explains the vast majority of the cross-job differences identified in Model 1 and 2. After inserting *pipeline orientation* into the model, the remaining cross job-level variance in *promotion typicality* shrink substantially from 0.0220 in Model 2 to 0.0031 in Model 3. This suggests that most of the cross job-level differences in *promotion typicality* can be explained by *pipeline orientation*. Taken together, Model 1 to 3 show that most of the variation in *promotion typicality* is at the job level, and this job-level variation is mostly explained by *pipeline orientation* with a high level of statistical significance.

Model 4 then inserts subfunction, pay grade and (long) job ladder fixed effects rather than random effects, examining if pipeline orientation still predicts promotion typicality despite holding these factors constant. We continue to find a large, significant positive effect of pipeline orientation, indicating that variation in how jobs affect promotion typicality is not purely driven

by where jobs sit within the organization's hierarchy or functional division of labor. Model 5 additionally inserts an array of job-level predictors. We find that other job-level predictors explain a much smaller portion of job level variation in *promotion typicality* compared to *pipeline orientation*, with the estimated variance at the job-level falling from 0.0032 to 0.0024 between Model 4 and Model 5. Model 6 then adds individual-level predictors. We lack data on many of the kinds of personality traits that would likely shape typicality. Nonetheless, we are able to include measures such as performance, total compensation, organization tenure, outside experience, and how the incumbent entered the focal job. While some of the individual-level predictors, such as performance, total compensation, organization tenure, and outside experience, are significant predictors of *promotion typicality,* their effect sizes are much smaller than that of *pipeline orientation*.

Pipelines and the Rate of Advancement at BigCo

H4 suggests that pipeline orientation shapes the rate of promotion out of a job, with promotions being faster out of jobs with a higher pipeline orientation. We test this prediction using a discrete-time event history analysis, where promotion represents the failure event. Because our data are annual snapshots, it makes more sense to structure these as discrete-time analyses, although our results are also robust to Cox proportional hazard models. Each observation represents a given employee in a given year. Our dependent variable takes the value of 0 when an employee remains in the job and 1 if they are promoted out of it. All other forms of mobility (exit out of the firm, lateral mobility, or demotion) are treated as censored observations, meaning that we drop the year prior to those other forms of move from the analysis, as the employee neither stays in their job nor is promoted in the following year. We also drop left-censored observations for which we did not observe the employee moving into a job, preventing us from calculating

how long they had been in their role. With all these exclusions, as well as dropping observations with missing data, our final sample consists of 93,086 employee-year observations across 536 jobs, with 14,372 promotion events.

We use a linear probability model for ease of interpreting the interaction terms. Since promotions do not take place immediately, the outcome variable is lagged one period such that all independent variables are at time *t* and promotion is at *t*+1. Errors are clustered by job to account for the non-independence of errors within jobs. Results are in Table 5.

Model 1 of Table 5 only includes control variables. Model 2 tests the main effect of *pipeline orientation* on promotion. The result reveals that pipeline orientation has a strong and positive effect ($b = .027$; $p < .001$) on the rate of promotion, providing support for H4. The coefficient indicates that a one standard deviation increase in pipeline orientation is associated with a 2.7% increase in promotion likelihood in any given year. This is an estimated 17.5% increase from our sample's baseline promotion rate of 15.4%.

In Model 3 we test H5 by introducing an interaction between *pipeline orientation* and *job recruiting breadth*. We find a significant negative interaction ($b = -.014$, $p < 0.001$), consistent with our argument that pipeline orientation will have stronger effects when recruitment patterns support a more coherent skill set among incumbents. When a job is one standard deviation above mean on both *pipeline orientation* and *job recruiting breadth*, incumbents only enjoy a 1.48% increase in promotion likelihood. When the job is one standard deviation below the mean on *job recruiting breadth,* increased *pipeline orientation* is associated with a 3.03% increase in promotion likelihood. We visualize this interaction effect in Figure 4.

Controlling for prior roles. One concern is that our results could reflect differences in the skills people bring to pipeline versus non-pipeline jobs. The ideal experiment would compare

promotion rates for identical people randomly assigned to jobs with different levels of *pipeline orientation*. We sought to get closer to such a setup by including fixed effects for the previous job that employees had held (denoted by *Last Job FE)* in Models 4 and 5 in Table 5. The *Last Job FE* in effect holds the prior job constant, thus comparing people who started in the same kind of role (and should therefore have similar skill profiles) and then left for jobs that have different *pipeline orientation*. We find that the key coefficients are similar to those in Models 2 and 3, suggesting that differences in people's backgrounds do little to explain our effects.

Effects of job ladders. We conducted additional analysis to explore whether our results were being driven by jobs' locations in organizationally defined job ladders. Model 6 examines the effects of *on long ladder* and *on short ladder* on promotion rates, and Model 7 examines the effect of *within-ladder promotion rate*. We find that being on a short job ladder is positively associated with promotion, consistent with the idea that such ladders are likely to be along pipelines. Perhaps surprisingly, we find a negative effect of being on a long job ladder, once the short job ladder is accounted for. This may indicate challenges in moving from one segment of a long ladder to the next. We also find that jobs that have more promotions along a job ladder also have faster promotion rates, which is consistent with our main arguments. Models 8 and 9 then include the *on long job ladder, on short job ladder,* and *within-ladder promotion rate* variables alongside our main independent variables. We find that the main effect of *pipeline orientation* and its interaction with *job recruiting breadth* are both robust to including these job ladder variables, indicating that our results do not simply reflect where jobs sit on organizationally defined job ladders.

Supplementary Analysis

We conducted a number of supplementary analyses to clarify our results.

Mobility into pipeline jobs and selection. We examined the characteristics of people who take pipeline jobs to explore whether our advancement results could reflect differences in who selects into pipeline jobs, our individual-level controls notwithstanding.

Appendix Table A5 reports analyses which regress *pipeline orientation* of the job that an individual will enter in the following year on current job and individual characteristics, conditional on job mobility in the following year. We find little evidence that indicators of ability correlate with moving into a pipeline-oriented job. We find that job performance ($p = .74$) and standardized compensation ($p = .17$) are unrelated to the pipeline orientation of a subsequent role. These results do not, therefore, suggest that there is systematic sorting of employees with higher ability and firm-specific human capital into jobs with higher *pipeline orientation*.

Indeed, it is striking how few variables predict pipeline orientation. The only variable that seems to be strongly associated with mobility into pipeline jobs is *subordinate number vs pay grade mean*, which has a negative relationship with mobility into pipeline jobs ($b = -.014$, $p < .01$). Controlling for the number of subordinates, we also find an average positive effect of being in a managerial job ($b = 0.14$, $p < .05$).

We also check to see if pipeline jobs lead into more valuable jobs, perhaps to maintain a strong supply of candidates (Brymer et al. 2019). We investigate the relationship between *pipeline orientation* and subsequent total compensation in the next year, conditional on getting a promotion in Appendix Table A6. We do not find a significant relationship between *pipeline orientation* of the current job and pay in the advancement destination.

We supplemented this analysis with an "Oster analysis," exploring how selection on unobservables might affect our results (details in Appendix 1). The analysis suggests that selection on unobservable performance would need to be several times stronger than selection on

observable performance to nullify the effect of role pipeline orientation on promotion rates.

Effects on attrition. Although our main focus is on the way that pipelines affect the speed and flexibility of advancement, we also explored their effects on attrition (Appendix Table A7). We found a statistically significant but weak negative effect of *pipeline orientation* on attrition ($b = -.0001$, $p < .05$), suggesting that being outside a pipeline might prompt employees to leave, perhaps due to the lack of clearly identified advancement pathways within the organization. We confirmed that differences in attrition did not affect our other results by rerunning our main specification with a subsample that dropped people that left BigCo during the period of observation (see Appendix Table A8).

Specification and sample. We also checked if our results are sensitive to removing some control variables, e.g. job size (see Appendix Table A9), the exclusion of observations where the entry date was imputed (see Appendix Table A10), and the inclusion of job ladder related fixed effects (see Appendix Table A11).

DISCUSSION

This study draws from theory on human capital pipelines to provide new insights into how people advance within organizations. We argue that internal mobility can show varying levels of structure, with pipeline jobs fostering advancement to a limited set of higher-level jobs while sprinkler jobs promote advancement to a much wider set of jobs. We develop theory on the determinants of this pipeline orientation and then use it to provide insights into when people make typical versus atypical moves in their careers. We also show how pipeline orientation helps to explain why some people get promoted faster than others.

A quantitative case study of promotions in a large US corporation confirms the main outlines of our account. We find substantial variation in jobs' pipeline orientations, with some

jobs fostering advancement into a narrow set of roles while promotions out of other roles take people into a much broader set of jobs. We also find that these differences reflect the way that organizational structure helps to channel the skill specializations and social relationships that influence within-organization matching.

We found that pipeline orientation was higher in jobs with greater skill specialization and in smaller functions, supporting the role of task overlap in shaping pipelines. The effects of organizational concentration were even stronger, with pipeline orientation being much greater in jobs that are more concentrated within a few business units. The relative importance of these effects is surprising, as function definitions relate directly to the skill requirements of different jobs, while the organization of business units reflects the way that the company organizes accountability for different activities. These results suggest that formal structure shapes pipelines more by structuring relationships and information flows than by defining jobs. We also find evidence that pipeline jobs tend to cluster along career paths, as pipeline-oriented jobs are fed by jobs that are themselves more pipeline-oriented.

We also demonstrate the central role of jobs' pipeline orientations in shaping careers. Not only does a job's pipeline orientation predict promotion typicality (consistent with its definition); but we also find that these cross-job effects have very high predictive power, with cross-job variance in typicality 10x larger than cross-person variance. These effects demonstrate the importance of pipeline orientation as a lens for understanding when people follow typical versus atypical careers within organizations. We also show that these effects are largely independent of other aspects of formal structure such as functional affiliations and hierarchical level.

