INTERNAL AND EXTERNAL HIRING[1]

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 more often by horizontal moves than by promotions. Most horizontal moves are external and within the same job functions, 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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Vacancies regularly arise throughout organizational job hierarchies, and employers must decide whether to fill them with internal hires or with external recruits. Most research that distinguishes between internal and external hires either relies on data 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 re-evaluate prior evidence and document new empirical facts concerning internal-versus-external hiring.

The results from prior research that we re-evaluate are as follows: 1) firms have a preference for internal promotion, as opposed to external recruitment; 2) that preference is particularly strong at the top of the job hierarchy; 3) most external moves are horizontal rather than vertical; 4) external hires have higher education levels than internally-promoted workers; 5) external hires have higher levels of experience than internally-promoted workers.

The new empirical facts we present are related to the characteristics of external hires prior their hiring. For example, we observe their job function prior to the job change. This allows us to investigate whether external hires into a given job function originated in the same job function, or a different one, in their prior firm. Such an investigation is important because the labor economics literature on specific human capital has increasingly focused on occupation and task-specific human capital, as opposed to firm-specific human capital. Firm-to-firm transitions that occur within a job function allow previously accumulated task-specific human capital to be productively employed, whereas that is not so for transitions that occur across job functions. So it is helpful to know the relative frequencies of those two types of transitions, and such information is new to the literature.

We also examine how various measures of workers' prior career histories relate to internal-versus-external hiring; such information has not been available in the data used in prior research. 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. Finally, our analysis incorporates a job-specific worker performance measure derived from data on individual performance-related pay. This allows us to examine the relationship between job performance and firm changes. Typically such information is unavailable to researchers.

Related Literature

Five Empirical Results from Prior Literature

Concerning the first of the five prior empirical results noted in the introduction, Bidwell and Mollick (2015) use data from a survey of MBA alumni in a leading U.S. business school to show that upward progression into a job with greater responsibilities is more likely to occur through internal promotion than external recruitment. Further evidence that firms have a preference for internal hiring over external hiring can be found in Baker et al. (1994), using personnel data from 1969 to 1988 in a single American firm in financial services. The results of that study are replicated in Kauhanen and Napari (2012) using a different sample (covering the years 1981 to 2006) of the same data we use. Those studies do not differentiate external hires by their job level in the originating job. Such differentiation is not possible in single-firm studies, because the job level of external hires in their original firm is not observed. In Kauhanen and Napari (2012) the information was available but was not used, because the purpose of that paper was to replicate the results in Baker et al. (1994). Similarly, using matched employer-employee panel data from Sweden, from 1970 to 1990, Lazear and Oyer (2004) provide evidence of a preference for internal hiring. Using a survey of British establishments sampled in 2004, DeVaro and Morita (2013) provide evidence that employers give preference to internal candidates over external candidates in hiring decisions.

There is also evidence showing that the share of external workers per job level shrinks at higher job levels, which relates to the second prior empirical result. Evidence that internal hiring becomes more prevalent at the higher echelons of the job hierarchy can be found in Baker et al. (1994) and Kauhanen and Napari (2012), and also in Lazear and Oyer (2004) and the single-firm studies by Bidwell (2011) and Chan (2006). Again, these studies do not differentiate external hires by their job level in the originating firm, which is a contribution of our study. 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). Defining a work-history variable measured as the number of "roles", or occupation/firm combinations, 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, other than for top executive positions. Moreover, horizontal moves are not considered. Our study is more comprehensive, as it considers various routes to the entire white-collar hierarchy.

Evidence for the third piece of prior evidence i.e., that most external hires are horizontal moves, is given in Bidwell and Mollick (2015). Our contribution is to show the result in a broader

sample and to refine it further by distinguishing between horizontal moves that change job function and those that do not.

A number of empirical studies support the fourth and fifth prior results. Analyzing personnel data from 2003 to 2009 in the U.S. investment banking arm of a financial services company, Bidwell (2011) finds that compared to internally-promoted workers, external hires have higher levels of education and experience and are promoted faster. Baker et al. (1994) also document that external hires have higher levels of education and experience than internally-promoted workers. The same result is found in Kauhanen and Napari (2012). Although he does not consider education and experience, Chan (2006) presents complementary results consistent with external hires having higher ability. Using personnel data from 1986 to 1994 in a U.S. financial corporation, he shows that being an external hire, as opposed to an internally-promoted worker, increases the promotion probability and the number of future promotions.

