How Internal Hiring Affects Occupational Stratification

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Abstract

When employers conduct more internal hiring, does this facilitate upward mobility for low-paid workers or does it protect the already advantaged? To assess the effect of within-employer job mobility on occupational stratification, we develop a framework that accounts for inequality in both rates and payoffs of job changing. Internal hiring facilitates advancement for workers without strong credentials, but it excludes workers at employers with few good jobs to advance into. Analyzing Current Population Survey data, we find that when internal hiring increases in a local labor market, it facilitates upward mobility less than when external hiring increases. When workers in low-paid occupations switch jobs, they benefit more from switching employers than from moving jobs within the same employer. One-third of this difference is due to low-paid workers isolated in industries with few high-paying jobs to transfer into. An occupationally segregated labor market therefore limits the benefits that internal hiring can bring to the workers who most need upward mobility.
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Internal hiring is often proposed as a way for employers to provide opportunity for upward occupational mobility to their frontline workers. In the mid-twentieth century, the construction of internal labor markets in large corporations provided a protected channel for occupational advancement for many workers (Cappelli, 2001; Hirsch, 1993; Jacoby, 2004). Recent research confirms that, for some workers, internal hiring facilitates upward occupational mobility more effectively than external mobility (Bidwell and Mollick, 2015; DeVaro et al., 2019). For a vivid example, one news report details how a janitor at Eastman Kodak in the 1980s rose up the ranks to become CTO of the company (Irwin, 2017). Absent internal hiring, workers disadvantaged on the external labor market would lose these advancement opportunities.

Yet, these advantages for internal candidates are often won at the expense of external applicants. Workers not ensconced at employers with advancement opportunities will face greater barriers to upward mobility when internal hiring is widespread (Kerr, 1977). If the protections attendant to internal hiring are concentrated on workers already in high-paying jobs, then replacing external with internal hiring for a given job could exacerbate occupational stratification. Recent labor market trends likely exacerbate these inequalities in the negative externalities of internal hiring. The decline of labor unions, which previously undergirded internal labor market protections for non-managerial and non-professional employees (Osterman, 1984), disproportionately strips internal hiring advantages from lower-skill workers. At the same time, outsourcing and workplace fissuring has increasingly segregated lower-paid occupations into their own employers, cut off entirely from the higher-paying occupations they might previously have accessed via internal mobility (Weil, 2014; Handwerker, 2018). Perhaps for these reasons, one study of low-earning workers finds that escape from low paying jobs is more common among workers who switched employers, rather than those who remain with their starting employer (Andersson et al., 2005).

Given these changes, we revisit the effect of internal hiring on occupational stratification. We do so by providing a framework for studying both the advantages of internal hiring for insiders and the negative externalities on outsiders. Specifically, we consider three channels that determine how internal hiring will affect opportunities for workers in high- and low-paying occupations: the extent of preference given to internal applicants; varying quality of internal jobs; and different rates of mobility.

First, internal applicants applying for an internal position may enjoy more or less advantage

compared to external applicants. This higher likelihood of a successful application results from institutionalized closure relative to outside applicants and from private employer information about incumbents' past work performance and worker quality. Depending on their credentials and the degree of closure at their employer, internal applicants may benefit more or less from their incumbent position relative to external applicants.

Second, a worker switching jobs within an employer largely composed of high-paying jobs will have a higher pay-off than moving within an employer with few opportunities. In other words, internal hiring provides little benefit for workers at employers with few high-paying occupational jobs to move into.

Third, beyond application advantage and job quality availability, some incumbent workers are more exposed to mobility opportunities when employers in their labor market shift toward internal hiring. Other workers, specifically those who are either unemployed or starting at an employer that does not hire internally, will be left out.

The stratification effect of internal hiring depends on the variable strength of each of these three factors across occupations. Highly paid workers are more likely to be in industries composed of high paying occupations and are more likely to be exposed to opportunities for internal mobility. But, lower paid workers are more likely to benefit from institutionalized closure and when private employer information offsets focus on formal qualifications. These multiple, offsetting pathways by which internal hiring affects occupational stratification underlie the contradictory prior research noted above. In this article, we quantify and compare each of these effects.

To do so, we study occupational attainment of job movers using Current Population Survey data on job switchers that includes both between- and within-employer job changes. We define occupational attainment (proxied by occupation average earnings) by the position attained through each type of job move. Empirically, we improve on two bodies of prior research. Case study research on specific employers or occupations has developed useful estimates of the consequences of within- compared to between-employer mobility (Bidwell and Mollick, 2015; Keller, 2018). But case study data cannot quantify heterogeneity in effects of within-employer mobility, which prior research on gender and job mobility suggests could be substantial (Fuller, 2008; Kronberg, 2013). On the other hand, studies of job mobility drawing on small panel surveys cannot calculate labor market-specific rates of internal hiring (Mouw and Kalleberg, 2010). As such, they cannot estimate externalities of

internal hiring on non-movers, like the non-employed workers who are passed over for a job in favor of a promotion given to an incumbent.

To address these limitations in prior research design, we measure within-employer job switching and between-employer switching using Current Population Survey (CPS) questions that explicitly ask respondents about both kinds of job mobility. We also field a supplementary survey to validate these questions relative to a series of alternative operationalizations of within-employer mobility. By observing variation in internal hiring within local labor markets over time, we provide the first estimates of the occupational stratification consequences of increased internal hiring. Moreover, by comparing similar workers who start in the same occupation, but move using different processes, we quantify cross-occupation variation in the occupation attainment premium associated with external relative to internal mobility.

1 Stratification Effects of Internal Hiring

We define occupational stratification as the extent to which upward (downward) occupational mobility is unlikely (likely) for workers in low-paid occupations, relative to workers in high-paid occupations.[1] Recent research suggests that intragenerational occupational mobility is increasing over time, but that this involves an increase in career instability, rather than an increase in upward mobility for workers starting in low-paid occupations (Jarvis and Song, 2017). We ask how organizational boundaries affect this occupational stratification process. If workers in higher paid occupations move into better occupations through internal hiring, compared to those in lower paid occupations, then employers' use of internal, rather than external, hiring contributes to stratification. For any group of workers, occupational mobility δ can be decomposed as:

$$\delta = (\pi_w * \gamma_w) + (\pi_b * \gamma_b)$$

where π is the rate of job changing, within w or between b employers, and γ is the expected degree of upward or downward occupational mobility associated with a job change.[2] These rates and pay-offs will vary across labor markets with more or less internal hiring and across different groups of workers. We also assume that these rates and pay-offs can vary across workers starting in high- and low-paid occupations, consistent with our interest in occupational stratification. When a labor

market shifts from external to more internal hiring ($\frac{\pi_w}{\pi_w+\pi_b}$ increases toward 1) it can affect both π and γ terms across different occupational groups. An increased share of internal hiring could both lower the probability of a job move for workers in low-paid occupations and also reduce the expected degree of upward occupational mobility associated with a move. In this case, internal hiring will increase occupational stratification.

In other cases, where the π and γ terms move in different directions, effects on stratification will depend on the magnitudes of each. In the analysis that follows, we consider how employers' use of internal hiring affects (1) pay-offs ($\gamma_w - \gamma_b$) to internal mobility and (2) population-level rates of job changing ($\pi_w + \pi_b$), across workers starting in different occupations.

Note that much prior theory about the effects of internal hiring has focused on the insulation enjoyed by incumbent workers in applying for internal positions relative to external applicants. In the following, we use this prior research to develop predictions about stratification, allowing internal hiring advantages to vary for workers from different origin occupations. But, we also use this simple model to motivate two additional factors, critical for understanding population-level stratification effects but often neglected in analysis of single organizations or worker-level mobility. First, the quality of within-employer available occupations varies across workers in different occupations (a second determinant of $\gamma_w - \gamma_b$, beyond the extent of application advantage for incumbents). Second, beyond pay-offs to job moves, we also consider how shifting rates of mobility affect occupational stratification. When firms in a local labor market use more internal hiring, each type of mobility rate could change differently across occupational groups, facilitating more job changes for some workers than for others.

1.1 Worker-level Pay-offs: Probability of Hire

Prior research has mainly investigated determinants of the pay-offs to internal and external mobility $\gamma_w - \gamma_b$, measured in pay, job quality or occupational attainment (Frederiksen et al., 2016; Fuller, 2008; DeVaro et al., 2019; Bidwell, 2011). Before turning to our more novel predictions about occupational composition and rates of mobility, we first develop predictions from this prior work. Specifically, much research has focused on explaining why an internal applicant may be advantaged over an external applicant for a given job. Building on this prior work, we theorize two potential determinants of application advantage, following the old debate between institutional and efficiency

explanations for internal hiring (Osterman, 1984).

First, we expect more advantaged internal mobility in workplaces marked by formalized internal labor markets (Pfeffer and Cohen, 1984). Institutionalized features of employment relations shape these internal markets. Specifically, unionized workplaces often rely on seniority-based promotion policies that shape an employer's internal career structure and advantage incumbents (Bidwell, 2013; Jacoby, 2004; Slichter and Livernash, 1960). Following prior research on the effect of unions on job mobility, we expect the influence of unions on internal labor markets extends beyond directly unionized workplaces (Bidwell, 2013): even non-union firms in unionized industries and regions formalize internal labor markets to avoid union organizing (Kaufman, 2008). As such,

Hypothesis 1. *Union influence will increase incumbent application advantage and increase the pay-off to internal, relative to external, mobility.*

If workers in lower-paid occupations are disproportionately exposed to unions, then these institutional benefits will tend to reduce stratification.

The second determinant of advantaged within-employer mobility stems from efficiency considerations. When employers directly observe work performance, they can promote high-performing internal applicants without relying on the proxies used in formal qualifications (Kauhanen and Napari, 2012; Bidwell, 2011; DeVaro et al., 2019). This finding builds on work in organizational economics that models unobserved ability, education and promotion likelihood (Waldman, 1984; Bernhardt, 1995; DeVaro and Waldman, 2012). It captures a common intuition that internal labor markets provide disproportionate benefits to workers who would be less successful at signaling quality on the open labor market. This prediction works primarily through a selection channel, whereby less educated workers are more positively selected for internal mobility. We expect that:

Hypothesis 2. *Workers with lower education will receive a higher pay-off from internal, relative to external, mobility.*

Both of these standard theories of the internal mobility predict relative advantages for workers lower in the occupational hierarchy. They focus on application advantage, or the probability that an internal applicant will obtain a job relative to an external applicant. They build on rich theoretical questions about the mobility dynamics of open labor markets relative to formal organizations. However, they typically neglect a simpler issue: the extent to which desirable jobs are available at

all inside a given employer. The potential pay-off in occupational attainment will depend not only on the probability that an internal applicant will be hired for a given job, but will also depend on the quality of that job.