We also find that pipeline orientation is associated with faster promotion, holding constant such variables as subfunction, pay grade, and job performance, as well as the role of job

ladders derived from job titles. We might expect that more diffuse advancement pathways would accelerate promotions by offering more advancement opportunities; instead, though, we find that promotion out of pipeline jobs is faster, likely reflecting the greater efficiency of matching within those pipelines. We further find that these effects are stronger when those jobs recruit from a narrower set of roles. Our findings therefore suggest a tradeoff for employees when deciding whether to pursue jobs within pipelines versus pursing sprinkler jobs. Working in pipeline jobs offers less flexibility in the choice of the next destination but allows people to advance more rapidly. Sprinkler jobs offer more flexibility in where one advances, but advancement is likely to take longer.

Our study aims to bridge two distinct perspectives on mobility. Internal labor market theory introduced the idea that advancement within organizations tends to be patterned and explored the extent of organizationally defined job ladders that might shape such advancement (Baron et al., 1986; Doeringer & Piore, 1971). Work within this literature focused on formal structures, though, rather than the paths that people pursue in practice (Baron, Davis-Blake & Bielby, 1986). The literature on pipelines, by contrast, has examined how mobility can follow set pathways in external labor markets, even in the absence of formal structure (Brymer, Molloy, & Gilbert, 2014; Brymer, Paraskevas, Josefy, & Ellram, 2024; Josefy et al., 2022). We extend their approach to explore the realized patterns of moves within organizations, examining why those patterns form and what consequences they have for how people advance.

Integrating these literatures allows us to make (and test) predictions that have not previously been explored. First, we provide new insight into how organizational structure shapes career paths. We identify factors that lead jobs to foster narrow versus broad patterns of advancement, demonstrating the role of task breadth, functional organization, and the

organizational distribution of jobs. Second, we demonstrate a relationship between the patterning of mobility and its rate, showing that pipeline-oriented jobs have more rapid promotion rates. Our theoretical approach also allows us to identify the presence of "sprinkler" jobs. Where internal labor market theory saw jobs as either being part of job ladders with narrow advancement opportunities or dead-end jobs without any advancement, we show that there are many jobs that allow people to advance into a wide set of different roles.

Our theory development also highlights the importance of jobs in shaping move typicality. Recent research on careers has made tremendous progress in understanding the career dynamics associated with the kinds of typical career paths that lead to specialist profiles versus the more atypical career paths pursued by generalists (Ferguson & Hasan, 2013; Leung, 2014; Merluzzi & Phillips, 2016; Nagle & Teodoridis, 2020; Teodoridis et al., 2019; Zuckerman et al., 2003). This work has often viewed move typicality as a consequence of individual attributes (Crossland et al., 2014; Zuckerman et al., 2003). Our theory and findings suggest instead that these differences between typical or atypical paths often reflect the very different set of influences shaped by whether jobs fall into pipelines.

Our research also adds to our understanding of modern internal labor markets. Although the move towards open-posting systems (Keller, 2018) has de-emphasized the importance of formal promotion ladders in shaping mobility, we show that those changes haven't necessarily led to the predominance of unstructured, lattice-like careers promoted by some commentators (Benko & Anderson, 2010; Cavoulacos & Minshew, 2017). Instead, we show that much mobility within organizations can remain highly patterned, despite the use of market-like staffing systems.

We also add to research on the determinants of promotion rates within organizations (e.g., Benson et al., 2019; Dencker, 2009; Phillips, 2001). Prior work on the way that jobs shape

promotion rates has largely focused on the presence of vacancy-based grade ratios (e.g. Barnett & Miner, 1992; Stewman & Konda, 1983). We develop a separate job-level characteristic that may also shape promotion chances–the pipeline orientation of the job. In doing so, we hope to shed new light on how and why promotion chances might vary across ostensibly similar roles within the same organization.

We also contribute to the literature on pipelines (Brymer et al., 2014; 2019). Recent empirical research has examined how pipelines shapes mobility between firms (Brymer et al., 2024; Josefy et al., 2023; Rocha & Brymer, 2025). Although theoretical work has extended the pipelines concept to internal moves (Byrmer et al., 2019), we believe that this is the first paper to explicitly study those internal human capital pipelines. In doing so, we also extend pipeline theory to explore effects on careers, positing and demonstrating a speed flexibility tradeoff associated with pipeline jobs. We further add to the pipeline literature by examining where pipelines are more likely to form. Although recent work has demonstrated more focused pipeline hiring by serial entrepreneurs (Rocha & Pozzoli, 2025), little work has examined the factors that contribute to pipeline mobility. By articulating the characteristics of jobs that shape pipelines we hope to open up new avenues for pipeline research.

Limitations and Future Directions

Our study has a number of limitations. First, our findings are based on a single organization, raising questions about generalizability. Our interviews suggested that BigCo's internal hiring process had a similar structure to those documented elsewhere (Keller, 2018). Based on our theory, we would expect to find similar results in other large organizations where mobility is governed by decentralized posting processes and informal networks. Nonetheless, it is important to explore if our hypotheses and findings hold in alternative settings.

Second, we cannot demonstrate a causal effect of pipeline orientation on promotions. The goal of much of our analysis is descriptive, in that we aim to demonstrate how different patterns of advancement are connected to different jobs. A particular concern is that we cannot conclusively untangle the effects of the jobs from the question of who initially selects into those jobs. We performed a number of supplementary analyses which found no evidence that individuals with higher job performance sort into jobs with high levels of pipeline orientation. This may mean that individuals are unable to systematically identify the structure of pipelines in the organization or strategically pursue these opportunities. It is also possible that enough other factors shape job choice that entry into pipeline jobs is effectively the result of stochastic and idiosyncratic processes. Either way, these analyses suggest that our results about advancement rates are unlikely to be substantially affected by differences in the kinds of prior jobs that people had held or their performance. Future research could leverage exogenous variation in advancement outcomes to provide causal tests of the relationships that we describe.

Third, our data does not allow us to explore how differences across demographic groups shape our effects. It would be valuable to understand how differences in pipeline orientation map onto well-documented differences in advancement outcomes for gender and racial minorities (Castilla, 2008; Petersen & Saporta, 2004).

Fourth, the relatively short time span of our data precludes a detailed analysis of how pipelines emerge. Our interviews during the study emphasized the strong role of informal relationships in shaping mobility, suggesting that pipelines likely form through informal repeated interactions, rather than deliberate strategic decisions on the part of managers. Further research exploring how managers make staffing decisions and when they choose to build pipelines would be a valuable addition to our knowledge in this area.

Because we use jobs as our unit of analysis, we offered only a cursory exploration of how pipelines might combine multiple jobs into longer, structured pathways. We did show that pipeline jobs tend to recruit from other pipeline jobs, and that their effects on advancement tend to be stronger when they recruit from a narrower set of sources. Nonetheless, future work might explore alternative theoretical approaches that allow for a more detailed consideration of how pipelines might shape entire sequences of jobs. We note that our analysis is focused on jobs that have at least 10 promotions out of them, restricting our sample to jobs in the middle echelons of the organization where upward mobility is more frequently observed. While many of these jobs were high in the organizational hierarchy, none were at the very top, leaving open the question of whether certain high-level jobs provide more paths to the uppermost echelons than others. As such, it is unclear whether our theory would generalize to the most-senior roles in organizations.

Despite these limitations, we believe that this study sheds new light on the structure of modern careers, highlighting the way that different jobs promote structured versus flexible career paths and demonstrating the implications of these paths for how quickly people advance within firms. In particular, we suggest that employees face a flexibility/speed tradeoff in thinking about how different jobs might aid their future careers. Pipeline jobs may offer very clear promotion pathways, allowing people to move quickly to the next level in their career, but providing fewer opportunities to consider different options. Sprinkler jobs may allow for greater exploration of career choices, but at the cost of slower advancement. We hope that future research will shed further light on the way that jobs shape career paths within modern organization.

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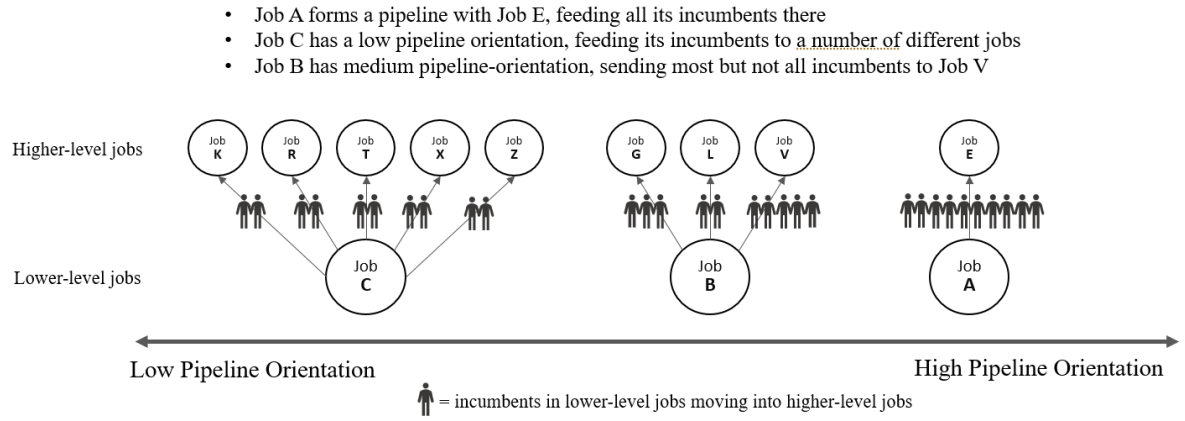
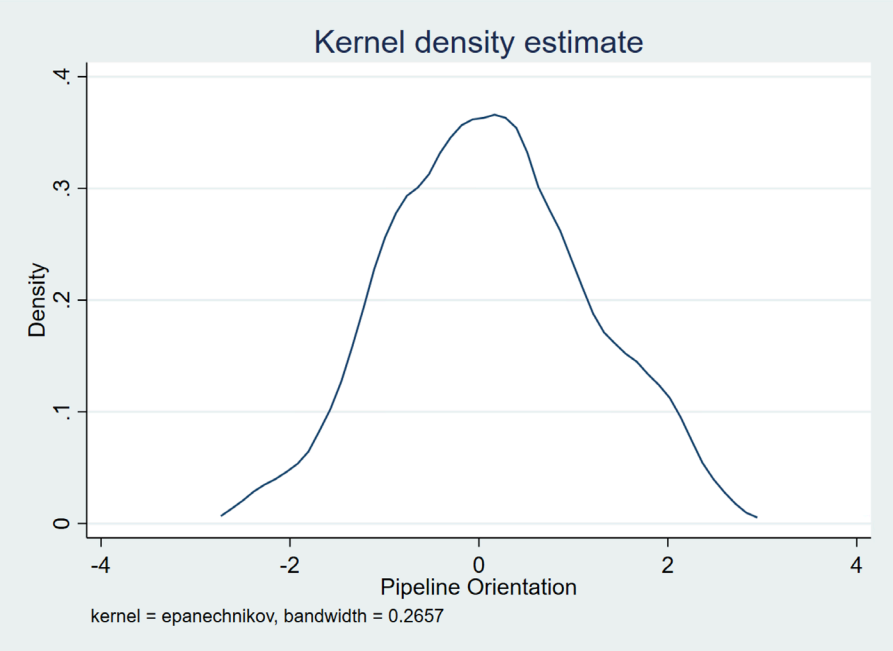
TABLES AND FIGURES

