

INTERNAL AND EXTERNAL HIRING*

by

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Abstract

Using large-scale, linked, employer-employee, Finnish panel data, we examine firms' internal-versus-external hiring decisions more comprehensively than has prior literature. We show that vacancies in job hierarchies are filled far more often by lateral moves than by promotions. Most lateral moves are external and within the same job title, so that internally-promoted workers face external competitors occupying higher job levels. Compared to internally-promoted workers, external and internal horizontal hires have stronger observable ability indicators (e.g., education, experience, prior work history) but weaker job performance in the year preceding the transfer. Internal and external horizontal hires have similar job histories.

Keywords: internal hiring, external recruitment, promotions, lateral moves, work history, job assignments, turnover

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I. INTRODUCTION

Vacancies regularly arise throughout organizational job hierarchies, and employers must decide whether to fill them with internal hires or with external recruits. An impediment to academic research on the subject is that information about external hires, prior to their joining the new employer, is scant in most data sets. Moreover, most research that distinguishes between internal and external hires either relies on data – sometimes quite old – from a single firm, or concentrates on a specific job type, often near the top of the organizational hierarchy. Such data narrow the scope of the conclusions that can be drawn. On the other hand, broad data sets that span multiple firms and jobs usually lack measures of occupations and job levels that allow meaningful cross-firm comparisons. Using a large, linked, employer-employee panel data set from Finland that overcomes those challenges, we pursue two goals in this analysis.¹ First, we document new empirical facts concerning job transitions and the internal-versus-external hiring decision in an empirical model that is more comprehensive than has been previously studied. Second, we connect those facts to existing theory on promotions and lateral moves.

Even basic descriptive statistics from these data offer important commentary on the literature. Job titles (and job levels) in our data are comparable across firms, which allows us to provide new information on the relative frequencies of six different ways to enter a job: external horizontal transfer (33.2%), internal horizontal transfer (26.8%), internal promotion (24.5%), internal demotion (8.6%), external promotion (4.3%), and external demotion (2.6%).²

The result that lateral moves are far more common than promotions is significant because the focus in the literature is exactly the opposite, i.e., promotions (particularly internal promotions) are heavily emphasized and lateral moves are relatively neglected.³ One reason for the literature's heavy emphasis on internal promotions may be the importance of such promotions, from a theoretical standpoint, in creating incentives. Another may be that much of the evidence that motivates the literature comes from the upper echelons of the hierarchy (e.g., top executives) where

¹ Studies using matched employer-employee data have proliferated during the last decade, but with rare exceptions (e.g. Friedrich 2017) most have not focused on firm recruiting and the relative roles of internal and external labor markets.

² Earlier work (e.g. Baker et al. 1994, and Lazear and Oyer 2004) reports the share of external hires per job level but without disaggregating, as we do, into promotions, lateral moves, and demotions. If we aggregate the job transitions, calculating the overall share of external hires per job level, our numbers are in the ballpark of those studies. Direct comparisons are difficult because the share of external hiring varies a lot by hierarchical level, and it is not easy to compare the levels across different data sets. In our data, external horizontal hires are especially common in the lower part of the hierarchy that is relatively neglected in prior work. For managerial employees, internal promotions are the most common way to enter the job, followed by external horizontal moves.

³ Research on lateral moves and job rotation includes Ortega (2001), Dohmen et al. (2004), Eriksson and Ortega (2006), Gittings (2012), Cassidy et al. (2016), and Jin and Waldman (2016).

internal promotions are more prevalent as a means of filling vacancies.⁴ Yet another may be inertia following the influential work on internal labor markets by Doeringer and Piore (1971), despite the dearth of clear evidence validating the notion of internal labor markets, particularly in the modern economy. Regardless of the reasons, our results suggest the value of reorienting future work towards a greater focus on lateral moves, particularly external ones.

The result that external hiring usually involves lateral moves rather than promotions is significant, because prior research has painted external hires with a broad brush when comparing them to internally-promoted workers, without regard to their job level. It has been known for decades (e.g. Baker et al. 1994) that external hires are observably “better” than internally-promoted workers on various dimensions. Theory has been developed to explain why external potential hires suffer a handicap relative to internal hires (e.g. Chan 1996, Waldman 2003). None of these explanations are based on the fact that, as we show, external hires (because they typically move within job levels) are usually drawn from a higher job level than are internally-promoted workers. Given that new empirical fact, earlier evidence that external hires are observably better than internally-promoted workers makes complete sense. Conditional on having achieved a higher job level before switching firms, workers are expected to be of superior ability. The result also has implications for tournament theory, which views promotions as the result of competitions across workers. That literature requires identifying the relevant “pool of competitors” faced by internal candidates. Our result suggests that the most relevant pool of external competitors lies not at the same job level as that of the internal candidate but rather at the next level up.

Research on internal-versus-external hiring involves specifying an empirical model of the different ways in which a job vacancy could be filled (e.g., internal promotion, external lateral move, etc.). Several strands of economic theory offer guidance concerning what variables to include on the right-hand side of such a model, but data limitations have prevented researchers from pursuing sufficiently comprehensive specifications. Employers make the internal-versus-external hiring decision using whatever information can be gleaned that is relevant to workers’ future job performance, and ideally that information would appear on the right-hand side of an empirical specification. But econometricians observe only a subset of that information, and prior research has relied only on educational attainment and years of experience.⁵ Our data allow us to introduce two new variables that are significant harbingers of future job performance.

⁴ For discussions, see Baker et al. (1994), Lazear and Oyer (2004), Chan (2006), and, for a theoretical analysis, Ke et al. (forthcoming).

⁵ Empirical evidence on differences in education and experience between internal and external hires is available in, e.g., Baker et al. (1994), Bidwell (2011), and Kauhanen and Napari (2012). Theoretical work on internal and external hiring includes Chan (1996), Waldman (2003), Agrawal et al. (2006), DeVaro and Morita (2013), and Ke et al. (forthcoming).

The first is the prior work history of both internal and external hires, which can serve as a signal of applicant quality (e.g. Bills 1990, Fan and DeVaro 2017). Employers can glean such information (except for new labor-market entrants) from an applicant's résumé. Little is known about the role of prior work history in internal-versus-external hiring decisions, because in most data sets a firm-to-firm transition is a data-destroying event. That is, when a worker leaves a firm, little is usually known about their next destination, and if they enter a firm, little is known about their previous employment spells. The second variable we incorporate is a job-specific worker performance measure derived from data on individual performance-related pay. This allows us to consider the relationship between job performance and firm changes. Typically such information is unavailable to researchers and even to potential employers.

Our data and empirical model allow us to consider, in addition to those two new variables, the role of the three main determinants of internal hiring that have been discussed in the literature, namely firm-specific human capital, worker incentives, and employers' asymmetric information about worker ability.⁶ We elaborate on those three determinants in the next section and explain how our empirical results connect to them.