1.2 Worker-level Pay-offs: Quality of Internal Jobs

The quality of within-employer jobs available to workers in low-end occupations will tend to be lower than workers in high-end occupations. Moreover, recent research suggests that this gap is growing. In an era of outsourcing and workplace fissuring (Weil, 2014), we expect occupational isolation to have a strong effect on mobility options out of lower paid jobs. For example, a study of the insurance industry found that delayering managerial positions limited promotion opportunities for workers (Scott et al., 1996). More broadly, lower-paid occupations are increasingly isolated in employers with few high-end occupation jobs to be promoted into (Handwerker, 2018). Retail stores for instance, have such a high ratio of frontline workers to even immediate supervisors or store managers, that few cashiers or stock clerks can hope to be promoted (Osterman, 2020).

Put abstractly, internal mobility will tend to move workers around a local job structure, while external mobility allows access to a broader variety of jobs. For workers starting in low-end jobs, this will tend to limit the upward mobility potential of internal moves. For workers starting in high-end jobs, internal mobility will tend to blunt the risks of shifting across job structures. While workers in low occupation jobs want larger changes to their occupational circumstances, those starting in high occupation jobs benefit from minimizing the risk of downward mobility.

Perhaps for this reason, one study of low-wage workers finds that upward mobility is concentrated among workers who switched into larger, lower-turnover employers, rather than those who stay with their current employer (Andersson et al., 2005). We build on this work by comparing employer switchers not to all workers remaining with a current employer, but to the sharper comparison group of workers who also change jobs but who do not switch employers. Workers exposed to a rich set of high-quality jobs within their current employer will benefit more from internal mobility:

Hypothesis 3. *When workers are in industries and employers with low-quality occupation composition, they will receive a lower pay-off from internal, relative to external, mobility.*

Together, the first two channels in Hypothesis 1 and 2 predict that employers switching from

external to internal hiring will dampen stratification: workers in low-end occupations are more likely to be in unionized industries and regions and to have worse formal educational credentials. These predictions follow from the emphasis in prior mobility research on application advantage, which governs the probability that an internal applicant will be chosen over an external applicant for a given job. In contrast, Hypothesis 3 brings research on occupational segregation to emphasize that not only the probability of hire, but also the quality of locally available jobs will impact the pay-offs to internal and external mobility.

1.3 Population-level Effects and Rates of Mobility

The hypotheses so far predict variation in the pay-off to individual workers of switching jobs internally relative to externally. This focus limits attention to job movers. However, as noted above, to understand the total occupational stratification effect of internal hiring, it is necessary to consider externalities on non-mover workers as well.

When a labor market shifts toward more internal hiring, it can change the rates of job changing experienced by different occupational groups. This shift could drive stratification even if the underlying pay-off to within-employer job changes relative to between-employer changes is invariant and equal across occupations. Specifically, we expect that this mobility rates channel will exacerbate stratification:

Hypothesis 4. *Low-occupation workers will move less when a larger share of a labor market's hiring is internal.*

Occupations sort across different employers with different degrees of employer-employee commitment and investment (Tolbert et al., 1980; Snower, 1989). This is an old idea in research on dual or segmented labor markets (Edwards, 1979). Internal hiring and career ladders are rare in the secondary labor market, marked by low commitment and dead-end jobs (Kalleberg et al., 1981). The key insight here is simple: internal hiring is distributed unequally across employers employing different types of occupations.

If higher paying employers and industries are more likely to shift toward internal hiring, then π_w will increase for the top end of the job distribution when overall internal hiring intensifies. Insofar as total hiring is fixed, this implies a decline in π_b for low-paid workers no longer able to switch away

from their current employer. This channel has been neglected by prior research on job mobility, as the labor market-wide implications of internal hiring cannot be captured by studying mobility at a single workplace or with small sample panel surveys. By conceptualizing these processes at the labor market- or population-level, we can identify effects on the workers passed up for mobility opportunities.

2 Data

To estimate the relative importance of these multiple, potentially countervailing forces, we study varying pay-offs and rates of internal hiring in US labor markets from 1995 to 2019. Starting in 1994, the Current Population Survey (CPS) added questions about month-to-month job mobility in an effort to reduce substantial month-to-month variation in industry and occupation categorization (Polivka and Rothgeb, 1993).[3] These questions present an underused opportunity to compare within- and between-employer job mobility (Moscarini and Thomsson, 2007). In the following section, we introduce the CPS job mobility questions and discuss results of an online survey that provides additional context on the interpretation of these questions. Next, we introduce other key measures used in the analysis. Finally, we compare occupational transitions due to within-employer job changes and between-employer job changes.

2.1 Measuring Job Mobility

Using the CPS to track within-employer and between-employer job mobility requires attention to the details of the survey's dependent occupational coding scheme. As discussed in more detail below, survey respondents stay in the CPS sample for spells of 4 consecutive months. Starting in the second month of each spell, the following three questions are asked in sequence:

1. "Last month, it was reported that you worked for (Employer's name). Do you still work for (Employer's name)?"
   YES → Next question
   NO → Skip to occupation and industry questions

2. "Have the usual activities and duties of your job changed since last month?"

YES → Skip to occupation and industry questions

NO → Next question

3. "Last month you were reported as (a/an Occupation) and your usual activities were (Description). Is this an accurate description of your current job?"

   YES → Use last month's industry/occupation codes

   NO → To occupation and industry questions

The first two questions are simple to code: (1)No indicates a between-employer job switch in the last month, while (2)Yes indicates a within-employer job switch in the last month. However, the third question is more ambiguous (Kambourov and Manovskii, 2013). In cases of (3)No, there are two possibilities: (a) the respondent initially forgot a job change, but upon being reminded of the activities reported in the previous month, remembered a change; and (b) the respondent had no job change, but retrospectively disagrees with the job description recorded in the prior survey. Ideally, instances of (3)No(a) would be coded as job changes, alongside (2)Yes, but we would exclude (3)No(b): (3)No(b) responses likely do not reflect job changes at all, but rather respondent corrections to the interviewer. The most likely reason for this false positive (3)No(b) response is that a different household member is responding to the survey than in the month immediately prior (Kambourov and Manovskii, 2013). These month-to-month respondent-switchers account for 19% of overall months, but 28% of (3)No months. To avoid including these survey-artifact, retrospective disagreements as job changes, we code as job switchers only instances of (3)No when the same respondent answers in the prior month. We expect this approach to reduce but not eliminate measurement error: some (3)No(a) cases will still be respondents correcting an inaccurate previous job description.[4]

Despite this complexity, there are several advantages to using these dependent coding questions to measure job mobility. First, a month-to-month measure of job mobility mitigates the substantial recall bias in survey questions that ask about job changing over a one year period (Kambourov and Manovskii, 2013). This recall bias is exacerbated further in work history data that requires multi-year recall (Parrado, 2005; Manzoni et al., 2014; le Grand and Tåhlin, 2002). Second, measuring job mobility with a direct survey question avoids problems that arise from inferring within-employer job changes using changes in occupation recorded in administrative data. Prior research has doc-

umented substantial measurement error in employer reports of worker promotions in such data (van der Klaauw and Dias da Silva, 2011). Even absent measurement error from the employer proxy response issue, administrative data only picks up job changes that occur between occupational levels. This makes comparison of within-employer to between-employer moves potentially misleading, especially for the study of occupational attainment, as the latter moves include both within- and between-occupation job changing, while the former moves cover only between-occupation changes (Frederiksen et al., 2016). As discussed below, many workers change jobs within employers but remain in the same occupation.

Note also that both voluntary and involuntary job moves are included in both the within-employer mobility questions and the between-employer question. Involuntary between-employer mobility is likely important during this period, as corporate downsizing became a popular strategy of increasing stock prices at the expense of displaced workers (Hirsch and Soucey, 2006). Involuntary within-employer job mobility can also occur. In restructuring, job bumping, in which one eliminated job pushes an incumbent worker across different positions, rather than vacancy chains, governs worker mobility within the firm. More broadly, a line of research on firm flexibility characterizes lay-offs and worker job flexibility as substitutes (Kalleberg, 2000). Employers impose flexibility not just by varying their number of employees but also by reallocating workers across jobs within employers. By asking workers directly about job changes, all of these kinds of mobility are covered symmetrically in responses to both within- and between-employer mobility questions.

2.2 What Does the CPS Mobility Question Measure?

Notwithstanding these advantages relative to other data, the core CPS question covering internal mobility (question 2 above) is subject to ambiguity. Unlike employer switches, in which job changes are well-defined by moves across organizational boundaries, internal job changes are difficult to define (Pergamit and Veum, 1999). When an employee becomes a senior researcher, rather than a researcher, is that job mobility? Is it job mobility when an architect is assigned a new project? Or for a retail clerk to move down the street when her employer rents a new storefront? Because the CPS internal mobility question is deployed in a dependent occupation coding module, as far as we know it has never been tested or validated as a measure of within-employer job mobility.

To validate the CPS question, we fielded a Mechanical Turk survey asking respondents about

their experiences of job mobility, including promotions and demotions, but also informal changes in tasks or projects. Figure 1 shows the results. Chart (a) indicates that respondents report frequently doing new tasks and projects at work: around 70% reported experiencing each of these work changes in the last year. In contrast, fewer respondents experienced formal changes in job title (25%) or a promotion (30%).

How do responses to the CPS duties and activities change question compare to these alternative questions? Changes in duties and activities were more common than formal job changes (44%), but closer in frequency to formal changes than to task and project changes. Likewise, chart (b) shows that the CPS measure is most strongly correlated with promotions and formal job title changes. In 72% of cases, responses to the job title change and the CPS question were the same. Among the negative cases, four fifths come from a reported duties and activities change occurring without a corresponding change in job title.

These results indicate that the CPS duties and activities measure is highly correlated with changes in job title and promotion. But, the measure also captures changes in actual work tasks, consistent with the "duties and activities" phrasing, but not with purely ceremonial changes in job title (Pergamit and Veum, 1999). However, note that the measure is not driven by minor changes in task assignment and project work, which are 40% more common than reported changes in job duties and activities. Based on this exercise, we interpret the CPS question as effectively capturing large job changes, like promotions or job title changes, and a subset of small job changes, like task reassignments.

[Figure 1 about here.]

