Between-Establishment Mobility within Firms by U.S. Workers: Scope, Prevalence, and Effects on Worker Earnings *

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Abstract

Multi-establishment firms account for around 60% of U.S. workers' primary employers, providing ample opportunity for workers to change their work establishment without changing their employer. Using U.S. matched employer-employee data, this paper analyzes workers' access to and use of such between-establishment job transitions, and estimates the effect on workers' earnings growth of greater access, as measured by proximity of employment at other within-firm establishments. While establishment transitions are not perfectly observed, we estimate that within-firm establishment transitions account for 9.7% percent of all job transitions and 19.6% of transitions originating from the largest firms. Using variation in workers' establishment locations within their firms' establishment network, we show that having a greater share of the firm's jobs in nearby establishments generates meaningful increases in workers' earnings: a worker at the 90th percentile of earnings gains from more proximate within-firm job opportunities can expect to enjoy 2% higher average earnings over the following five years than a worker at the 10th percentile with the same baseline earnings.

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1 Introduction

Several recent papers (e.g. Cao et al. (2017), Kleinman (2022), Hsieh and Rossi-Hansberg (2023)) have documented the dramatic rise of multi-establishment service firms across many sectors over the last 40 years, with their employment share rising from 29% of U.S. workers in 1980 to around 48% by 2017 (Kleinman, 2022). This increase has been driven almost entirely by increases in establishment counts rather than sizes (Cao et al., 2017), and has been most rapid among the largest firms, who have both entered new locations and added establishments within their existing areas (Kleinman, 2022). Indeed, we find that firms with more than 100 establishments now employ over 25% of U.S. workers. Thus, most workers could switch establishments without leaving their firms, and many workers have a large set of establishment options both near and far away. This paper uses matched employer-employee data to study the prevalence and importance of opportunities for between-establishment job mobility within firms (denoted BEM below) in the United States.

We make two primary contributions. First, we estimate the annual within-firm mobility rate between establishments in the United States and more generally provide novel stylized facts about the use of BEM. Standard measures of employer-to-employer (E-to-E) mobility conflate firm-to-firm transitions with between-establishment transitions within the same firm.[1] Thus, our estimate also allows us to isolate the firm-to-firm mobility rate. This is important in part because the E-to-E rate is often used to gauge the labor market's dynamism, its ability to facilitate efficient worker-firm matching (Fujita et al., 2024). It is also used as a key moment in job search models to calibrate search frictions (e.g. Berger et al., 2024), which are likely to be far greater for between-firm than within-firm moves. Furthermore, characterizing BEM access and transition rates is important in its own right to evaluate the importance of internal labor markets as a driver of residential mobility and workers' career progression, especially with rising worker concentration at 100+ establishment firms. To assess which kinds of workers and firms rely most on BEM, we examine heterogeneity in BEM prevalence and access. Our descriptive analysis also explores how geographic distance to other within-firm establishments mediates BEM.

[1] For example, two commonly used sources for job-to-job mobility rates are at odds on how to handle establishment mobility. The Quarterly Workforce Indicators (QWI) measure transitions between state employer IDs in the LEHD data, which reflect within-firm and between-firm mobility (Abowd et al., 2009); in contrast, the Current Population Survey (CPS) asks respondents whether they still work at the same company as the previous wave, which mostly measures between-firm mobility (Fallick and Fleischman, 2004) but may also capture some within-firm mobility.

Second, we assess the importance of BEM in shaping workers' career paths by estimating the causal effect of greater access to potential BEM opportunities on workers' short and medium-run earnings growth. We measure BEM access based on geographic proximity to existing jobs at the firm's other establishments, exploiting variation in the locations of workers' establishments within the firms' establishment network. We show that our measure strongly predicts workers' BEM use and provide non-causal evidence that realized BEM transitions predict subsequent earnings gains.

Research on BEM in the United States is complicated by two key features of its matched employer-employee data, the Longitudinal Employer Household Dynamics (LEHD) database. First, while each firm's full employee roster is faithfully reported in each state, each worker's establishment must be imputed for firms who group multiple establishments within the same State Employer Identification Number (hereafter SEIN).[2] Second, the Census Bureau intentionally eschews imputing any BEM within a SEIN employment spell to avoid creating spurious job transitions (Vilhuber and McKinney, 2014). We show that these aspects of the data are less limiting than they appear, and highlight two other data features that permit a fruitful analysis of BEM.

First, between-establishment job transitions are observed when a worker changes SEIN within a firm. Thus, we observe *all* between-state transitions within the same firm among the 25 states in our sample.[3] Additionally, we document that large firms generally create many SEINs within the same state. Overall, we find that 90% of employment at multi-establishment firms is contained within the subset of firms featuring multiple SEINs (56.9% of all U.S. workers).

This insight motivates our analysis of between-SEIN transitions within a firm. We find that between-SEIN mobility is quite common: among our 25-state sample, 1.34% of workers at multi-SEIN firms change SEINs within the same firm each year, with 4.4% changing SEINs at least once within 7 years. Adding in our rough estimates of within-SEIN mobility and SEIN mobility to out-of-sample states brings the total BEM rate to 2.3% for workers at multi-SEIN firms and 1.45% among all workers. We find that 13.5% of workers change firms each year on average, so that 9.7% of all E-to-E transitions are within firms ($\sim$ 2.3M and $\sim$ 1.2M transitions per year, respectively). Moreover, 20.8% of observed between-state E-to-E transitions are within-firm, revealing that within-firm transitions are disproportionately likely to be long-distance. These aggregate

[2]SEINs are a state-specific accounting identity used by firms primarily to manage taxes, unemployment insurance, and legal liability. SEINs are used as employer identifiers in labor market statistics such as the LEHD-based QWI.

[3]Each state must provide separate approval of LEHD data access for each project.

numbers mask substantial heterogeneity in the prevalence of establishment mobility by both firm and worker characteristics. For example, annual SEIN mobility rates are 16 times higher at firms with over 5,000 workers than at firms with fewer than 100 workers.

The second valuable LEHD feature is that *all* establishments' locations and sizes are fully observed, so that access to potential BEM opportunities can be correctly measured and analyzed. Our earnings growth estimates exploit the fact that assignment to establishments with differential opportunities for moves to nearby establishments may contain an exogenous component. Specifically, we measure a worker's access to BEM opportunities by constructing the shares of existing within-firm employment that lie in discrete distance bands relative to the worker's establishment. Regressing average percentage changes in annual earnings over a time window (1, 3, 5 or 7 years) on this vector of distance shares estimates the degree to which a more geographically proximate employment distribution within the firm contributes to workers' earnings growth.

A crucial element of our identification strategy is the use of both firm-by-year and county-by-year fixed effects in all of our regressions. This allows us to leverage the fact that locations that are central to one firm's establishment network may be quite remote in another's. For example, CVS and Rite Aid pharmacies may both hire pairs of workers in Philadelphia and Boston who all have nearly identical jobs, but Rite Aid's Philadelphia worker will be near a much larger share of other Rite Aid jobs than its Boston worker, and the opposite will be true for the CVS workers.

This approach removes three potential biases that could otherwise obscure the causal relationship of interest: (1) more productive firms may produce faster revenue and earnings growth while also expanding outward, leading higher worker earnings growth to correlate with smaller shares of nearby BEM opportunities, (2) workers with greater earnings prospects may sort to larger firms with more geographic breadth; and (3) locations central to many firms' establishment networks may experience distinct shocks or trends affecting earnings growth.

The position of a worker's establishment within the firm's network may also contain an endogenous component. Workers with greater growth potential may be more likely to sort to the firms' more geographically central establishments (e.g. future executives may be trained at the headquarters). Also, establishments that enjoy higher revenue and award greater raises independently of worker composition may also have superior BEM opportunities. And establishments in rural areas will tend to have a smaller share of the firm's jobs nearby, and may follow different

earnings growth trends. We address these sources of bias by including a variety of worker, establishment, and location controls, and then assess the potential for remaining bias by examining patterns of selection on observable characteristics and constructing placebo tests.

The findings from our baseline specification suggest that a greater share of employment at more proximate establishments leads to meaningfully faster earnings growth for workers at multi-establishment firms. Specifically, shifting just 10% of the firm's employment from establishments more than 500 miles away to those within 10 miles increases average annual earnings over the following 5 years by 0.27% relative to baseline year earnings. Predicted earnings gains fall monotonically as one considers alternative 10% shifts to less proximate jobs: 0.17%, 0.12%, 0.08%, and 0.03% for 10-25, 25-50, 50-100, and 100-500 miles, respectively. Our distance profile estimates are quite robust to alternative ways of measuring the geographic distribution of BEM opportunities.

When combined with the substantial variation in the distance distribution of other-establishment employment within and particularly across firms, these estimated distance profiles account for a non-trivial amount of earnings growth variation among workers at multi-establishment firms: a worker at the 90th percentile of expected earnings gains attributable to his/her proximity to within-firm job opportunities can expect 2% higher real earnings over the following five years (21% of the sample mean) than a worker at the 10th percentile with the same baseline earnings.

Consistent with the idea that greater BEM opportunities is the mechanism driving these earnings gains, we also find a strong monotonic relationship between greater employment shares at closer establishments and within-firm SEIN transition rates: 10% employment shifts from very distant establishments to those 0-10, 10-25, 25-50, 50-100, and 100-500 miles away predict increases in the worker share making a SEIN transition within 5 years of 0.9%, 0.8%, 0.6%, 0.4%, and 0.2%.

Furthermore, we show that, conditional on our full control set, actually switching SEINs predicts 7.8% higher annualized earnings in the next year and 6.8% over five years relative to staying in one's SEIN, compared to 6.1% and 5.8% for a between-firm transition. The effects of both greater access to BEM opportunities and realized transitions increase by around 50% when growth is based on raw rather than annualized earnings from full quarters, partly because superior BEM access increases expected quarters of work.

We also find substantial heterogeneity across worker and firm types in the sensitivity of workers' earnings growth and SEIN mobility rates to the distance distribution of jobs at their firms'

other establishments. For example, for workers at firms with over 5,000 workers, the same 10% employment shift from establishments over 500 miles away to those within 10 miles predicts 0.33% higher per-year earnings over 5 years and a 0.5% increase in annual SEIN mobility. More generally, elevated baseline SEIN mobility rates and elevated earnings and SEIN mobility sensitivity to the distance distribution of BEM opportunities all tend to occur in concert, with greater levels of all three at higher-paying firms, at firms in the information, trade/transportation/utilities, and finance/real estate sectors, as well as among younger and initially higher-paid workers.

We construct placebo tests that (1) replace future earnings growth with past earnings growth for new hires; (2) replace workers' BEM access measures with those of workers from other firms in the same census tract; and (3) replace our "first stage" SEIN transition indicator outcome with a firm transition indicator. We find no evidence of selection into more central establishments of workers with greater tendency to switch jobs or persistent ability to raise their earnings, nor evidence of systematically lower earnings growth among workers in tracts that tend to be less central to their firms' networks, conditional on other location controls. Examination of the sensitivity of our results to the exclusion of various establishment and worker controls does not reveal evidence of bias from unobserved establishment-level factors correlated with BEM access (Altonji et al., 2005), but does indicate some selection of workers with favorable characteristics for growth into establishments with a greater share of more distant job opportunities. This suggests that our substantial estimates may actually understate the earnings growth impact of greater BEM access.

Our paper builds upon and bridges several strands of research. Most directly, studies from Norway (Huttunen et al., 2011), Portugal (Tavares et al., 2018), and France (Cestone et al., 2023) each examine aspects of BEM use in those countries. We are the first to document the prevalence of and scope for BEM in the US. Huttunen et al. (2011) show that BEM reduces earnings losses from plant closings, while Tavares et al. (2018) observes greater earnings premia from BEM than switching firms. Focusing on firm outcomes, Cestone et al. (2023) show that worker flows between firms within broader business groups facilitate these groups' expansion in industries where a key competitor has exited. Rather than focus on BEM responses to exogenous shocks, which cannot be perfectly foreseen when a worker decides to join a firm, we contribute by estimating the effect of *access* to potential BEM opportunities on expected short- and medium-run earnings growth.

Because the first two papers focus on quite small countries, they are not well-positioned to

assess how the proximity of other establishments affects their value to workers. Consistent with our findings, Cestone et al. (2023) show that increases in within-conglomerate flows are largest for business groups with many workers at other firms in the same labor market. We expand on this result by using several distance bins to explore sensitivity of BEM flows to spatial frictions within and across local labor markets and by using a more comprehensive measure of BEM flows.