A main result of our study is that external hires typically held the same job title and same job level in their previous firm. Lateral hires are also more educated and experienced, and have had more promotions, fewer demotions, and more previous job titles than internally promoted workers, suggesting that lateral hires have stronger observable indicators of ability. External hires have higher levels of education and experience than internally-promoted workers, consistent with prior work based on narrower data sets and less comprehensive empirical models.

The one dimension on which external hires do not look observably better than internally-promoted workers, and indeed look worse, is performance, as inferred from performance-based pay. An interpretation is that, because most external hires are lateral moves (and, therefore, originate at a higher job level than those who enter the same position via internal promotion), those workers are not necessarily selected from the right tail of the within-job-level performance distribution, whereas internally-promoted workers (because they qualify for promotion) tend to be drawn from the right tail of the within-job-level performance distribution. That is, the performance measures themselves are partly level-specific, and workers who qualify for promotion tend to come disproportionately from the high end of their level's performance distribution.

⁶ Additionally, we study the role of firm and job characteristics that the literature suggests should have a bearing on the internal hiring decision. For example, large firms are in a better position to hire internally, and theory shows that larger firms may have more of a bias favoring insiders, particularly at the top of the hierarchy (Ke et al. forthcoming). See also DeVaro and Morita (2013) for empirical evidence that larger establishments do more internal hiring.

We find that internal and external lateral hires have quite similar work histories, even though internal hires possess firm-specific human capital. That result is consistent with a modest role for firm-specific human capital in influencing internal hiring decisions. It also further supports our conclusion that the reason why the literature has found that external hires “look better” than internally-promoted workers is that those are apples-to-oranges comparisons (i.e., comparing workers of two different ranks), whereas when apples-to-apples (i.e., external laterals versus internal laterals) comparisons are made, there are no differences in observables like work history.

II. RATIONALES FOR INTERNAL HIRING AND LATERAL MOVES

Three theoretical justifications for internal hiring (and particularly internal promotion) have been discussed in the literature. The first is firm-specific human capital, which gives insiders a productivity advantage over outsiders.⁷ Firm-specific human capital can potentially explain prior empirical evidence that external hires are more educated and experienced (because they need to be to compete with the internal candidates who possess firm-specific human capital). However, this explanation is incongruent with the modern human capital literature that de-emphasizes firm-specific skills relative to skills that are portable across firms, e.g., occupation-specific skills, task-specific skills, or general skills that vary in the weights with which they are combined within firms.⁸ These more portable forms of human capital support considerable external mobility, as we find in the data. We can examine the role of occupation-specific human capital given that we observe the job histories of external recruits, which allows us to distinguish between workers who come from the same job title and those who come from another job title. We show that external hires into a job tend to come from exactly the same job in their previous firm and that they have held that job longer than internal hires. One interpretation is that outsiders must compensate for their lack of firm-specific human capital with occupation-specific human capital.

Frederiksen and Kato (Forthcoming) study the roles of different types of human capital for (internal and external) promotions to top executive positions using a matched employer-employee data set from Denmark (the IDA data).⁹ They find that a broad scope of human capital acquired inside the firm, as opposed to human capital acquired at other firms, is particularly beneficial for promotions to top executive positions. The extent to which this finding generalizes to other positions is unclear, because the IDA data do not allow hierarchies to be compared across firms,

⁷ See, for example, Bayo-Moriones and Ortín-Ángel (2006) and DeVaro and Morita (2013).

⁸ See, for example, Gibbons and Waldman (2006), Lazear (2009), Kambourov and Manovskii (2009), Gathmann and Schönberg (2010), Morita and Noone (2014), and Cassidy (forthcoming).

⁹ Their work-history variable is the number of “roles”, which are defined as occupation/firm combinations.

other than for top executive positions. Moreover, horizontal moves, which in our data comprise the two most common ways to enter a job, are not considered. Our study is more comprehensive, as it considers various routes to the entire white-collar hierarchy.

A second rationale for internal hiring concerns incentives (Malcomson 1984, Chan 1996).¹⁰ Promotions create incentives to exert effort, as in Lazear and Rosen (1981) and Ghosh and Waldman (2010), or to invest in human capital, as in Prendergast (1993), Zábajník and Bernhardt (2001), and DeVaro et al. (forthcoming). These incentives are weakened if the firm toughens its workers' competition by also hiring externally. The incentives-based rationale applies primarily to promotions (which are prizes workers strive to achieve), whereas the firm-specific-human-capital rationale also applies to lateral moves which, as we show, are even more common than internal promotions when attention extends beyond the upper echelons of the job hierarchy.

A third rationale for internal hiring, and why internal hires look better than external ones on dimensions like education and experience, is that the asymmetric information that employers have on insiders' and outsiders' abilities implies that outsiders are riskier hires.¹¹ The fact that there is less uncertainty about insiders than outsiders does not itself predict a bias favoring insiders. But if employers are better informed about internal candidates than about external candidates (e.g. Novos 1992, Novos 1995), they may favor internal candidates over external ones with similar observable characteristics.¹² For example, whereas an external applicant with a low education level would be screened out, a low-educated internal candidate who is observed to be of high ability may be favorably treated. Greenwald (1986) shows that if incumbent employers have more accurate information about the ability of their employees than competing employers, then firm changers are, on average, less able than those who stay, conditional on observed characteristics.

Under asymmetric learning, the observable indicators of ability that employers use in hiring decisions include not only education and experience, but also prior work history. Most of the work on the signaling role of promotions (e.g. Waldman 1984, MacLeod and Malcomson 1988, Ricart i Costa 1988, Waldman 1990, Owan 2004, DeVaro and Waldman 2012) focuses on the signal implied by a worker's most recent job assignment.¹³ But the work history that can be gleaned from

¹⁰ Incentive-based rationales for internal hiring are relevant primarily when the number of employees in the promotion competition is fixed. If a job is expanding, external hiring is needed to fill the new slots.

¹¹ Analyses of risky hires using the option-value perspective are found in Lazear (1998) and Bollinger and Hotchkiss (2003).

¹² See Schönberg (2007), Kahn (2013), Kim and Usui (2014), and Fan and DeVaro (2017) for empirical evidence of asymmetric learning about worker ability.

¹³ Bernhardt (1995) considers a multi-period promotion signaling model in which two promotions are possible, but the work history is still limited to a single firm.

a résumé in virtually every job application is richer. The signaling role of these more comprehensive work histories has been neglected, both theoretically and empirically.¹⁴

Theoretical work that explicitly models lateral moves is rare. A recent exception is Jin and Waldman (2016), which is based on the idea of skill accumulation via job rotation. When human capital is task-specific, and when higher-level jobs require knowledge of multiple skills, then workers who move laterally early in their careers acquire a broad portfolio of skills that increases their promotion chances.¹⁵

III. DATA

The data set is a large, linked, employee-employer panel from 1981 to 2014. The data come from the records of the Confederation of Finnish Industries (EK), which is the central organization of employer associations in Finland. Although EK has member firms from many industries, manufacturing has traditionally been the most important sector represented in the data. The firms affiliated with EK represent over two thirds of the Finnish GDP and over 90% of exports. The member firms account for approximately 33% of total employment in Finland, which covers a significant share of the Finnish economy.