Other Empirical Results from the Literature

In addition to the five pieces of evidence that are our focus, the empirical literature on internal-versus-external hiring has yielded other findings. Bidwell and Keller (2014) examine internal promotions, internal horizontal transfers, and external horizontal transfers, and in particular which types of jobs are more likely to be filled by each type of transition. Using seven years of personnel data covering all jobs from the U.S. offices of a large investment bank, they find that jobs with higher performance variability and a larger grade ratio of junior to senior workers are more likely to be filled by internal moves. They also find that the effects of performance variability depend on the grade ratio, which affects staffing decisions only when the firm does not face strong pressures to promote junior workers. No effect is found for firm-specific skills.

Bidwell (2011) finds strong effects on pay, worker performance, and mobility of whether workers enter jobs via internal or external moves. He finds that workers who are internally promoted into jobs have significantly better performance for the first two years than workers hired externally into similar jobs, and lower rates of voluntary and involuntary exit. However, the external hires initially enjoy about 18 percent higher pay than internally-promoted workers. Bidwell interprets the evidence in the personnel data through the theoretical lens of firm-specific skills and incomplete information. Whereas his analysis focuses on firm-specific skills, ours emphasizes the importance of task-(or job)-specific skills.

The shape of the job hierarchy has also been found to relate to the relative prevalence of internal and external hiring. Using a cross section of British establishments sampled in 2004, DeVaro and Morita (2013) find that when controlling for the number of managers, increasing the

number of lower-level workers is associated with a greater probability of internal promotion relative to external recruitment.

Three Theoretical Rationales for Internal Hiring

From a theoretical standpoint the literature has focused mainly on explaining the first of the five pieces of prior evidence on which we focus.[5] Theoretical work emphasizes three main justifications for internal hiring and, particularly, internal promotion, namely firm-specific human capital, incentives, and information. Although the following discussion reviews them sequentially, some of the studies build theoretical arguments that draw on more than one of the three. For example, theory developed in Bidwell (2011) combines firm-specific human capital and incomplete information, and Bidwell and Keller (2014) develop theory based on the interaction of two sets of factors: how firm-specific skills and information affects worker-job fit, and how promotions affect coworkers' incentives.

The first of the three rationales is firm-specific human capital, which gives insiders a productivity advantage over outsiders (e.g. Bayo-Moriones and Ortín-Ángel 2006, Bidwell 2011, DeVaro and Morita 2013, Bidwell and Keller 2014). Firm-specific human capital can also explain prior empirical evidence on the fourth and fifth prior empirical facts, i.e., that external hires require more education and experience to compete with the internal candidates who possess firm-specific human capital. As discussed in the next subsection, the labor economics literature has increasingly focused on the notion of task specificity (rather than firm specificity) in skills.

A second rationale for internal hiring concerns incentives (Malcomson 1984, Chan 1996, Waldman 2003). 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), Zábojník and Bernhardt (2001), and DeVaro et al. (forthcoming). These incentives are weakened if the firm toughens its workers' competition by also hiring externally, as shown in Chan (1996). 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 horizontal moves. 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 because every internal move creates another internal vacancy.

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

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[5] See Ke et al. (2018) for a theoretical explanation of the second prior empirical result, i.e., that the prevalence of internal hiring increases at higher levels of the job ladder.

on insiders' and outsiders' abilities implies that outsiders are riskier hires.[6] 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. 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, and although Bernhardt (1995) considers a multi-period promotion signaling model in which two promotions are possible, the work history is still limited to a single firm. But the work history that employers can glean from résumés is richer. The signaling role of these more comprehensive work histories has been neglected. 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.

Horizontal Moves and Task-Specific Human Capital

The third empirical result from the introduction concerns external horizontal moves. Most research on hierarchical mobility focuses on promotions. The literature on horizontal moves is smaller, but that topic is important because of recent growth in external hiring at all levels of the job hierarchy (Royal and Althauser 2003, Jacoby 2005). Examples of research on horizontal moves include Jin and Waldman (2016), Cassidy et al. (2016), Bidwell and Mollick (2015), Bidwell and Keller (2014), Gittings (2012), Bidwell (2011), Eriksson and Ortega (2006), Dohmen et al. (2004), and the related analysis of job rotation in Ortega (2001).