A second literature focuses on measuring levels of and trends in worker residential and employer mobility (Molloy et al., 2011; Hyatt et al., 2018; Fujita et al., 2024), with the goal of understanding the role of moving and search frictions in equilibrating markets and shaping the evolution of the business cycle (Moretti, 2011; Moscarini and Postel-Vinay, 2016; Cadena and Kovak, 2016). A sub-literature on the scale of local labor markets documents how job and residential mobility rates decay with distance to destinations (Tolbert and Sizer, 1996; Manning and Petrongolo, 2017; Mansfield, 2024). Here, we contribute by highlighting the importance of distinguishing within-firm from between-firm transitions when measuring E-to-E rates, particularly for long-distance moves that govern rates of regional wage convergence (Blanchard and Katz, 1992).

A third, long-standing literature uses detailed data from single firms to document the important role of within-firm job ladders in earnings dynamics for workers at large firms (Baker et al., 1994; DeVaro and Waldman, 2012). We show that internal labor markets can operate at a national scale, but multi-establishment internal labor markets are likely to be more effective when establishments are closer together. A related literature uses national matched employer-employee data, often from Europe, to characterize worker mobility within and across firms and quantify the contributions of each to earnings growth (Van der Klaauw and Dias da Silva, 2011; DeVaro et al., 2019; Kramarz et al., 2014; Papageorgiou, 2018). In addition to comparing earnings changes from internal vs. external job changes, we provide causal estimates of obtaining greater access to an internal labor market by leveraging workers' relative positions in their firms' establishment networks.

A fourth literature shows that workers at large firms enjoy higher earnings and faster earnings growth (Brown and Medoff, 1989; Arellano-Bover, 2024). We find greater mobility and earnings gains among large firms, suggesting that greater access to BEM opportunities within larger firms may be one mechanism or mediating force through which superior earnings growth is realized.

A related literature measures the extent to which monopsony power suppress U.S. workers' earnings (Berger et al., 2022; Yeh et al., 2022; Azar et al., 2022; Jarosch et al., 2024). Our paper sug-

gests that firms with many establishments may have the offsetting benefit to workers of increasing access to jobs at distant locations, which is valuable as insurance against negative local shocks (as Huttunen et al. (2011)'s plant closings results suggest) or if location preferences evolve with age.

Several papers provide theoretical mechanisms and/or empirical evidence to explain why BEM occurs. A primary reason for a firm to initiate such transitions is that relative product demand across its establishment network shifts, changing its optimal allocation of labor. Giroud and Mueller (2019) formalize this mechanism and show that shocks to one establishment's location affect employment at other distant establishments. Kleinman (2022) shows that a decline in the cost of spatial expansion can also lead firms to reallocate labor, including toward the headquarters.[4] Cestone et al. (2023) find that firms with a larger pool of its conglomerate's workers nearby disproportionately rely on reallocating the conglemerate's workers following positive shocks and enjoy larger increases in market share and sales. We show that there is sufficient long-distance BEM to suggest that even firms with geographically dispersed establishments prefer to use BEM rather than a combination of layoffs and hires to facilitate establishment-level employment shifts.

A firm may use BEM to reward its best performing workers with promotions so as to incentivize worker effort (Lazear and Rosen, 1981). Or it may wish to retain or better exploit a worker's firm-specific or task-specific human capital (Becker, 1962; Carmichael, 1983; Lazear, 2009; Gibbons and Waldman, 2004). Or search costs of hiring a worker of similar quality may exceed the moving costs from a worker transfer (Schmutz and Sidibé, 2019). These explanations are all consistent with our finding that BEM is more common among higher-paid, moderately-tenured employees.

If BEM were desired only by firms, workers might demand higher salaries or promotions to offset moving or commuting costs required by the transition. Mulalic et al. (2014) show that firms do pay such compensating differentials when moving entire establishments to new locations. This scenario helps explain the link we discover between greater BEM access and earnings growth, and also suggests that the earnings growth impacts we find could overstate worker utility gains.

However, some BEM may be initiated by workers, so that our estimates might understate utility gains from greater BEM access. For example, workers' location preferences may change due to spousal job opportunities or family care responsibilities (McKinnish, 2008; Compton and Pollak, 2014), or they may request promotions or even lateral transfers to jobs at other establishments that

[4] Retirements, quits, and skill development can also alter the optimal allocation.

they have learned they would enjoy, be productive at, or that would provide skill development or signaling opportunities (Jovanovic, 1979; Waldman, 1984; Papageorgiou, 2014; Pastorino, 2015).[5]

The paper proceeds as follows. Section 2 describes the LEHD data, with a focus on which kinds of establishment mobility can and cannot be observed. Section 3 provides a descriptive analysis of U.S. workers' access to and use of BEM. Section 4 describes how we estimate the impact of greater spatial proximity to jobs at other establishments on worker earnings and SEIN mobility. Section 5 presents the main earnings growth and SEIN mobility results, assesses threats from omitted variable and sorting bias, confirms robustness to alternative measures of BEM access and earnings growth, and analyzes worker and firm heterogeneity in sensitivity to BEM access. Section 6 forms a rough estimate of the overall rate of establishment transitions. Section 7 concludes.

2 Data

Our analysis relies on a 15% random sample of workers from employer-employee data covering 25 U.S. states with around 60% of U.S population within the 2014 snapshot of the Census Bureau's Longitudinal Employer Household Dynamics database (LEHD).[6] We focus on the years 2002-2013 for which we have a balanced panel of contributing states. The LEHD's core consists of quarterly job records reporting the earnings and identification number of each employee as well as the state-specific employer identification number (SEIN). The LEHD augments these job-level records with four additional sources of information: 1) employee demographic information from social security registers; 2) a firm identification number derived from federal tax records that links SEINs sharing the same ownership; 3) the industry, geographic location (census block centroid), and quarterly employment and payroll of each of the SEIN's establishments (called SEINUNITs or units) from an employer survey (ES202); and 4) a unit-to-worker file that imputes each worker's establishment based on residential information from tax records and establishment employee counts.

A few key aspects of the data are worth emphasizing. First, features 2), 3) and 4) above allow the construction of the full distribution of existing (filled) positions across establishments within

[5]Both firm-specific human capital and search frictions might also increase the worker surplus from BEM. Workers with substantial firm-specific human capital may struggle to find similar promotion opportunities at other firms, and firms may be able to more efficiently inform existing employees about its other job opportunities (Papageorgiou, 2018).

[6]States that provided data access cover all major U.S. regions and most U.S. coastline. The national LEHD covers 96% of U.S. employment, with exclusions for federal, farm, and self-employment, among others (Abowd et al., 2009).

each worker's firm, which we use to characterize workers' potential future BEM opportunities.[7]

Second, the Census Bureau's imputation algorithm generally assigns a worker to only one establishment during his/her SEIN employment spell to avoid creating spurious job transitions (Vilhuber et al., 2018). This choice essentially suppresses any information about BEM within SEINs. However, all BEM within our sample that involves a SEIN change within a firm ID is observed. This includes all BEM across states within our 25 state sample (but not outside of it) as well as between-SEIN transitions within the same (in-sample) state. Firms (particularly large ones) often create many SEINs within the same state, especially when there is a natural way to group establishments into subsidiaries, often for the purpose of limiting liability.[8] In Section 6, we use the distributions of establishment locations and distances among observed SEIN transitions to produce a rough estimate of the rate of within-SEIN transitions. These results suggest that about 50% of within-state BEM is between different SEINs, though this may be somewhat overstated if establishments in the firms' other SEINs differ more in job composition than those in the same SEIN.

Third, we rely on the Census Bureau's firm ID, which is based initially on federal EIN numbers. Because some firms' EINs may change over time, this measure is not fully longitudinally consistent. However, many errors involve small firms receiving new IDs when transitioning from one to multiple establishments, which will only cause us to miss a tiny amount of BEM. Moreover, our baseline earnings growth specification only requires correct cross-sectional assignment of establishments to firms and observation of workers' future earnings. Nonetheless, to minimize mismeasurement of BEM, we remove small shares of within-firm SEIN transitions in which (1) a worker's new and old SEIN are in the same census block, since these are likely to be cases in which the worker's work location did not change, or (2) the new and old SEINs are linked by the Census Bureau's success-predecessor file, suggesting that the firm moved an establishment's physical location for all workers rather than changing the transitioning worker's tasks and co-workers.

Fourth, for workers reporting nonzero pay from multiple SEINs within a year, we choose the highest earnings SEIN as the representative SEIN (along with its firm ID and SEINUNIT assign-

[7] Due to the establishment assignment algorithm's reliance on a worker's initial residential location within a SEIN employment spell, most assignment errors will occur when two candidate establishments are both near a worker's residence. This limits errors' importance for the measures of access to BEM opportunities used below. Also, remote work was less common during the period we consider, further reducing the frequency of imputation errors.

[8] Our understanding is that businesses that rely on franchising (e.g. McDonald's) produce many separate firm IDs, while those that operate a chain of many establishments will be grouped into a single firm ID (e.g. Starbucks).

ment). This avoids excessive focus on secondary jobs that account for little worker pay, but may cause us to miss SEIN transitions that are either temporary or quickly superseded by a firm separation. To capture a worker's annual salary rather than the share of the year he/she worked, we construct "annualized" earnings for each worker by prorating earnings from full quarters only. All earnings are adjusted for inflation using the CPI series and expressed in 2017 dollars.

3 Descriptive Analysis of SEIN Mobility

Figure 1 shows the pooled distribution of employment among all worker-years in our 2002-2013 sample across bins defined by the firm's count of either establishments or distinct SEINs. We see that 63.5% of workers' primary firms operate multiple establishments among our sample of states. 79.1% of these firms group their establishments into multiple SEINs, accounting for 56.9% of all worker-years. Moreover, 25.6% of sample employment is concentrated at firms with at least 100 establishments, while 23.3% is at firms with at least 100 SEINs.[9] Thus, a sizable minority of U.S. workers have many potential destination establishments within their firms. Appendix Tables A.1 and A.2 provide a variety of statistics comparing the firm characteristics and worker composition of multi-establishment and multi-SEIN firms to single-establishment firms.[10]

Furthermore, Figure 2 shows a consistent upward trend in BEM opportunities: the overall multi-establishment and multi-SEIN shares of employment increased from 61.8% and 55.3% in 2003 to 66.0% and 59.7% in 2012, and the shares of workers at multi-establishment (multi-SEIN) firms with more than 100 establishments (SEINs) increased from 24.5% to 27.1% (22.3% to 24.6%). Despite growing BEM opportunities, the share of workers making observed SEIN transitions stays stable at around 0.7 or 0.8% per year over the course of our sample.[11]

Table 1 reports statistics for a subsample of worker-years in which the worker was employed within our sample states in both the chosen and subsequent year, so that movers' destinations

[9] These are lower bound estimates of true shares due to unobserved establishments outside our 25 state sample.

[10] To summarize, weighting by employment, the average multi-SEIN firm operates 65 SEINs with 10 establishments per SEIN and 72 workers per establishment. Multi-SEIN firms have far greater mean (worker-weighted) employment (46,082) than multi-unit single-SEIN (MUSS) firms (13,900) and especially single-unit (SUSS) firms (240), as well as far more generous pay distributions, with 29% of their workers earning in the top national quintile versus 15% for both MUSS and SUSS firms. Multi-SEIN firms employ outsized shares of workers in the manufacturing, information, and wholesale/retail supersectors, while employment in MUSS and SUSS firms is disproportionately concentrated in the education/health and other services supersectors, respectively.

[11] This may be because the Great Recession offset increases that would have occurred in 2009-2013 by depressing job mobility of all kinds, as evidenced by the fall in firm mobility rates from 15.4% in 2006 to 11.3% in 2009.

can be observed. Rows 2-6 display the shares of the firm's employment beyond the worker's own establishment that are located in establishments within 10 miles, 10-25 miles, 25-50 miles, 50-100 miles, 100-500 miles, and over 500 miles away, respectively. We use these as measures of BEM access in our causal analysis below. The average worker at a multi-unit firm is over 500 miles away from 47.0% of the jobs at their firm's other establishments and 100-500 miles away from another 22.6%. Nonetheless, on average 12.4% of jobs at other establishments are within 10 miles and 19.2% are within 25 miles. These shares vary widely among workers, reflecting the mix of local, regional, and national companies: standard deviations are 0.265 and 0.382 for the shares of other-establishment employment within 10 miles and over 500 miles, respectively. Other-establishment employment is considerably more locally concentrated among workers at multi-unit single-SEIN ("MUSS") firms, with 39.2% and 59.6% of jobs located within 10 and 25 miles (Table A.1).

The yellow curve in Figure 3 displays the CDF of distance to the next nearest establishment among workers at multi-establishment firms. Over 40% work within 4 miles of another establishment and over 50% work within 10 miles, confirming that most of these workers could potentially switch establishments without changing residences. The blue curve shows that about 25% and 35% of workers at multi-SEIN firms are within 4 and 10 miles of an establishment in a different SEIN. Thus, the nearest BEM option is generally only slightly further when restricting to the subset of potentially observable transitions, with substantial support at short distances. We use these distributions to gauge the likely frequency of unobserved within-SEIN BEM in Section 6.