2.3 MSA-level Rates of Internal Mobility

To measure the extent of internal hiring within a labor market, we aggregate these individual-level mobility responses to local labor market-wide shares of internal hiring: the share of all job changes within a Metropolitan Statistical Area (MSA)-year that are due to internal hiring. We use MSA as a meaningful definition of a geographical labor market that is available in the CPS (unlike commuting zone, which is missing for many cases due to suppression of small county FIPS codes). For our analysis, we calculate these rates leaving out the nodal worker. One quarter of CPS

observations in non-metropolitan or small MSAs are excluded. In a robustness test below, we find results are also robust to excluding MSA-years with fewer than 1,000 observations.

What does it mean for a higher share of hires in a labor market to be internal, rather than external? No organization can survive on internal hiring alone. However, internal hires need not rattle a vacancy through a fixed job structure until a new entrant arrives (Rosenfeld, 1992). Organizations can replace internally vacated positions by redistributing work or by automating production. They can also make internal hires initially to reallocate workers, who would otherwise be laid off. Finally, in many professional promotion processes, like those for professors, a job title change may add or change work, but need not create a vacancy. In all of these cases, organizations can choose between moving workers internally or making external hires, but the internal move does not create a vacancy. A higher share of internal hires at the labor market level indicates more firms that are using these internal mobility processes to fill positions. Note that while any given job could be filled via either internal or external hire, there is no mechanical trade-off between these two hiring strategies at the aggregate, labor market level.

2.4 Additional Measures and Sample Construction

We use these individual and labor market-level measures of internal hiring to predict occupational attainment. We operationalize occupational attainment as average earnings in an occupation by year. To calculate occupational attainment, we take survey-weighted job averages of the IPUMS CPS usual weekly earnings variable from the Outgoing Rotation Group (ORG) sample.[5] This average occupation by year earnings measure occupational attainment across jobs.[6] We also use occupational attainment to divide origin occupations into four equal-sized quartiles. Inequality across these occupation of origin quartiles measures stratification effects of within-employer mobility.

To compare the effects of different types of mobility on similar workers in similar jobs, we construct a fixed effect that includes workers' origin occupation and industry along with education and age. Education is categorized as less than high school, high school or finished 12th grade; some college or less than 4 years of college; a bachelors degree; or more than 4 years of college or a graduate degree. Age is divided into 6 categories: less than 21; 21 to 29; 30 to 39; 40 to 49; 50 to 59; and above 60. We weight all occupational attainment models using the CPS Basic Monthly weights.

We add to these core fixed effects and predictors several moderators to test Hypotheses 1, 2 and 3. Following a prior research on the spillover effects of unions (Western and Rosenfeld, 2011), we operationalize union density at the industry-region-year level. Industry is detailed IPUMS 1990 industry categories and region is the 9 Census regions. For education, we simply use the education categories noted above. For occupational composition, we take the industry average of occupational attainment. Ideally, we would measure this variable at the employer level. However, the CPS includes no employer identifiers. As such, we proxy at the industry level.

The CPS is a monthly panel in which a household is surveyed for each of 4 initial months; is given 8 months off; and is then sampled for a final 4 months. Job mobility questions are not asked in the first or fifth months. Note that because the CPS follows households, not individuals, respondents who change addresses from month to month are excluded from the analytical sample. We follow prior studies and drop cases missing responses to any of the job change questions (around 5%) (Fallick and Fleischman, 2004). Table A.1 in the appendix summarizes the exclusions that define the analytic sample. Table A.2 in the appendix describes the timing sequence of survey coverage and responses for an example CPS respondent. For the occupational attainment analysis, only months 2, 3, 4, 6, 7 and 8 are included, as the job mobility questions are only asked when a respondent was surveyed in the immediately prior month. The example respondent in Table A.1 would provide examples of upward mobility during a between-firm switch (in Month 2) and downward mobility during a within-firm switch (in Month 6). Table 1 shows descriptive statistics for the variables we use in the analysis.

[Table 1 about here.]

2.5 Occupation Transitions Within and Between Employers

Are job switches due to internal hiring different from those due to between-employer mobility? We plot two occupation transition matrices in Figure 2 (building on prior work by Jarvis and Song (2017)), that distinguish between within-employer from between-employer mobility. The figure charts 16 occupation groups ranked by average weekly earnings, with a job mover's origin occupation on the y-axis and the destination occupation on the x-axis.[7] Markers in the figure are scaled by the number of transitions across each occupation pair. For both within- and between-employer

moves, workers often stay within their occupation during job transitions. This is particularly true for service, protective and professional work, where employees are fixed in their occupations, while clericals, managers and production workers are more likely to shift across occupations.

[Figure 2 about here.]

This pattern of staying within an occupation is more pronounced for within-employer than between-employer transitions. For example, protective workers have very high within-employer rates of remaining in the same occupation (police do not get promoted out of the protective occupations), but relatively high rates of switching occupations when they move between workplaces. Downward mobility, while altogether less common than upward mobility, is more likely in between-employer transitions. Specifically, managerial workers shift to sales, clerical, or service jobs and clerical workers shift to sales and services positions. Likewise, service workers moving up to sales or clerical jobs make up a large share of between-employer transitions, while upward mobility for service workers is rare in within-employer moves. Indeed, workers starting in service occupations stand out from the other low-skilled occupations in terms of their high between-employer transition rates out of their origin occupation. Overall, occupation transitions, especially those crossing greater rank distances, are more common in between-employer moves. Within-employer job switchers typically either remain within their origin occupation or move up to a management position. These descriptive results provide a preliminary case that movement within and between employers can have different effects on occupational stratification.

3 Models

Assessing the stratification effects of within-employer mobility requires operationalizing the decomposition introduced above. We first estimate separate models for pay-offs and rates of mobility by occupation group. We then model the total effect of labor-market-wide shifts toward internal hiring on occupational attainment for workers starting in high- and low-attainment occupations.

First, to estimate the relative pay-off of within-employer mobility, we fit a simple model predicting average occupational attainment a of worker i in time $t+1$, or the month following the reference period:

$$log(a_{i,t+1}) = \gamma x_{i,t} + \alpha_{i,t} + e_{i,t}. \quad (1)$$

$x_{i,t}$ is a within-employer move (relative to a between-employer reference move). Job attainment $a_{i,t+t}$ is measured at the first survey following a job change (and the survey in which that job change is retrospectively reported). $\alpha_{i,t}$ is a fixed effect constructed by interacting detailed occupation and industry codes, education, age and year (all defined in the month immediately prior to the job change). The model thus compares the occupational attainment of workers who come from the same industry and occupation and have the same characteristics, but who switched jobs within- compared to between-employers. Because $a_{i,t+1}$ is defined at the level of occupation-year, the fixed effect matches workers exactly on pre-move job attainment. As such γ provides an estimate of the effect of moving within an employer rather than between employers for similar workers in similar starting positions.

This model allows us to test hypotheses 1 and 2, which predict that unionization and low education will both increase the pay-offs to internal, relative to external, mobility. We also test hypothesis 3, which addresses not just the likelihood of internal hire, but also the quality of jobs available within an employer for internal transfer. We operationalize each of these hypotheses as mediators that can reduce the heterogeneity in pay-offs across workers starting at different occupational levels. We do this by interacting $x_{i,t}$ with industry- and individual-level measures that we expect define variation in the pay-off to within-employer mobility.

Specifically, we include the workers' origin industry's average occupational attainment, the origin region-year-industry's union density and workers' educational attainment prior to the move. As occupation, industry and educational attainment are all included in $\alpha_{i,t}$, the main effect of each of these measures is absorbed in the fixed effects. The interaction term defines variation in the pay-off to within-employer mobility. In these and all remaining models, we use robust standard errors clustered at the MSA-level. We present results from this first model in results Section 4.1.

Next, we incorporate externalities to internal hiring, by testing hypothesis 4 that workers in low-paying occupations will move less as a labor market shifts toward internal hiring. To estimate differential rates of job changing by local labor markets (MSA), we fit a series of linear probability models. These models predict whether a respondent switches jobs (either within-employer or between-employer or both) in response to an increase in MSA-wide internal hiring:

$$c_{i,t+1} = \pi x_{m,t+1} + \psi h_{m,t+1} + \alpha_{i,y} + \alpha_m + e_{i,t}. \tag{2}$$

where $c_{i,t+1}$ is a dummy variable for if an individual switches job in month $t+1$. The coefficient π indicates the job mobility response to an increase in MSA-level internal hiring, $x_{m,t+1}$. We also control for MSA-level total hiring, $h_{m,t+1}$, and we interact both of these hiring variables with workers' starting occupational level. We include two sets of fixed effects: $\alpha_{i,t}$ is defined as in equation 3 by detailed origin occupation and industry codes and year, and α_m fixed effects for each MSA. To decompose mobility rates across within-employer (π_w), between-employer (π_b) and to employment (π_e) components, we define $c_{i,t+1}$ as each of these narrower mobility categories. These mobility type-specific rates assess whether workers in high-paid occupations will experience more of a mobility increase in response to internal hiring than will workers in low-paid occupations.[8] We present these models of mobility rates in Section 4.2.

Finally, we look at the aggregate effect of MSA-level internal hiring on occupational attainment, effectively combining differences in pay-offs and rates of mobility:

$$log(a_{i,t+1}) = \beta x_{m,t+1} + \lambda w_{m,t+1} + \alpha_{i,t} + \alpha_m + e_{i,t}, \tag{3}$$

where $x_{m,t+1}$ is the MSA-level rate of internal hiring. $\alpha_{i,t}$ is a fixed effect for the origin industry, occupation and year for each worker. Occupational attainment is again predicted conditional on the origin job, isolating the change in occupational attainment associated with increased internal hiring. We also include MSA-level fixed effects, α_m, to condition out fixed heterogeneity in local labor market conditions across MSAs. To assess stratification effects, we interact the overall internal hiring $x_{m,t+1}$ with starting occupational groups to assess how β varies across the occupational distribution. Regardless of whether a worker actually uses an internal hiring process, this model shows the consequences on occupational attainment when internal hiring becomes more or less common. In these models, we include nonemployed individuals, as greater internal hiring could particularly disadvantage this group.[9]

Other labor market changes could simultaneously affect rates of internal hiring and affect the ease of upward mobility differently across occupational groups. We control for a vector of time-variant labor market conditions $w_{m,t+1}$ to address this possibility. First, we condition on rates of overall hiring (the sum of internal hires, hires from other workplaces and hires of non-employed people). If increased hiring and job mobility increases upward mobility in general, then controlling

for overall hiring rates helps isolate the effect of employers shifting toward internal hiring as a share of total hiring. Second, we control for occupation-group-specific unemployment and earnings in each MSA. If a labor market is particularly weak for some occupations, those occupations will enjoy fewer advancement opportunities. Finally, the overall job structure of a local labor market could change at the same time as internal hiring increases. We include detailed occupation and industry composition controls, both at the 18-category IPUMS level, that control for the share of each industry and occupation by year and labor market. It is still possible that unobserved, time-varying features of the labor market could bias estimates. However, these controls cover important features of the labor market that could affect occupational attainment and internal hiring, and mitigate concerns about omitted variable bias. We present this final models of mobility rates in Section 4.3.