EK collects the data by sending annual surveys to its member firms. One of the main purposes of the survey is to provide information for collective bargaining. The key piece of information that is needed in bargaining is the level and growth of wages in different jobs. For this reason the data contain detailed information on earnings (including performance-related pay) and the individual's job. The response rate is very high because all member firms, except for the smallest ones in a few particular industries, are required to respond to the survey.¹⁶ The data are based on the administrative records of the member firms, which guarantees that all information is accurate.

The EK data are particularly well suited for this analysis given that they allow us to 1) observe workers' prior career histories; 2) construct comparable job classifications across firms; 3) identify many different types of career moves; 4) measure workers' education and experience, which are the primary ability indicators that the prior literature has considered; and 5) measure

¹⁴ An exception is Fan and DeVaro (2017), which finds empirical evidence for a "job-hopping wage penalty" for college graduates but not high school graduates, interpreting that evidence as supportive of asymmetric employer learning for college graduates and symmetric learning for high school graduates. While Fan and DeVaro investigate how mobility affects wages, we study how employees entering a job through different channels differ in their job histories.

¹⁵ The model of Cassidy et al. (2016) also allows for external lateral mobility as well as promotions.

¹⁶ Membership in EK is not compulsory, but it is mainly the smallest firms that are not in the data. A conservative estimate is that at least 80% of white-collar workers in manufacturing are included in the data.

wages reliably.¹⁷ Importantly, the EK data contain occupational classifications that are comparable across firms. Each firm in the data has a subset of the same set of 56 job titles, and all firms have detailed instructions on how to assign each of the job titles to persons. Therefore, jobs can be classified in a comparable manner across firms, as explained shortly. The classification allows an employee's prior work history to be defined similarly for both internal and external hires. Internal and external hires can, in turn, be distinguished by firm identifiers.

Although the data contain information on both white-collar and blue-collar workers, we restrict the analysis to full-time, white-collar employees.¹⁸ This is because the occupational classification system in the blue-collar data is not comparable across firms. The wages of white-collar workers are recorded for the survey month, e.g., October. Information on performance-related pay refers to the whole year. Performance-related pay includes both individual- and group-level bonuses.

Work history variables are constructed for each person, starting with about 4.4 million person-year observations. The analysis is restricted to years in which a person is hired into a new job (either in the current firm or a new one). For example, consider a worker who is observed in the data for 25 years. The entire 25-year history is used to construct the work history variables for that worker for each year. Suppose that worker experienced three job changes (e.g., two internal promotions, and one external horizontal move) during that time. Then only those three observations for that worker are used in the empirical analysis. The sample is further restricted to years 2002-2014 so that we can measure employee performance (see below) and identify job title changes and hierarchical changes as cleanly as possible. On average, each person appears 1.5 times in the data. The data include 86,549 person-year observations that come from 58,897 unique individuals, who work in 1106 different firms. Because we focus on employees who enter a new job from another job observed in the data, we exclude employees who enter jobs from outside the data.

IV. IDENTIFYING CAREER MOVES

The identification of career moves is based on job titles, job levels, and firm identifiers. The job title classification is described first. This is done separately for the years 1981-2001 and 2002-2014, because of a classification change that started in 2002.

The job classification in 2002-2014 is a four-digit code containing two pieces of information: 1) The first three digits describe the job title (e.g., product R&D, process R&D,

¹⁷ There might be gaps in the career (e.g., due to spells of unemployment or spells of employment in other sectors).

¹⁸ An individual is defined to be working full time if regular weekly working hours exceed 30. Part-time work for white-collar workers in manufacturing is rare (less than 2% in 2006).

Information and Communications Technology (ICT) planning, ICT maintenance, finance and investment, accounting, etc.) and 2) the fourth digit describes the hierarchical level (Managerial, Professional, Expert, Clerical).

The job titles appear in 18 families. Within each of these families there are about 3 titles, on average, for a total of 56.¹⁹ For example, the largest job-title family is Research and Development, which contains three titles: Research, Product R&D, and Process R&D. Financial management consists of: Finance and investments; Accounting; Treasury, invoicing, debt collection; Internal auditing; and General financial administration. Many, but not all, of these titles can be found in all four hierarchical levels.

In the years 1981-2001 there are 75 different job titles, but the data do not contain a code for the hierarchical level. For example, consider R&D. In 1981-2001 there are eight job titles in R&D, but they are not explicitly assigned to hierarchical levels. However, using the descriptions of the features of the jobs that are provided as part of the data gathering process, they can be assigned to different hierarchical levels (examples of the titles range from management of R&D to routine tasks in R&D). We use the hierarchical classification of Kauhanen and Napari (2012), which applies the descriptions of the 75 job titles to sort them into six hierarchical levels. After 2002, R&D jobs are split into research tasks, product development, and process development. In this example, before 2002 there are 8 title-level combinations, whereas after 2002 there are $3 \times 4 = 12$ combinations, so the classification becomes finer.

Due to the change in the classification, we cannot identify changes in job titles or hierarchical levels between 2001 and 2002. We drop the year 2002 from the analysis because we cannot identify changes in job titles and levels confidently for that year. The construction of career histories related to the job classification for the years 1981-2001 follows that classification.

Dependent variable

Six ways to enter a job are identified: 1) internal horizontal transfer, 2) external horizontal transfer, 3) internal promotion, 4) external promotion, 5) internal demotion, 6) external demotion.²⁰

Promotions are defined as transitions from lower hierarchical levels to higher ones. This definition is consistent with the definition of promotions in theoretical studies of careers, and it does

¹⁹ The 18 families of titles are: 1) Business management and development, 2) Research and development, 3) Quality control, 4) Manufacturing, 5) Construction, 6) Transport and storage, 7) Information and communications technology, 8) Maintenance and repair, 9) Purchases, 10) Sales and marketing, 11) Communication, 12) Law, insurance and tax affairs, 13) Environmental management, 14) Financial management, 15) Administration services, 16) Personnel management, 17) Occupational health care and security, and 18) Corporate security.

²⁰ A seventh way is to enter the data for the first time. These workers are not considered, because information about their prior career is unobserved. External horizontal transfers may enter either the same job title or a different one, though in most of the analysis we aggregate these cases for a compact presentation of results.

not have the problems associated with self-reported promotions (Pergamit and Veum 1999). Promotions are external (internal) if the firm identifier does (does not) change. Demotions are defined similarly.

Horizontal transfers occur when the job title changes but the hierarchical level does not. External and internal transfers are, again, defined by a change in the firm identifier.

Predictors

The following variables are used in the analysis, for which descriptive statistics are given in Table 1. The human capital of the employees is measured by years of education (and its square), potential experience (five categories), and firm tenure (five categories). Education and experience have been used in previous studies on external and internal hiring, but firm tenure has not. Prior work history is measured by the number of job titles, job levels, firms, promotions, and demotions to date; years at the current job title; and years at the current level.