Figure 1. Illustration of job pipeline orientation



Notes. Graphical illustration of job pipeline orientation. Figure shows examples of jobs with varying levels of pipeline orientation, with job A representing jobs with high pipeline orientation and job C representing jobs with low pipeline orientation. Job A has a high pipeline orientation because it feeds all its incumbents to job E, job C has a low pipeline orientation because it feeds its incumbents to a variety of other jobs.

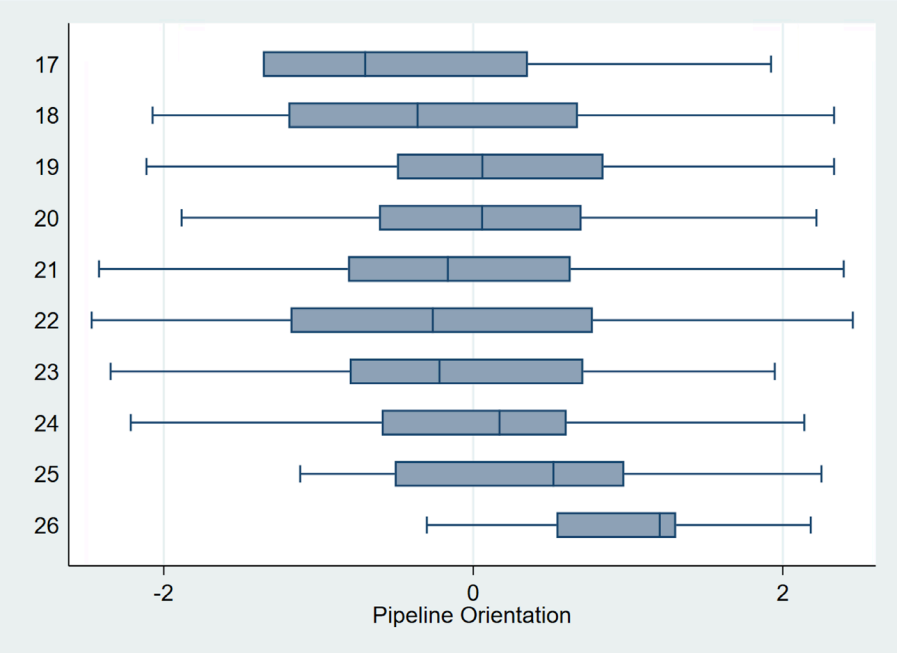
Figure 2. Kernel Density Plot of Pipeline Orientation



Notes. Kernel density plot of pipeline orientation.

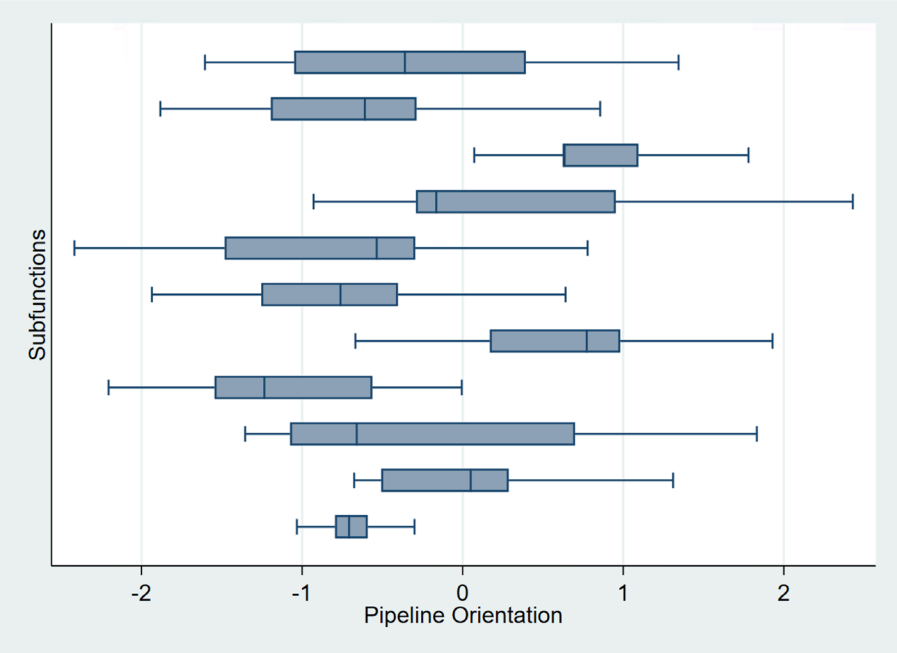
Figure 3. Distribution of Pipeline Orientation

Panel A. Pipeline Orientation by Pay Grade



Notes. Whisker plot of pipeline orientation by pay grade. Only pay grades with at least 10 jobs are shown.

Panel B. Pipeline Orientation by Job Subfunction



Notes. Whisker plot of pipeline orientation by job subfunction. Only job functions with at least 10 jobs are shown, and they are sorted by average pay from lowest (top) to highest (bottom).

Panel C. Pipeline Orientation by On Long/Short Ladder

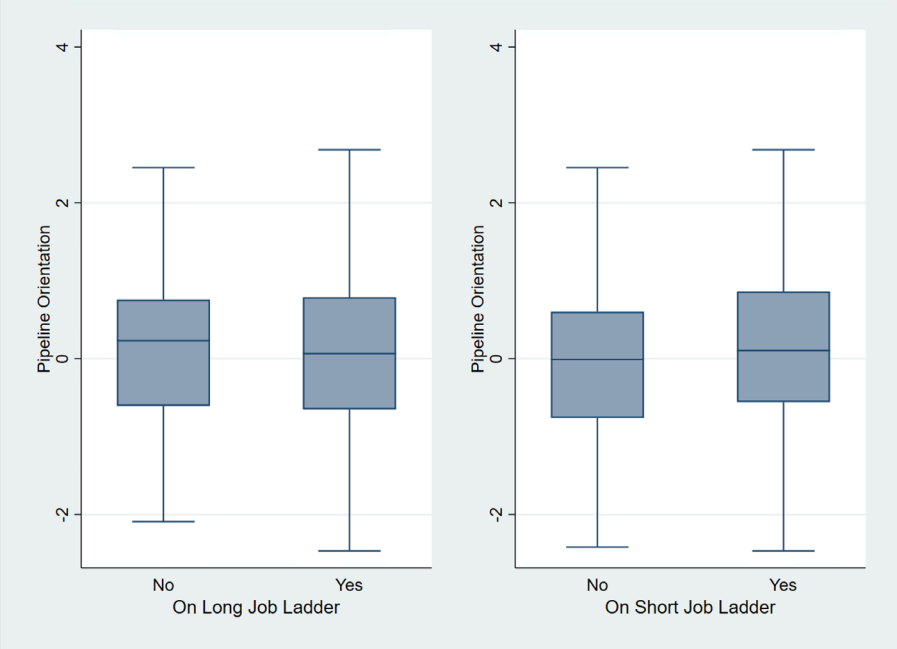
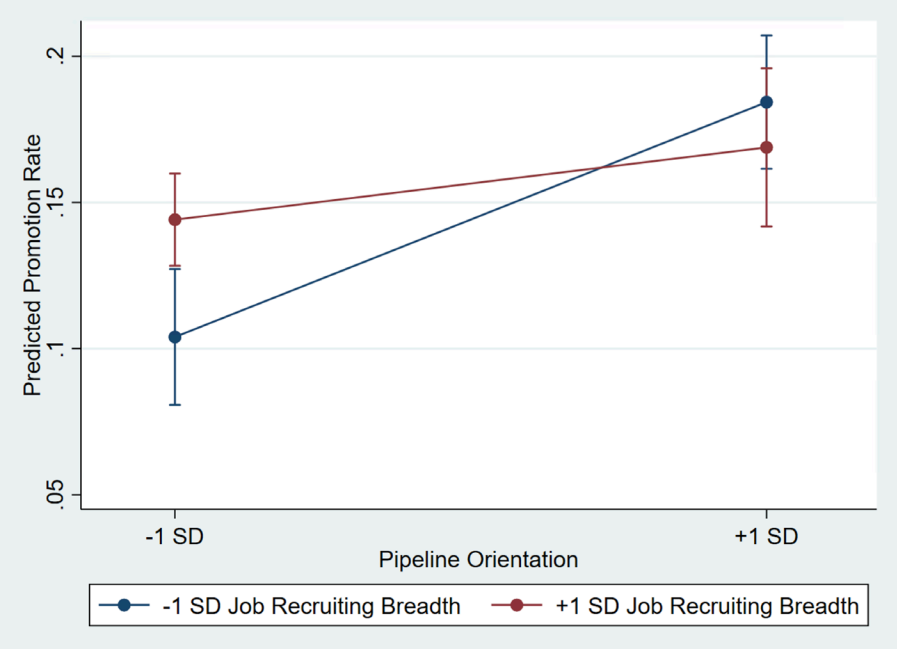


Figure 4. Moderating Effects of Job Recruiting Breadth on the Relationship Between Pipeline Orientation and Promotion Rate



Notes. Margins plot of interaction effect between pipeline orientation and job recruiting breadth in predicting promotion.