4 Results

4.1 Worker-level Pay-offs

Conditional on job mobility, how does the level of occupational attainment vary across within- and between-employer moves? We model the pay-offs of within- compared to between-employer mobility, defined above as $\gamma_w - \gamma_b$. Figure 3 displays basic results across the occupation spectrum. The figure shows the effects across origin occupations of within-employer job mobility relative to mobility across employers. In general, workers in higher paid occupations receive a higher pay-off from within-employer job changes relative to between-employer changes. Managerial occupations have the highest relative pay-offs. At the other extreme, farming, household and service occupations actually face a penalty from moving within- rather than between-employers. These differences are consistent with variation in the occupational opportunity structure of the industries in which these occupations work: workers in service occupations are often in companies with few opportunities for advancement. Several exceptions to the general pattern of decreasing pay-offs with decreasing occupational earnings include clerical, operators and material movers—all occupations disproportionately concentrated in large and unionized employers.

[Figure 3 about here.]

Table 2 probes these differences analytically, using equation 1, to test our hypotheses about varying pay-offs to internal relative to external job mobility. Model 1 in Table 2 shows that, consistent with prior research, there is a small occupational attainment premium associated with changing jobs within an employer relative to switching employers. Workers who switch jobs within an employer end up in occupations that are around 1.5% higher paid than similar workers who switch employers altogether. This premium is some combination of positive selection through employer learning about incumbents and institutional protections that benefit incumbent workers.

[Table 2 about here.]

However, Model 2 shows that, consistent with Figure 3, the apparently small premium associated with within-employer mobility varies substantially across occupational groups. The lowest quartile of occupations actually benefit around 7% *less* from within- than between-employer mobility. Middle earning occupations enjoy a job attainment premium of 3% to 5% from within-employer moves. The top earning quartile benefits the most (6%). These results indicate that within-employer mobility relative to between-employer mobility provides stronger advantages for workers starting in higher-paid occupations.

What explains this gradient? We first test explanations related to the probability that an internal applicant will be advantaged relative to an external applicant. Hypothesis 1 predicts that union influence increases advantage to internal applicants, due to the institutionalization of internal labor market policies. Model 3 adds an interaction with industry-region-year level union density. If variation in within-employer mobility pay-offs is driven in part by the presence of institutionalized internal labor markets, union influence should increase those pay-offs. Model 3 shows that higher union density industry-regions do indeed have higher within-employer mobility premiums. However, controlling for union density does little to reduce overall variance in effects across occupations. Overall, the uneven distribution of institutional closure, as proxied by union density, explains very little of the inequality in pay-offs across occupations.

Next, Model 4 interacts within-employer mobility with education levels. As education is the key credential facilitating job mobility on the open labor market, we expect that workers with lower education will be less successful attaining job mobility in the external market (hypothesis 2). The results show that relative to workers with more than a college degree, workers with less educa-

tion experience a consistently higher pay-off from within-employer mobility. The pay-off decreases linearly with education attainment and is highest for workers without a high school degree, who experience 7% higher occupational attainment for within-employer mobility than between-employer mobility. This education gradient is important for determining the occupational inequality generated by within-employer mobility. However, the educational gradient actually diminishes inequality. Controlling for education increases the range in occupational pay-off by around 20% (from 0.12 to 0.15).

Model 5 adds an interaction with the average occupational level of a worker's origin industry (hypothesis 3). Beyond the extent of preference for internal applicants, addressed above by union density and education level, the occupational structure within an employer will also affect the relative pay-offs to internal mobility. For workers in origin industries with higher average occupational attainment, within-employer job mobility carries a substantially higher premium than for workers in lower paid industries. Workers above the top quartile of industries by opportunity structure receive an 8% pay-off from within-employer mobility, while those in the bottom quartile receive a 7% penalty. These results are consistent with the idea that workers in industries and organizations with ample opportunity structure benefit from internal hiring, while workers in lower-paying and lower-skilled industries need to switch employers altogether to increase occupational attainment. The industry-level occupational structure also explains a substantial portion of the inequality in pay-offs to within-employer mobility across occupational groups. Controlling for occupational opportunity reduces the range in within-employer mobility effects across occupations by around one third (from 0.15 to 0.10).

Together these results establish consistently unequal pay-offs in job attainment from internal hiring. While opportunity structure and education effects go in offsetting directions, the net result is that lower quartile occupations receive a relatively smaller occupational attainment pay-off from within-employer moves compared to between-employer moves.

4.2 Rates of Mobility by Occupation

Varying pay-offs to movers (γ) is not however the only way that increased internal hiring can affect low occupation workers. Next, we consider varying rates of mobility (π). Specifically, we test 4, that low occupation workers will move less as a labor market shifts toward internal hiring. This

hypothesis adds to standard analysis that internal mobility imposes externalities on non-job-movers, who may counterfactually have applied successfully for an external job posting. To capture this externality, we shift up to an MSA-wide analysis, implementing equation 2. Table 3 models whether a worker moved jobs during MSA-wide changes in internal hiring. Model 1 shows that increased internal hiring yields greater movement for higher-earning occupations.

[Table 3 about here.]

Next, we divide the overall mobility change into three types of mobility: employed persons moving between employers, employed persons moving jobs within an employer, and nonemployed persons moving into employment. Models 2, 3 and 4 in Table 3 show that mobility responsiveness to increased internal hiring is particularly low for low-paid occupations in within-employer and to employment moves. Overall these results indicate that greater rates of internal hiring will disproportionately increase higher-occupation attainment workers' ability to move jobs (i.e. $\pi_w^H > \pi_w^L$). Note that this does not mean that increasing internal hiring lowers mobility opportunities for workers in low-earning occupations in absolute terms. Instead, it just indicates that internal hiring does not provide as much opportunity for those workers as does external hiring.

4.3 Effects of Labor Market-level Rates of Internal Hiring

Finally, Table 4 assesses the total effect of increased internal hiring on upward mobility, drawing on equation 3. Specifically, we fit equation 3, which combines the individual pay-offs (γ) to job movers from Table 2 and the varying rates of mobility (π) modeled in Table 3. Model 1 shows that increases in internal hiring in an MSA are associated with a small decrease in average occupational attainment. However, consistent with the results in Tables 2 and 3, this decrease is not evenly distributed across workers starting in different occupations. Model 2 shows that as employers in an MSA engage in more internal hiring, the lowest two occupational groups experience increases in job attainment, while for the top two occupational quartiles attainment decreases.

[Table 4 about here.]

However, Model 3 swaps out internal hiring for external hiring rates and shows that this stratification-reducing job attainment pattern is much weaker for internal hiring than for external hiring: increases in external hiring provide around double the increase in job attainment for

workers starting in low-paid occupations, compared to increases in internal hiring. Indeed, increases in hiring of any kind are associated with more mobility, which mechanically benefits workers at the bottom of the job distribution (consistent with prior research on inequality and mobility (Choi, 2016)). In Model 4, we estimate job attainment patterns of rates of internal and external hiring simultaneously. The apparent benefits of internal hiring for low occupation workers drop by a third: different channels of hiring are correlated with each other, and increased external hiring benefits workers in low-end occupations more than does increased internal hiring.

Our core question is about the impact on stratification of employers using more internal hiring, rather than the impact of employers hiring more in general. To capture this effect, in Model 5, we control for total MSA-level rates of hiring. Holding constant total hiring, increases in MSA-level internal hiring therefore indicate employers swapping internal for external hiring. Model 5 shows that increasing the share of mobility due to internal hiring reduces job attainment for workers at the bottom and increases it for those at the top.

The results in Table 4 demonstrate that higher shares of internal hiring, holding constant total hiring, reduce upward mobility for workers in low-paid occupations. However, increases in internal hiring could be driven by various labor market shifts that also influence job attainment. Table 5 presents models with adjustments for occupational composition, occupation group-specific MSA unemployment and occupation group-specific MSA earnings. We run these models separately for each occupational group. Consistent with the results in Table 4, workers starting in the lowest quartile experience a decrease in job attainment as their MSA shifts toward internal hiring. Workers in the other job groups enjoy a small increase in occupational attainment. These positive point estimates attenuate relative to the uncontrolled models and effects for the top two quartiles are not statistically significantly different from zero. Nonetheless, postestimation comparison across the coefficients establishes that all three of the groups experience more positive occupational attainment outcomes than workers in the lowest quartile. When labor markets shift toward a larger share of internal hiring, occupational stratification increases.

[Table 5 about here.]

4.4 Earnings analysis

In the foregoing analyses, we focus on workers' occupational attainment. However, occupational averages may mask heterogeneity in pay within job categories and across employers. This could bias results if measurement error in the dependent variable varies with occupation of origin and with type of job change. For example, service workers may be more likely to attain managerial positions through between-employer moves and less likely to attain technical positions. If professionals are more likely to attain managerial positions through within-employer moves, then service workers would have apparently stronger occupational attainment through between-employer mobility. However, the managerial jobs obtained by the service workers may be far lower paid than both those that the professionals occupy and the alternative technical position otherwise available through within-employer mobility.

To test this concern, we use the subsample of the CPS that includes weekly earnings information (the Outgoing Rotation Group (ORG), described above) to estimate the effect of job mobility directly on weekly earnings. As Table A.2 shows, only months 4 and 8 can be used in that analysis. Due to this restricted set of months, we code any months following a job switch as job switch months. Note that in this design, the 8 month gap between the first and second set of survey months means that job changes that happen during that period are unobserved. Based on the rates of workers who switch over a 3 month period, in one year around 8 percent of non-within-employer switchers and 11 percent of non-between-employer switchers are wrongly categorized. This misclassification will tend to attenuate estimates of earnings changes associated with job changing.