The first row in Table 1's second panel shows that 1.34% of workers at multi-SEIN firms move to an establishment in another SEIN in our sample in a typical year. Since multi-SEIN firms account for 90% of employment at multi-unit firms, this bounds the BEM rate for workers at multi-unit firms above 1.20%. Similar SEIN mobility rates for multi-SEIN workers with and without other establishments in their SEINs (Table A.1's "MUMS" and "SUMS" columns) suggest that access to within-SEIN establishment substitutes does not unduly suppress between-SEIN mobility.[12]

The remaining rows of column 3's second panel provide the shares of observed SEIN transitions whose distance between origin and destination establishments falls into each of six distance bins. Frictions that deter long-distance transitions clearly exist: even though only 9.3% of jobs

[12] About 43% of workers at multi-SEIN firms and 24.6% of all workers work in a single-establishment SEIN, so that all their BEM is between-SEIN and thus perfectly observed within our sample states. The non-representativeness of this "SUMS" population in Table A.2 precludes relying only on them for identification.

at other same-firm establishments are within 10 miles, 24.9% of SEIN transitions are to establishments within 10 miles. By contrast, only 21.6% of between-SEIN transitions are to establishments over 500 miles away even though on average 52.5% percent of other-establishment employment is at least 500 miles away. We exploit this differential propensity to make short- and long-distance moves in Section 5 to estimate the earnings effects of closer proximity to BEM options.

The first row of Table 1's last panel reveals that 12.6% of all workers and 12.2% of workers at multi-SEIN firms who remain employed in our sample states switch firms in a typical year, so that firm transitions are about 10 times as common as within-firm SEIN transitions.[13] Firm transitions also feature a much more locally concentrated mix of destinations than SEIN transitions. Distances of over 500 miles and over 100 miles account for only 5.6% and 24.2% of firm transitions versus 21.6% and 43.2% of SEIN transitions, respectively. Since a much larger share of other-firm jobs are 500+ miles away (77.3%) than other-SEIN jobs (52.5%), the within-firm ratio of long-distance moves to long-distance employment is nearly six times higher than its between-firm counterpart. Thus, long-distance within-firm job transitions must create or preserve some additional value or surplus to either workers or firms that long-distance firm transitions do not.

If this surplus stems primarily from workers' desires to live or work in alternative locations, long-distance BEM need not lead to pay increases. However, if most of the surplus stems from lower recruiting costs or productivity gains from better skill allocation, a raise may be required to facilitate the transfer. We discuss and consider evidence for possible mechanisms in Section 5.3.

Table 2 provides SEIN mobility rates for various subpopulations defined by categories of worker and firm characteristics. For each subpopulation we display its share of all sample workers, the share of the subpopulation working in a multi-SEIN firm, its annual SEIN mobility rate among those in multi-SEIN firms, and its unconditional SEIN and firm mobility rates.

Starting with firm sizes, we see much higher SEIN mobility rates at the largest employers: 1.6% at firms with over 5,000 workers compared with 0.1%, 0.3%, 0.5%, and 0.8% at firms with $<$ 100, 101-500, 500-1,000, and 1,000-5,000 workers, respectively. The 33% of workers whose firms employ

[13]Note that the 13.5% firm transition rate we report in the introduction equally weights years rather than worker-year observations. These average annual rates of firm mobility are roughly consistent with quarterly rates reported by Hahn et al. (2021) that vary between 2% and 4% over our sample period, but somewhat smaller than those reported by Hyatt and McEntarfer (2012), in part because we focus on transitions between dominant jobs and exclude between-SEIN moves within a firm ID. Fallick and Fleischman (2004), Haltiwanger et al. (2015), and Fujita et al. (2024) discuss the challenges associated with measurement of E-E rates.

over 5,000 workers account for 71% of all SEIN transitions. These SEIN mobility differences are mostly due to differences in shares of workers at risk of changing SEINs: multi-SEIN firms only account for 10.5% and 44.1% of workers among firms with <100 and 101-500 workers versus 84.3% and 95.4% among firms with 1,000-5,000 and >5,000 workers. However, SEIN mobility rates also rise with size among multi-SEIN employers, despite increasing shares of distant positions (see Appendix Table A.3): 1.7% of workers at multi-SEIN firms with >5,000 workers change SEINs each year versus 0.7-1.0% of those in smaller size categories. This partly reflects larger firms' greater numbers of jobs at other locations, but may also suggest that they have more developed establishment transfer procedures or firm-wide promotion ladders (Gumpert et al., 2021).

SEIN mobility is also more common among workers at the highest paying (worker-weighted) quintile of firms (1.2%) relative to lower-paying quintiles (0.3%-0.9%). Again, these differences mostly reflect gaps in the share working in multi-SEIN firms, which increase with pay quintile from 38% to 79%, but the top-paying quintile also exhibits a higher conditional SEIN mobility rate (1.5%) than other quintiles (0.8-1.3%). This is consistent with a greater value for such firms of retaining and properly allocating talented workers. Interestingly, the increased SEIN mobility with greater size and average pay is paired with decreasing firm mobility rates, suggesting that SEIN transitions replace firm transitions as a source of worker mobility at large, high paying firms.

Wide variation in shares at multi-SEIN firms also drives the large differences in SEIN mobility rates across industry supersectors, with the multi-SEIN share varying from 26% in construction and other services to around 70% in manufacturing and finance and 85% in information. Even among multi-SEIN firms, those in finance and information have high SEIN mobility rates, in keeping with their reputations as industries that prize worker productivity and reward it via strong corporate ladders. Information's high rate occurs despite its large mean share of within-firm jobs over 500 miles away (66%, from Appendix Table A.3), reflecting its largest firms' national scope.

Moving to worker characteristics, we find that unconditional SEIN mobility rates are over three times as high for the highest earnings quintile (1.3%) relative to the lowest (0.4%), and the 22% of workers in the final sample's top earnings quintile account for 40% of all SEIN transitions. This partly reflects assortative matching to larger and higher-paying firms, as the share at multi-SEIN firms increases with earnings quintile from 44% to 72%. But even among multi-SEIN firms, SEIN mobility rates also increase monotonically with both national and within-firm earn-

ings quintiles (0.9% to 1.9% and 1.0% to 1.9%, respectively). This suggests that the surplus from retaining worker-firm matches is most valuable among the most skilled workers, perhaps due to greater firm-specific human capital and/or larger search costs of finding appropriate matches for workers offering or firms seeking specialized skills. Lower firm mobility rates among higher-paid workers supports this interpretation.

We also see that conditional and unconditional SEIN mobility is common at all ages, but peaks at ages 30-39 at 1.5% and 0.9% before declining to 1.0% and 0.5% for workers over 55. This mid-career peak contrasts with monotonically decreasing firm mobility rates, again consistent with an important role for firm-specific human capital. We observe limited heterogeneity in SEIN mobility rates by gender, race/ethnicity, or firm tenure (up to the 10 years that are identifiable in our panel).

Taken together, our descriptive statistics reveal that mobility between establishments within firms is fairly common across all types of workers and firms. They also suggest that BEM is sensitive to the distance between worker's own and other establishments, though less so than for firm transitions. We now leverage variation across workers in the spatial distribution of their firms' other establishments to assess how better access to BEM opportunities affects earnings paths.

4 Regression Methodology

Our baseline specifications relate the percent change in average annual earnings over the following p years relative to base year t for worker i at establishment $e(i,t)$ in state s, denoted $\%\Delta Earnings^{p}_{it}$, to the worker's year t access to BEM opportunities within firm $f(i,t)$[14]:

$$\%\Delta Earnings^{p}_{it} = \sum_{d \in bins} BEM\ Access^{d}_{et}\beta_d + X_{it}\delta + X_{et}\lambda + \gamma^{F}_{ft} + \gamma^{C}_{ct} + \gamma^{NS}_{nst} + \varepsilon_{it} \tag{1}$$

where we suppress dependence of e, f, c, n, and s on (i,t) to simplify notation. Since most workers' annual earnings grow over time, the outcome mean rises with the window length p. Section 5.6 and Appendix A.3 discuss and show robustness to alternative earnings growth measures.

Our sample for earnings regressions consists of all worker-years in which the worker is initially employed and is observed with earnings at least twice for a 3-year window, three times for a 5-year window, and five times for a 7-year window. The latter restrictions ensure sufficiently

[14]For example, a worker who earns \$20,000 in year t and \$25,000, \$30,000, and \$35,000 in years $t+1$ to $t+3$ has $\%\Delta Earnings^{3}_{it} = (25,000+30,000+35,000)/(3*20,000)-1 = .5$, or 50% growth. Appendix A.3 offers further detail.

large samples and reasonably precise measurement of the individual's outcome while limiting the selection problem created by dropping those experiencing years of nonemployment.

Our preferred measures of access to BEM opportunities, $\{BEM\ Access^{d}_{et},\ d \in bins\}$, consist of shares of employment in firm f's other establishments that fall into each distance bin d among the following bins: 0-10, 10-25, 25-50, 50-100, 100-500, and 500+ miles. Table 1's second panel provides means of these measures among workers at multi-unit and multi-SEIN firms. Since a worker's origin location is based on an assigned establishment rather than his/her residence, our measures vary at the establishment-year level. Distance bins are assigned using the distance between the census block centroids of the worker's assigned establishment and each other establishment in the firm (see Appendix A.4 for further detail). Because these employment shares sum to one for each worker, we normalize to zero the coefficient for the share of other-establishment employment that is over 500 miles away.

By relying on shares of workers in each distance bin, we can explore how mobility costs that may be non-linear in distance mediate establishment mobility. However, this access measure imposes that the same distance share distribution will predict the same rate of mobility and earnings growth impact regardless of the firm's overall employment count. If every job opportunity at the firm within a given distance bin were equally likely to cause worker i to switch establishments, one should use each bin's position count rather than share. However, firms with many large establishments may also have a wider array of occupations if they are more vertically integrated. And larger firms also have more within-firm competitors for their vacancies. Thus, the number of relevant and obtainable job opportunities need not grow linearly with firm size. We consider alternative access measures that incorporate the scale of employment in each bin in Section 5.

One reason for our focus on spatial distributions rather than scale is that we wish to isolate variation in exposure among workers from different establishments within the same firm-year so as to remove any endogeneity bias stemming from more or less geographically concentrated firms tending to either share faster revenue growth with workers or hire workers with greater earnings growth potential. We do this by including a full set of firm-year fixed effects, represented by γ^{F}_{ft}. But this choice naturally eliminates differential earnings gains from BEM options that operate purely through variation in the firm-wide scale of employment opportunities.

Note that we isolate exclusively within-firm variation in access only to minimize scope for

omitted variable bias; we expect the $BEM\ Access$ coefficients β to be relevant for analyzing differences in BEM access between firms as well, and we exploit between-firm variation in predicted values below when quantifying the overall importance for worker earnings growth of superior geographic access to BEM opportunities. That said, our proximity-based access measures only permit us to place a lower bound on the importance of access to a multi-establishment internal labor market, since they cannot capture the difference in value between having all other same-firm establishments 500+ miles away and having no other same-firm establishments at all. This difference in value is likely to be substantial given that we estimate that at least 15% of establishment transitions within multi-SEIN firms feature origin-destination distance of over 500 miles.

X_{it} is a vector of individual controls consisting of categorical indicators for sex, race, ethnicity, age, highest level of education (including a flag for imputed education status), bins of tenure at firm f, and earnings decile in (initial) year t. These controls mitigate selection bias from non-random selection into centrally located establishments within firms of individuals likely to experience inferior or superior earnings growth regardless of their establishment's geographic centrality.

X_{et} is a vector of establishment controls consisting of lagged annual growth rates of employment, payroll and average pay, as well as indicators for bins of the year t levels of these variables. These controls address selection bias from the possibility that more geographically central establishments may tend to be higher-performing and thus cause faster earnings growth for their workers for reasons unrelated to these workers' quality or their BEM opportunities. This might occur if the firm tries to create new establishments in the same area as its most successful branch.

Finally, γ_{ct}^{C} and γ_{nst}^{NS} denote county-by-year and 4-digit industry-by-state-by-year fixed effects that absorb the impact of labor market trends or shocks that are specific to certain geographic areas and/or industries that may drive differential earnings growth and correlate with $BEM\ Access$.

Our goal is to isolate random variation in which workers sort to establishments that are near versus far from the firm's other establishments. Such random variation might be created by naturally occurring turnover that leads different establishments to hire at different times, and thus match with particular workers among the qualified pool who happen to be searching at the same time. The inclusion of county-year and industry-state-year fixed effects exploits the fact that different firms concentrate employment in different regions and different counties within regions.