Whereas firm specificity of human capital is helpful for thinking about internal promotions, task-specificity is a more natural concept for thinking about horizontal moves. Task-specific (or

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

occupation-specific) human capital, which is portable across firms, has been increasingly emphasized in the labor economics literature relative to firm-specific human capital (Gibbons and Waldman 2004, Gibbons and Waldman 2006, Kambourov and Manovskii 2009, Gathmann and Schönberg 2010, Cassidy 2017). When task-specific human capital is important, external horizontal moves should occur mostly within job functions rather than across job functions, so that task-specific human capital is preserved.

The formal theoretical model developed in Jin and Waldman (2016) explains horizontal moves by building on the idea of skill accumulation via job rotation when skills are task-specific. The idea is that when human capital is task-specific, and when higher-level jobs require knowledge of multiple skills, then workers who move horizontally early in their careers acquire a broad portfolio of skills that increases their promotion chances. All of the promotions and horizontal moves in that model, however, are internal, so the model does not speak to the third empirical finding noted in the introduction. The formal theoretical model of Cassidy et al. (2016) explains both external and internal horizontal mobility, but there is no task-specific human capital in that model and all separations from firms occur exogenously.

A challenge in the empirical internal-versus-external hiring literature is distinguishing external horizontal moves from external promotions (or demotions), because of the difficulties associated with defining comparable job hierarchies across firms. Our data allow us to make this distinction reasonably well, and in fact to sharpen it by distinguishing between external horizontal moves that involve changes in job function and those that do not. Those that do not involve a change in job function preserve task-specific human capital.

Data and Methods

The data set is a large, linked, employee-employer panel from 1981 to 2014. The data come from the administrative 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. 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.

The EK data are particularly well suited for this analysis because they allow us to 1) observe workers' prior career histories; 2) construct comparable job functions across firms; 3) identify many different types of career moves; 4) measure workers' education and experience; and 5) measure wages reliably. There might be gaps in the career (e.g., due to spells of unemployment or spells of employment in other sectors). Importantly, the EK data contain job functions that are comparable across firms. Each firm in the data has a subset of the same set of 56 job functions, and all firms have detailed instructions on how to assign each of the job functions to persons. Therefore, jobs can be classified in a comparable manner across firms, as we explain shortly. The classification allows us to define an employee's prior work history similarly for both internal and external hires. We distinguish internal and external hires using 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. This is because the job classification system in the blue-collar data is not comparable across firms. We define an individual 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). 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.

We construct work-history variables for each person, starting with about 4.4 million person-year observations. We restrict the analysis 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. We use the entire 25-year history 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 we only use those three observations for that worker in the empirical analysis. We further restrict the sample to years 2002-2014 so that we can measure employee performance (see below) and identify job function 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. Given our 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.

Identifying Career Moves

We identify career moves using job functions, job levels, and firm identifiers. We describe the job function first, treating it separately for the years 1981-2001 and 2002-2014 because of a function 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 function (e.g., product R&D, process R&D, Information and Communications Technology (ICT) planning, ICT maintenance, finance and investment, accounting, etc.) and 2) the fourth digit describes the hierarchical level (Managerial[7], Professional[8], Expert[9], Clerical[10]).

The four-level job hierarchy will not provide an exact description of the white-collar portion of the hierarchy in every firm. This issue highlights one of the challenges of multi-firm research. Part of the benefit of single-firm studies is that researchers have access to precise details about the way jobs are organized, which allows authors to identify what constitutes a promotion from the perspective of the organization's workers, and that level of detail is lost in a multi-firm sample. In particular, imposing a hierarchy of only four levels on every firm in the sample might cause us to overstate the number of lateral moves and understate the number of promotions, particularly in the top (managerial) job level. Nonetheless, a four-level hierarchy corresponds well to the typical firm and to the previous literature. For example, in the financial services firm first analyzed in Baker et al. (1994), the researchers infer an 8-level job hierarchy in the white-collar portion of the firm. But the lowest 4 levels contain 97.5% of the workers. As those authors write, "in this sense the [white collar portion of the] firm has four significant levels". In DeVaro and Waldman (2012), which uses those data, only the first 4 levels are used because the highest 4 levels are so sparse that they disappear after selecting on a few key variables. Similarly, Bidwell and Mollick (2015) estimate models with three job-level dummies, with a fourth as the reference group. Moreover, Frederiksen et al. (2017) revisit some of the well-known single-firm personnel data sets from the literature, finding that all data sets use job hierarchies with 5 to 6 levels, and in 6 out of 7 firms the 3 thickest