Table 1. Summary Statistics and Correlations for Key Variables

Panel A. Job Level

VARIABLES	N	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Pipeline Orientation	536	0.11	1.04	1.00														
(2) Total Promotions (Logged)	536	3.43	0.79	-0.10**	1.00													
(3) Average Job Size (Logged)	536	3.57	0.99	-0.09**	0.73***	1.00												
(4) Managerial Job	536	0.37	0.48	0.04	-0.17***	-0.02	1.00											
(5) Average Number of Subordinates	536	0.91	1.96	-0.09**	-0.16***	-0.01	0.53***	1.00										
(6) Pay Grade	536	21.38	2.29	0.08*	-0.25***	-0.06	0.77***	0.42***	1.00									
(7) Pay Grade^2	536	462.43	96.92	0.09**	-0.25***	-0.05	0.78***	0.43***	1.00***	1.00								
(8) Average Total Compensation (Logged)	536	11.56	0.54	0.09**	-0.25***	-0.07	0.76***	0.40***	0.96***	0.97***	1.00							
(9) Average Grade Ratio	536	1.32	1.34	0.16***	-0.01	-0.32***	-0.30***	-0.21***	-0.31***	-0.31***	-0.31***	1.00						
(10) Job Recruiting Breadth	536	-0.02	1.05	-0.32***	-0.02	0.07*	0.38***	0.32***	0.43***	0.41***	0.37***	-0.20***	1.00					
(11) Task Content Breadth	536	-0.03	0.96	-0.02	0.03	0.02	0.18***	0.18***	0.29***	0.28***	0.27***	0.08*	0.18***	1.00				
(12) Average Function Size (Logged)	536	8.29	0.94	-0.07*	0.12***	0.17***	-0.13***	0.09**	-0.19***	-0.19***	-0.20***	0.03	-0.05	0.13***	1.00			
(13) Organizational Distribution	536	-0.09	0.95	-0.36***	0.10**	0.11***	0.22***	0.21***	0.16***	0.17***	0.17***	-0.13***	0.49***	-0.15***	-0.25***	1.00		
(14) On Long Job Ladder	536	0.90	0.30	0.00	0.04	-0.06	-0.01	-0.01	-0.03	-0.04	-0.06	0.06	-0.02	-0.10**	-0.03	0.07*	1.00	
(15) On Short Job Ladder	536	0.63	0.49	0.11**	0.16***	-0.03	-0.16***	-0.13***	-0.25***	-0.26***	-0.27***	0.14***	-0.18***	-0.08*	-0.02	-0.06	0.41***	1.00
(16) Average Source Job Pipeline Orientation	515	-0.22	0.81	0.36***	-0.05	0.15***	0.00	-0.10**	0.15***	0.15***	0.14***	-0.20***	-0.15***	-0.05	-0.07*	-0.20***	-0.02	-0.03

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

Notes. Summary statistics and pairwise correlations of relevant variables for job level analyses.

Panel B. Individual-Year Level

VARIABLES	N	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Promotion	93,086	0.15	0.36	1.00						
(2) Pipeline Orientation	93,086	0.00	1.00	0.03***	1.00					
(3) On Long Job Ladder	93,086	0.90	0.31	0.00	-0.06***	1.00				
(4) On Short Job Ladder	93,086	0.63	0.48	0.06***	0.05***	0.43***	1.00			
(5) Within-Ladder Promotion Rate	93,086	0.55	0.27	0.05***	0.39***	0.36***	0.33***	1.00		
(6) Job Size (Logged)	93,086	4.73	1.12	-0.13***	-0.11***	-0.06***	0.06***	0.15***	1.00	
(7) Managerial Job	93,086	0.31	0.46	-0.05***	0.08***	-0.01***	-0.28***	-0.03***	-0.32***	1.00
(8) Subordinate Number vs Pay Grade Mean	93,086	-0.12	2.18	0.03***	-0.09***	0.05***	-0.02***	-0.01***	0.01*	0.07***
(9) Grade Ratio	93,086	0.97	2.30	0.09***	0.06***	0.03***	0.03***	0.07***	-0.13***	-0.08***
(10) Job Recruiting Breadth	93,086	0.00	1.00	-0.03***	-0.29***	0.03***	-0.17***	-0.08***	-0.18***	0.43***
(11) Standardized Performance	93,086	0.04	0.98	0.19***	-0.03***	-0.03***	-0.09***	-0.05***	-0.06***	0.09***
(12) Performance Scale Dummy	93,086	0.67	0.47	0.03***	-0.08***	0.03***	0.10***	0.02***	0.07***	-0.35***
(13) Standardized Compensation	93,086	0.10	0.77	0.14***	0.02***	-0.04***	-0.01*	0.01***	-0.05***	-0.04***
(14) Organization Tenure at Job Entry	93,086	86.96	87.84	-0.09***	-0.04***	-0.06***	-0.19***	-0.12***	-0.06***	0.19***
(15) Outside Experience	93,086	4.92	1.17	-0.14***	0.07***	-0.03***	0.01***	0.01*	0.09***	0.01***
(16) Time in Job	93,086	16.00	14.13	-0.01*	-0.02***	0.03***	-0.02***	0.01***	0.06***	0.01*
(17) Entered by Promotion	93,086	0.30	0.46	-0.04***	-0.04***	0.04***	-0.08***	-0.03***	-0.09***	0.13***
(18) Entered by Hire	93,086	0.24	0.43	0.02***	0.05***	0.02***	0.12***	0.07***	0.01***	-0.15***
(19) Entered by Lateral Move	93,086	0.35	0.48	0.03***	0.02***	-0.06***	-0.08***	-0.05***	-0.04***	0.08***
(20) Promotion Typicality	14,372	0.42	0.31		0.61***	-0.02**	0.10***	0.42***	0.09***	-0.04***

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

Panel B. Individual-Year Level (Continued)

VARIABLES	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(8) Subordinate Number vs Pay Grade Mean	1.00											
(9) Grade Ratio	0.00	1.00										
(10) Job Recruiting Breadth	0.14***	-0.05***	1.00									
(11) Standardized Performance	0.01***	-0.01**	0.07***	1.00								
(12) Performance Scale Dummy	0.00	0.02***	-0.14***	-0.03***	1.00							
(13) Standardized Compensation	-0.05***	0.02***	-0.08***	0.25***	-0.13***	1.00						
(14) Organization Tenure at Job Entry	0.01**	-0.04***	0.12***	0.09***	-0.06***	0.17***	1.00					
(15) Outside Experience	-0.03***	-0.07***	-0.05***	-0.14***	-0.04***	0.08***	-0.33***	1.00				
(16) Time in Job	0.01***	-0.03***	-0.01***	0.03***	-0.22***	0.14***	0.02***	0.08***	1.00			
(17) Entered by Promotion	0.02***	0.00	0.12***	0.14***	-0.04***	-0.16***	0.15***	-0.19***	0.01***	1.00		
(18) Entered by Hire	-0.02***	0.05***	-0.10***	-0.18***	0.05***	-0.08***	-0.46***	0.17***	0.01*	-0.37***	1.00	
(19) Entered by Lateral Move	-0.03***	-0.03***	0.03***	0.06***	-0.02***	0.19***	0.32***	-0.04***	-0.05***	-0.48***	-0.41***	1.00
(20) Promotion Typicality	-0.03***	0.05***	-0.18***	-0.05***	0.01	0.04***	-0.06***	0.06***	-0.05***	-0.06***	0.03***	0.01

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

Notes. Summary statistics and pairwise correlations of relevant variables for individual-year level analyses.