To see this, suppose that Wells Fargo (highly concentrated in San Francisco) and Citizen's

Bank (highly concentrated in Boston) each post vacancies in March and in April, but Wells Fargo's March and April vacancies are in San Francisco and Boston while Citizen's Bank's are in Boston and San Francisco. Suppose that two pairs of similar job applicants from Boston and San Francisco sort into positions within their cities based on slightly different job search timings. Then the share of Wells Fargo employment within 10 miles will be higher for its Boston worker than its San Francisco worker, and the opposite will be true for the Citizen's Bank pair, providing exogenous identifying variation in $BEM\ Access$ conditional on firm-year and location-year fixed effects.

Note that we are trying to capture the causal effect of expanding potential opportunities to switch establishments instead of using $BEM\ Access$ shares as instruments to estimate the causal effect of actually making such a transition. There are three reasons for this. First, we cannot form the correct (endogenous) treatment variable, an establishment transition indicator, because we only observe such transitions if they involve a SEIN change. This precludes a standard IV approach, since greater BEM access might affect earnings via within-SEIN establishment switches.

Second, even if all BEM were observed (as it is for workers in SUMS establishments), the IV exclusion restriction would be invalid if potential within-firm opportunities affected earnings growth directly by altering bargaining power with outside firms.

Finally, the "reduced form" effect of greater access to opportunities that we do estimate is arguably at least as practically relevant as the effect of actual transitions or transition offers. Many policy levers might affect which workers sort to initial jobs with greater BEM access, such as facilitating better dissemination of information about vacancies at firms with a national reach. And early-career workers may benefit from learning that a multi-establishment firm might provide a more streamlined promotion path or better insurance against adverse local demand shocks.

Even though we do not estimate the causal effect of between-SEIN mobility on earnings, we do wish to demonstrate that the earnings effects we find could plausibly be generated via better BEM access. Thus, we also investigate the "first stage" impact of our BEM access shares on SEIN mobility, as well as the "second stage" relationship between realized SEIN mobility and earnings.

A few adjustments to the estimating equation are necessary when the outcome is an indicator for making a between-SEIN transition within a firm:

$$1(SEIN\ Transition)^{p}_{it} = \sum_{d \in bins} BSM\ Access^{d}_{SEINt}\theta_d + \sum_{d \in bins} BEM\ Access^{d,W/in\text{-}SN}_{et}\zeta_d \quad (2)$$

$$+ X_{it}\mu + X_{et}\nu + \pi^{F}_{ft} + \pi^{C}_{ct} + \pi^{NS}_{nst} + \omega_{it}$$

First, we restrict the sample to workers at multi-SEIN firms, since only these workers are at risk for making a between-SEIN transition. Second, to properly capture SEIN transition options, we only include between-SEIN employment when constructing shares of employment by distance bin for our SEIN-level access measures, $BSM\ Access^{d}_{SEINt}$. Third, we replace indicators for bins of total employment at the firm's other establishments (an element of X_{et}) with bins of employment at other SEINs. Fourth, we additionally control for the shares of within-SEIN positions at other establishments that fall in each distance bin, denoted $BEM\ Access^{d,W/in\text{-}SN}_{et}$. These address the possibility that a high share of jobs within one's SEIN that are nearby creates a more appealing set of outside options that reduce the impact of between-SEIN opportunities on SEIN mobility.

The second stage's estimating equation mimics equation (1), but with the $BEM\ Access$ shares replaced by SEIN and firm transition indicators and the sample restricted to multi-SEIN workers:

$$\%\Delta Earnings^{p}_{it} = 1(SEIN\ Trans._{it})\kappa_1 + 1(Firm\ Trans._{it})\kappa_2 + X_{it}\delta + X_{et}\lambda + \gamma^{F}_{ft} + \gamma^{C}_{ct} + \gamma^{NS}_{nst} + \varepsilon_{it} \quad (3)$$

Regressing earnings growth directly on $1(SEIN\ Trans._{it})$ allows us to assess the premium that workers making SEIN transitions receive. Controlling for $1(Firm\ Trans._{it})$ allows us to interpret κ_1 as the SEIN transition premium relative to staying at one's SEIN instead of a mix of firm staying and switching, and facilitates a comparison between SEIN and firm transition premia.

However, κ_1 and κ_2 cannot be given a causal interpretation. Without exogenous variation in job offers at other establishments or firms, we only observe selected samples of offers deemed sufficiently attractive by workers deemed worthy. In addition, some of those who did not switch SEIN or firm actually made within-SEIN transitions, contaminating the control group.

Nonetheless, given the absence of existing stylized facts about returns to within-firm mobility, these estimates may be useful in calibration exercises that incorporate within-firm opportunities in structural job search models. Sizable observational SEIN transition premia would also provide further suggestive evidence that greater access to potential BEM opportunities increases earnings primarily via a higher probability of a lucrative offer to switch establishments.

We cluster standard errors at the worker and firm levels in each of specifications (1)-(3) to capture likely dependence across observations due to persistent shocks to workers and firms.

5 Main Results

5.1 Earnings Effects of Improved BEM Access

Figure 4 and Table 3 display the results of our baseline specification for earnings windows of 1, 3, 5 and 7 years. We find very strong evidence that greater geographic concentration of within-firm employment increases workers' future earnings. For all four windows, expected earnings gains increase monotonically as the firm's employment at other establishments shifts to closer distance bins relative to the worker's establishment. The average annual effects increase with the length of the window, suggesting that the value of better $BEM\ Access$ compounds over time. Focusing on the 5-year window, we find that a worker with 100% of other-establishment employment within 10 miles can expect to earn 2.7% more over 5 years than a comparable worker whose otherwise comparable establishment is over 500 miles away from the firm's other establishments. The same comparison for workers with all other-establishment employment 10-25, 25-50, 50-100, and 100-500 miles away yields 1.7%, 1.2%, 0.8%, and 0.3% higher expected earnings.

Of course, very few workers have 100% of other-establishment employment in a single distance bin, so we use three other approaches to gauge our findings' economic importance. First, we evaluate the impact of a one standard deviation increase in a given distance bin's share (at the expense of the 500+ category). A one SD shift increases earnings over 5 years by 0.7% for the 0-10 mile bin and 0.3%, 0.2%, 0.1%, and 0.1% for the 10-25, 25-50, 50-100, and 100-500 mile bins.

Second, we evaluate the predicted growth gain for a worker with the sample mean employment share for each distance bin compared to a worker with all BEM opportunities 500+ miles away. These values result in 0.1%, 0.4%, 0.6%, and 0.9% additional earnings growth over 1, 3, 5, and 7 years respectively. Such earnings gains correspond to 21%, 18%, 19%, and 22% of median earnings growth in the sample for these windows.

Comparing to workers with solely long-distance options produces the tightest lower bounds achievable with a distance-based identification strategy for the effects of typical BEM access at multi-establishment firms relative to workers at single-establishment firms with no possible BEM. However, we also wish to assess the importance of heterogeneity in proximity to other establishments among workers at multi-establishment firms. Thus, our third approach examines the distribution of predicted BEM Access earnings contributions among such workers. Column 1 of

Table A.7 reports selected vingtile cutoffs of this distribution for the 5-year window. While BEM access causes less than 0.1% extra growth for about 25% of workers at multi-establishment firms, 35% gain over 0.5% in earnings, 20% gain over 1%, and almost 10% of workers gain over 2%.

These predicted values combine the within- and between-firm variation in distance bin shares, which assumes that the coefficients identified from within-firm variation are externally valid for variation across firms. By removing the firm-specific mean from each earnings prediction, we can instead consider BEM access contributions relative to other workers at the same firm. This distribution is far more concentrated, with a 90-to-10 percentile difference among employees from the same firm only accounting for a 0.3% difference in earnings over 5 years. Thus, the bulk of the variation in the value of BEM access stems from comparisons between firms.

Finally, column 5 replaces our full-year earnings measure with workers' raw (non-annualized) earnings when computing earnings growth. The coefficients grow by around 50%, so that shifting 100% of jobs from 500+ to 0-10 miles away predicts a 4.5% increase in 5-year average earnings. Column 6 suggests a mechanism: workers with more proximate $BEM\ Access$ tend to work more quarters in subsequent years. While annualized earnings better approximates workers' salary and removes volatility from temporary workforce absences, it obscures extensive margin gains that occur when BEM prevents unemployment spells that would otherwise have occurred.

5.2 SEIN Mobility Effects

Figure 4 and Table 4 report the results of our "first stage" regression equation (2) relating employment shares by distance bin among jobs in other SEINs to indicators for switching SEINs at least once within 1, 3, 5, or 7 years for the sample of workers at multi-SEIN firms. As with earnings growth, we find very strong evidence that SEIN mobility is sensitive to the distance distribution of other-SEIN employment. For each time window, expected SEIN mobility increases monotonically as other-SEIN employment shifts to ever closer distance bins. This is consistent with $BEM\ Access$ causing earnings gains primarily via realized within-firm transitions.

Specifically, a worker with 100% of other-SEIN employment within 10 miles has a 0.038 higher probability of making a SEIN transition within the year than if all such employment were more than 500 miles away. The corresponding increases for the 10-25, 25-50, 50-100, and 100-500 mile categories are 0.035, 0.027, 0.018, and 0.010, respectively. These probability increases naturally as

the time window expands, since more workers have had sufficient time to find a suitable opportunity at another establishment. For example, a worker whose SEIN transition opportunities are all within 10 miles is a full 10 percentage points more likely to switch SEINs at least once within 7 years than one whose SEIN transition opportunities are all 500+ miles away.

As with our earnings results, we gauge the economic importance of these distance profiles by evaluating the predicted contribution of $BSM\ Access$ to the SEIN transition rate for a worker with the sample mean employment share for each distance bin compared to one of the $\sim$10% of workers whose other-SEIN opportunities are all over 500 miles away. These contributions are 0.8%, 1.4%, 1.7%, and 2.0% for rates of making at least one SEIN transition within 1, 3, 5, and 7 years. The 90th-to-10th percentile difference in $BSM\ Access$ contributions to annual SEIN transition rates is 2.6 percentage points. Note that these values understate the degree to which differences in proximity to other establishments drive BEM, since $BSM\ Access$ excludes within-SEIN establishments in its distance bin shares (because we cannot observe those transitions), and such establishments tend to be closer to the worker's own establishment. Thus, the job mobility of a sizable share of workers is substantially increased by having much of their firms' employment at nearby establishments.

5.3 Earnings Premia from SEIN and Firm Transitions

Table 5 displays estimates of equation (3), which directly relates earnings growth over various windows to whether workers switched SEINs or switched firms between year t and $t+1$. Recall that these results reflect a selection process in which only offers with sufficient appeal relative to moving costs are accepted. Thus, they should be interpreted as conditional correlations that are consistent with the hypothesis that better BEM access raises expected earnings by increasing the chances of receiving an offer to secure a raise (or avoid a pay cut) by switching establishments. The first column shows that those who switch SEINs enjoy 7.77% faster earnings growth the following year than observationally equivalent workers who stayed at their year t SEIN. The growth premium for those who switch firms, 6.14%, is slightly smaller, mirroring Tavares et al. (2018).[15]

Column 2 restricts the sample to multi-SEIN workers to align the composition of workers at risk for making firm and SEIN transitions. The SEIN transition premium barely changes (7.54%),

[15]Firm switchers include laid-off workers who found a new firm within a year along with those making direct E-E transitions, while some SEIN transitions may be recalls or new hires at the firm's other SEINs among laid-off workers. Thus, these premia might rise if one could restrict the sample to those currently employed when the job offer arrived.

but the firm transition premium falls to 4.6%, since the omitted single-establishment and single-SEIN firms generally offer low pay premia that leave more scope for gains from changing firms.

The next three columns show the increase in average pay over 3, 5, and 7 year windows relative to the baseline year among multi-SEIN workers. The premium for switching SEINs remains about 1% higher than for switching firms, with both remaining roughly stable at $\sim$ 7% and 6% between 3 and 7 years. Thus, any further acceleration of earnings from year t switchers at the destination SEIN or firm between years $t+2$ and $t+7$ seem to be roughly offset by eventual gains for time t stayers, perhaps because they also make SEIN or firm transitions in these subsequent years.

As with the earnings gains from superior BEM access, Column 6 shows that using raw annual earnings in place of full-year equivalent earnings increases 5-year growth premia from realized SEIN and firm transitions by around 50% to 10.9% and 10.3%, respectively, consistent with an extensive margin response in number of quarters worked.

Columns 7 and 8 report separate earnings growth premia by category of distance between origin and destination establishments for both SEIN and firm transitions. SEIN transition premia increase monotonically with distance, rising from 4.8% for 0-10 mile moves to 11.7% for 500+ mile moves. Firm transition premia display a very similar pattern, rising from 3.5% to 8.5%.