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[7] Managers plan, direct, coordinate and evaluate the overall activities of enterprises or of organizational units within them. Tasks performed by managers usually include: planning and directing daily operations; investment, operational and recruitment decisions; responsibility for personnel development, responsibility of performance.

[8] Professionals increase the existing stock of knowledge and apply scientific concepts and theories. Tasks performed by professionals usually include: conducting research and development, developing operational methods, demanding planning tasks, managerial duties. Supervision of other workers may be included.

[9] Experts perform mostly technical and related tasks connected with research and the application of scientific concepts and operational methods. Tasks performed by experts usually include: undertaking and carrying out technical work connected with research; planning of production, logistics and maintenance; initiating and carrying out various technical services related to trade, finance, and administration. Supervision of other workers may be included.

[10] Clerical support workers record, organize, store, compute and retrieve information and perform a number of clerical duties. Tasks performed by clerical support workers usually include typing, operating word processors and other office machines; entering data into computers; carrying out secretarial duties; recording and computing numerical data; keeping records filing documents; carrying out duties in connection with mail services; preparing and checking material for printing; performing money-handling operations; dealing with travel arrangements; supplying information requested by clients and making appointments; operating a telephone switchboard. Supervision of other workers may be included.

levels contain more than 90% of the workers. Thus, the four-level hierarchy should offer a good approximation of the hierarchies of our sampled firms. Moreover, the sampled firms are provided detailed information (given in the preceding four footnotes) to ensure that jobs are correctly classified into levels in a comparable way across firms.

The job functions appear in 18 families. Within each of these families there are about 3 functions, on average, for a total of 56. The 18 families of functions 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. For example, the largest job-function family is Research and Development, which contains three functions: 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 functions can be found in all four hierarchical levels.

In the years 1981-2001 there are 75 different job functions, but the data do not contain a code for the hierarchical level. For example, consider R&D. In 1981-2001 there are eight job functions 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 functions 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 functions 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 job-function-level combinations, whereas after 2002 there are 3×4=12 combinations, so the classification becomes finer.

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

We define promotions 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 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. We define

demotions similarly. Horizontal transfers occur when the job function changes but the hierarchical level does not. We distinguish external and internal transfers by a change in the firm identifier.

There are, therefore, six different ways to enter a job: 1) internal horizontal transfer, 2) external horizontal transfer, 3) internal promotion, 4) external promotion, 5) internal demotion, 6) external demotion. 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 function or a different one, though in most of the analysis we aggregate these cases for a compact presentation of results.

Table 1 displays the year-to-year transition matrix, which includes stayers. Fifteen percent of workers who stayed in their current job in a given year experience some type of transition in the following year, and our analysis focuses on those transitions. The transition matrix reveals that demotions are rare events, but they 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.

Empirical Model of Job Transitions

We conduct multivariate analysis by estimating a multinomial logit model in which the values of the dependent variable correspond to the six ways $(j = 0,1,...,5)$ to enter a job. Because the six probabilities $P(y = j \mid \mathbf{x}) = \exp(\mathbf{x}\boldsymbol{\beta}_j) \Big/ \left[1 + \sum_{h=1}^{5} \exp(\mathbf{x}\boldsymbol{\beta}_h) \right]$ sum to unity, we estimate only five parameter vectors. We assign internal promotions 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., $\log\left(\dfrac{P(y = j \mid \mathbf{x})}{P(y = 0 \mid \mathbf{x})} \right) = \mathbf{x}\boldsymbol{\beta}_j$ for

$j = 1, 2, ..., 5$, 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 can be assessed using $\beta_{ij} = \dfrac{\dfrac{\partial \left(\dfrac{P(y = j \mid \mathbf{x})}{P(y = 0 \mid \mathbf{x})} \right)}{\partial x_{ij}}}{\dfrac{P(y = j \mid \mathbf{x})}{P(y = 0 \mid \mathbf{x})}}$.