Table 2. Example Job Titles, Pipeline Orientation, and Destination Jobs by Job Subfunction and Pay Grade

Job Subfunction	Pay Grade	Job Title	Pipeline Orientation	Destination Jobs
Marketing	22	Marketing Specialist 4	-0.46	Sales Strategy Manager 1 Sales Training Manager 1 Sales Manager 2 Marketing Manager 1 Marketing Manager 2 Marketing Research Manager Strategic Marketing Manager 1 Strategic Marketing Manager 2 Brand Product Management Manager 1 Contract Management Manager 1 Customer Relations Director 1 Sales Administration Manager 1 Sales Manager 1
		Market Development Specialist 4	-1.15	Market Development Manager 1 Contract Management Manager 2 Product Name A Manager 1 Product Name B Manager 1 Clinical Medical Education Manager 1 Strategic Marketing Manager 1 Sales [Division A] Manager 2 National/Key Accounts Manager 2
	23	Strategic Marketing Manager 1	0.00	Marketing Manager 2 Strategic Marketing Manager 2 Forecasting Manager 2 Business Development Manager 2 Brand Product Management Manager 2 Sales [Division A] Manager 1 Sales [Division B] Manager 2 Sales Analysis Manager Sales Strategy Manager 2 Marketing Director 1 Marketing Manager 2 Marketing Research Manager 2 Marketing Communications Manager 2 Strategic Marketing Manager 2 Strategic Marketing Director 1
		Marketing Manager 1	-0.71	Strategic Planning Manager Strategic Planning Director 1 National Key Accounts Manager 2 Customer Info Services Manager 2 Community Relations Manager 2 Regulatory Affairs Director 1 Field Technology Service Manager 2 New Product Management Manager 2 Patent Advocacy Manager 2 Business Development Manager 2 Brand Product Management Manager 2 Clinical Medical Education Manager 2
R&D	20	Research Analyst 2	1.05	Regulatory Affairs Specialist 3 Resource Planning Specialist 3 Biology/Microbiology Scientist 3 R&D Scientist 3 R&D Specialist 3 R&D Scientist 3 R&D Scientist 3
		R&D Scientist 2	0.32	R&D Engineer 3 R&D Supervisor 1 Product Assessment Specialist 3 Process Excellence Specialist 3 Resource Planning Specialist 4 Quality Manager 1 Quality Engineering Engineer 3

	23	R&D Project Manager 1	0.67	Quality Control Analyst 3 Quality Systems Analyst 3 Customer Complaints Analyst 3 Manufacturing Production Supervisor 2 Business Solutions Analyst 3 Clinical Supplies Specialist 4 Regulatory Affairs Specialist 3 Biology/Microbiology Scientist 3 Chemistry Scientist 3 R&D Engineering Manager 2 R&D Project Manager 2 R&D Project Manager 1 Research Development Manager 2 Information Technology Manager 2 Operations Manager 2 Strategic Planning Manager 2 Clinical Trials Manager 2 Clinical Research Manager 2 Pharmacology Manager 2 R&D Engineering Manager 2 R&D Project Manager 2 R&D Manager 2 R&D Scientist 6
		Quality Assurance R&D Manager 1	-0.16	Research & Development Manager 1 Product Development R&D Manager 2 Clinical Trials Manager 2 Clinical Research Manager 2 Engineering Manager 2 Engineering Director 1 Quality Assurance R&D Manager 2 Quality Manager 2
Sales	19	Field Tech Services Technician 3	1.09	Field Tech Services Technician 4 Field Tech Services Technician 3 Field Tech Services Specialist 3 Field Tech Services Specialist 2 Field Tech Services Manager 1 Product Name C Representative 3 Field Tech Services Specialist 3 Contract Management Analyst 2 Sales Analytics Analyst 2
		Telesales Representative 1	0.07	[Division C] Representative 2 [Product Name D] Representative 2 Telesales Representative 2 Procurement Buyer 3 Field Tech Services Specialist 4 Field Tech Services Specialist 3 Field Tech Services Manager 1 Product Development R&D Manager 2
	21	Field Tech Services Specialist 3	0.63	Sales Training Manager 1 Sales [Division A] Manager 1 Strategic Marketing Manager 1 Marketing Specialist 2 Patient Advocacy Manager 1 [Product Name E] Representative 4 Sales Strategy Manager 2 Sales Strategy Manager 1 Sales Strategy Analyst 3
		Sales Strategy Analyst 3	-0.89	Sales & Marketing Manager 1 Sales [Division C] Manager 1 Marketing Specialist 2 Brand/Product Management Specialist 4 Procurement Manager 1

Notes. Example jobs with different levels of pipeline orientation and destination jobs within job subfunctions and pay grade.

Table 3. Determinants of Pipeline Orientation

VARIABLES	(1)	(2)	(3)	(4)
	Pipeline Orientation			
Total Promotions (Logged)	-0.125	-0.066	-0.107	0.002
	(0.085)	(0.082)	(0.084)	(0.084)
Average Job Size (Logged)	0.068	0.086	0.111*	-0.017
	(0.069)	(0.069)	(0.070)	(0.071)
Managerial Job	-0.010	0.003	-0.033	0.128
	(0.159)	(0.156)	(0.155)	(0.142)
Average Number of Subordinates	-0.055**	-0.027	-0.025	-0.011
	(0.022)	(0.022)	(0.022)	(0.021)
Pay Grade	-0.570*	-0.742**	-0.760**	-1.16***
	(0.293)	(0.349)	(0.345)	(0.311)
Pay Grade^2	0.022***	0.025***	0.025***	0.029***
	(0.008)	(0.008)	(0.008)	(0.008)
Average Total Compensation (Logged)	-0.893**	-0.707	-0.607	0.012
	(0.414)	(0.438)	(0.432)	(0.418)
Average Grade Ratio	0.147***	0.161***	0.161***	0.168***
	(0.038)	(0.038)	(0.038)	(0.037)
Job Recruiting Breadth	-0.388***	-0.215***	-0.202***	-0.141***
	(0.046)	(0.053)	(0.053)	(0.049)
Task Content Breadth		-0.108**	-0.108**	-0.070
		(0.045)	(0.044)	(0.046)
Average Function Size (Logged)		-0.116***	-0.109***	-0.096**
		(0.044)	(0.044)	(0.044)
Organizational Distribution		-0.360***	-0.358***	-0.321***
		(0.052)	(0.052)	(0.052)
On Long Job Ladder			-0.087	-0.149
			(0.139)	(0.141)
On Short Job Ladder			0.255***	0.240***
			(0.092)	(0.089)
Average Source Job Pipeline Orientation				0.360***
				(0.061)
Constant	12.525**	13.371***	12.417**	11.839**
	(5.265)	(5.067)	(5.011)	(5.124)
Observations	536	536	536	515
R-squared	0.210	0.277	0.288	0.350

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Notes. OLS regressions at the job level of analysis. Robust standard errors in parentheses.

Table 4. Pipeline Orientation and Promotion Typicality

	(1)	(2)	(3)	(4)	(5)	(6)
			Promotion Typicality			
Job Level Predictors						
Pipeline Orientation			0.186***	0.183***	0.187***	0.188***
			(0.0038)	(0.0057)	(0.005)	(0.005)
Job Size (Logged)					0.046***	0.045***
					(0.005)	(0.005)
Managerial Job					0.030	0.032
					(0.030)	(0.031)
Subordinate Number vs Pay Grade Mean					0.003*	0.003*
					(0.001)	(0.001)
Grade Ratio					0.005***	0.005***
					(0.001)	(0.001)
Job Recruiting Breadth					0.022***	0.022***
					(0.006)	(0.006)
Individual Level Predictors						
Standardized Performance						0.006*
						(0.002)
Performance Scale Dummy						-0.011
						(0.010)
Standardized Compensation						0.007*
						(0.004)
Organization Tenure at Job Entry						0.000**
						(0.000)
Outside Experience						0.008***
						(0.002)
Entered by Promotion						-0.000
						(0.009)
Entered by Hire						0.013+
						(0.009)
Entered by Lateral Move						-0.002
						(0.008)
Random Effects						
Individual	0.0034	0.0032	0.0034	0.0030	0.0030	0.0032
Job	0.0420	0.0220	0.0031	0.0032	0.0024	0.0025
Subfunction		0.0139	0.0004			
Pay Grade		0.0063	0.0000			
Ladder		0.0072	0.0009			
Residual	0.0516	0.0519	0.0516	0.0519	0.0517	0.0514
Year FE	No	No	No	Yes	Yes	Yes
Pay Grade FE	No	No	No	Yes	Yes	Yes
Subfunction FE	No	No	No	Yes	Yes	Yes
Ladder FE	No	No	No	Yes	Yes	Yes
Observations	14,372	14,372	14,372	14,372	14,372	14,372

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Notes. Linear mixed-effect models (Rabe-Hesketh & Skrondal, 2008) with estimates of linear predictor beta coefficients and random effect variances. Each observation is a promotion. Robust standard errors in parentheses.

Table 5. Effect of Pipeline Orientation on Promotion Rate

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					Promotion				
Pipeline Orientation		0.027***	0.027***	0.025***	0.027***			0.018***	0.019***
		(0.007)	(0.007)	(0.005)	(0.005)			(0.007)	(0.008)
Pipeline Orientation X Job Recruiting Breadth			-0.014***		-0.011***				-0.012***
			(0.005)		(0.004)				(0.005)
On Long Job Ladder						-0.031*		-0.036**	-0.029*
						(0.019)		(0.017)	(0.017)
On Short Job Ladder						0.026**		0.017**	0.014
						(0.010)		(0.009)	(0.009)
Within-ladder Promotion Rate							0.073***	0.056**	0.052*
							(0.021)	(0.025)	(0.024)
Job Size (Logged)	-0.048***	-0.044***	-0.045***	-0.034***	-0.036***	-0.048***	-0.051***	-0.048***	-0.049***
	(0.008)	(0.007)	(0.007)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)
Managerial Job	-0.012	-0.018	-0.035	-0.027	-0.034	-0.012	-0.019	-0.021	-0.036*
	(0.023)	(0.023)	(0.021)	(0.022)	(0.021)	(0.022)	(0.023)	(0.022)	(0.021)
Subordinate Number vs Pay Grade Mean	0.006***	0.006***	0.006***	0.007***	0.007***	0.006***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Grade Ratio	0.009**	0.008**	0.008**	0.004*	0.004*	0.009**	0.007*	0.008*	0.008*
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)
Job Recruiting Breadth	0.006	0.006	0.006	0.007	0.006	0.008	0.002	0.004	0.004
	(0.008)	(0.007)	(0.007)	(0.005)	(0.005)	(0.008)	(0.008)	(0.008)	(0.008)
Standardized Performance	0.062***	0.062***	0.062***	0.065***	0.065***	0.062***	0.063***	0.063***	0.063***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Performance Scale Dummy	0.004	0.004	0.003	-0.002	-0.002	0.004	0.003	0.003	0.003
	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)
Standardized Compensation	0.068***	0.067***	0.066***	0.061***	0.060***	0.067***	0.066***	0.066***	0.065***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
Organization Tenure at Job Entry	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Outside Experience	-0.043***	-0.043***	-0.043***	-0.038***	-0.038***	-0.043***	-0.043***	-0.043***	-0.043***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Entered by Promotion	-0.011	-0.012	-0.013	-0.032**	-0.030**	-0.010	-0.015	-0.014	-0.014
	(0.014)	(0.014)	(0.013)	(0.015)	(0.015)	(0.014)	(0.013)	(0.013)	(0.013)