The combination of rising transition premia with distance and large returns to more proximate BEM access suggests that workers dislike long distance moves enough to only accept the most lucrative offers, which occur too rarely to meaningfully raise the expected return to distant potential jobs. However, similar distance gradients for earnings premia from SEIN and firm transitions suggests that lower moving or psychic costs of making long distance SEIN transitions do not drive workers' greater relative propensity to make very distant SEIN vs. firm transitions from Section 3.

To investigate why within-firm moves make up a disproportionate share of long distance job transitions, Figure 5 displays SEIN transition rates, BSM access shares, and distance bin distributions of realized SEIN transitions by quintile of a BSM access regression index based on the "first stage" coefficients relating BSM access shares to SEIN mobility from equation (2).[16]

By construction, workers at higher quintiles of the BSM access index naturally have a larger share of within-firm employment at nearby distance bins. And as expected, a smaller share of

[16]We use the model with separate $BSM\ Access$ coefficients by firm size category from Section 6 for this exercise, since these better capture large firms' higher SEIN mobility rates despite larger shares of very distant employment.

their SEIN transitions are long-distance. However, the strength of this relationship is informative: workers in the middle quintiles of the BSM access index make long distance transitions quite rarely, even though substantial shares of their potential BSM options are far away. Instead, around 65% of all SEIN transitions longer than 500 miles are undertaken by the 40% of workers in the lowest two BSM access index quintiles, for whom 1% or less of other-establishment employment at their firm is within 100 miles. Thus, the workers making long distance SEIN transitions are generally those with no nearby options for switching SEINs within the same firm.

One potential mechanism that can reconcile all these patterns is as follows: many workers develop valuable firm-specific skills that can only be fully exploited by moving to another establishment where a position representing a promotion is available, but these workers' firms only have distant establishments, so the only viable path to promotion requires a long-distance move, which they only accept if the raise is large enough. This transition can either be applied for by a worker or requested (with the raise as a lure) by a firm who wishes to reallocate experienced staff to distant establishments. By contrast, those with underexploited occupation-specific rather than firm-specific skills will generally be able to find *some* nearby firm with a high valuation of these skills, so that long-distance firm transitions are made even less frequently.

However, we cannot rule out a second mechanism in which search and/or recruiting costs are large but rise more slowly with distance for within-firm than between-firm transitions, perhaps due to low cost channels for conveying information about internal vacancies (e.g. companywide e-mails). Thus, workers are more likely to hear about distant job opportunities and identify the few worthwhile ones if they are within-firm. These two mechanisms are hard to distinguish in part because they complement one another (Lazear, 2009; Papageorgiou, 2018). Lower within-firm search costs of finding qualified but distant workers enables workers and firms to identify mutual gains from long-distance transitions that better utilize firm-specific skills/experience.

5.4 Evaluating the Magnitude of Sorting and Selection Biases

The validity of our estimates of earnings gains from more proximate BEM access requires that, conditional on controls, other earnings growth determinants are orthogonal to the other-establishment employment shares in each distance bin. Here we investigate several sources of potential bias.

Because the lion's share of variation in employment shares by distance bin is between firms

or (to a lesser extent) between years within firm, our inclusion of firm-year fixed effects in all our estimating equations to reduce sorting bias also removes considerable identifying variation. Thus, column 1 of Table 6 uses firm rather than firm-year fixed effects, so that identifying variation in average earnings gains across years within firm is included. The $BEM\ Access$ coefficients continue to monotonically increase as one considers closer distance bins, but are now generally about 20% smaller than before, suggesting that firms that are geographically expanding within the sample are delivering faster earnings growth in later sample years. Column 2 replaces the firm fixed effects with controls for observed firm characteristics (bins of total employment and interactions between average pay bins and firm's international trade engagement status).[17] The $BEM\ Access$ coefficients become small, negative, and generally insignificant, suggesting that other sources of earnings growth that are correlated with firms' geographic scope would hide any effects of differential access to BEM opportunities in the absence of firm-year and particularly firm fixed effects.

The remaining potential bias stems from non-random sorting of workers to current establishments within their firms and correlation between establishment- and location-specific components of earnings growth and establishments' relative positions in their firms' establishment networks.

Our baseline controls mostly exhaust the information contained in the LEHD's few worker and establishment attributes. However, we explore the degree of selection on these observable characteristics as a rough guide to the possible correlation between $BEM\ Access$ shares and earnings-relevant unobserved establishment and worker characteristics (Altonji et al., 2005; Oster, 2019).

Column 2 of Table 6 displays coefficients from a simplified specification that omits establishment and worker characteristics but retains firm-year fixed effects, state-year-industry effects and county-year fixed effects. All $BEM\ Access$ coefficients differ from zero with 95% confidence, but the effects are much smaller and do not increase monotonically as one considers closer bins. Adding the establishment controls (col. 4) barely changes the estimates, even though the past employment and average pay growth rate controls in particular are strong predictors of earnings growth. This insensitivity suggests that unobserved establishment level factors may not be major drivers of endogeneity bias. In column 5 we add indicators for individual initial earnings deciles. Since greater baseline earnings limits the scope for growth, it strongly negatively predicts earnings

[17] International trade engagement status has 6 categories that reflect whether the firms export and import and their relationship with their trade partners.

growth, so that selection of higher earnings workers into centrally located establishments could dampen the distance gradient. Sure enough, adding these controls restores monotonicity of coefficients with distance bin proximity. Finally, comparing column 5 to our baseline specification in Table 3 isolates the impact of controlling for other demographic characteristics. All $BEM\ Access$ coefficient magnitudes increase by 40% or more, creating a much steeper distance gradient.

On one hand, these results suggest that selection into centrally located establishments is related to worker characteristics that predict future earnings gains, so that $BEMAccess$ shares may not be fully exogenous, even conditional on firm-year and county-year fixed effects and the other controls. On the other hand, suppose the signs of the correlations are the same between shares in closer distance bins and regression indices of observed and unobserved worker characteristics, respectively, as one might expect if firms allocate workers to establishments based on evaluations that reflect a mix of characteristics from both sets. Then the true coefficient profile would feature an even steeper distance gradient than we have estimated. This suggests that our estimates may even understate how differential BEM access contributes to earnings differences.

To further assess the scope for selection bias from non-random worker sorting conditional on our baseline controls, we add an additional set of controls and run two placebo tests.

Column 1 of Table 7 replaces the worker-level demographic controls with their establishment averages. Altonji and Mansfield (2018) suggest that such aggregated controls can remove bias from sorting on unobserved worker characteristics by spanning the space of establishment amenities that drive such sorting. The coefficients are nearly unchanged, shrinking by 0 to 5%.

The first placebo test (col. 4 of Table 7) examines whether the current $BEM\ Access$ shares predict earnings growth over the previous 5 years (relative to a $t-6$ baseline) for newly hired workers. The idea behind the test is that current firm-specific BEM options should not predict earnings growth prior to the worker's arrival unless workers with a persistent unobserved ability to be promoted faster tend to be assigned to more or less central establishments within their new firm. To implement this test, we include all workers with sufficiently long prior earnings histories in order to estimate reasonable firm-year fixed effect values, but we interact the $BEM\ Access$ coefficients with a new hire indicator to isolate the test's relevant subpopulation. The coefficients are generally small, inconsistent in sign, and statistically insignificant at the 5% level except for the 0-10 distance bin. Its negative coefficient suggests that, if anything, the value of nearby BEM

access is understated, since past earnings growth positively predicts future growth conditional on our other controls. Thus, we do not find evidence of selection of workers with persistent ability to garner larger raises into establishments with more proximate BEM opportunities. Note that the absence of a pattern here is not driven by focusing on zero-tenure workers. Running our baseline specification on the same sample with the same interactions with the firm-switcher indicator (col. 3) produces roughly the same pattern as our original results.

The second placebo test uses a firm rather than SEIN transition indicator as the outcome in our first-stage specification (2). If firms' more central establishments tend to hire workers who are better able to attract or move to job offers regardless of whether they are within the same firm, then large shares of other-SEIN but within-firm employment at nearby locations might also predict higher firm transition rates. Column 6 shows the opposite. This suggests possible crowd-out: workers may not bother to seek jobs at other firms if they have many potential within-firm promotion opportunities at nearby establishments that do not require moving/search/training costs. Comparing the $BSM\ Access$ coefficients for SEIN vs. firm mobility suggests that up to 50% of access-induced SEIN mobility comes at the expense of firm mobility.

Next, we consider remaining bias from omitted location-specific earnings trends or shocks that are either specific to an industry or small area within a county. Our baseline specification includes county-by-year fixed effects, so remaining concerns stem from relationships between within-county establishment location, distance bin shares, and earnings growth.

Column 3 replaces county×year and state×industry×year fixed effects with county×industry ×year fixed effects. Adding finer fixed effects reduces $BEMAccess$ coefficient sizes by around 20% on average, but retains the pattern of increasing coefficients with closer distance. Smaller coefficients could reflect the removal of a slight bias from correlation between industry×county shocks and the network centrality of establishments; however, they may simply reflect the changing industry composition of residual $BEMAccess$ variation in the presence of distance gradient heterogeneity by industry (see Section 5.7), since finer fixed effects primarily remove variation from 4-digit industries less likely to have multiple firms per industry-county combination.

Finally, we construct a placebo in which we replace the worker's own $BEM\ Access$ shares with those of another, randomly chosen worker at a different multi-establishment firm in the same census tract. Any correlation between a different firm's employment distance distribution and

the worker's own earnings growth would indicate a common geographic component of distance shares and earnings growth. All the $BEM\ Access$ coefficients are tiny (Table 7 col. 5), indicating that common sub-county location shocks are not a meaningful source of bias.[18]

5.5 Assessing Robustness to Alternative Exposure Measures

The distance bin employment shares that we use as measures of access to BEM opportunities impose that the creation of a large nearby establishment at a large firm is equivalent to the creation of a small nearby establishment at a small firm. However, one might imagine that a worker might benefit more from the creation of a greater number of local jobs for the worker to apply to even if it represents the same shift in the local share of firm-wide employment.

Thus, column 1 of Table 8 reports results from a specification that replaces employment shares with logs of job counts at the firm's establishments within each distance bin. While there is faint evidence that a greater local job count increases expected growth, the distance profile is much weaker and less consistent in pattern than for the baseline specification. Column 2 considers a "horse-race" specification that includes both log counts and firm-wide employment shares by distance bin. Log counts have almost no predictive power conditional on shares, while higher shares of proximate jobs still strongly predict greater earnings growth. The distribution of log job counts predicts SEIN mobility somewhat better (col. 3), but again the relationship weakens once we control for shares (col. 4), which nearly retain the coefficient pattern of the baseline SEIN mobility specification. One possible explanation for the weak predictive power of the distance distribution of job counts is that as firms grow, they become more occupationally differentiated, so that a smaller share of its jobs are relevant for any given worker.

Thus, in an effort to better capture access to relevant jobs, in column 5 we calculate $BEM\ Access$ only among jobs that pay at least as much as the worker's current job (i.e. same earnings decile or higher). The $BEM\ Access$ coefficients are similar to those of our baseline, in part because the shares of higher-paying jobs and all jobs in each distance bin are very highly correlated, since different establishments often have very similar earnings distributions to each other. This collinearity

[18]Note that these coefficients' standard errors are an order of magnitude smaller, so that a couple coefficients are statistically significantly different from zero despite their economic unimportance. This is because there is far more residual variation in distance bins with which to identify these coefficients due to a weak correlation between the firm-year fixed effect of the worker's actual firm and the spatial employment distribution of their tract neighbor's firm.

undermines our ability to assess which job opportunities are the relevant ones.

We also consider a specification that uses the share of establishments rather than the share of employment in each distance bin. This specification shows remarkably similar patterns of coefficients by distance bin to the employment share specification for both the earnings and SEIN mobility outcomes (columns 6 and 8). Again, the fact that different establishments of the same firm tend to have similar sizes prevents us from distinguishing between these two access measures.

Finally, column 7 shows that our baseline 5-year growth results are nearly unchanged when we use the second rather than first worker-to-establishment assignment draw provided by the Census Bureau's unit-to-worker file.[19] This insensitivity is partly because establishment assignments are known with certainty for the 43% of multi-SEIN workers whose SEIN contains only one SEINUNIT, but also because other plausible assignments are usually nearby establishments that are also close to the worker's residence (e.g. an equidistant Starbucks in a different direction), causing negligible mismeasurement of the $BEMAccess$ shares.

5.6 Assessing Robustness to Alternative Earnings Growth Measures

Our preferred earnings growth measure, mean annual earnings over a chosen window as a share of base year earnings, was chosen for its simplicity, comparability across windows, and accuracy in capturing how streams of pay raises and cuts alter a worker's cumulative earnings relative to their established earnings level. However, Table 9 reports estimates of our baseline specification (1) based on various alternative growth measures over a 5-year window.