We use the multinomial logit model for descriptive purposes to summarize the data, and the results do not necessarily have causal interpretations. We measure all individual-level explanatory

variables 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.

Predictors

We use the following variables in the multivariate analysis. 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 functions, job levels, firms, promotions, and demotions to date; years at the current job function; and years at the current level. Table 2 displays descriptive statistics for the preceding variables.

We infer a measure of the employee's performance in the previous job from the amount of performance-related pay received, following DeVaro and Kauhanen (2016) and Cassidy et al. (2016). To start, we estimate a regression 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 function 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. We then use the regression residuals as measures of worker performance. Thus, we measure each worker's performance by how much performance-related pay the worker received compared to other workers in the same job function, 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.

A potential concern is that the performance measure may conflate individual and organizational performance. Performance pay in many organizations depends both on individual performance and on overall business performance. If the business does poorly, no one receives a bonus. This might partly account for low performers being more willing to leave their firms – they could just be deserting a firm that is unable to pay the bonus to poor performance. To address this issue, we recomputed the performance measure by including firm dummies on the right-hand side of the regression. The results differ only slightly when this alternative performance measure is used, and the reason is that person effects dominate the variance of the performance measure. An ANOVA analysis of the performance measures illustrates this and is available upon request.

In addition to the individual-level variables, we consider job characteristics, with a distinction between "managerial and professional" jobs (higher in the hierarchy) and "expert and clerical" jobs (lower in the hierarchy). We construct three indicators to distinguish among shrinking, stable (omitted category), and growing jobs. Shrinking jobs are firm/job level/job function-cells in which there are fewer employees in year *t* at the time of the survey compared to the situation in year *t-1*. We define growing jobs analogously. In stable jobs the number of employees is the same as in the previous year. There are seven categories for firm size. Other variables included in the analysis are dummies for job function (18 categories), industry (53 categories), and year.

Results

Revisiting Previous Evidence

Table 3 displays the routes by which workers enter new jobs. Sixty percent of new jobs are filled with an internal hire, versus 40% with an external hire, suggesting a preference for internal hiring that is consistent with the first prior result stated in the introduction. However, the most frequent transitions are external horizontal moves (33%), followed by internal horizontal moves (27%) and internal promotions (25%). We focus most of our analysis on these moves, as they cover 85% of the transitions. The prevalence of internal promotion increases at higher elevations of the job ladder, consistent with the second of the five prior empirical results. For managers and professionals it is 36% and is the most frequent way to enter a job, whereas for clerical and expert workers it is only 12%. External horizontal moves are more common for the lower-level jobs (38%) than for the higher-level ones (29%). Our result concerning the prevalence of lateral moves (particular external ones) relative to internal promotions 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.

The most common type of external move is horizontal, consistent with the third prior empirical result, as documented in Bidwell and Mollick (2015). Horizontal transfers account for 83% of all external moves, 86% of external moves for lower-level jobs, and 80% of moves for higher-level jobs. External demotions, in particular, are quite rare.[11] External promotions are relatively infrequent (4%), which implies that the external competition faced by internal workers who might get promoted is not from peers at the same job level but rather from 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.

Our evidence concerning the fourth and fifth of the prior empirical results comes from the multinomial logit analysis. Table 4 displays estimation results, showing 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. Table A1 in the online appendix displays the complete set of estimation results, including external promotions, internal demotions and external demotions. Consistent with the fourth and fifth prior empirical results, both internal and external horizontal hires are more educated than internally-promoted employees, given that the coefficients on the quadratic education variable are both positive and statistically significant at conventional levels. The result on external hires accords with prior evidence (e.g. Baker et al. 1994, Bidwell 2011) but the result that internal horizontal hires are more educated than internally-promoted workers is new.

Table 4 also reveals that work experience is longer for either type of horizontal hire than for internally-promoted workers. 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. The 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.

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[11] However, 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). Our results show that demotions are much more common in lower-level jobs than in higher-level ones.

Relative to clerical and expert jobs, the higher-level 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).