Entered by Hire	0.000	-0.001	-0.002	-0.011	-0.010	0.001	-0.003	-0.003	-0.004
	(0.015)	(0.015)	(0.015)	(0.021)	(0.021)	(0.015)	(0.015)	(0.015)	(0.015)
Entered by Lateral Move	0.036***	0.036***	0.035***	0.010	0.011	0.037***	0.034***	0.034***	0.034***
	(0.013)	(0.013)	(0.013)	(0.011)	(0.011)	(0.013)	(0.013)	(0.013)	(0.012)
Constant	0.623***	0.606***	0.613***	0.561***	0.565***	0.635***	0.606***	0.620***	0.622***
	(0.043)	(0.041)	(0.040)	(0.032)	(0.032)	(0.045)	(0.042)	(0.041)	(0.040)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pay Grade FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Subfunction FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time in Job FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Last Job FE	No	No	No	Yes	Yes	No	No	No	No
Observations	93,086	93,086	93,086	64,110	64,110	93,086	93,086	93,086	93,086
R-squared	0.155	0.157	0.158	0.203	0.203	0.154	0.157	0.158	0.159

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Notes. All models are linear probability models. We conduct discrete-time event history analysis where promotion is the failure event. Dummy variables for each value of number of months in the job are inserted to model time dependence in promotion rates (denoted by *Time in Job FE*). All models include year, pay grade, subfunction fixed effects. Model 4 and 5 include last job fixed effect, operationalized by inserting a dummy for each unique job that was held prior to moving into the current job. Robust standard errors are clustered by job.

APPENDIX 1: ADDITIONAL ROBUSTNESS CHECKS

We conducted a series of diagnostic tests following Oster (2019)[6] to assess the extent to which our main result might reflect omitted variable bias. These tests use the effects of observable controls on regression results to estimate how much larger the effects of unobservables would need to be to overturn the findings. The results of these tests are reported in Appendix Table 1.

First, we compare the size of the coefficient estimate on *pipeline orientation* obtained with unsaturated versus saturated models. The first unsaturated model that we examine consists of only pipeline orientation and the second consists of all covariates except for job performance. The saturated model refers to Model 2 of Table 5. The first row in Appendix Table 1 merely confirms that the set of covariates we include is an effective set of controls that accounts for other determinants of promotion. The comparison in the second row helps gauge the impact of selection on individual ability on the coefficient estimate. If selection on ability was a strong driver of the results we find, the coefficient should change substantially between the unsaturated (without performance) and saturated model. The fact that the coefficient estimates between the two models are highly similar (unsaturated: 0.0125, saturated: 0.269) suggest that selection on ability is unlikely a strong force that's driving the results we find.

We then computed the δ test statistic which assesses the strength of selection on unobservables in comparison to observables that would be necessary to reduce the estimated coefficient to 0. When the estimated δ is equal to 1, it means selection on unobservables would have to be as strong as selection on observables to nullify the results. We follow Oster (2019)

[6] These tests are implemented using the *psacalc* command in Stata. In estimating the bias-adjusted treatment effects, we follow Oster (2019) and set $\delta = 1$.

and set R^2_{max} as $1.3R^2_{full}$, where R^2_{full} is the R-squared of Model 2 in Table 5. The estimated $|\delta|$ is 4.39 meaning that the effect of unobservables would have to be at least four times stronger than that of the observed variables to reduce the estimated coefficient to 0. These results together suggest that even if omitted variables had substantially stronger effects on promotion than the covariates included in our models (e.g. job performance) they would not overturn the results obtained, further indicating that the results are unlikely to be driven by selection of higher performers into high pipeline orientation jobs or biased by omitted variables.

APPENDIX TABLES

Appendix Table A1: Results for Oster's Diagnostic Tests

Specification for Unsaturated Model	Unsaturated model β (R^2)	Saturated Model β (R^2)	$\lvert\delta\rvert$ for $R^2_{max} = 1.3R^2_{full}$
Role Pipeline Orientation only	0.0125 (0.001)	0.0269 (0.157)	34.37
All covariates except job performance	0.0100 (0.098)	0.0269 (0.157)	4.39

Appendix Table A2. Effect of Pipeline Orientation on Promotion, Measure Constructed with Advancement Moves Within 3-Year Rolling Time Window

VARIABLES	(1)	(2)	(3)	(4)
	Promotion			
Pipeline Orientation (3-Year Rolling)	0.0221***	0.0210***	0.0142**	0.0141**
	(0.0083)	(0.0080)	(0.0069)	(0.0068)
Pipeline Orientation (3-Year Rolling) X Job Recruiting Breadth		-0.0070		-0.0089
		(0.0059)		(0.0064)
Job Size (Logged)	-0.0369**	-0.0381**	-0.0189	-0.0202
	(0.0174)	(0.0175)	(0.0129)	(0.0127)
Managerial Job	-0.0187	-0.0364	0.0479	0.0334
	(0.0652)	(0.0649)	(0.0688)	(0.0646)
Subordinate Number vs Pay Grade Mean	0.0055***	0.0057***	0.0071***	0.0072***
	(0.0021)	(0.0021)	(0.0021)	(0.0021)
Grade Ratio	0.0147**	0.0145**	0.0080**	0.0079**
	(0.0067)	(0.0067)	(0.0039)	(0.0038)
Job Recruiting Breadth	0.0146	0.0133	0.0205**	0.0182**
	(0.0115)	(0.0113)	(0.0086)	(0.0091)
Standardized Performance	0.0681***	0.0682***	0.0667***	0.0668***
	(0.0053)	(0.0053)	(0.0048)	(0.0048)
Performance Scale Dummy	-0.0030	-0.0023	0.0027	0.0033
	(0.0114)	(0.0114)	(0.0111)	(0.0113)
Standardized Compensation	0.0677***	0.0674***	0.0671***	0.0668***
	(0.0071)	(0.0070)	(0.0075)	(0.0074)
Organization Tenure at Job Entry	-0.0006***	-0.0006***	-0.0006***	-0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Outside Experience	-0.0384***	-0.0383***	-0.0353***	-0.0352***
	(0.0032)	(0.0032)	(0.0030)	(0.0030)
Entered by Promotion	-0.0175	-0.0179	-0.0343	-0.0344
	(0.0140)	(0.0139)	(0.0222)	(0.0222)
Entered by Hire	-0.0176	-0.0183	-0.0379	-0.0384
	(0.0146)	(0.0146)	(0.0321)	(0.0321)
Entered by Lateral Move	0.0209*	0.0205*	-0.0092	-0.0091
	(0.0120)	(0.0120)	(0.0155)	(0.0155)
Constant	0.5785***	0.5866***	0.4704***	0.4786***
	(0.1050)	(0.1059)	(0.0787)	(0.0776)
Year FE	Yes	Yes	Yes	Yes
Pay Grade FE	Yes	Yes	Yes	Yes
Subfunction FE	Yes	Yes	Yes	Yes
Time in Job FE	Yes	Yes	Yes	Yes
Last Job FE	No	No	No	Yes
Observations	46,799	46,799	31,022	31,022
R-squared	0.1690	0.1691	0.2278	0.2280

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A3. Effect of Pipeline Orientation on Promotion, Measure Constructed with Advancement Moves with Change in Unit

VARIABLES	(1)	(2)	(3)	(4)
	Promotion			
Pipeline Orientation (Unit Change)	0.0178***	0.0168**	0.0139***	0.0145***
	(0.0069)	(0.0068)	(0.0043)	(0.0043)
Pipeline Orientation (Unit Change) X Job Recruiting Breadth		-0.0110**		-0.0098***
		(0.0046)		(0.0030)
Job Size (Logged)	-0.0420***	-0.0430***	-0.0339***	-0.0350***
	(0.0076)	(0.0075)	(0.0054)	(0.0053)
Managerial Job	-0.0107	-0.0250	-0.0200	-0.0268
	(0.0231)	(0.0225)	(0.0222)	(0.0216)
Subordinate Number vs Pay Grade Mean	0.0061***	0.0059***	0.0071***	0.0070***
	(0.0015)	(0.0015)	(0.0015)	(0.0015)
Grade Ratio	0.0090**	0.0089**	0.0047*	0.0047*
	(0.0044)	(0.0044)	(0.0025)	(0.0025)
Job Recruiting Breadth	0.0077	0.0068	0.0092*	0.0080
	(0.0077)	(0.0078)	(0.0051)	(0.0051)
Standardized Performance	0.0615***	0.0617***	0.0647***	0.0648***
	(0.0043)	(0.0043)	(0.0032)	(0.0032)
Performance Scale Dummy	0.0045	0.0043	-0.0025	-0.0025
	(0.0093)	(0.0092)	(0.0078)	(0.0078)
Standardized Compensation	0.0682***	0.0678***	0.0609***	0.0608***
	(0.0057)	(0.0056)	(0.0047)	(0.0047)
Organization Tenure at Job Entry	-0.0007***	-0.0006***	-0.0006***	-0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Outside Experience	-0.0433***	-0.0431***	-0.0378***	-0.0377***
	(0.0025)	(0.0025)	(0.0020)	(0.0020)
Entered by Promotion	-0.0110	-0.0107	-0.0363**	-0.0355**
	(0.0141)	(0.0139)	(0.0153)	(0.0153)
Entered by Hire	0.0006	0.0006	-0.0154	-0.0145
	(0.0151)	(0.0150)	(0.0214)	(0.0213)
Entered by Lateral Move	0.0365***	0.0363***	0.0074	0.0078
	(0.0133)	(0.0132)	(0.0109)	(0.0109)
Constant	0.5961***	0.6013***	0.5573***	0.5618***
	(0.0426)	(0.0422)	(0.0333)	(0.0331)
Year FE	Yes	Yes	Yes	Yes
Pay Grade FE	Yes	Yes	Yes	Yes
Subfunction FE	Yes	Yes	Yes	Yes
Time in Job FE	Yes	Yes	Yes	Yes
Last Job FE	No	No	No	Yes
Observations	93,086	93,086	64,110	64,110
R-squared	0.1561	0.1566	0.2018	0.2021