The CPS also top codes earnings, which increasingly bites during this period. 7 percent of high occupation workers start their first ORG period above the top code, while only 0.33 percent of low occupation workers do so. This differential topcode exposure can bias comparisons of pay changes between these occupation groups: a larger share of pay-increasing job changes among high occupation workers are misrecorded as non-changing (due to the top code). This will mechanically bias downward the estimates of job moving (both within and between firms) for workers starting out in the sample in a high paid occupation. Nonetheless, we include these estimates as an important check on our occupational attainment model and focus on the comparison between within-employer and between-employer job changes.

Note also that unlike job categories, which are invariant from month to month unless a job change occurs, earnings change even within a single employment spell. As such, we include non-job changers as a control group. Finally, we weight these models by ORG weights, rather than CPS Basic weights.

The results in Table 6 are consistent with the occupational attainment models. Model 1 shows that on average across occupations, job mobility is associated with increased pay. But Models 2 and 3 show that while job mobility of any kind carries a higher earnings premium for workers in the lowest occupational quartile, earnings increases from between-employer mobility are nearly double those of within-employer mobility. In contrast, among the highest occupational group, between-employer mobility has a slightly worse earnings penalty than within-employer mobility. For both occupational attainment and for earnings, low-paid workers benefit more from between-employer than within-employer job changes.

[Table 6 about here.]

5 Robustness

Our main results reveal substantial inequality in the effects of within-employer mobility across the occupational spectrum. They also decompose this inequality into channels of differential mobility rates, opportunity structure, closure and employer learning. In this section, we test the robustness of our core results to a series of potential alternative explanations and objections: different rates of involuntary mobility by within- and between-employer mobility (Section 5.1); strictly short-term differences in pay-off by mobility type (Section 5.2); excluding job changes that do not result in occupation change (Section 5.3); individual worker characteristics as confounding variables (Section 5.4); within-household changes in survey respondent (Section 5.5); small samples for some MSAs (Section 5.7); and measurement error on internal job mobility (Section 5.8). In the following, we briefly describe these tests and refer readers to results in the appendix.

5.1 Involuntary Mobility

A key difference between within- and between-employer mobility is that the latter is more likely to be involuntary than the former. During corporate restructuring or through bumping and seniority

rules, workers can be involuntarily shifted into less desirable positions within the same employer. But, such involuntary mobility will often lead to exit. In contrast, a larger portion of between-employer mobility is likely to be due to lay-offs or terminations. If the proportions of involuntary moves vary across within- and between-employer mobility in this manner, it could drive apparent differences in pay-offs across mobility channels.

While the monthly CPS data do not distinguish voluntary from involuntary mobility, we proxy for voluntary mobility by restricting the sample to job changes that do not involve downward occupational mobility. Any differences between within- and between-employer mobility are due to the extent of upward mobility, rather than the share of upward mobility. Model 1 in Table A.3 shows results this restricted sample. The average occupational premium for within-employer mobility evaporates when downward mobility is excluded: unlike between-employer mobility, within-employer mobility tends to protect workers from downward moves. But, inequality across occupations persists even among upward and lateral moves. These results suggest that stratification effects of internal mobility are not due only to varying proportions or pay-offs of involuntary mobility.

5.2 Longer Term Effects

Another limitation of the main analysis is that occupational transitions are only measured from one month to another. If short-term occupational changes differ substantially from the longer-term implications of those moves, our results could just reflect temporary adjustments. To use the longest possible period of the CPS, in Model 2 of Table A.3 we limit the sample to respondents who switched jobs during their second sampling month (the first month in which they are asked about mobility). We then look at the effect of that move on occupational attainment 15 months later, in their final surveyed month. Model 2 in Table A.3 shows that results attenuate somewhat (and standard errors increase), but the occupational gradient remains substantively similar to that estimated on the month-to-month transitions in the full dataset.

5.3 Conditioning on Occupational Change

Workers across different occupations and industries may interpret the within-employer job change questions in the CPS differently. We test for this measurement error by restricting job change instances to those that also include a change in occupation. We expect that this higher-bar for job

changing will make reporting from diverse industries and occupations more comparable. Essentially, it excludes the minor changes in projects or assignments that could be reported differently by different workers.

Model 3 in Table A.3 displays results with this occupation change condition. Those in higher-paying occupations still earn greater premiums from internal moves when we only look at those workers who changed occupations. Workers starting in low-paying occupations now earn a small premium from within-employer moves but this premium is considerably less than those of the other occupational quartiles. Overall, these results suggest that our finding of higher returns to within-employer changes for higher-paying occupations is robust to restricting the sample to occupation changers.

5.4 Accounting for Demographic Characteristics of Workers

Female and non-white workers—who are more likely to be relegated to lower-paying jobs and occupations within employers—may also be less able to access advancement opportunities (Kronberg, 2013). To test this, we narrow the fixed effects further to include sex and race or ethnicity groups in addition to age, education, occupation, industry, and year fixed effects. Model 4 in Table A.3 indicates that our main results remain consistent within sex-race groupings. Even comparing within demographic groups, low-occupation workers have a lower internal hiring premium than high-occupation workers.

5.5 Survey Respondent Consistency

The CPS follows households, rather than individual respondents so the actual respondent to the survey can change from month to month. This introduces possible measurement error, in which respondents from the same household may describe jobs differently from month to month.[10] These different descriptions may yield false positive changes in jobs. As discussed above, we attempt to limit any potential error by restricting employer and job changes to those cases for which the respondent remained the same between reporting months. To ensure complete consistency in respondent, we further restrict our sample to those households whose respondent remained the same throughout the entire panel. Model 5 in Table A.3 shows that even when we narrow our sample to those workers whose household respondent did not change throughout the whole panel, the pattern

and magnitude of differential returns to within-employer mobility across occupations remains.

5.6 Internal Labor Markets and Entry-level Jobs

In our main analysis, we assume that internal hiring can increase as a share of total hiring. However, in a strict vacancy chain model of internal hiring, this is misleading: any internal hire must ultimately be filled, through a point-of-entry, or entry-level job. In this model, while external hiring can increase without a concomitant increase in internal hiring (as in an expanding firm), internal hiring cannot increase without creating a proportionate increase in external hiring. As noted above, this model misses restructuring and other, perhaps increasingly common, forms of internal hiring that do not create a vacancy to be filled externally. Job structures and task allocations within organizations are not fixed structures Wilmers (2020).

However, in many cases internal hires do create vacancies in entry-level jobs. To test for this, we proxy for excluding entry-level positions by defining internal hiring shares only within occupations above the median level of attainment within each industry. Aggregating to the year-MSA level, this alternative measure tracks only internal hiring into higher-end occupations within an industry. If these internal hires create lower level external hires, as in the vacancy chain theory, this compensatory increase would is excluded from our measure. Table A.4 replicates Model 5 from Table 4 with this alternative measure. The occupational heterogeneity pattern is consistent with the main results.

5.7 Excluding Small Metro Areas in Macro Analyses

In our macro-level analyses, we construct MSA-level measures of internal hiring and overall hiring. Some MSAs may have few job switcher respondents in a year, which could introduce noise into the measures. To address this potential concern, we restrict the sample to those MSAs with more than 1,000 observations in a year (three quarters percent of the total sample). We implement this restriction and re-run our models from Table 4 in Table A.4. Model 2 shows that the advantage that fourth quartile occupations experience from internal hiring compared to first quartile occupations increases. This change is driven by the first quartile occupations benefiting less from MSA-level internal hiring and benefiting more from MSA-level external hiring once smaller MSAs are excluded. These results suggest that our findings strengthen when excluding small MSAs and

reducing measurement error.

5.8 Measurement Error on Internal Job Mobility

If workers across the occupation spectrum interpret the internal job mobility question differently, then the incongruity in job change definitions could explain the differential returns we find. For example, low-end occupations may be more likely to reply positively in situations that are in fact minor task switches, rather than substantive job changes. In this case, an apparent lower pay-off to job mobility for low-paid occupations could result mechanically from a higher portion of false positive job changers within that group.

We use our MTurk survey to study variation across four education groups (High school or less, Some College, College graduates, and College+) and five occupation groups (Professional, Clerical, Production, Services, and Other). Figure A.1 shows the rates of false positive rates across these groups. Among education groups, false positive rates ranged from 29 percent (High school or less) to 46 percent (Some College). Besides those with a high school degree or less, higher-educated workers were less likely to report a change in duties and activities without a corresponding change in job title or promotion. Differences in payoffs between those with some college and those with more education may therefore be partially explained by a higher incidence of minor task changes. Among the occupation groups, false positive rates ranged from just 20 percent (Services) to 53 percent (Clerical). Service workers, disproportionately falling in the bottom occupational quartile, are thus *less* likely than other occupations to indicate a change in duties and activities without a corresponding title change or promotion. These findings suggest that the CPS results provide conservative estimates of differential mobility returns by occupation group. On the other hand, the differences in false positive rates between middle-wage and higher-wage occupations are ambiguous as both sets of these occupations are found in "Clerical" and "Production" occupation groups. These false positive rates indicate that the key differences in effects between the top and bottom of the occupational distribution are unlikely to be driven by measurement error.

6 Conclusion

We provide the first assessment of the total effect of internal hiring on stratification in occupational attainment. When employers in a labor market use more internal hiring, upward mobility increases less for those in low-paid occupations than when employers use more external hiring. The pay-off to within-employer mobility varies substantially across occupations, such that for the bottom quartile of workers internal mobility is worse than external mobility. This variation is driven by a less advantageous industry-level occupational opportunity structure and is partially offset by less educated workers benefiting more from within-employer moves. In contrast, union density increases the pay-off of within-employer mobility without affecting the distribution of advantage across occupations.

The net effect of these processes is that as local labor markets increase internal hiring, workers in lower-paid occupations are less likely to move up the occupational hierarchy, compared to when local labor markets increase external hiring. Mobility inside employers thus does more to preserve occupational stratification than does mobility in the open labor market. Instead of providing a ladder of opportunity, organizational boundaries can block upward mobility among those at the bottom of the occupational distribution.

The current analysis has several limitations. We cannot be certain that unobserved changes do not make it differentially harder for different occupational groups to advance at the same time as a labor market shifts toward internal hiring: employers are responsive to local labor market conditions in their hiring and human resources decisions. We include a rich set of controls for occupational and industry composition and labor market strength, but omitted variable bias remains a concern. Future research should study settings where there are shocks to internal hiring that do not otherwise affect occupational attainment.