New Evidence

Table 3 shows that external horizontal transfers are typically hired to the same job function that they held in the previous firm. Only in 15% of the cases does the job function change. This result, 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. External horizontal movers that remain in the same job function 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 function changes.

Table 4 reveals that the coefficient on "years at job function so far" is negative for internal horizontal transfers and positive for external horizontal transfers. This suggests that internal horizontal transfers tend to occur rather soon after the employee has entered his/her most recent job function, whereas external horizontal transfers occur after a longer stay at the most recent job function. The nature of external hiring is, thus, different: the movers tend to keep their job function (as Table 3 shows). 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. Note that 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.

Next we consider three results on the prior career success of internal and external candidates. These results show that even though the external hires have better observable indicators of ability, measures that the hiring firm may not fully observe show that the external hires have not performed as well as those who have been internally promoted.

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.[12] 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. However, 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-function/level/firm/year-cell. Internally-promoted workers have higher wages 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).

Relative to jobs that are expanding, those that are stable or shrinking 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 less relevant when employment

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[12] 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%.

in the job is increasing, because then external hiring decreases the promotion probability to a smaller extent than would occur if employment in the job were not increasing. 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. 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.

Sensitivity Analysis

The results are 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 function. To see whether employee (as well as job and firm) characteristics differ between employees who move within job functions and those who move across job functions, we estimated the model distinguishing between mobility within and across job functions, i.e., with eleven different mobility types.[13] The estimation results are similar to the baseline results, irrespective of whether an employee switches job function or not.

The second robustness check concerns firm size. The results in Table 4 show that firm size affects hiring 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 4.

Discussion and Conclusion

Using a large, linked, employer-employee matched panel data set from Finland, we confirm the following five empirical findings from the literature on internal-versus-external hiring that has been conducted on narrower, often single-firm, data sets: 1) firms have a preference for internal promotion; 2) that preference is particularly strong at the top of the job hierarchy; 3) most external moves are horizontal rather than vertical; 4) external hires have higher education levels than

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[13] The eleven different mobility types are: internal horizontal transfer, external horizontal transfer (with and without job-function change), internal promotion (with and without job-function change), external promotion (with and without job-function change), internal demotion (with and without job-function change), external demotion (with and without job-function change).

internally-promoted workers; 5) external hires have higher levels of experience than internally-promoted workers.

Of particular interest is third result. Bidwell and Mollick (2015) find that the primary source of external mobility is horizontal moves. They also find that these external horizontal moves are an important means of changing job functions. Although we confirm the first of these results, we uncover the new result that most external horizontal moves occur within job functions.

In our view, the evidence on the importance of horizontal moves (particularly external ones) justifies a call for increased research attention to that subject, within a hierarchical mobility literature that is still vastly dominated by models of promotion. The evidence also has important implications for tournament theory. That literature requires identifying the relevant pool of competitors that each worker faces in promotion tournaments. Our results clarify that internal workers at a given job level face their greatest external competition from workers not at the same job level but at the next level up. That insight about how to correctly characterize the competitor pool has been difficult to extract from the prior literature, because most studies are unable to distinguish the job level from which an external hire originated. The insight also 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 (i.e., the fourth and fifth prior empirical results).

The new result that most external horizontal moves occur within job functions, when combined with growing evidence from the labor economics literature on the importance of task-specific (as opposed to firm-specific) human capital, suggests that external horizontal movers should not suffer a drop in productivity when switching firms. This helps to explain findings from the prior literature that external horizontal moves are associated with large wage increases – which are difficult to reconcile with big productivity drops arising from with the loss of firm-specific human capital. Bidwell and Keller (2014) finding of no effect of firm-specific skills complements our conclusions that task-specific or job-specific skills (which those authors do not discuss) are more relevant than firm-specific skills.

A corollary of most external moves being horizontal is that relatively few external moves are promotions. Promotions, when they occur, are much more likely to be internal. The notion of boundaryless careers (Arthur and Rousseau 2001) – as opposed to organizational careers – is that the evolution of workers' careers is not contained within the boundaries of an organization and often involves external mobility. Our results, like those in Bidwell and Mollick (2015), can be interpreted as a counterpoint to the boundaryless career argument, in the sense that we find

significant differences between internal and external moves. In particular, promotions are far more likely to be internal than external, at all levels of the job ladder.