A measure of the employee's performance in the previous job is inferred from the amount of performance-related pay received, following DeVaro and Kauhanen (2016) and Cassidy et al. (2016). To start, a regression is estimated in which the dependent variable is the log of the amount of performance-related pay that worker i receives in year $t+1$, and the independent variables (including job title dummies, job level dummies, year dummies, and industry dummies) are measured in year t . The reason for leading the dependent variable is that payments for performance in year t are typically made in year $t+1$. The regression residuals are then used as measures of worker performance. Thus, each worker's performance is measured by how much performance-related pay the worker received compared to other workers in the same job title, same job level, and same industry, in a given year. Firm changers may separate from the firm before receipt of performance-related pay, which poses a challenge to their performance measurement. Following Cassidy et al. (2016) we address this issue by using lagged values of performance-related pay for workers who have just switched firms and who have received zero performance-related pay.

A natural question is whether this approach measures true variation in worker performance. DeVaro and Kauhanen (2016) and Cassidy et al. (2016) show that this performance measure matches all empirical regularities of subjective performance measures identified in the literature. Frederiksen et al. (2017) compare subjective performance evaluations across several firms in multiple countries and find three consistent patterns: 1) strong autocorrelation that declines with longer lags; 2) positive correlation with promotions and wages; and 3) negative correlation with demotions and firm separations. In addition, Medoff and Abraham (1980, 1981) and DeVaro and

Waldman (2012) find a positive correlation between performance and wage growth. The present performance measure matches all of these findings.

In addition to the individual-level variables, job characteristics are considered, with a distinction between “managerial and professional” jobs (higher in the hierarchy) and “expert and clerical” jobs (lower in the hierarchy). Three indicators are constructed to distinguish among contracting, stable (omitted category), and growing jobs. Contracting jobs are firm/job level/job title-cells in which there are fewer employees in year t at the time of the survey compared to the situation in year $t-1$. Growing jobs are defined analogously. In stable jobs the number of employees is the same as in the previous year. Firm size is controlled by seven size classes. Other variables included in the analysis are dummies for job title (18 categories), industry (53 categories), and year.

V. DESCRIPTIVE ANALYSIS

Table 2 displays the routes by which workers enter new jobs and shows that the most frequent transitions are external horizontal moves (33%). The second and third-most common transitions are internal horizontal moves (27%) and internal promotions (25%). Henceforth, we focus on these moves as they cover 85% of the transitions.

In contrast to the evidence from the single firm investigated in Baker et al. (1994), internal demotions are not rare and account for nearly 9% of transitions (or more than 11% if external demotions are included). Other studies, such as Dohmen et al. (2004) and Belzil and Bognanno (2008) show much higher levels of demotions compared to Baker et al. (1994). External promotions are relatively infrequent (4%). That is, the external competition faced by internal workers who might get promoted is not peers at the same job level but rather external workers one job level up. For example, if Apple had hired an external CEO rather than internally promoting Tim Cook in 2011, that person would likely have been the CEO at another company. Table 2 also reveals a pronounced difference by skill level in the propensity for internal hiring. For lower-skilled clerical and expert jobs the bias in favor of internal hiring is more than 8 percentage points smaller than it is for higher-skilled managerial and professional jobs.²¹ Our result concerning the prevalence of lateral moves (particular external ones) relative to internal promotions is new to the literature and is likely understated due to our focus on white-collar workers, who have relatively high representation in high-level jobs, where internal promotion is more common.

Table 2 also shows that external horizontal transfers are typically hired to the same job title that they held in the previous firm. Only in 15% of the cases does the job title change. This result,

²¹ Table 2 also reveals that demotions, when they occur, are more common internally than externally, and in general they are much more common for low-skilled jobs than for high-skilled ones.

together with the fact that external horizontal moves are the most common way to hire externally, means that external hires typically originate from the same job in the previous firm. One interpretation is that firms are “playing it safe” by hiring outsiders only to jobs that they held previously. In this kind of move, the outsiders do not lose their occupation-specific or task-specific capital (Kambourov and Manovskii 2009, Gathmann and Schönberg 2010) and the hiring firm may infer the productivity of the hires more accurately compared to the situation where the job title also changes.

Table 3 displays the year-to-year transition matrix, which is augmented to include stayers. Fifteen percent of workers who stayed in their current job in a given year experience some type of transition in the following year. The corresponding percentage for workers who entered a new job in the current year ranges from over 17 to nearly 27, depending on the way in which the current job was entered. Internal horizontal transfers are the most likely to move again in the following year, and most often the move is either another horizontal transfer (internal or external) or an internal promotion. This is consistent with internal horizontal transfers being related to job rotation. Eighty percent of persons who were promoted internally stay in the same job, but if they move, the most common move is an internal horizontal transfer (about 8% of the cases). The next common moves are external horizontal transfer and internal demotion (about 5% each). If a worker who arrives as an external horizontal transfer fails to remain in that job the following year, the most likely transition is another external horizontal transfer (so that the worker came and left within a year). Some of these cases may involve returning to the original firm. Demotions are rare but tend to occur the year immediately after a promotion (particularly an external one). Although some of these moves might represent misclassifications, the pattern suggests quick corrections of mistaken promotion decisions, particularly external ones that involve greater uncertainty.

VI. EMPIRICAL MODEL OF JOB TRANSITIONS

In the multivariate analysis, a multinomial logit model is estimated in which the values of the dependent variable correspond to the six ways ($j = 0, 1, \dots, 5$) to enter a job. Because the probabilities $P(y = j | \mathbf{x}) = \frac{\exp(\mathbf{x}\boldsymbol{\beta}_j)}{1 + \sum_{h=1}^5 \exp(\mathbf{x}\boldsymbol{\beta}_h)}$ sum to unity, only five parameter vectors are estimated. Internal promotions are assigned to the base category, i.e., $\boldsymbol{\beta}_0 = \mathbf{0}$. The log-odds ratio between category j and the base category is linear, i.e., $\log\left(\frac{P(y = j | \mathbf{x})}{P(y = 0 | \mathbf{x})}\right) = \mathbf{x}\boldsymbol{\beta}_j$ for $j = 1, 2, \dots, 5$, so $\boldsymbol{\beta}_j$ reveals how a change in \mathbf{x} affects the log-odds between category j and the base category. This

interpretation of the parameters facilitates comparing the individual and job characteristics of, e.g., external horizontal transfers to those who are internally promoted. The magnitude of the parameters

$$\frac{\partial \left(\frac{P(y = j | \mathbf{x})}{P(y = 0 | \mathbf{x})} \right)}{\partial x_{ij}}$$

can be assessed using $\beta_{ij} = \frac{\partial x_{ij}}{\frac{P(y = j | \mathbf{x})}{P(y = 0 | \mathbf{x})}}$. The multinomial model is used for descriptive

purposes to summarize the data, and the results do not necessarily have causal interpretations.