Column 1 uses an unweighted average of year-to-year earnings growth. Updating the earnings base each year considerably shrinks the sample mean. However, as shares of the sample mean, the coefficients are comparable to the baseline specification (e.g. 24.5% vs. 27.9% for the 0-10 mile bin). To ease comparison, note that the predicted 0.75% extra growth per year for workers from shifting all their firms' employment from 500+ miles away to within 10 miles, if applied five years in a row, would increase 5-year average annual earnings by $\frac{1.0075+1.0075^2+1.0075^3+1.0075^4+1.0075^5}{5} - 1 = 2.27\%$ relative to the base year, close to the 2.67% value from the baseline specification. The remaining difference is because averages of year-to-year growth do not assign greater weight to raises that arrive earlier (and can be enjoyed longer). For example, a worker who earns \$20,000 in year t

[19] See Appendix A.4 for more detail on the worker-establishment assignment in the LEHD.

and receives a $20,000 raise in $t+1$ but no further pay changes over the next four years exhibits the same average year-to-year growth (20%) as one with the same $20,000 base earnings but who receives his/her $20,000 raise in year $t+5$, despite $80,000 more in total 5-year earnings. Our baseline measure assigns 5-year growth rates of 100% and 20% to the two workers.

Column 2 calculates the growth rate using the end-of-window earnings divided by baseline earnings: $\frac{Y_{t+5}}{Y_t} - 1$. This measure has the opposite problem of overvaluing end-of-window raises: it assigns the same two hypothetical workers 5-year growth rates of 100%. Unsurprisingly, its $BEM\ Access$ distance gradient is generally 1.6 to 1.9 times steeper than our baseline.

Columns 3-5 consider three other alterations to our baseline growth measure: using two years ($t-1$ and t) to form the baseline, discounting earnings at a 3% rate each year to better approximate the PDV of future earnings changes, and winsorizing 5-year growth at 400% rather than 200%. None of these alternatives meaningfully changes the estimates relative to the baseline.

5.7 Heterogeneous Effects

The various panels of Figure 6 and the various columns of Appendix Tables A.8-A.11 explore how the sensitivity of earnings gains and SEIN mobility to more proximate BEM access varies across categories of several other firm and worker characteristics. Here we provide a brief summary of the main takeways, and relegate a full discussion of such heterogeneity to Appendix A.1.

First, a glance from afar at Figure 6 reveals that larger shares of one's firm's jobs at closer establishments predict both larger earnings increases and greater SEIN transition probabilities for the vast majority of worker and firm subpopulations we consider. This demonstrates that our baseline results are generally representative of most groups rather than driven by unrealistically steep distance profiles for one small group. Furthermore, although not perfectly aligned, subpopulations that exhibit greater earnings sensitivity to the proximity of BEM opportunities also tend to show greater sensitivity for SEIN mobility. This provides further suggestive evidence that establishment transitions are the primary mechanism generating earnings gains rather than other earnings-relevant unobserved worker, establishment, or location attributes correlated with distance bin shares of employment at other establishments. It also suggests that BEM is generating considerable value for firms, since they seem to be willing to pay more to facilitate these transfers.

More specifically, we find that sensitivity of both earnings and SEIN mobility to more proxi-

mate BEM access is about 50% and 100% larger, respectively, among firms with over 100 SEINs or establishments relative to those operating only a few. Thus, instead of treating job counts and job shares at different distance bins as competing access measures, these findings argue for treating the scale and proximity of BEM opportunities as complementary. We also find far larger earnings coefficients for closer distance bins' shares among higher paid workers (relative to the full U.S. or relative to their co-workers) and slightly larger coefficients among higher paying firms, consistent with higher productivity firms and workers placing greater value on finding optimal job matches.

Though industry-specific profiles are often noisy due to insufficient support in BEM access shares across all distance bins, we find consistent evidence of earnings growth increases with more proximate access in manufacturing, wholesale/retail, information, finance, and leisure & hospitality, suggesting that our results are not being driven by a single industry.

Interestingly, though workers older than 55 are relatively less sensitive to more proximate BEM access, moving from 0 to 100% of within-firm employment within 10 miles still increases their earnings growth by 1.8%, while their overall mean growth is -1.1%. This underscores the fact that older workers have few alternative paths to earnings growth. In particular, their rate of entity transitions is only ∼30% smaller than for 20-30 or 30-40 year old workers, compared to a 50-70% reduction in firm transition rate. Finally, we find negligible differences in BEM access sensitivity by gender for either outcome, and limited (and noisily estimated) heterogeneity by race/ethnicity.

6 Estimating National Between-Establishment Mobility Rates

In this section we describe how we construct our conservative estimate of the overall share of U.S. workers who switch establishments within their firms each year: 1.45%. Our goal is to estimate the frequency of two kinds of unobserved job transitions: 1) transitions between establishments within the same SEIN, and 2) SEIN transitions from in-sample states to out-of-sample states. Table 10 details the contributions of each of our steps to the final estimate. We summarize our approach here, and provide a full description in Appendix A.2.

Starting with 1), we exploit the fact that we observe the universe of establishment locations and sizes in our sample states, regardless of SEIN, and that we have estimates of how changes in the scale and geographic distribution of within-firm employment drive between-SEIN job mobility.

Because we find marked heterogeneity in SEIN mobility rates by firm size category, we use as our starting point predicted values from the version of our SEIN mobility regression that features separate distance bin profiles for each out-of-SEIN employment bin (see Table A.9).

These naive predicted values contain four sources of mismeasurement when used to capture predicted rates of all BEM (not just between-SEIN mobility). First, our $BSM\ Access$ measures for the SEIN mobility outcome use distance bin shares of firm employment only among establishments in other SEINs, excluding other within-SEIN establishments. Second, we capture heterogeneity in $BSM\ Access$ sensitivity using bins of other-SEIN employment rather than firmwide employment. We address these by replacing the $BSM\ Access$ measures and employment bins with their firmwide $BEM\ Access$ analogues when re-computing predicted values, which imposes that the relationships between $BSM\ Access$ shares and SEIN mobility by other-SEIN employment bin extend to the corresponding firmwide $BEM\ Access$ relationships. This may be conservative if greater similarity between same-SEIN establishments' positions and the worker's own produces a steeper distance profile. These two adjustments increase the predicted share of workers at multi-SEIN firms who remain in sample states that engage in BEM from 1.34% to 1.62%.

Third, the component of the naive predicted values contributed by the other control variables has a mean that is scaled to fit observed SEIN rather than establishment mobility rates. To re-scale this component, we regress this component on the same controls except for the firm-year fixed effects, which we replace with indicators for categories of both within-SEIN and out-of-SEIN employment. These indicators' coefficients capture the (conditional) relationship between firm scale and SEIN mobility that was previously absorbed by the firm-year fixed effects.

As before, we replace the other-SEIN employment categories with other-establishment employment categories, which requires a similar assumption extrapolating the relationship between other-SEIN employment and SEIN mobility to their firmwide analogues. We also zero out all of the within-SEIN employment indicators, since these captured the role of unobservable "outside options" for SEIN mobility that are now reflected in the other-establishment size categories. Adding the change in this auxiliary regression's predicted values created by these adjustments yields a predicted annual rate of establishment mobility for workers at multi-SEIN firms of 1.81%.

Fourth, we use the same procedure to predict BEM rates for workers at multi-unit, single SEIN (MUSS) firms who were not at risk of switching SEINs, since we observe all the variables necessary

to form their predicted values. We estimate an annual BEM rate for such workers of 1.56%.

For workers at multi-SEIN firms, we must also add an estimate of the rate of SEIN transitions to out-of-sample states. Because the LEHD reports the number of states in which a worker received pay among all 50 states, we can infer the share of all multi-SEIN leavers from our sample states who take new jobs outside the sample: 9.0%. Next, we assume that the share of between-state transitions among multi-SEIN workers that are within-firm is the same for moves to out-of-sample states as to other in-sample states: 30.1%. Multiplying these two shares and the multi-SEIN job leaving rate (19.5%) and adding to our previous total suggests that 2.31% of multi-SEIN workers engage in BEM each year. Since multi-SEIN and MUSS workers make up 56.9% and 6.6% of U.S. workers, this implies an annual BEM rate of 1.45% among U.S. workers in our sample states, and that 9.7% of all establishment transitions are within-firm. Since our sample states are scattered around the U.S., we assume the same BEM rate in the out-of-sample states, so that about 2.3 million workers switch establishments within firms per year.

Finally, because SEIN transition rates vary strongly by firm size, we estimate BEM rates separately by size category. The adjustments are trivial at small firms but substantial at the largest firms. We find that BEM rates are 2.8% among the 33.0% of workers at firms with >5,000 employees and 1.6% among the 13.4% of workers at 1001-5000 employee firms. Within-firm transitions account for 19.6% and 10.0% of all employment location changes among these worker categories, and 35.6% and 17.9% of changes that cross state lines. Thus, this exercise reinforces the finding that internal labor markets within large firms drive a large share of the establishment mobility reported in public statistics for nearly half the workforce, especially among long distance transitions.

7 Conclusion

This paper analyzes an overlooked but important aspect of U.S. labor markets: changes in workers' primary establishments within firms. We provide novel measurements showing that at least 0.76% and likely around 1.45 % of U.S. workers switch establishment locations within the same firm each year, accounting for 9.7% percent of all worker changes in employment location. We show that within-firm establishment transitions are far more likely than between-firm transitions to exhibit a long distance between origin and destination establishments, suggesting that sufficient

value is created by reallocating workers to overcome mobility frictions that would preclude analogous transitions for firm-switchers. Nonetheless, remaining geographic mobility frictions are substantial enough to exploit by using variation among same-firm workers in their establishments' distribution of distances to other within-firm positions to estimate the effect of greater access to potential establishment-switching opportunities on earnings growth. We find that a worker at the 90th percentile of our proximity- based measure of access can expect to earn about 2% more per-year over five years relative to a 10th percentile worker with the same base year pay.

The fact that firms are generally paying a premium to facilitate worker reallocations suggests that increased firm productivity or lower recruiting costs rather than worker preferences likely accounts for most of the underlying surplus created by such transitions. We show that establishment mobility is concentrated among early- to mid-career workers with higher initial pay and among large and higher-paying firms, and that these types of workers and firms also exhibit stronger earnings growth responses to greater access to potential establishment switching opportunities.

These findings are consistent with models suggesting that high skill workers and high productivity firms face greater returns to finding optimal matches (e.g. Teulings and Gautier, 2004). However, further research is necessary to determine whether the gains from establishment reallocation of such workers are driven by high payoffs to efficient allocation of firm-specific human capital or instead by high payoffs to avoiding recruiting costs for hard-to-fill positions.

Finally, analysis of the interplay between establishment mobility and increased use of remote work is a particularly compelling extension of this paper's research. Remote work dramatically reduces costs of re-allocating workers when their most desired or highest productivity task changes, which may increase the value of working at a large firm that operates many teams with many projects in many markets. At the same time, remote work makes recorded assignments to establishment locations less reliable (to the extent physical locations exist at all). This may undermine researchers' ability to detect such mobility across tasks, teams, and markets in administrative data.

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8 Tables and Figures

Table 1: BEM Access Levels and SEIN and Firm Mobility Rates and Distance Distributions among Workers at Multi-Unit and Multi-SEIN firms

		Overall	Multi-Unit	Multi-SEIN
			Population	
Worker Share	Total	1	0.635	0.568
Share by Distance	0-10 miles		12.4%	9.3%
	10-25 miles		6.8%	5.2%
	25-50 miles		5.2%	4.3%
	50-100 miles		6.0%	5.4%
	100-500 miles		22.6%	23.4%
	500+ miles		47.0%	52.5%
			SEIN Mobility	
Rate	Total	0.008	0.012	0.013
Share by Distance	0-10 miles		24.5%	24.4%
	10-25 miles		14.8%	14.8%
	25-50 miles		8.6%	8.5%
	50-100 miles		8.2%	8.1%
	100-500 miles		21.2%	21.2%
	500+ miles		21.1%	21.2%
			Firm Mobility	
Rate	Total	0.126	0.122	0.122
Share by Distance	0-10 miles	34.9%	31.2%	30.9%
	10-25 miles	22.5%	21.8%	21.8%
	25-50 miles	11.7%	12.1%	12.0%
	50-100 miles	9.3%	10.6%	10.5%
	100-500 miles	15.5%	18.1%	18.5%
	500+ miles	5.2%	5.5%	5.6%

Source: LEHD 2014 snapshot.
Notes: "Worker Share": Share of all worker-year observations in the baseline sample whose primary firm belongs to the subpopulation defined by the column-label. "BEM Access": The distance shares in the first panel capture the average among all worker-year observations of the share of workers at other establishments within the worker's firm whose establishments are located in each distance bin relative to the worker's own establishment. "SEIN Mobility Rate": Share of worker-years in which the worker transitions to a different primary SEIN within the same firm by the following year. "Firm Mobility Rate": Share of worker-years in which the worker transitions to a different primary firm by the following year. "Multi-Unit" and "Multi-SEIN": Set of workers whose firms feature multiple establishments (units) and SEINs (State Employer Identification Numbers), respectively. "Share of Other-Establishment Employment by Distance Bin": Average share of employment at other within-firm establishments at the same firm whose distance from the worker's own establishment falls into the row's distance bin within the column's subpopulation. "Share of SEIN Transitions by Distance Bin": Share of all within-firm SEIN transitions within the column's subpopulation whose distance between the worker's baseline and new establishment falls into the row's distance bin. "Share of Firm Transitions by Distance Bin": Share of all transitions between primary firms within the column's subpopulation whose distance falls into the row's distance bin.