What is interesting about our confirmation of the fourth and fifth prior results is not just that the results hold in a broad, multi-firm sample, but also that information on work histories (even for external hires) has allowed us to estimate more comprehensive empirical specifications than have been previously considered. Moreover, in addition to controlling for work histories, we control for proxies for worker performance that capture, at least in part, components of worker ability that are often not fully observed by researchers and potential employers. It is interesting that the standard, observable markers of ability (like education and work experience) continue to be relevant even in the presence of controls for prior work history and performance. A new result is that while external hires are superior to internally-promoted workers on observable dimensions of ability like education and experience, they actually appear worse on the dimension of unobserved dimensions of ability. This result is consistent with internally-promoted workers being drawn from the right tail of the within-job-level performance distribution, whereas external horizontal movers are drawn from other parts of the within-job-level performance distribution.

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. In addition to the results on the fourth and fifth prior results, we find that, compared to internally-promoted employees, external horizontal hires have longer job-function tenures, 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 function 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 function. Thus, internal horizontal transfers seem quite different in nature, perhaps targeted at providing diverse work experience and, hence, preparing for a future promotion.

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.

The new results we present can probably be generalized outside of Finland, both because there is nothing particularly idiosyncratic about Finland's labor market that should have a bearing on these results, and because earlier work using these data has yielded results that align with research from other countries. For example, Kauhanen and Napari (2012) use these data to replicate the findings from the American personnel data used in Baker et al. (1994), and (DeVaro and Kauhanen 2016) use these data to replicate various results from classic tournament theory that were found in data from other countries, including British personnel data (Audas et al. 2004) and a panel of American executives (Bognanno 2001). Although we follow most of the literature in our focus on the white-collar portion of the hierarchy, the extent to which those results generalize to the blue-collar portion is unclear and should be investigated in future work.

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Table 1: One-Year Transition Matrix

t+1

	Internal horizontal transfer	External horizontal transfer	Internal promotion	External promotion	Internal demotion	External demotion	Stayer	Total
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	

t (row label to the left of the table)

Table 2: 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[1]	0.07	0.86	-7.82	4.09
Number of job functions to date	2.22	1.39	1	12
Number of employers to date	1.41	0.72	1	9
Years at job function 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
Shrinking 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
500-100	0.12	0.32	0	1
1000-2000	0.13	0.33	0	1

[1] The performance measure is computed using the entire sample, including workers who switch job function, 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 function, 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.

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 3: Routes to a job, %

	All	Clerical and Expert	Managerial and Professional	Job function 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 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	-0.03
	(-0.30)	(-0.56)
Years of education^2	0.01*	0.01**
	(2.55)	(2.93)
Work experience		
Experience up to one year		
2-5 years	0.47***	0.48***
	(6.71)	(5.20)
6-15 years	1.07***	1.11***
	(10.32)	(8.95)
16-25 years	1.66***	1.68***
	(12.91)	(11.50)
More than 25 years	1.85***	1.84***
	(12.99)	(11.47)
Number of job functions to date	0.11***	0.06
	(3.56)	(1.71)
Number of employers to date	-0.06	0.16*
	(-1.51)	(2.42)
Years at function so far	-0.04***	0.02*
	(-5.80)	(2.11)
Years at level so far	0.01	0.01
	(1.56)	(0.74)
Firm tenure		
Tenure up to one year		
2-5 years	-0.25*	-0.14
	(-2.22)	(-0.66)
6-10 years	-0.26*	-0.31
	(-2.09)	(-1.34)
11-15 years	-0.08	-0.10
	(-0.55)	(-0.41)
More than 15 years	-0.20	-0.44
	(-1.27)	(-1.49)
Prior performance		
Performance	-0.43***	-0.97***
	(-5.24)	(-6.41)
Performance t-1	0.19**	0.17
	(2.84)	(1.37)
No prior promotions		
1 prior promotion	0.96***	0.92***