Table 4 displays estimation results from the multinomial logit model. All individual-level explanatory variables are measured in year t , and the job characteristics are measured in year $t+1$. This timing structure allows measurement of the individual-level variables before the transitions, consistent with the focus on the characteristics of the destination job (as opposed to the source job) and, in particular, whether it is growing or not.

Table 4 shows how internal and external horizontal hires compare with internally-promoted employees (Panel A), and how job and firm characteristics affect how a job is filled (Panel B). For a compact presentation, only the estimates on internal and external horizontal transfers are reported. The complete set of estimation results, including external promotions, internal demotions and external demotions, is presented in Appendix Table A1.

VI.1 The roles of job-specific and firm-specific human capital

Earlier literature has emphasized the role of firm-specific human capital for the internal-versus-external hiring decision. An important theme in the literature is that the external candidates need to compensate for their lack of firm-specific human capital with higher levels of general human capital (e.g. Baker et al. 1994, Bidwell 2011, DeVaro and Morita 2013). By utilizing information on the past job assignments of the external and internal hires, we show evidence on the importance of job-specific human capital.

A new result is that internal horizontal transfers tend to occur rather soon after the employee has entered his/her most recent job title, whereas external horizontal transfers occur after a longer stay at the most recent job title. This can be seen from the results that the coefficient on the year at job title is negative for internal horizontal transfers and positive for external horizontal transfers. The nature of external hiring is, thus, different: the movers tend to keep their job title (as Table 2 shows) and must compensate for their lack of firm-specific human capital by their job-specific human capital.

There is also persistence in switching firms. External horizontal hires have had more prior employers (the log-odds ratio between external horizontal transfer and internal promotion is 0.18 higher for one more prior employer). However, employees who make an internal horizontal move or are internally promoted do not differ in the number of prior employers.²²

We also confirm three results from the earlier literature that have been interpreted to suggest that the external employees have to compensate with general human capital for their lack of firm-specific human capital.

First, both internal and external horizontal hires have a longer work experience than internally promoted employees. The longer the work experience is, the higher is the log-odds ratio between internal or external horizontal transfer and internal promotion. For example, for those with 16-25 years of work experience the log-odds ratio is 1.7 times higher compared to those with experience up to one year. Moreover, the work experiences of internal and external horizontal hires are about equally long. This result that external hires have a longer work experience than internally promoted workers has been found in the previous literature (Baker et al. 1994, Bidwell 2011, Kauhanen and Napari 2012), but the parallel finding on internal hires is new.

Second, both internal and external horizontal hires are more educated than internally-promoted employees. This finding on external hires accords with previous evidence (e.g. Baker et al. 1994, Bidwell 2011) but a new finding is that internal horizontal hires are more educated than internally-promoted workers.

Third, relative to clerical and expert jobs, managerial and professional jobs are less likely to be filled by external or internal horizontal hiring than by internal promotion. This result accords with earlier evidence that internal hiring is more common at higher hierarchical levels (e.g. Baker et al. 1994, Lazear and Oyer 2004). A typical explanation for this result is that firm-specific human capital is more important at higher hierarchical levels.

VI.2 *Asymmetric information*

Information asymmetries may also lead employers to favor internal candidates over external candidates with similar observable characteristics. This is another explanation for the preceding findings concerning human capital. Three new results on the prior career success of internal and external candidates appear below. These results show that even though the external hires have better observable indicators of ability, measures that the hiring firm may not observe show that the external hires have not performed as well as those who have been internally promoted. The second

²² By “number of prior employers” we mean *before* an external transition occurs, so that the comparison between internally promoted and externally recruited workers is apples-to-apples.

and third results bolster the main result of this study and our interpretation that promoted employees tend to come from the right tail of the performance distribution compared to lateral movers.

First, both internal and external lateral hires' prior career success, as measured by the number of prior promotions and number of prior demotions, is better: they have had more promotions and fewer demotions before the transition. For example, the log-odds ratio between internal horizontal hires (external horizontal hires) and internally-promoted employees is 1.01 (0.94) higher for those with one prior promotion compared to employees without prior promotions.²³ Similarly, the log-odds ratio between internal horizontal hires (external horizontal hires) and internally-promoted employees is 0.67 (0.87) lower for those with one prior demotion compared to employees without prior demotions. These numbers show that internally-promoted and internally/externally horizontally transferred employees differ significantly in their work histories, with the latter group having better observable indicators of ability.

It is worth noting, however, that if employees start their careers from the same level, it is natural that employees hired from the same level, internally or externally, have had at least one more promotion than employees promoted from a level below. This highlights the fact that external hires typically come from the same hierarchical level in the previous firm.

Second, even though internal and external horizontal hires have better work histories than internally promoted employees, as measured by the number of prior promotions and demotions, internally promoted employees have the highest performance measures just before the transfer (i.e., the log-odds ratio between internal horizontal hire and internal promotion decreases by 0.43 for a one-unit change in performance). Employees who change employers and continue at the same level, in contrast, have the lowest performance just before the transfer (i.e., the log-odds ratio between external horizontal hire and internal promotion decreases by 0.97 for a one-unit change in performance). The estimates also show that in the preceding year, internal horizontal hires performed better than internally promoted employees (i.e., the log-odds ratio between internal horizontal transfer and internal promotion increases by 0.19 for a one-unit change in the previous year's performance). This means that before the transitions take place, the employees who get internally promoted have caught up to, and surpassed, the performance of employees who are internally horizontally transferred.

Third, another way to assess prior career success is to compare wages relative to other workers in the same job-title/level/firm/year-cell. Internally promoted workers have higher wages

²³ Another way to assess the magnitude is to calculate the semi-elasticity of the probability of external horizontal transfer with respect to the number of promotions. One prior promotion increases the probability of an internal horizontal transfer by 20% and the probability of an internal horizontal transfer by 16%.

and higher wage growth compared to their peers. This is consistent with earlier research showing that promoted workers tend to originate from higher wage deciles of the hierarchy (Baker et al. 1994, Kauhanen and Napari 2012).

VI.3 Incentives

Relative to jobs that are expanding, those that are stable or contracting are associated with a lower probability of external horizontal hiring than internal promotion. This result can be understood in light of theories showing that external hiring decreases the incentives for the incumbent workers (Chan 1996). The incentive considerations are not relevant when the employment in the job is increasing, because then external hiring does not decrease the probability of being promoted. The results also show that when a position is filled internally, the employment growth in the destination job does not differ between jobs that are filled via promotion or horizontal transfer.

VI.4 Other findings

The results on firm size are consistent with larger firms having a greater tendency to hire internal horizontal transfers (as opposed to internally-promoted workers) than smaller firms. This accords with the results of DeVaro and Morita (2013), who find that larger firms use more external hiring. In firms larger than 2000 employees, external horizontal hiring is less likely relative to internal promotion.