Relatedly, we cannot distinguish between specific employers who are implementing more or less internal hiring. As such, when we measure the effect of occupational composition, we do so at an industry, rather than firm level. This introduces measurement error into that part of our analysis. The increasing availability of linked employer-employee data with occupational information should allow future research to distinguish effects of increasing internal hiring depending on firm wage levels and starting occupational composition. Such a study would be a natural empirical extension

of the framework proposed in this paper.

Third, the dependent coding questions in the CPS provide a rare sample size large enough to detect effect heterogeneity in mobility types across occupations. However, the data have key downsides. The CPS only records month-to-month transitions, so we are unable to construct full occupational trajectories for respondents. While we find similar results in robustness tests looking at 1.5 year outcomes, even this period is relatively short. Perhaps more important, the CPS follows households, rather than people. If individuals leave a household or move to a new address, they drop out of the CPS sample. The original survey presented in this paper validates the dependent codes as a measure of within-employer job coding. Future analysis of surveys that include these questions, like the restricted-use version of the SIPP, could determine whether within-employer mobility provides different pay-offs over longer time horizons and across geographical mobility.

Finally, the occupation codes given in the CPS are quite broad, consistent with standard Census and Bureau of Labor Statistics coding schemes. This means that we miss job upgrading that occurs within occupation categories, or even within job title (Wilmers, 2020). We expect that this problem artificially constrains upward mobility for high-occupation respondents. For a respondent starting as an executive in the data, there is nowhere to go but down. However, in fact that respondent may be promoted from CFO to CEO (internal mobility) or may switch from CFO of a small company to CFO of a large company. As such, the apparently unequal effects of mean reversion and local moves—which constrain upward mobility for low occupation workers, but protect high occupation workers from downward mobility—may be exaggerated in these data.

Notwithstanding these limitations, we extend prior research, which typically draws on a single firm or a single occupation and finds that within-employer mobility boosts career advancement. While we confirm in nationally representative data that on average, within-employer mobility yields a higher pay-off in occupational attainment than between-employer mobility, we also find that this pay-off varies across occupations. The top quartile of workers, mainly in managerial and professional jobs, receive the largest benefits from within-employer moves relative to between-employer moves. But for the bottom quartile, pay-offs to within-employer mobility are actually lower than for between-employer moves. In light of this substantial heterogeneity, estimates of mobility pay-offs from a single occupation are unlikely to generalize to other parts of the job distribution.

One third of this inequality in occupational attainment pay-off across origin jobs can be explained

by the occupational quality of a worker's origin industry: moving jobs in an employer dominated by low-skilled positions brings fewer opportunities than does moving within an employer with many high-paying jobs. This finding implies that the influence of internal hiring on stratification depends crucially on how occupations are sorted across employers and industries. As the economy shifts away from manufacturing, in which lower skill workers are employed in the same firms with engineers and professionals, toward service sector employment, lower skilled workers may increasingly suffer from occupational isolation. This trend is heightened by the rise of outsourcing and contracting out (Weil, 2014; Wilmers, 2018). Recent research finds that increasing skill segregation across firms has contributed to rising inequality, as the lowest skilled workers are isolated from higher skilled workers (Handwerker, 2018). Beyond stagnant within-job wages, the results in this paper suggest that skill segregation across employers can cut off lower skilled workers from opportunities for advancement.

More broadly, by studying internal hiring during a period of relative weakness in bargaining power for low-paid workers, we show that increasing internal hiring per se is not enough to boost occupational attainment. When low-paid workers are highly isolated in their own organizations, or disproportionately non-employed, aggregate shifts toward internal hiring, and away from external hiring, reinforce stratification. Prior research has characterized employer-worker relational investment as a means to dampen inequality and improve job quality. And we confirm that internal mobility benefits workers without strong educational credentials, by interrupting market processes that reward the highly educated. But our findings caution that even when a closure tactic is biased toward disadvantaged workers in this way, its overall stratification effect hinges on the distribution of opportunities (defined here as the job opportunities within an employer and as the conditional likelihood of mobility). By reorienting research beyond a single worker's mobility options, and toward labor market opportunities within a local labor market, we show that internal hiring exacerbates stratification for some workers.

Notes

[1]Note that this concept is distinct from predictions about between-occupation earnings inequality, or about intergenerational occupational mobility. We draw on older research on labor market dualism and industrial segmentation: excessive reliance on internal hiring can create a permanent underclass in a secondary market excluded from employment in the industrial core (Tolbert et al., 1980; Kalleberg et al., 1981). In robustness tests below, we also show results on earnings growth.

[2]This formula summarizes mobility effects for employed workers. In the empirical models below we also include a π term for rates of entry into employment for non-employed workers.

[3]While these questions were first asked in 1994, the first several months had very high affirmative responses which declined rapidly during the first year. We interpret this rapid decay as an artifact of the new survey roll-out and therefore begin analysis in 1995. We also drop observations from May to August of 1995, due to an error in CPS individual identifiers in those months (Fujita et al., 2020).

[4]In a robustness test, we categorize all (3)No responses as job stayers and measure within-employer mobility only using (2)Yes. Results are consistent with our main specification.

[5]This measure includes weekly pay for respondents who report being paid on a weekly basis and for hourly workers includes hourly wages multiplied by their usual number of hours worked per week. From 1995 to 1997, these earnings are top-coded at $1923, and from 1998 onward, at $2885. We windsorize wages at and above these topcodes, multiply the topcode values by 1.5 and deflate to 2000 dollars.

[6]Our results were robust to alternative measurements including average wages over a time-invariant version of occupational attainment and average earnings across over occupation by industry by year.

[7]We use meso-level occupations to distinguish between short micro-level occupation transitions and farther, macro-level transitions. We adopt the IPUMS occupation categorization of meso-level occupations, excluding military occupations. This includes: managers, management related

occupations, professions, technicians, sales, clerical, private household, protective services, service, farming, mechanics, construction, precision production, machine operators, drivers, and material movers and extraction.

[8]We use a linear probability model here, rather than a logistic or probit model, because of the multiple high-dimension fixed effects included. In models with fixed effects, logistic and probit models can produce downwardly biased coefficients (Rodriguez and Goldman, 1995) and inconsistent estimates (Lancaster, 2000; Greene, 2004). On the other hand, linear modeling of binary outcomes can produce heteroskedastic errors, yield predicted values outside of the [0,1] range, and generally specify the wrong functional form (Wooldridge, 2010). The presence of heteroskedastic errors does not bias our estimates of the coefficients, π, but does suggest caution in interpreting significance tests. We use cluster robust standard errors (clustering on MSA) to mitigate this heteroskedasticity problem. In a robustness check, we find that very few of the predicted values fall outside the unit interval.

[9]The occupation quartile for unemployed persons looking for work uses their most recent reported occupation.

[10]In addition to this measurement error, Fujita et al. 2020 found that a change to the Current Population Survey procedure in 2007 that sought to protect the privacy of individuals within the household increased the incidence of missing responses to the dependent interviewing questions (including changes in employer and job duties and activities). Specifically, they found that this systematically reduced the overall rate of reported employer-to-employer switching. The increased rate of missingness rose most among households that changed respondents between survey months, so conditioning on no change in respondent significantly reduces the effect of these missing answers. We also split the sample between pre- and post-2007 and found estimated effects were consistent.

7 About the Authors

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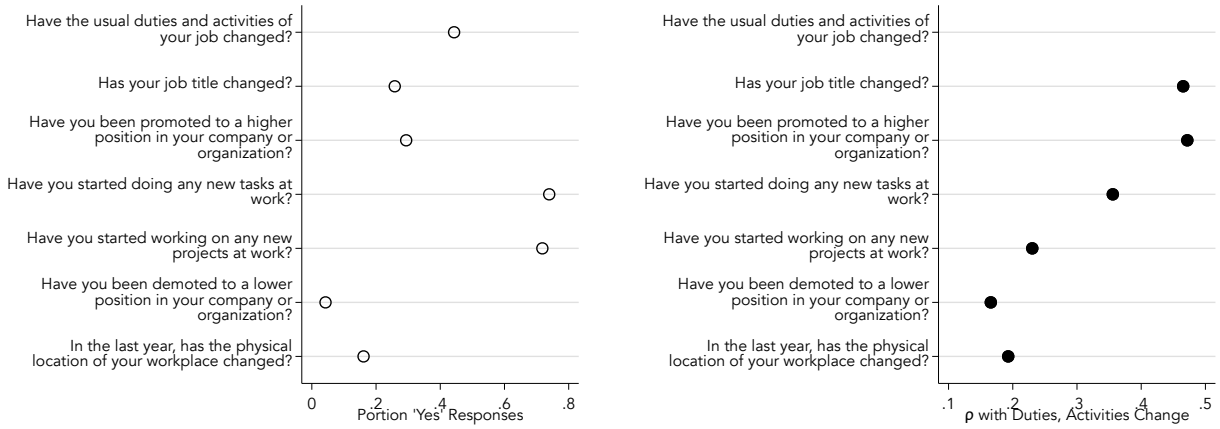
Figure 1: Validating the CPS Measure of Internal Mobility

(a) Mean Rates of Job Changes in Last Year

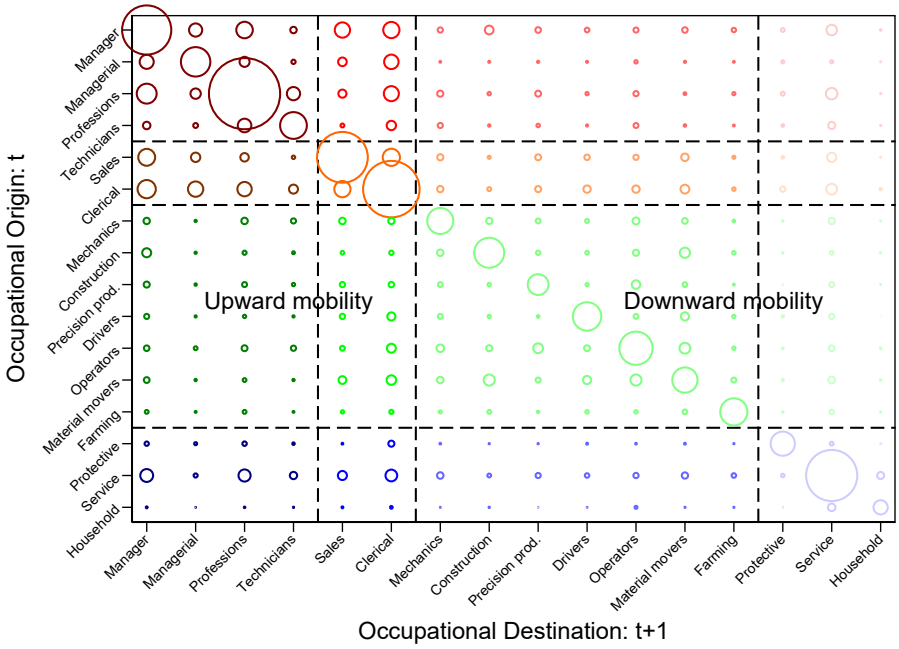
(b) Correlation Between CPS Measure and Alternative Measures