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A4. Effect of Pipeline Orientation on Promotion, Measure Constructed with All Job Mobility

VARIABLES	(1)	(2)	(3)	(4)
	Promotion			
Pipeline Orientation (All Moves)	0.0342***	0.0334***	0.0320***	0.0330***
	(0.0078)	(0.0077)	(0.0056)	(0.0058)
Pipeline Orientation (All Moves) X Job Recruiting Breadth		-0.0150**		-0.0084*
		(0.0059)		(0.0048)
Job Size (Logged)	-0.0387***	-0.0390***	-0.0304***	-0.0310***
	(0.0072)	(0.0070)	(0.0053)	(0.0052)
Managerial Job	-0.0020	-0.0300	-0.0147	-0.0222
	(0.0242)	(0.0211)	(0.0240)	(0.0211)
Subordinate Number vs Pay Grade Mean	0.0071***	0.0065***	0.0076***	0.0074***
	(0.0015)	(0.0016)	(0.0016)	(0.0016)
Grade Ratio	0.0080**	0.0077**	0.0040*	0.0040*
	(0.0040)	(0.0039)	(0.0022)	(0.0022)
Job Recruiting Breadth	0.0065	0.0035	0.0085*	0.0051
	(0.0073)	(0.0078)	(0.0048)	(0.0053)
Standardized Performance	0.0622***	0.0627***	0.0650***	0.0651***
	(0.0043)	(0.0042)	(0.0032)	(0.0032)
Performance Scale Dummy	0.0037	0.0033	-0.0024	-0.0026
	(0.0092)	(0.0092)	(0.0078)	(0.0078)
Standardized Compensation	0.0652***	0.0637***	0.0601***	0.0598***
	(0.0053)	(0.0050)	(0.0046)	(0.0046)
Organization Tenure at Job Entry	-0.0006***	-0.0006***	-0.0006***	-0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Outside Experience	-0.0429***	-0.0427***	-0.0376***	-0.0375***
	(0.0024)	(0.0024)	(0.0020)	(0.0020)
Entered by Promotion	-0.0136	-0.0148	-0.0344**	-0.0335**
	(0.0135)	(0.0131)	(0.0153)	(0.0152)
Entered by Hire	-0.0015	-0.0028	-0.0115	-0.0105
	(0.0148)	(0.0146)	(0.0214)	(0.0214)
Entered by Lateral Move	0.0340***	0.0327***	0.0078	0.0079
	(0.0128)	(0.0125)	(0.0110)	(0.0110)
Constant	0.5788***	0.5816***	0.5398***	0.5412***
	(0.0416)	(0.0409)	(0.0328)	(0.0325)
Year FE	Yes	Yes	Yes	Yes
Pay Grade FE	Yes	Yes	Yes	Yes
Subfunction FE	Yes	Yes	Yes	Yes
Time in Job FE	Yes	Yes	Yes	Yes
Last Job FE	No	No	No	Yes
Observations	93,086	93,086	64,110	64,110
R-squared	0.1578	0.1587	0.2028	0.2030

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A5. Job and Individual Level Predictors of Pipeline Orientation (t+1), Conditional on Job Mobility

VARIABLES	(1) Pipeline Orientation (t+1)
Job Size (Logged)	-0.0172
	(0.0204)
Managerial Job	0.1339*
	(0.0750)
Subordinate Number vs Pay Grade Mean	-0.0141**
	(0.0064)
Grade Ratio	0.0104
	(0.0101)
Job Recruiting Breadth	-0.0377
	(0.0240)
Standardized Performance	0.0022
	(0.0067)
Performance Scale Dummy	0.1126***
	(0.0336)
Standardized Compensation	-0.0190
	(0.0139)
Organization Tenure at Job Entry	0.0001
	(0.0001)
Outside Experience	0.0191***
	(0.0057)
Entered by Promotion	-0.0134
	(0.0295)
Entered by Hire	0.0324
	(0.0312)
Entered by Lateral Move	0.0400
	(0.0270)
Constant	-1.5078***
	(0.1075)
Year FE	Yes
Pay Grade FE	Yes
Subfunction FE	Yes
Time in Job FE	Yes
Last Job FE	No
Observations	20,766
R-squared	0.3344

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A6. Effect of Pipeline Orientation on Future Pay Conditional on Promotion

VARIABLES	(1) Standardized Compensation (t+1)
Pipeline Orientation	-0.0442
	(0.0344)
Job Size (Logged)	-0.0029
	(0.0265)
Managerial Job	0.0966
	(0.0836)
Subordinate Number vs Pay Grade Mean	-0.0078
	(0.0076)
Grade Ratio	0.0042
	(0.0090)
Job Recruiting Breadth	0.0258
	(0.0259)
Standardized Performance	-0.0336***
	(0.0114)
Performance Scale Dummy	0.1587**
	(0.0672)
Standardized Compensation	0.6264***
	(0.0198)
Organization Tenure at Job Entry	0.0001
	(0.0002)
Outside Experience	-0.0075
	(0.0073)
Entered by Promotion	0.0983**
	(0.0416)
Entered by Hire	0.0794*
	(0.0446)
Entered by Lateral Move	0.0594
	(0.0480)
Constant	-0.6093***
	(0.1273)
Year FE	Yes
Pay Grade FE	Yes
Subfunction FE	Yes
Time in Job FE	Yes
Last Job FE	No
Observations	14,304
R-squared	0.4435

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A7. Effect of Pipeline Orientation on Voluntary Turnover

VARIABLES	(1)	(2)
	Voluntary Turnover	
Pipeline Orientation	-0.0001*	-0.0002**
	(0.0001)	(0.0001)
Job Size (Logged)	-0.0001**	-0.0001
	(0.0000)	(0.0001)
Managerial Job	-0.0001	-0.0004
	(0.0002)	(0.0006)
Subordinate Number vs Pay Grade Mean	-0.0000	0.0000
	(0.0000)	(0.0000)
Grade Ratio	0.0000	0.0000
	(0.0000)	(0.0000)
Job Recruiting Breadth	-0.0000	-0.0001
	(0.0000)	(0.0002)
Standardized Performance	0.0001*	0.0001
	(0.0000)	(0.0001)
Performance Scale Dummy	-0.0001	-0.0002
	(0.0001)	(0.0001)
Standardized Compensation	-0.0000	-0.0001
	(0.0001)	(0.0001)
Organization Tenure at Job Entry	-0.0000	-0.0000*
	(0.0000)	(0.0000)
Outside Experience	-0.0000	-0.0000
	(0.0000)	(0.0000)
Entered by Promotion	-0.0001	-0.0003
	(0.0001)	(0.0005)
Entered by Hire	-0.0001	-0.0003
	(0.0002)	(0.0005)
Entered by Lateral Move	0.0000	-0.0002
	(0.0001)	(0.0005)
Constant	0.0009**	0.0011*
	(0.0004)	(0.0006)
Year FE	Yes	Yes
Pay Grade FE	Yes	Yes
Subfunction FE	Yes	Yes
Time in Job FE	Yes	Yes
Last Job FE	No	No
Observations	93,086	64,110
R-squared	0.0033	0.0260

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A8. Effect of Pipeline Orientation on Promotion, Attrition Free Sample

VARIABLES	(1)	(2)	(3)	(4)
	Promotion			
Pipeline Orientation	0.0309***	0.0307***	0.0246***	0.0258***
	(0.0069)	(0.0067)	(0.0054)	(0.0054)
Pipeline Orientation X Job Recruiting Breadth		-0.0146***		-0.0098***
		(0.0049)		(0.0037)
Job Size (Logged)	-0.0443***	-0.0455***	-0.0334***	-0.0349***
	(0.0077)	(0.0075)	(0.0059)	(0.0058)
Managerial Job	-0.0220	-0.0404	-0.0031	-0.0087
	(0.0263)	(0.0263)	(0.0233)	(0.0237)
Subordinate Number vs Pay Grade Mean	0.0071***	0.0071***	0.0081***	0.0082***
	(0.0018)	(0.0019)	(0.0019)	(0.0019)
Grade Ratio	0.0076*	0.0075*	0.0041	0.0041
	(0.0043)	(0.0042)	(0.0027)	(0.0027)
Job Recruiting Breadth	0.0055	0.0058	0.0082	0.0080
	(0.0074)	(0.0076)	(0.0050)	(0.0053)
Standardized Performance	0.0643***	0.0647***	0.0675***	0.0676***
	(0.0049)	(0.0048)	(0.0036)	(0.0036)
Performance Scale Dummy	0.0026	0.0021	-0.0067	-0.0067
	(0.0103)	(0.0102)	(0.0088)	(0.0088)
Standardized Compensation	0.0669***	0.0659***	0.0609***	0.0606***
	(0.0059)	(0.0057)	(0.0053)	(0.0052)
Organization Tenure at Job Entry	-0.0007***	-0.0007***	-0.0006***	-0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Outside Experience	-0.0439***	-0.0439***	-0.0393***	-0.0392***
	(0.0026)	(0.0026)	(0.0022)	(0.0022)
Entered by Promotion	-0.0066	-0.0068	-0.0263	-0.0237
	(0.0152)	(0.0148)	(0.0175)	(0.0173)
Entered by Hire	0.0060	0.0054	-0.0202	-0.0184
	(0.0168)	(0.0166)	(0.0242)	(0.0242)
Entered by Lateral Move	0.0441***	0.0437***	0.0179	0.0196
	(0.0147)	(0.0144)	(0.0123)	(0.0122)
Constant	0.6102***	0.6178***	0.5511***	0.5549***
	(0.0439)	(0.0435)	(0.0362)	(0.0361)
Year FE	Yes	Yes	Yes	Yes
Pay Grade FE	Yes	Yes	Yes	Yes
Subfunction FE	Yes	Yes	Yes	Yes
Time in Job FE	Yes	Yes	Yes	Yes
Last Job FE	No	No	No	Yes
Observations	73,244	73,244	51,473	51,473
R-squared	0.1604	0.1614	0.2084	0.2087