VII. ROBUSTNESS CHECKS

The results were largely insensitive to a number of robustness checks. We discuss three of them here, the first of which uses an alternative definition of the dependent variable. The six different mobility types are determined by whether an employee switches firms and/or job levels; they do not distinguish between switching and not switching job title. To see whether employee (as well as job and firm) characteristics differ between employees who move within job titles and those who move across job titles, the model was estimated distinguishing between mobility within and across job titles, i.e., with twelve different mobility types.²⁴ The estimation results are very similar to the baseline results, irrespective of whether an employee switches job title or not. The second robustness check concerns firm size. The results in Table 5 show that firm size affects hiring

²⁴ The twelve different mobility types are: internal horizontal transfer without job title change, internal horizontal transfer with job title change, external horizontal transfer without job title change, external horizontal transfer with job title change, internal promotion without job title change, internal promotion with job title change, external promotion without job title change, external promotion with job title change, internal demotion without job title change, internal demotion with job title change, external demotion without job title change, and external demotion with job title change.

channels. In an investigation of whether the estimation results differ when the sample is restricted to hiring firms of a certain size, as measured by the number of employees, again, the estimation results are very similar to the baseline results. The third robustness check uses an alternative measure for job performance. Here we use levels of performance-related pay instead of logs and do not replace the zeros by lagged values for the firm changers. Again, the results concerning job performance are qualitatively similar to Table 5.

VIII. CONCLUSION

Prior research on internal-versus-external hiring has been hampered by scant information on external hires. Our data have allowed us to overcome those limitations and to assemble a new array of stylized facts to guide future research. Perhaps the most important result, given the literature's heavy focus on internal promotions, is the revelation that most positions are actually filled by lateral moves (particularly external ones that originate from the same job title). This means that the pool of external competitors for workers who are internally promoted mostly consists of workers who are at a higher job level, which provides a more obvious explanation than earlier ones for the common finding in the literature that external hires are superior to internally-promoted workers on dimensions like education and experience.

Information on work histories (even for external hires) allows us to estimate more comprehensive empirical specifications than have been previously considered. We have shown that job entrants' job histories – perhaps the most important signal recruiters have about external job candidates' characteristics – vary considerably according to whether the entrant is an internal or external hire. Compared to internally-promoted employees, external horizontal hires are more educated and have longer job title tenures, longer overall work experience, more prior promotions, and fewer demotions. However, external horizontal transfers have poorer performance in their job prior to the transition. This result is consistent with internally-promoted workers being concentrated in the right tail of the within-job-level performance distribution, to a greater extent than external (lateral) hires.

The work histories of internal horizontal hires are rather similar to the work histories of external horizontal hires. When the horizontal transfers are internal the job title always changes, whereas when they are external it rarely changes. Moreover, internal horizontal hires tend to occur after a relatively short tenure at the previous job title. Thus, internal horizontal transfers seem quite different in nature, perhaps targeted at providing diverse work experience and, hence, preparing for a future promotion.

We have also shown that job and firm characteristics are associated with the popularity of various entry channels. External hiring is more common at lower hierarchical levels and is rare unless the employment in the destination job is growing. Larger firms use more internal horizontal hiring.

Our findings suggest a need for further research on the relationship between job history and hiring decisions. The questions of how (1) job vacancies are created and filled, (2) how employees select to the external job market, and (3) how employers make recruitment decisions are still largely unexplored. Also outside the scope of the current project is how entrants' job paths and other job market outcomes, such as wages, evolve after entry into the job. Our results also suggest that the literature's heavy emphasis on promotions (particularly internal ones) relative to lateral moves (particularly external ones) is misplaced and that, in the literature on tournament theory, the pool of external competitors for workers of a given rank consists predominantly of higher-ranked workers.

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Table 1: Descriptive Statistics

	Mean	Standard deviation	Min	Max
Years of education	15.10	2.84	9	25
Experience up to one year	0.04	0.19	0	1
2-5 years	0.11	0.31	0	1
6-15 years	0.36	0.48	0	1
16-25 years	0.29	0.46	0	1
More than 25 years	0.20	0.40	0	1
Tenure up to one year	0.10	0.30	0	1
2-5 years	0.29	0.45	0	1
6-10 years	0.21	0.41	0	1
11-15 years	0.14	0.35	0	1
More than 15 years	0.25	0.43	0	1
Female	0.31	0.46	0	1
Performance ²⁵	0.07	0.86	-7.82	4.09

²⁵ The performance measure is computed using the entire sample, including workers who switch job title, job level, and/or firm as well as workers who do not switch, with the mean performance measure equaling zero by construction (because it is a regression residual). Table 1 presents descriptive statistics only on those workers who switch job title, job level, and/or firm, and in this restricted sample (which shows that, on average, switching workers perform better than non-switching workers) the performance variable has a non-zero mean.

Number of job titles to date	2.22	1.39	1	12
Number of employers to date	1.41	0.72	1	9
Years at title so far	6.38	5.55	1	33
Years at level so far	7.05	5.85	1	33
No prior promotions	0.52	0.50	0	1
1 prior promotion	0.34	0.47	0	1
More than 1 prior promotion	0.14	0.35	0	1
No prior demotions	0.77	0.42	0	1
1 prior demotion	0.19	0.39	0	1
More than 1 prior demotion	0.04	0.19	0	1
Relative wage	0.57	4.84	-68.47	54.45
Relative wage growth	-0.04	1.80	-70.82	6.00
Labor market entrant	0.26	0.44	0	1
Clerical and expert jobs	0.47	0.50	0	1
Managerial and professional jobs	0.53	0.50	0	1
Expanding job	0.78	0.41	0	1
Stable job	0.04	0.21	0	1
Contracting job	0.17	0.38	0	1
Firm size smaller than 50	0.05	0.21	0	1
50-100	0.04	0.20	0	1
100-200	0.08	0.27	0	1
200-500	0.15	0.35	0	1
500-1000	0.12	0.32	0	1
1000-2000	0.13	0.33	0	1
larger than 2000	0.44	0.50	0	1
Business management and development	0.01	0.12	0	1
Research and development	0.23	0.42	0	1
Quality control	0.04	0.19	0	1
Manufacturing	0.11	0.32	0	1
Construction	0.06	0.24	0	1
Transport and storage	0.04	0.19	0	1
ICT	0.13	0.34	0	1
Maintenance and repair	0.04	0.19	0	1
Purchases	0.04	0.21	0	1
Sales and marketing	0.17	0.38	0	1
Communication	0.01	0.09	0	1
Law, insurance and tax affairs	0.00	0.06	0	1
Environmental management	0.00	0.05	0	1
Financial management	0.05	0.22	0	1
Administration services	0.03	0.17	0	1
Personnel management	0.03	0.16	0	1
Occupational health care and security	0.00	0.06	0	1
Corporate security	0.00	0.06	0	1

The number of observations is 86,549 for each variable.