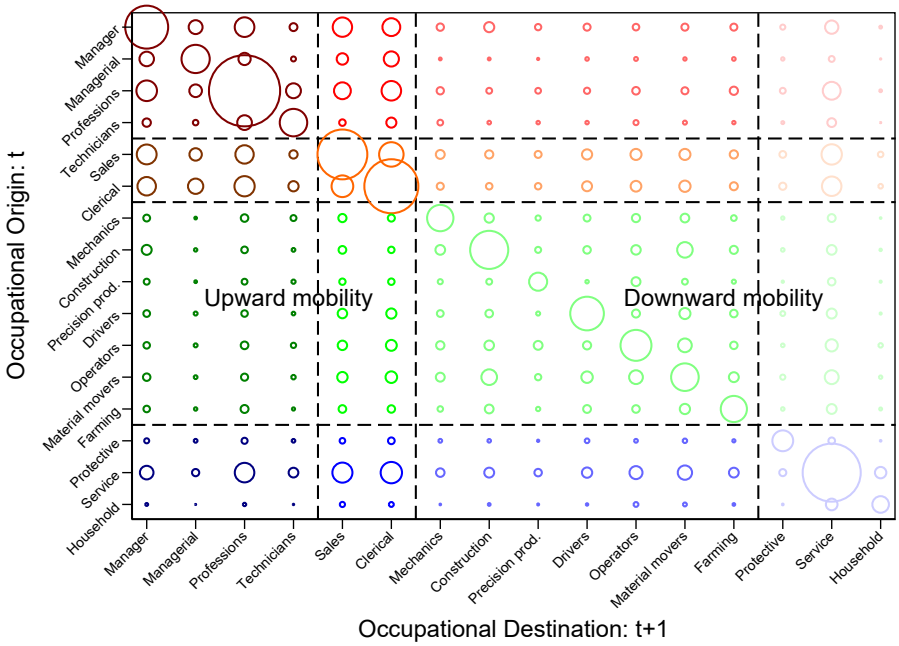
Note: These results are from a survey conducted on Mechanical Turk (N=447).

Figure 2: Contour Plots of Occupational Mobility, 1995-2019

(a) Within-employer Job Changes



(b) Between-employer Job Changes



Note: Meso-level occupations are sorted by macro class and then ranked by average weekly earnings. Labels reflect each meso class. The core colors (red, orange, green, blue) correspond to the vertical axis; the shade of each color correspond to the horizontal axis.
Source: CPS Basic Monthly.

Figure 3: Higher Paid Occupations Benefit More from Within-Employer Mobility

Note: Occupations are ranked by average weekly earnings.
Source: CPS Basic Monthly.

Table 1: Descriptive Statistics

	Mean	Std. Dev.	Min.	Max.
Occupation Attainment (in log(earnings))	6.426	0.47	4.75	8.09
Within-Employer Move	0.014	0.12	0.00	1.00
Between-Employer Move	0.018	0.13	0.00	1.00
To-Employment Move	0.014	0.12	0.00	1.00
Low Occupation Attainment	0.204	0.40	0.00	1.00
Medium-low Occupation Attainment	0.245	0.43	0.00	1.00
Medium-high Occupation Attainment	0.261	0.44	0.00	1.00
High Occupation Attainment	0.291	0.45	0.00	1.00
Age	41.860	12.39	21.00	75.00
LTHS	0.088	0.28	0.00	1.00
High School	0.272	0.45	0.00	1.00
Some College	0.283	0.45	0.00	1.00
College Grad	0.233	0.42	0.00	1.00
Post-college	0.124	0.33	0.00	1.00
White	0.664	0.47	0.00	1.00
Black	0.117	0.32	0.00	1.00
Hispanic	0.143	0.35	0.00	1.00
Other	0.076	0.27	0.00	1.00
Industry Union Density	0.130	0.16	0.00	1.00
Industry Occupational Attainment	6.455	0.27	5.14	7.01
MSA Total Hiring	0.038	0.01	0.00	0.36
MSA Internal Hiring	0.008	0.01	0.00	0.31
MSA External Hiring	0.030	0.01	0.00	0.09
MSA-level Occ-specific Earnings	6.283	0.48	4.41	7.73
MSA-level Occ-specific Unemployment	0.048	0.03	0.00	0.70
Observations	10272442			

Note: Descriptive statistics are shown for the basic CPS data.

Table 2: Occupational Attainment of Within-Employer Mobility Relative to Between-Employer Mobility

	(1)	(2)	(3)	(4)	(5)
Within-Emp. Move	0.016***				
	(0.002)				
Within-Emp. Move * 1st Occ. Q.		-0.066***	-0.065***	-0.112***	-0.087***
		(0.004)	(0.004)	(0.006)	(0.007)
Within-Emp. Move * 2nd Occ. Q.		0.036***	0.036***	-0.010	-0.016**
		(0.003)	(0.003)	(0.006)	(0.006)
Within-Emp. Move * 3rd Occ. Q.		0.046***	0.044***	0.009	0.005
		(0.004)	(0.004)	(0.005)	(0.005)
Within-Emp. Move * 4th Occ. Q.		0.061***	0.061***	0.037***	0.016**
		(0.006)	(0.006)	(0.005)	(0.006)
Within-Emp. Move * Union Density			0.018	0.030*	0.019
			(0.012)	(0.013)	(0.011)
Within-Emp. Move * LTHS				0.065***	0.073***
				(0.007)	(0.007)
Within-Emp. Move * High School				0.049***	0.055***
				(0.005)	(0.005)
Within-Emp. Move * Some College				0.044***	0.048***
				(0.006)	(0.006)
Within-Emp. Move * College grad				0.024***	0.025***
				(0.006)	(0.006)
Within-Emp. Move * Occupational opp.					0.086***
					(0.008)
Fixed effects:					
Occupation X Industry X X Education X Age X Year	×	×	×	×	×
R^2	0.727	0.729	0.729	0.729	0.730
Observations	262314	262245	262245	262245	262245

Outcome is logged earnings in mover's destination occupation cell. Sample consists only of job changers: reference group is between-employer or labor market job changers. Reference group for education interacted categories is workers with greater than a college degree. Union density is measured at the origin industry-region-year level. Occupational opportunity is measured as the average of occupational wages in the origin industry. Both variables are demeaned for coefficient interpretability. Each occupational quartile interaction indicates the pay-off to internal mobility, relative to between-employer mobility, for that quartile. Standard errors are clustered at the level of MSA.

Source: CPS.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

Table 3: Mobility Rates in Response to Increases in Internal Hiring

	All Change	Between-Emp.	Within-Emp.	To Employ.
	(1)	(2)	(3)	(4)
1st Occ. Q. * MSA Internal Hiring	1.272***	-0.097	1.405***	-0.036
	(0.077)	(0.062)	(0.085)	(0.041)
2nd Occ. Q. * MSA Internal Hiring	1.152***	-0.167***	1.374***	-0.059
	(0.112)	(0.043)	(0.091)	(0.037)
3rd Occ. Q. * MSA Internal Hiring	1.203***	-0.163***	1.407***	-0.039
	(0.069)	(0.038)	(0.058)	(0.025)
4th Occ. Q. * MSA Internal Hiring	1.472***	-0.160***	1.639***	-0.008
	(0.077)	(0.034)	(0.084)	(0.020)
1st Occ. Q. * MSA Total Hiring	0.297***	0.187***	0.036	0.075*
	(0.047)	(0.032)	(0.025)	(0.029)
2nd Occ. Q. * MSA Total Hiring	0.407***	0.252***	0.085***	0.073**
	(0.041)	(0.023)	(0.021)	(0.024)
3rd Occ. Q. * MSA Total Hiring	0.410***	0.262***	0.104***	0.043*
	(0.034)	(0.022)	(0.018)	(0.018)
4th Occ. Q. * MSA Total Hiring	0.302***	0.238***	0.049*	0.016
	(0.037)	(0.025)	(0.021)	(0.016)
Fixed effects:				
Occupation X Industry X Year	×	×	×	×
MSA	×	×	×	×
R^2	0.037	0.029	0.036	0.036
Observations	10233981	10233981	10233981	10233981

Outcome is job mobility given below model numbers and explained in the text. Sample consists of all workers, including labor market entrants in T-1. Standard errors are clustered at the MSA-level.
Source: CPS.
* p < .05; ** p < .01; *** p < .001 (two-tailed tests)

Table 4: Occupational Attainment Response to Increases in Internal Hiring

	(1)	(2)	(3)	(4)	(5)
MSA Internal Hiring	-0.029*				
	(0.013)				
1st Occ. Q. * MSA Internal Hiring		0.179***		0.122***	-0.206**
		(0.034)		(0.027)	(0.070)
2nd Occ. Q. * MSA Internal Hiring		0.081***		0.065***	-0.027
		(0.020)		(0.018)	(0.035)
3rd Occ. Q. * MSA Internal Hiring		-0.144***		-0.116***	0.052
		(0.018)		(0.019)	(0.035)
4th Occ. Q. * MSA Internal Hiring		-0.189***		-0.135***	0.199***
		(0.027)		(0.026)	(0.059)
1st Occ. Q. * MSA External Hiring			0.352***	0.329***	
			(0.058)	(0.059)	
2nd Occ. Q. * MSA External Hiring			0.105***	0.092***	
			(0.025)	(0.026)	
3rd Occ. Q. * MSA External Hiring			-0.192***	-0.168***	
			(0.026)	(0.027)	
4th Occ. Q. * MSA External Hiring			-0.361***	-0.334***	
			(0.046)	(0.047)	
1st Occ. Q. * MSA Total Hiring					0.329***
					(0.059)
2nd Occ. Q. * MSA Total Hiring					0.092***
					(0.026)
3rd Occ. Q. * MSA Total Hiring					-0.168***
					(0.027)
4th Occ. Q. * MSA Total Hiring					-0.334***
					(0.047)
Constant	6.427***	6.427***	6.428***	6.428***	6.428***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed effects:					
Occupation X Industry X Year	×	×	×	×	×
MSA	×	×	×	×	×
R^2	0.890	0.890	0.890	0.890	0.890
Observations	10233981	10233981	10233981	10233981	10233981