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A9. Effect of Pipeline Orientation on Promotion, Exclude Job Size

VARIABLES	(1)	(2)	(3)	(4)
	Promotion			
Pipeline Orientation	0.0309***	0.0307***	0.0246***	0.0258***
	(0.0069)	(0.0067)	(0.0054)	(0.0054)
Pipeline Orientation X Job Recruiting Breadth		-0.0146***		-0.0098***
		(0.0049)		(0.0037)
Managerial Job	-0.0220	-0.0404	-0.0031	-0.0087
	(0.0263)	(0.0263)	(0.0233)	(0.0237)
Subordinate Number vs Pay Grade Mean	0.0071***	0.0071***	0.0081***	0.0082***
	(0.0018)	(0.0019)	(0.0019)	(0.0019)
Grade Ratio	0.0076*	0.0075*	0.0041	0.0041
	(0.0043)	(0.0042)	(0.0027)	(0.0027)
Job Recruiting Breadth	0.0055	0.0058	0.0082	0.0080
	(0.0074)	(0.0076)	(0.0050)	(0.0053)
Standardized Performance	0.0643***	0.0647***	0.0675***	0.0676***
	(0.0049)	(0.0048)	(0.0036)	(0.0036)
Performance Scale Dummy	0.0026	0.0021	-0.0067	-0.0067
	(0.0103)	(0.0102)	(0.0088)	(0.0088)
Standardized Compensation	0.0669***	0.0659***	0.0609***	0.0606***
	(0.0059)	(0.0057)	(0.0053)	(0.0052)
Organization Tenure at Job Entry	-0.0007***	-0.0007***	-0.0006***	-0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Outside Experience	-0.0439***	-0.0439***	-0.0393***	-0.0392***
	(0.0026)	(0.0026)	(0.0022)	(0.0022)
Entered by Promotion	-0.0066	-0.0068	-0.0263	-0.0237
	(0.0152)	(0.0148)	(0.0175)	(0.0173)
Entered by Hire	0.0060	0.0054	-0.0202	-0.0184
	(0.0168)	(0.0166)	(0.0242)	(0.0242)
Entered by Lateral Move	0.0441***	0.0437***	0.0179	0.0196
	(0.0147)	(0.0144)	(0.0123)	(0.0122)
Constant	0.6102***	0.6178***	0.5511***	0.5549***
	(0.0439)	(0.0435)	(0.0362)	(0.0361)
Year FE	Yes	Yes	Yes	Yes
Pay Grade FE	Yes	Yes	Yes	Yes
Subfunction FE	Yes	Yes	Yes	Yes
Time in Job FE	Yes	Yes	Yes	Yes
Last Job FE	No	No	No	Yes
Observations	73,244	73,244	51,473	51,473
R-squared	0.1604	0.1614	0.2084	0.2087

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A10. Effect of Pipeline Orientation on Promotion, Exclude June Entry

VARIABLES	(1)	(2)	(3)	(4)
	Promotion			
Pipeline Orientation	0.0253***	0.0250***	0.0245***	0.0256***
	(0.0066)	(0.0065)	(0.0050)	(0.0050)
Pipeline Orientation X Job Recruiting Breadth		-0.0099**		-0.0097**
		(0.0042)		(0.0040)
Job Size (Logged)	-0.0427***	-0.0437***	-0.0379***	-0.0391***
	(0.0068)	(0.0067)	(0.0056)	(0.0054)
Managerial Job	-0.0095	-0.0214	-0.0179	-0.0238
	(0.0222)	(0.0211)	(0.0236)	(0.0226)
Subordinate Number vs Pay Grade Mean	0.0071***	0.0071***	0.0079***	0.0079***
	(0.0016)	(0.0016)	(0.0018)	(0.0018)
Grade Ratio	0.0083**	0.0082**	0.0037*	0.0037*
	(0.0040)	(0.0040)	(0.0021)	(0.0021)
Job Recruiting Breadth	0.0092	0.0088	0.0054	0.0047
	(0.0067)	(0.0068)	(0.0049)	(0.0053)
Standardized Performance	0.0639***	0.0641***	0.0652***	0.0653***
	(0.0037)	(0.0037)	(0.0034)	(0.0034)
Performance Scale Dummy	-0.0028	-0.0031	-0.0037	-0.0037
	(0.0090)	(0.0090)	(0.0082)	(0.0082)
Standardized Compensation	0.0615***	0.0610***	0.0589***	0.0587***
	(0.0052)	(0.0051)	(0.0048)	(0.0048)
Organization Tenure at Job Entry	-0.0006***	-0.0006***	-0.0006***	-0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Outside Experience	-0.0414***	-0.0414***	-0.0369***	-0.0369***
	(0.0024)	(0.0024)	(0.0022)	(0.0022)
Entered by Promotion	-0.0246*	-0.0249*	-0.0270	-0.0241
	(0.0139)	(0.0137)	(0.0194)	(0.0192)
Entered by Hire	-0.0075	-0.0084	0.0293	0.0324
	(0.0151)	(0.0150)	(0.0284)	(0.0284)
Entered by Lateral Move	0.0276**	0.0271**	0.0115	0.0133
	(0.0120)	(0.0118)	(0.0128)	(0.0128)
Constant	0.5964***	0.6027***	0.5641***	0.5667***
	(0.0414)	(0.0405)	(0.0352)	(0.0350)
Year FE	Yes	Yes	Yes	Yes
Pay Grade FE	Yes	Yes	Yes	Yes
Subfunction FE	Yes	Yes	Yes	Yes
Time in Job FE	Yes	Yes	Yes	Yes
Last Job FE	No	No	No	Yes
Observations	75,019	75,019	52,639	52,639
R-squared	0.1557	0.1562	0.2030	0.2033

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Appendix Table A11. Effect of Pipeline Orientation on Promotion, Inclusion of Job Ladder and Job Ladder Step FE

VARIABLES	(1)	(2)	(3)	(4)	(5)
			Promotion		
Pipeline Orientation	0.0269***	0.0297***	0.0309***	0.0307***	0.0319***
	(0.0067)	(0.0071)	(0.0073)	(0.0068)	(0.0071)
Pipeline Orientation X Job Recruiting Breadth				-0.0173***	-0.0185***
				(0.0043)	(0.0044)
Job Size (Logged)	-0.0436***	-0.0456***	-0.0487***	-0.0477***	-0.0515***
	(0.0071)	(0.0092)	(0.0093)	(0.0090)	(0.0091)
Managerial Job	-0.0177	-0.0150	-0.0126	-0.0335	-0.0355
	(0.0231)	(0.0235)	(0.0225)	(0.0227)	(0.0228)
Subordinate Number vs Pay Grade Mean	0.0064***	0.0058***	0.0056***	0.0054***	0.0051***
	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0015)
Grade Ratio	0.0084**	0.0066*	0.0065*	0.0064*	0.0064*
	(0.0041)	(0.0036)	(0.0036)	(0.0035)	(0.0035)
Job Recruiting Breadth	0.0065	0.0090	0.0069	0.0060	0.0036
	(0.0073)	(0.0082)	(0.0082)	(0.0080)	(0.0080)
Standardized Performance	0.0621***	0.0620***	0.0621***	0.0622***	0.0624***
	(0.0043)	(0.0040)	(0.0040)	(0.0040)	(0.0040)
Performance Scale Dummy	0.0041	0.0065	0.0061	0.0062	0.0058
	(0.0092)	(0.0089)	(0.0088)	(0.0089)	(0.0088)
Standardized Compensation	0.0671***	0.0673***	0.0674***	0.0672***	0.0673***
	(0.0054)	(0.0045)	(0.0045)	(0.0045)	(0.0045)
Organization Tenure at Job Entry	-0.0006***	-0.0006***	-0.0006***	-0.0006***	-0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Outside Experience	-0.0431***	-0.0408***	-0.0403***	-0.0407***	-0.0402***
	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Entered by Promotion	-0.0124	-0.0226*	-0.0229*	-0.0218*	-0.0221*
	(0.0138)	(0.0118)	(0.0118)	(0.0118)	(0.0118)
Entered by Hire	-0.0007	-0.0115	-0.0129	-0.0117	-0.0133
	(0.0150)	(0.0133)	(0.0131)	(0.0132)	(0.0130)
Entered by Lateral Move	0.0358***	0.0243**	0.0232**	0.0245**	0.0234**
	(0.0130)	(0.0111)	(0.0111)	(0.0111)	(0.0111)
Constant	0.6059***	0.6124***	0.6242***	0.6221***	0.6381***
	(0.0409)	(0.0518)	(0.0514)	(0.0507)	(0.0506)
Year FE	Yes	Yes	Yes	Yes	Yes
Pay Grade FE	Yes	Yes	Yes	Yes	Yes
Subfunction FE	Yes	Yes	Yes	Yes	Yes
Time in Job FE	Yes	Yes	Yes	Yes	Yes
Job Ladder FE	No	Yes	Yes	Yes	Yes
Job Ladder Step FE	No	No	Yes	No	Yes
Observations	93,086	92,862	92,862	92,862	92,862
R-squared	0.1573	0.1688	0.1698	0.1699	0.1709

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1