Table 2: Routes to a job, %

	All	Clerical and Expert	Managerial and Professional	Job title changes %
Internal horizontal transfer	26.83	28.33	25.49	100
External horizontal transfer	33.23	38.23	28.75	15
Internal promotion	24.51	11.94	35.73	33
External promotion	4.27	2.00	6.3	52
Internal demotion	8.61	15.24	2.69	41
External demotion	2.56	4.27	1.04	60
Total	100	100	100	
Observations	86,594	40,825	45,724	

Table 3: One-Year Transition Matrix

		t+1							
		Internal horizontal transfer	External horizontal transfer	Internal promotion	External promotion	Internal demotion	External demotion	Stayer	Total
t	Internal promotion	7.97	4.86	1.06	0.22	4.57	0.96	80.35	100
	External promotion	4.93	3.65	1.12	0.24	6.54	1.08	82.44	100
	Internal horizontal transfer	9.92	7.64	5.98	0.76	1.91	0.44	73.36	100
	External horizontal transfer	3.65	8.01	3.36	0.7	1.23	0.37	82.68	100
	Internal demotion	5.7	4.4	12.96	1.53	0.64	0.24	74.54	100
	External demotion	3.4	3.54	10.54	1.7	0.68	0.07	80.07	100
	Stayer	3.71	5	3.73	0.67	1.16	0.38	85.35	100
	Total	4.23	5.23	3.86	0.67	1.36	0.4	84.25	

Table 4: Results from Multinomial Logit: Internal and external horizontal transfers

Panel A: Employee level variables		
	Internal horizontal transfer	External horizontal transfer
Education		
Years of education	-0.02 (-0.30)	-0.03 (-0.56)
Years of education ²	0.01* (2.55)	0.01** (2.93)
Work experience		
Experience up to one year		
2-5 years	0.47*** (6.71)	0.48*** (5.20)
6-15 years	1.07*** (10.32)	1.11*** (8.95)
16-25 years	1.66*** (12.91)	1.68*** (11.50)
More than 25 years	1.85*** (12.99)	1.84*** (11.47)
Number of job titles to date	0.11*** (3.56)	0.06 (1.71)
Number of employers to date	-0.06 (-1.51)	0.16* (2.42)
Years at title so far	-0.04*** (-5.80)	0.02* (2.11)
Years at level so far	0.01 (1.56)	0.01 (0.74)
Firm tenure		
Tenure up to one year		
2-5 years	-0.25* (-2.22)	-0.14 (-0.66)
6-10 years	-0.26* (-2.09)	-0.31 (-1.34)
11-15 years	-0.08 (-0.55)	-0.10 (-0.41)
More than 15 years	-0.20 (-1.27)	-0.44 (-1.49)
Prior performance		
Performance	-0.43*** (-5.24)	-0.97*** (-6.41)
Performance t-1	0.19** (2.84)	0.17 (1.37)
No prior promotions		

1 prior promotion	0.96*** (16.47)	0.92*** (13.46)
More than 1 prior promotion	1.45*** (12.03)	1.55*** (12.71)
No prior demotions		
1 prior demotion	-0.60*** (-7.44)	-0.77*** (-11.63)
More than 1 prior demotion	-1.20*** (-8.21)	-1.47*** (-12.64)
Other		
Relative wage	-0.12*** (-11.11)	-0.09*** (-9.08)
Relative wage growth	-0.03** (-3.13)	-0.03 (-1.69)
Female	-0.64*** (-14.41)	-0.61*** (-12.57)

Panel B: Job and firm level variables

Job characteristics		
Clerical and expert jobs		
Managerial and professional jobs	-2.13*** (-21.81)	-2.25*** (-24.25)
Expanding job		
Stable job	-0.09 (-1.17)	-1.10*** (-7.66)
Contracting job	-0.05 (-0.35)	-1.75*** (-4.35)
Firm characteristics		
Firm size smaller than 50		
51-100	0.06 (0.36)	0.17 (0.78)
101-200	0.03 (0.17)	-0.20 (-0.88)
201-500	0.44** (3.05)	-0.32 (-1.40)
501-1000	0.73*** (4.06)	0.41 (1.23)
1001-2000	0.20 (1.03)	-0.75 (-1.91)
larger than 2000	0.44** (2.64)	-1.04** (-2.60)
Industry indicators	Yes	Yes
Year indicators	Yes	Yes
Observations	86563	
Share of all observations (%)	27	33

Notes: The table reports coefficients from multinomial logit, t statistics are reported in parentheses (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$). The reference category of the dependent variable is Internal promotion. The dependent variable is a transition between year t and $t+1$, and the individual level variables are measured before the transition (at year t). Relative wage and wage growth are calculated within jobtitle/level/firm/year-cells. The dependent variable is a transition between year t and $t+1$, and the job and firm level variables refer to the destination job (i.e. they are measured at year t) Stable job: employment in the job title/level/firm-cell is unchanged between years t and $t+1$; Contracting job: employment in the job title/level/firm-cell decreases between years t and $t+1$, Expanding job: employment in the job title/level/firm-cell increases between years t and $t+1$.

Table A1: Results from Multinomial Logit: Full table

Panel A: Employee level variables					
	Internal horizontal transfer	External horizontal transfer	External promotion	Internal demotion	External demotion
Education					
Years of education	-0.02 (-0.30)	-0.03 (-0.56)	0.07 (0.92)	0.16* (2.33)	0.16 (1.79)
Years of education ²	0.01* (2.55)	0.01** (2.93)	-0.00 (-0.86)	0.01** (2.72)	0.01** (2.86)
Work experience					
Experience up to one year					
2-5 years	0.47*** (6.71)	0.48*** (5.20)	0.00 (0.02)	0.52*** (4.56)	0.66*** (4.61)
6-15 years	1.07*** (10.32)	1.11*** (8.95)	-0.00 (-0.04)	1.67*** (12.00)	1.69*** (10.54)
16-25 years	1.66*** (12.91)	1.68*** (11.50)	-0.04 (-0.26)	2.70*** (15.96)	2.41*** (12.74)
More than 25 years	1.85*** (12.99)	1.84*** (11.47)	-0.34* (-2.11)	3.21*** (17.25)	2.57*** (12.39)
Number of job titles to date	0.11*** (3.56)	0.06 (1.71)	-0.03 (-0.65)	0.07* (2.04)	0.19*** (4.09)
Number of employers to date	-0.06 (-1.51)	0.16* (2.42)	0.18** (3.11)	0.08 (1.58)	0.21** (3.01)
Years at title so far	-0.04*** (-5.80)	0.02* (2.11)	-0.00 (-0.29)	0.01 (1.13)	0.04*** (3.35)
Years at level so far	0.01 (1.56)	0.01 (0.74)	0.02 (1.85)	-0.03*** (-3.47)	-0.04* (-2.43)
Firm tenure					
Tenure up to one year					
2-5 years	-0.25* (-2.22)	-0.14 (-0.66)	-0.12 (-0.73)	-0.19 (-1.66)	-0.11 (-0.59)
6-10 years	-0.26* (-2.09)	-0.31 (-1.34)	-0.30 (-1.56)	-0.14 (-1.05)	-0.33 (-1.77)
11-15 years	-0.08 (-0.55)	-0.10 (-0.41)	-0.52* (-2.50)	0.03 (0.21)	-0.12 (-0.54)
More than 15 years	-0.20 (-1.27)	-0.44 (-1.49)	-0.94*** (-3.90)	-0.28 (-1.65)	-0.72** (-2.83)
Prior performance					
Performance	-0.43*** (-5.24)	-0.97*** (-6.41)	-0.77*** (-5.47)	-0.95*** (-8.85)	-1.08*** (-7.29)
Performance t-1	0.19** (2.84)	0.17 (1.37)	0.29*** (3.73)	0.17* (2.08)	0.25* (2.17)
No prior promotions					
1 prior promotion	0.96***	0.92***	-0.02	1.86***	1.80***