	(16.47)	(13.46)
More than 1 prior promotion	1.45***	1.55***
	(12.03)	(12.71)
No prior demotions		
1 prior demotion	-0.60***	-0.77***
	(-7.44)	(-11.63)
More than 1 prior demotion	-1.20***	-1.47***
	(-8.21)	(-12.64)
Other		
Relative wage	-0.12***	-0.09***
	(-11.11)	(-9.08)
Relative wage growth	-0.03**	-0.03
	(-3.13)	(-1.69)
Female	-0.64***	-0.61***
	(-14.41)	(-12.57)
Panel B: Job and firm level variables		
Job characteristics		
Clerical and expert jobs		
Managerial and professional jobs	-2.13***	-2.25***
	(-21.81)	(-24.25)
Expanding job		
Stable job	-0.09	-1.10***
	(-1.17)	(-7.66)
Shrinking job	-0.05	-1.75***
	(-0.35)	(-4.35)
Firm characteristics		
Firm size smaller than 50		
51-100	0.06	0.17
	(0.36)	(0.78)
101-200	0.03	-0.20
	(0.17)	(-0.88)
201-500	0.44**	-0.32
	(3.05)	(-1.40)
501-1000	0.73***	0.41
	(4.06)	(1.23)
1001-2000	0.20	-0.75
	(1.03)	(-1.91)
larger than 2000	0.44**	-1.04**
	(2.64)	(-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 job-function/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 function/level/firm-cell is unchanged between years t and t+1; Shrinking job: employment in the job function/level/firm-cell decreases between years t and t+1, Expanding job: employment in the job function/level/firm-cell increases between years t and t+1.

Online Appendix

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	-0.03	0.07	0.16*	0.16
	(-0.30)	(-0.56)	(0.92)	(2.33)	(1.79)
Years of education^2	0.01*	0.01**	-0.00	0.01**	0.01**
	(2.55)	(2.93)	(-0.86)	(2.72)	(2.86)
Work experience					
Experience up to one year					
2-5 years	0.47***	0.48***	0.00	0.52***	0.66***
	(6.71)	(5.20)	(0.02)	(4.56)	(4.61)
6-15 years	1.07***	1.11***	-0.00	1.67***	1.69***
	(10.32)	(8.95)	(-0.04)	(12.00)	(10.54)
16-25 years	1.66***	1.68***	-0.04	2.70***	2.41***
	(12.91)	(11.50)	(-0.26)	(15.96)	(12.74)
More than 25 years	1.85***	1.84***	-0.34*	3.21***	2.57***
	(12.99)	(11.47)	(-2.11)	(17.25)	(12.39)
Number of job functions to date	0.11***	0.06	-0.03	0.07*	0.19***
	(3.56)	(1.71)	(-0.65)	(2.04)	(4.09)
Number of employers to date	-0.06	0.16*	0.18**	0.08	0.21**
	(-1.51)	(2.42)	(3.11)	(1.58)	(3.01)
Years at function so far	-0.04***	0.02*	-0.00	0.01	0.04***
	(-5.80)	(2.11)	(-0.29)	(1.13)	(3.35)
Years at level so far	0.01	0.01	0.02	-0.03***	-0.04*
	(1.56)	(0.74)	(1.85)	(-3.47)	(-2.43)
Firm tenure					
Tenure up to one year					
2-5 years	-0.25*	-0.14	-0.12	-0.19	-0.11
	(-2.22)	(-0.66)	(-0.73)	(-1.66)	(-0.59)
6-10 years	-0.26*	-0.31	-0.30	-0.14	-0.33
	(-2.09)	(-1.34)	(-1.56)	(-1.05)	(-1.77)
11-15 years	-0.08	-0.10	-0.52*	0.03	-0.12
	(-0.55)	(-0.41)	(-2.50)	(0.21)	(-0.54)
More than 15 years	-0.20	-0.44	-0.94***	-0.28	-0.72**
	(-1.27)	(-1.49)	(-3.90)	(-1.65)	(-2.83)
Prior performance					
Performance	-0.43***	-0.97***	-0.77***	-0.95***	-1.08***
	(-5.24)	(-6.41)	(-5.47)	(-8.85)	(-7.29)
Performance t-1	0.19**	0.17	0.29***	0.17*	0.25*
	(2.84)	(1.37)	(3.73)	(2.08)	(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)
Shrinking 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*
	(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 job-function/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 function/level/firm-cell is unchanged between years t and t+1; Shrinking job: employment in the job function/level/firm-cell decreases between years t and t+1, Expanding job: employment in the job function/level/firm-cell increases between years t and t+1.