Outcome is logged earnings in destination occupation-year cells. Sample consists of all workers, including labor market entrants in T-1. Standard errors are clustered at the MSA-level. Source: CPS.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

Table 5: Occupational Attainment in Response to Increases in Internal Hiring (with Controls)

	1st Occ. Q.	2nd Occ.	3rd Occ.	4th Occ
	(1)	(2)	(3)	(4)
MSA Internal Hiring	-0.151***	0.025	-0.013	0.008
	(0.042)	(0.037)	(0.035)	(0.043)
MSA Total Hiring	0.295***	0.045	-0.084***	-0.167***
	(0.033)	(0.027)	(0.025)	(0.032)
MSA-level Occ-specific Earnings	0.004*	0.007***	0.007***	0.012***
	(0.002)	(0.002)	(0.002)	(0.002)
MSA-level Occ-specific Unemployment	-0.010	-0.022**	-0.032***	-0.057***
	(0.007)	(0.007)	(0.008)	(0.011)
Constant	5.875***	6.132***	6.396***	6.836***
	(0.094)	(0.076)	(0.081)	(0.108)
Fixed effects:				
Occupation X Industry X Year	×	×	×	×
MSA	×	×	×	×
Composition controls:				
2-digit Industry	×	×	×	×
2-digit Occupation	×	×	×	×
R^2	0.676	0.666	0.670	0.727
Observations	2026226	2479195	2681117	3047264

Outcome is logged earnings in destination occupation-year cells. Sample consists of all workers, including labor market entrants in T-1. Standard errors are clustered at the MSA-level. Source: CPS.

* p < .05; ** p < .01; *** p < .001 (two-tailed tests)

Table 6: Earnings Effects of Mobility

	(1)	(2)	(3)
Within-Emp. Move	0.010**		
	(0.003)		
Between-Emp. Move	0.015***		
	(0.003)		
Within-Emp. Move * 1st Occ. Q.		0.078***	0.074***
		(0.008)	(0.008)
Within-Emp. Move * 2nd Occ. Q.		0.021***	0.019**
		(0.006)	(0.006)
Within-Emp. Move * 3rd Occ. Q.		-0.000	-0.001
		(0.006)	(0.006)
Within-Emp. Move * 4th Occ. Q.		-0.032***	-0.030***
		(0.006)	(0.006)
Between-Emp. Move * 1st Occ. Q.		0.139***	0.129***
		(0.008)	(0.008)
Between-Emp. Move * 2nd Occ. Q.		0.011	0.007
		(0.006)	(0.006)
Between-Emp. Move * 3rd Occ. Q.		-0.032***	-0.034***
		(0.006)	(0.006)
Between-Emp. Move * 4th Occ. Q.		-0.044***	-0.043***
		(0.007)	(0.007)
Constant	6.322***	6.322***	4.898***
	(0.000)	(0.000)	(0.035)
Fixed effects:			
Worker	×	×	×
Year	×	×	×
Controls: Age, Age2, Educ.			×
R^2	0.835	0.836	0.837
Observations	2524594	2524594	2524594

Outcome is logged earnings for ORG respondents. Standard errors are clustered at the worker level.

Source: CPS ORG.

* p < .05; ** p < .01; *** p < .001 (two-tailed tests)

A Appendix

Table A.1: Sample Restrictions on Job Mobility Measures, 1995-2019

	Yes	No	Blank	Refused	Eligible
Employed	18,795,145	12,319,799	8,063,195	.	18,795,145
Outgoing Rotation Group	4,633,874	14,161,271	.	.	4,633,874
Employed T-1	12,631,452	532,428	997,391	.	12,631,452
Same Employer	11,742,685	285,412	5,564	597,791	11,742,685
Switch Job	123,107	11,499,910	4,157	115,511	11,619,578
Same Respondent as T-1	9,526,145	2,093,433	.	.	9,624,688
T-1 Description Accurate	9,322,725	91,786	208,504	1,673	.
Non-missing, if Eligible	.	.	.	.	11,884,249

Source: Basic Monthly CPS.

Table A.2: Timing Sequence for Example CPS Respondent

Month in sample	Calendar date	Weekly earnings	Occupation	Industry	Occupational attainment	Employer switch	Within-firm switch
1	Sept. 2011	N/A	Nurse	Hospitals	$868	N/A	N/A
2	Oct. 2011	N/A	Manager	Hospitals	$1006	Yes	No
3	Nov. 2011	N/A	Manager	Hospitals	$1006	No	No
4	Dec. 2011	$900	Manager	Hospitals	$1006	No	No
(8 mo.) gap)							
5	Sept. 2012	N/A	Manager	Hospitals	$1249	N/A	N/A
6	Oct. 2012	N/A	Nurse	Hospitals	$862	No	Yes
7	Nov. 2012	N/A	Nurse	Hospitals	$862	No	No
8	Dec. 2012	$850	Nurse	Hospitals	$862	No	No

Table A.3: Robustness Tests on Mobility Pay-offs

	(1)	(2)	(3)	(4)	(5)
Within-Emp. Move * 1st Occ. Q.	-0.144***	-0.039**	-0.022**	-0.093***	-0.095***
	(0.005)	(0.013)	(0.008)	(0.005)	(0.007)
Within-Emp. Move * 2nd Occ. Q.	-0.056***	0.024*	0.107***	0.039***	0.047***
	(0.004)	(0.010)	(0.007)	(0.004)	(0.006)
Within-Emp. Move * 3rd Occ. Q.	-0.029***	0.029***	0.081***	0.067***	0.068***
	(0.002)	(0.008)	(0.010)	(0.004)	(0.006)
Within-Emp. Move * 4th Occ. Q.	-0.021***	0.045***	0.114***	0.078***	0.084***
	(0.002)	(0.008)	(0.009)	(0.006)	(0.007)
Robustness Test	No Down	1.5 Yr. Lag	Occ. Switch	Race, Sex	One Resp.
Fixed effects:					
Occupation X Industry X X Education X Age X Year	×	×	×		×
Occupation X Industry X X Education X Age X Year Sex X Race				×	
R^2	0.847	0.660	0.582	0.777	0.768
Observations	180303	34716	98617	190303	99302

Note: Outcome is logged earnings in mover's destination occupation cell. Sample consists only of job changers: reference group is between-employer or labor market job changers. Standard errors are clustered at the level of MSA.

Source: CPS.

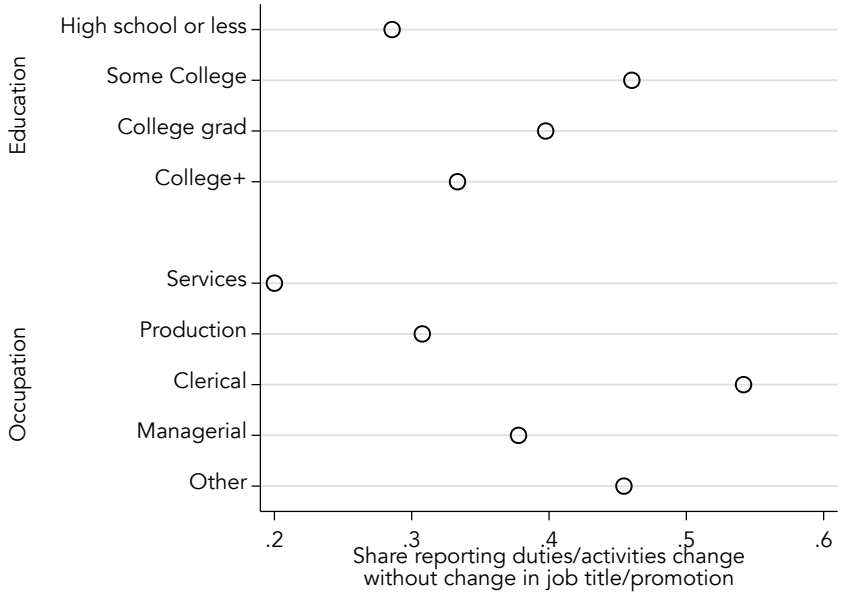
Table A.4: Robustness Tests on MSA-level Hiring Models

	(1)	(2)
1st Occ. Q. * MSA Internal Hiring (Excl. Entry-level)	-0.339***	
	(0.091)	
2nd Occ. Q. * MSA Internal Hiring (Excl. Entry-level)	-0.095*	
	(0.045)	
3rd Occ. Q. * MSA Internal Hiring (Excl. Entry-level)	0.020	
	(0.043)	
4th Occ. Q. * MSA Internal Hiring (Excl. Entry-level)	0.240**	
	(0.076)	
1st Occ. Q. * MSA Total Hiring (Excl. Entry-level)	0.494***	
	(0.074)	
2nd Occ. Q. * MSA Total Hiring (Excl. Entry-level)	0.175***	
	(0.032)	
3rd Occ. Q. * MSA Total Hiring (Excl. Entry-level)	-0.169***	
	(0.033)	
4th Occ. Q. * MSA Total Hiring (Excl. Entry-level)	-0.398***	
	(0.057)	
1st Occ. Q. * MSA Internal Hiring		-0.449**
		(0.143)
2nd Occ. Q. * MSA Internal Hiring		-0.082
		(0.078)
3rd Occ. Q. * MSA Internal Hiring		0.094
		(0.063)
4th Occ. Q. * MSA Internal Hiring		0.374***
		(0.107)
1st Occ. Q. * MSA Total Hiring		0.504***
		(0.128)
2nd Occ. Q. * MSA Total Hiring		0.178**
		(0.058)
3rd Occ. Q. * MSA Total Hiring		-0.237***
		(0.053)
4th Occ. Q. * MSA Total Hiring		-0.482***
		(0.094)
Constant	6.427***	6.444***
	(0.000)	(0.001)
Robustness Test	Non-entry-level	No Small MSAs
Fixed effects:		
Occupation X Industry X Year	×	×
MSA	×	×
R^2	0.890	0.888
Observations	10233981	7141835

Note: Outcome is logged earnings in destination occupation-year cells. Sample consists of all workers, including labor market entrants in T-1. Standard errors are clustered at the MSA-level. For Model 1, MSA-level measures of hiring exclude entry-level positions. For Model 2, we exclude MSA-years with fewer than 1000 respondents.

Source: CPS.

Figure A.1: Rates of Measurement Error by Education and Occupation



Note: These results are from a survey conducted on Mechanical Turk (N=447).