	(16.47)	(13.46)	(-0.26)	(22.38)	(17.31)
More than 1 prior promotion	1.45***	1.55***	-0.07	3.04***	3.11***
	(12.03)	(12.71)	(-0.52)	(22.48)	(18.27)
No prior demotions					
1 prior demotion	-0.60***	-0.77***	0.06	-1.19***	-1.30***
	(-7.44)	(-11.63)	(0.41)	(-10.47)	(-10.61)
More than 1 prior demotion	-1.20***	-1.47***	-0.03	-1.99***	-2.50***
	(-8.21)	(-12.64)	(-0.17)	(-11.27)	(-11.75)
Other					
Relative wage	-0.12***	-0.09***	-0.01	-0.25***	-0.21***
	(-11.11)	(-9.08)	(-1.17)	(-18.33)	(-15.43)
Relative wage growth	-0.03**	-0.03	-0.03*	-0.03	-0.04*
	(-3.13)	(-1.69)	(-2.52)	(-1.55)	(-1.99)
Female	-0.64***	-0.61***	-0.06	-1.12***	-1.04***
	(-14.41)	(-12.57)	(-0.77)	(-13.84)	(-11.86)

Panel B: Job and firm level variables

Job characteristics

Clerical and expert jobs

Managerial and professional jobs	-2.13***	-2.25***	0.24	-4.55***	-4.41***
	(-21.81)	(-24.25)	(1.46)	(-31.08)	(-29.28)

Expanding job

Stable job	-0.09	-1.10***	-0.21	-0.12	-0.46***
	(-1.17)	(-7.66)	(-1.86)	(-1.16)	(-3.35)

Contracting job

	-0.05	-1.75***	-1.10**	-0.10	-0.70**
	(-0.35)	(-4.35)	(-2.76)	(-0.77)	(-2.90)

Research and development

Business management and development	1.64***	0.71***	0.59**	0.99***	1.51***
	(7.32)	(3.35)	(2.71)	(3.67)	(3.74)

Quality control

	0.61***	-0.07	0.18	0.35	0.04
	(4.11)	(-0.45)	(1.05)	(1.83)	(0.18)

Manufacturing

	0.11	-0.06	-0.09	0.11	-0.02
	(0.68)	(-0.33)	(-0.48)	(0.63)	(-0.11)

Construction

	-0.19	0.30	0.36	-0.17	0.03
	(-0.87)	(1.12)	(1.49)	(-0.58)	(0.12)

Transport and storage

	0.43**	-0.54**	-0.11	0.10	-0.33
	(3.23)	(-2.58)	(-0.35)	(0.53)	(-1.38)

ICT

	0.58***	-0.11	-0.13	-0.14	0.08
	(3.97)	(-0.50)	(-0.68)	(-0.75)	(0.30)

Maintenance and repair

	0.42*	-0.12	0.14	0.36	0.25
	(2.26)	(-0.43)	(0.58)	(1.47)	(0.59)

Purchases

	0.59***	-0.20	0.02	0.07	0.36
	(3.45)	(-1.22)	(0.09)	(0.27)	(1.50)

Sales and marketing

	0.57***	0.15	0.02	0.58***	0.50*
	(3.99)	(1.06)	(0.11)	(3.73)	(2.52)

Communication

	0.16	-0.13	-0.28	0.46	0.84*
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	(0.66)	(-0.58)	(-1.18)	(1.55)	(2.26)
Law, insurance and tax affairs	-0.39	-0.46*	-0.01	-0.29	-0.34
	(-1.52)	(-2.22)	(-0.05)	(-0.74)	(-0.60)
Environmental management	1.13***	0.00	0.20	0.56	0.47
	(4.22)	(0.01)	(0.50)	(1.46)	(0.85)
Financial management	0.17	-0.03	0.43*	0.21	0.41
	(1.36)	(-0.16)	(2.39)	(1.05)	(1.90)
Administration services	-0.34*	-0.22	0.09	0.07	-0.07
	(-2.49)	(-1.25)	(0.37)	(0.32)	(-0.30)
Personnel management	0.30*	-0.05	0.45*	0.09	0.63**
	(2.26)	(-0.30)	(2.34)	(0.43)	(2.62)
Occupational health care and security	0.52	0.06	0.22	0.61	0.68
	(1.68)	(0.16)	(0.59)	(1.42)	(1.42)
Corporate security	0.61	-0.49	-1.01*	0.45	-0.07
	(1.92)	(-1.54)	(-2.10)	(1.28)	(-0.12)
Firm characteristics					
Firm size smaller than 50					
51-100	0.06	0.17	-0.24	0.21	-0.10
	(0.36)	(0.78)	(-1.25)	(0.92)	(-0.45)
101-200	0.03	-0.20	-0.69***	-0.13	-0.45*
	(0.17)	(-0.88)	(-3.85)	(-0.67)	(-2.22)
201-500	0.44**	-0.32	-0.91***	0.10	-0.74***
	(3.05)	(-1.40)	(-4.85)	(0.50)	(-3.74)
501-1000	0.73***	0.41	-0.74**	0.56*	-0.32
	(4.06)	(1.23)	(-2.86)	(2.09)	(-1.03)
1001-2000	0.20	-0.75	-1.91***	0.02	-1.76***
	(1.03)	(-1.91)	(-6.12)	(0.07)	(-6.19)
larger than 2000	0.44**	-1.04**	-2.10***	-0.34	-2.32***
	(2.64)	(-2.60)	(-5.96)	(-1.45)	(-6.94)
Industry indicators	Yes	Yes	Yes	Yes	Yes
Year indicators	Yes	Yes	Yes	Yes	Yes
Observations	86563				

Notes: The table reports coefficients from multinomial logit, t statistics are reported in parentheses (* p<0.05, ** p<0.01, *** p<0.001). The reference category of the dependent variable is Internal promotion. The dependent variable is a transition between year t and t+1, and the individual level variables are measured before the transition (at year t). Relative wage and wage growth are calculated within jobtitle/level/firm/year-cells. The dependent variable is a transition between year t and t+1, and the job and firm level variables refer to the destination job (i.e. they are measured at year t) Stable job: employment in the job title/level/firm-cell is unchanged between years t and t+1; Contracting job: employment in the job title/level/firm-cell decreases between years t and t+1, Expanding job: employment in the job title/level/firm-cell increases between years t and t+1.