Table 2: Heterogeneity in Frequency of SEIN Mobility within Firms across Worker and Firm Subpopulations

	Firm Heterogeneity					Worker Heterogeneity				
	Firm Size					Earnings				
	1-100	101-500	501-1K	1K-5K	>5K	Q1	Q2	Q3	Q4	Q5
Full Sample Share	0.324	0.154	0.057	0.134	0.330	0.106	0.225	0.226	0.215	0.228
Prob(Multi-SEIN)	0.105	0.441	0.673	0.843	0.954	0.438	0.477	0.533	0.612	0.715
SEIN Mobility — MS	0.008	0.007	0.008	0.010	0.017	0.009	0.010	0.011	0.014	0.019
SEIN Mobility - All	0.001	0.003	0.005	0.008	0.016	0.004	0.005	0.006	0.008	0.013
Firm Mobility - All	0.132	0.145	0.139	0.128	0.108	0.211	0.164	0.119	0.097	0.082
	Wage					Tenure				
	Q1	Q2	Q3	Q4	Q5	Hires	1-2 yrs	3-5 yrs	>5 yrs	
Full Sample Share	0.200	0.200	0.200	0.200	0.200	0.171	0.295	0.231	0.303	
Prob(Multi-SEIN)	0.379	0.471	0.539	0.660	0.794	0.557	0.563	0.580	0.572	
SEIN Mobility — MS	0.008	0.010	0.012	0.013	0.015	0.012	0.015	0.015	0.012	
SEIN Mobility - All	0.003	0.005	0.006	0.009	0.012	0.007	0.008	0.008	0.007	
Firm Mobility - All	0.187	0.141	0.113	0.097	0.091	0.186	0.187	0.106	0.048	
	Industry					Age				Sex
	Min.	Const.	Manuf.	Trade & Trans.	Infor.	< 30	30-39	40-54	55 +	M	F
Full Sample Share	0.012	0.066	0.141	0.224	0.031	0.258	0.241	0.363	0.138	0.454	0.546
Prob(Multi-SEIN)	0.556	0.266	0.702	0.647	0.845	0.564	0.584	0.577	0.528	0.561	0.575
SEIN Mobility — MS	0.020	0.021	0.008	0.013	0.020	0.014	0.015	0.013	0.010	0.013	0.014
SEIN Mobility - All	0.011	0.006	0.006	0.009	0.017	0.009	0.009	0.007	0.005	0.008	0.008
Firm Mobility - All	0.116	0.152	0.084	0.123	0.117	0.201	0.132	0.093	0.062	0.128	0.124
	Industry (Cont)					Race				
	Fin. & Real Estate	Prof. Bus. Serv.	Educ. & Health	Leis. & Hosp.	Other Serv.	White		Black	Asian/ Pac. Is	Other
						N-Hisp	Hisp			
Full Sample Share	0.082	0.147	0.178	0.076	0.031	0.670	0.139	0.098	0.065	0.028
Prob(Multi-SEIN)	0.694	0.621	0.433	0.415	0.262	0.563	0.538	0.644	0.586	0.558
SEIN Mobility — MS	0.017	0.015	0.010	0.014	0.011	0.014	0.011	0.013	0.014	0.013
SEIN Mobility - All	0.012	0.009	0.004	0.006	0.003	0.006	0.006	0.008	0.008	0.007
Firm Mobility - All	0.120	0.171	0.105	0.180	0.122	0.119	0.144	0.147	0.119	0.149
	Number of Establishments					Within-Firm Earnings				
	2-3	4-10	11-25	26-100	>100	Q1	Q2	Q3	Q4	Q5
Full Sample Share	0.072	0.100	0.084	0.123	0.256	0.137	0.133	0.133	0.133	0.139
Prob(Multi-SEIN)	0.780	0.765	0.840	0.938	0.976	0.786	0.797	0.797	0.797	0.780
SEIN Mobility — MS	0.006	0.007	0.010	0.013	0.018	0.010	0.012	0.013	0.015	0.019
SEIN Mobility - All	0.005	0.005	0.008	0.012	0.018	0.008	0.009	0.010	0.012	0.015
Firm Mobility - All	0.136	0.128	0.128	0.117	0.116	0.172	0.132	0.115	0.104	0.093

Source: LEHD 2014 snapshot.
Notes: "Full Sample Share": Share of all worker-year observations from the baseline sample whofalls into the category defined by the column label. "Prob(Multi-SEIN)": Worker-year-weighted share of firms in the subpouplation defined by the column label who operate multiple SEINs. "SEIN Mobility—MS.": Annual SEIN mobility rate among workers at multi-SEIN firms within the firm category defined by the column label. "SEIN Mobility-All.": Annual SEIN mobility rate among workers at any firm within the firm category defined by the column label (including those in single-SEIN firms not at risk of changing SEINs). "Firm Mobility-All.": Annual Firm mobility rate among workers at any firm within the firm category defined by the column label. "Tenure": Years since the worker was hired by their current firm. "Q1"-"Q5" = Quintiles of the relevant worker-year-weighted distribution (Worker Earnings or Firm-Average Pay). Supersector labels: "Min."- Natural Resources and Mining; "Const."- Construction; "Manuf."- Manufacturing; "Trade & Trans"- Retail/Wholesale Trade, Transportation, and Utilities; "Infor."- Information; Fin. & Real Estate - Finance and Real Estate; "Prof. Bus. Serv."- Professional and Business Services; "Leis. & Hosp." - Leisure and Hospitality; "Other Serv." - Other Services. "N-Hisp"-Not Hispanic; "Hisp": Hispanic. "Within-Firm Earnings": Quintile of worker earnings within own firm's earnings distribution.

Table 3: Effects on Average Percent Change in Earnings of Greater Distance-Based Access to Opportunities for Between-Establishment Mobility over Various Time Windows

	Mean %Δ(Earnings)					Number of Quarters
	Full Year (Annualized)				Raw	
Distance Share	**1 yr**	**3 yrs**	**5 yrs**	**7 yrs**	**5 yrs**	**1 yr**
500+ miles	–	–	–	–	–	–
(s.d.= 0.381)						
100-499 miles	0.001	0.001	0.003	0.006†	0.004	0.018‡
(s.d.= 0.270)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
50-99 miles	0.001	0.004°	0.008†	0.012‡	0.013‡	0.039‡
(s.d.= 0.150)	(0.001)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
25-49 miles	0.002	0.007†	0.012‡	0.018‡	0.018‡	0.043‡
(s.d.= 0.142)	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
10-24 miles	0.005‡	0.011‡	0.017‡	0.025‡	0.028‡	0.048‡
(s.d.= 0.173)	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
0-9 miles	0.008‡	0.017‡	0.027‡	0.036‡	0.045‡	0.039‡
(s.d.= 0.265)	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
Controls						
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Establish. Charact.	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-State-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
County-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Predicted Effects						
Pred. Eff. at $\bar{X}$	0.001	0.004	0.006	0.009	0.010	0.017
Pred. Eff. at $\bar{X}$/med(Y)	0.210	0.184	0.191	0.220	0.314	0.004
Median Outcome	0.007	0.020	0.033	0.042	0.032	4.000
Mean Outcome	0.034	0.069	0.096	0.120	0.176	3.757
Obs.	74.6M	55.4M	40.4M	29.4M	40.4M	74.6M
R-squared	0.281	0.352	0.391	0.408	0.563	0.312

Source: LEHD 2014 snapshot.

Notes: The sample in a given column consists of all worker-years in which the worker is employed in a sample state in the base year and is observed with positive earnings at a firm in a sufficient share of the subsequent years within the outcome window given by the column label (next year for the 1 year outcome window, 2 of 3 years for the 3 year window, 3 of 5 years for the 5 year window, 5 of 7 years for the 7 year window. "Mean %Δ(Earnings)": Mean percent change in the worker's earnings across the years in the outcome window given by the column label relative to the baseline year. "Full-Year" vs. "Raw": Whether annualized or raw earnings in each year are used as the inputs to computing 5-year earnings growth. Annualized earnings use mean earnings among full quarters multiplied by 4. 'Number of Quarters": Number of quarters worked in $t+1$ is used as the outcome rather than earnings growth over the following 5 years. Control categories: "Demographics"- Indicators for categories of race (5), ethnicity (2), gender (2), firm tenure (4), age (4), and worker baseline earnings (9); "Establish. Charact.": Indicators for establishment size (5) and average pay categories (5), midpoint growth rates over prior 3 years of establishment employment and average pay, and the shares of within-SEIN positions at other establishments that fall in each distance bin for the first-stage regressions. "Firm-Year FE": indicator variables for each firm×year combination. "Sector-State-Year FE": Indicators for each combination of 4-digit NAICS code, U.S. State, and year. "County-Year FE": Indicators for each combination of county and year. "Pred. Eff. at $\bar{X}$": The predicted impact on the outcome of having the sample average shares of within-firm employment in each distance bin relative to having all within-firm employment 500+ miles away (which is the reference category in all columns). Clustered two-way standard errors by firm and work in parentheses.

‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table 4: Effects on SEIN Transition Rates of Greater Distance-Based Access to Opportunities for Between-Establishment Mobility over Various Time Windows

	$\mathbb{I}$(**SEIN Transition**)			
Distance Share	**1 yr**	**3 yrs**	**5 yrs**	**7 yrs**
500+ miles	–	–	–	–
(s.d.= 0.381)				
100-499 miles	0.009‡	0.017‡	0.020‡	0.024‡
(s.d.= 0.270)	(0.001)	(0.002)	(0.003)	(0.004)
50-99 miles	0.018‡	0.035‡	0.041‡	0.047‡
(s.d.= 0.150)	(0.001)	(0.003)	(0.004)	(0.005)
25-49 miles	0.027‡	0.053‡	0.064‡	0.071‡
(s.d.= 0.142)	(0.002)	(0.004)	(0.005)	(0.006)
10-24 miles	0.035‡	0.068‡	0.081‡	0.090‡
(s.d.= 0.173)	(0.002)	(0.004)	(0.005)	(0.006)
0-9 miles	0.038‡	0.074‡	0.089‡	0.099‡
(s.d.= 0.265)	(0.002)	(0.004)	(0.005)	(0.006)
Controls				
Demographics	Yes	Yes	Yes	Yes
Establish. Charact.	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes
Sector-State-Year FE	Yes	Yes	Yes	Yes
County-Year FE	Yes	Yes	Yes	Yes
Predicted Effects				
Pred. Eff. at $\bar{X}$	0.008	0.014	0.017	0.020
Mean Outcome	0.008	0.018	0.024	0.028
Obs.	44.3M	35.7M	27.4M	19.1M
R-squared	0.110	0.114	0.114	0.113

Source: LEHD 2014 snapshot.

Notes: The sample in a given column consists of all worker-years in which the worker is employed in a sample state in the base year and is observed with positive earnings at a firm in a sufficient share of the subsequent years within the outcome window given by the column label (next year for the 1 year outcome window, 2 of 3 years for the 3 year window, 3 of 5 years for the 5 year window, 5 of 7 years for the 7 year window. ""$\mathbb{I}$(SEIN Transition)": An indicator for whether the worker changed primary SEIN affiliation within the same firm between the observation year and the subsequent year. Control categories: "Demographics"- Indicators for categories of race (5), ethnicity (2), gender (2), firm tenure (4), age (4), and worker baseline earnings (9); "Establish. Charact.": Indicators for establishment size (5) and average pay categories (5), midpoint growth rates over prior 3 years of establishment employment and average pay, and the shares of within-SEIN positions at other establishments that fall in each distance bin for the first-stage regressions. "Firm-Year FE": indicator variables for each firm×year combination. "Sector-State-Year FE": Indicators for each combination of 4-digit NAICS code, U.S. State, and year. "County-Year FE": Indicators for each combination of county and year. "Pred. Eff. at $\bar{X}$": The predicted impact on the outcome of having the sample average shares of within-firm employment in each distance bin relative to having all within-firm employment 500+ miles away (which is the reference category in all columns). Clustered two-way standard errors by firm and work in parentheses.

‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table 5: Conditional Mean Earnings Impacts of Realized SEIN and Firm Transitions Relative to Remaining in One's SEIN over Various Time Windows: Overall and by Transition Distance Category

	Mean %Δ(Earnings)							
	Full Year (Annualized)					Raw	Full Year (Annualized)	
Distance Share	**1 yr**	**1 yr**	**3 yrs**	**5 yrs**	**7 yrs**	**5 yrs**	**1 yr**	**5 yrs**
SEIN transition	0.078‡	0.075‡	0.070‡	0.068‡	0.072‡	0.109‡		
	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.004)		
×500+ miles							0.117‡	0.098‡
							(0.006)	(0.004)
×100-499 miles							0.086‡	0.074‡
							(0.003)	(0.003)
×50-99 miles							0.068‡	0.061‡
							(0.004)	(0.004)
×25-49 miles							0.059‡	0.051‡
							(0.004)	(0.004)
×10-24 miles							0.054‡	0.052‡
							(0.004)	(0.004)
×0-9 miles							0.048‡	0.052‡
							(0.005)	(0.003)
Firm transition	0.061‡	0.046‡	0.060‡	0.058‡	0.062‡	0.103‡		
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)		
×500+ miles							0.085‡	0.095‡
							(0.004)	(0.004)
×100-499 miles							0.054‡	0.063‡
							(0.004)	(0.003)
×50-99 miles							0.043‡	0.054‡
							(0.004)	(0.004)
×25-49 miles							0.046‡	0.059‡
							(0.004)	(0.003)
×10-24 miles							0.045‡	0.059‡
							(0.004)	(0.003)
×0-9 miles							0.035‡	0.049‡
							(0.003)	(0.003)
Controls								
Demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Establish. Charact.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-State-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	74.6M	42.6M	31.6M	22.9M	16.4M	22.9M	42.6M	22.9M
R-squared	0.2851	0.1154	0.1953	0.2411	0.2662	0.4635	0.1157	0.2412

Source: LEHD 2014 snapshot.
Notes: Col. 1 reports the mean difference in earnings growth for the baseline sample among those switching SEINs or firms relative to SEIN stayers, conditional on baseline controls (see Section 4's equation (3)). Col. 2-7 restrict the sample to workers at multi-SEIN firms, and report impacts over different time windows (col. 2-5) and/or by transition distance category (col. 6-7). The samples for the 3, 5, and 7 year time windows require observed earnings in 2 of 3 years, 3 of 5 years, and 5 of 7 years. Table 3 defines the outcome variable and control variable categories. Standard errors clustered by firm and worker are in parentheses. ‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table 6: Using the Degree of Selection on Observable Characteristics to Assess Potential Endogeneity Threats to the Validity of BEM Access Causal Effect Estimates on the Average Percent Change in Worker's Earnings Across the Following 5 Years

Distance Share	Restrictive FEs		Restrictive Controls		
	Firm FE	Firm Charact.	Min.	Min. + Estab	Min.+ Inc. + Estab
500+ miles	–	–	–	–	–
100-500 miles	0.003	-0.001	0.004°	0.004°	0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
50-100 miles	0.005°	0.000	0.008†	0.007†	0.004
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
25-50 miles	0.011‡	-0.003	0.008†	0.008†	0.007°
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
10-25 miles	0.013‡	-0.004°	0.008†	0.007†	0.011‡
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
0-10 miles	0.022‡	0.000	0.012‡	0.014‡	0.019‡
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Controls					
Demographics	X	X	X	X	X
Income	X	X			X
Estab. Charact.	X	X		X	X
Firm Charact.		X			
Firm FE	X				
Firm-Year FE			X	X	X
Sector-State-Year FE	X	X	X	X	X
County-Year FE	X	X	X	X	X
Obs.	40.4M	40.4M	40.4M	40.4M	40.4M
R-squared	0.303	0.179	0.284	0.284	0.366

Source: LEHD 2014 snapshot.
Notes: Specification Labels: "Firm FE"- Replaces firm×year fixed effects with firm fixed effects; "Firm Charact."-Replaces firm×year fixed effects with indicators for firm size categories and for combinations of firm average pay category and firm trade status category (non-trader, arms-length importer only, arms-length exporter only, arms-length importer and exporter, related-party importer or exporter, related-party importer and exporter); "Min."- Minimal controls consisting of fixed effects as noted. "Min + Estab"- Minimal controls plus indicators for establishment size and average pay categories and midpoint growth rate over prior 3 years of establishment size and average pay. "Min + Inc. + Estab"- Minimal controls, establishment controls, and indicators for a worker's initial earnings decile. Clustered two-way standard errors by firm and worker in parentheses.
‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table 7: Using Supplementary Control Variables and Placebo Tests to Assess Potential Endogeneity Threats to the Validity of BEM Access Causal Effect Estimates

Distance Share	Mean %Δ(Earnings)					𝕀(Firm Transition)
	Supplementary Controls		Firm Switchers		Tract	
	Avg. Worker Char.	Ind × Cty Shocks	Baseline	Placebo	Placebo	Baseline
500+ miles	–	–	–	–	–	–
100-500 miles	0.003	0.001	-0.002	0.001	-0.002‡	-0.009‡
	(0.002)	(0.002)	(0.003)	(0.003)	(0.000)	(0.002)
50-100 miles	0.007†	0.005	-0.001	0.004	-0.001	-0.013‡
	(0.003)	(0.003)	(0.004)	(0.004)	(0.001)	(0.002)
25-50 miles	0.012‡	0.010†	0.007	0.002	-0.001	-0.015‡
	(0.003)	(0.004)	(0.004)	(0.005)	(0.001)	(0.003)
10-25 miles	0.016‡	0.014‡	0.010†	0.001	-0.003‡	-0.019‡
	(0.003)	(0.003)	(0.004)	(0.004)	(0.001)	(0.002)
0-10 miles	0.025‡	0.020‡	0.025‡	-0.014‡	-0.001	-0.018‡
	(0.003)	(0.003)	(0.004)	(0.004)	(0.001)	(0.002)
Controls						
Demographics	X	X	X	X	X	X
Income	X	X	X	X	X	X
Establish. Charact.	X	X	X	X	X	X
Estab. Worker Charact. Avg.	X					
SEIN Charact.						X
Firm Charact.	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X
Firm-Year FE	X	X	X	X	X	X
Sector-State-Year FE	X	X	X	X	X	X
County-Year FE	X	X	X	X	X	X
County-Sector-Year FE		X				X
Obs.	40.4M	40.4M	40.4M	21.9M	23.4M	44.3M
R-squared	0.296	0.403	0.392	0.336	0.243	0.162

Source: LEHD 2014 snapshot.

Notes: Specification Labels: "Supplementary Controls - Avg. Worker Char.": replaces worker characteristic indicators with establishment averages of these indicators. "Supplementary Controls - Ind × Cty Shocks": Replaces county × year and state × industry × year fixed effects with county × industry × year fixed effects. "Tract Placebo": a worker's actual within-firm employment shares by distance bin are replaced with those of another randomly chosen worker from a different multi-unit firm within the same census tract. "Firm Switchers Placebo": the outcome is the worker's average percent change in earnings over the previous 5 years relative to a baseline from 6 years ago, the worker's within-firm employment shares by distance bin are interacted with an indicator for whether the worker is a new hire at the firm, and the sample consists of workers who worked in both the current year and 6 years earlier and 3 of the 5 intervening years. "Firm Switchers Baseline": Same sample years and interactions with employment distance shares as the "Firm Switchers Placebo", but using the worker's forward-looking earnings as the outcome rather than their earnings growth at the previous firm. "𝕀(Firm Transition)": The SEIN transition indicator outcome is replaced with a Firm Transition outcome in the "first stage" specification (2). The share of workers in establishments over 500 miles away is the reference category. Clustered two-way standard errors by firm and worker in parentheses. ‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table 8: Exploring Alternative Measures of Distance-Based Access to BEM Opportunities

	Mean %Δ(Earnings)		𝕀(SEIN Transition)		Mean %Δ(Earnings)			𝕀(SEIN Transition)
Distance	Log-Level	Both	Log-Level	Both	Worker Exposure	Establish. Exposure	2nd U2W Unit Exposure	Establish. Exposure
Log(Count)								
500+ miles	-0.0003	-0.0005	0.0005‡	0.0004°				
	(0.000)	(0.000)	(0.000)	(0.000)				
100-500 miles	0.0001	0.0001	0.0003‡	0.0002°				
	(0.000)	(0.000)	(0.000)	(0.000)				
50-100 miles	0.0000	-0.0001	0.0005‡	0.0004‡				
	(0.000)	(0.000)	(0.000)	0.000				
25-50 miles	0.0004‡	0.0003†	0.0010‡	0.0008‡				
	(0.000)	(0.000)	0.000	0.000				
10-25 miles	0.0009‡	0.0006‡	0.0014‡	0.0012‡				
	(0.000)	(0.000)	0.000	(0.000)				
0-10 miles	-0.0006	0.0001	0.0002	0.0010				
	(0.000)	(0.000)	(0.001)	(0.001)				
Shares								
500+ miles		–		–	–	–	–	–
100-500 miles		0.005		0.006°	0.000	0.003	0.003	0.010‡
		(0.003)		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
50-100 miles		0.007°		0.012‡	0.004	0.007°	0.006°	0.019‡
		(0.003)		(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
25-50 miles		0.011†		0.016‡	0.010†	0.015‡	0.015‡	0.028‡
		(0.004)		(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
10-25 miles		0.012†		0.019‡	0.018‡	0.016‡	0.017‡	0.035‡
		(0.004)		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
0-10 miles		0.019‡		0.019‡	0.027‡	0.028‡	0.025‡	0.035‡
		(0.004)		(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Controls								
Baseline Controls	X	X	X	X	X	X	X	X
Baseline FEs	X	X	X	X	X	X	X	X
Obs.	40.4M	40.4M	44.3M	44.3M	40.4M	40.4M	40.4M	44.3M
R-squared	0.392	0.392	0.110	0.110	0.392	0.392	0.391	0.110

Source: LEHD 2014 snapshot.

Notes: See Table 1 notes for outcome definitions. Column Specifications: "Log-Level": Measures access to between-establishment mobility (BEM) opportunities via the logarithm of the count of employees at other establishments (in any of the firm's SEIN for the earnings outcome, in other SEINs within the firm for the SEIN mobility outcome) within each of the distance bins defined by row labels (relative to the worker's own establishment); "Both": Includes both the share of workers and the log count of workers at other establishments within each distance bin as measures of access to BEM opportunities. "Worker Exposure": Restricts the shares of other-establishment workers in each distance bin to be calculated only among workers in an earnings decile at least as high as the worker's own. "Establish. Exposure": Replace the share of other-establishment employment in each distance bin (or other-SEIN) employment for the SEIN mobility outcome) with the share of other establishments (or other-SEINs' establishments) within each distance bin. "2nd U2W Unit Exposure": Assigns the worker's establishment based on the unit-to-worker file's 2nd rather than first implicate, and computes distance-based exposure shares accordingly. "Baseline Controls" and "Baseline FEs": See Table 1 notes. Clustered two-way standard errors by firm and worker in parentheses.

‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table 9: Robustness of Earnings Growth Impacts of Superior BEM Access to Alternative Measures of Earnings Growth

	Mean %Δ(Earnings)				
	Avg Annual Growth	**Begin-to-End Growth**	**t and $(t-1)$ Base**	**PDV**	**Less Winsorizing**
Distance Share	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
500+ miles	–	–	–	–	–
100-499 miles	0.002†	0.008†	0.005†	0.003	0.003
	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)
50-99 miles	0.005‡	0.017‡	0.011‡	0.008†	0.007°
	(0.001)	(0.004)	(0.003)	(0.003)	(0.003)
25-49 miles	0.006‡	0.023‡	0.016‡	0.013‡	0.011‡
	(0.001)	(0.004)	(0.003)	(0.003)	(0.003)
10-24 miles	0.009‡	0.032‡	0.020‡	0.017‡	0.016‡
	(0.001)	(0.004)	(0.003)	(0.003)	(0.003)
0-9 miles	0.011‡	0.044‡	0.030‡	0.027‡	0.028‡
	(0.001)	(0.004)	(0.003)	(0.003)	(0.003)
Controls					
Demographics	Yes	Yes	Yes	Yes	Yes
Establish. Charact.	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes
Sector-State-Year FE	Yes	Yes	Yes	Yes	Yes
County-Year FE	Yes	Yes	Yes	Yes	Yes
Predicted Effects					
Pred. Eff. at $\bar{X}$	0.001	0.012	0.008	0.006	0.006
Pred. Eff. at $\bar{X}$/med(Y)	0.097	0.294	0.189	0.193	0.184
Median Outcome	0.015	0.039	0.040	0.033	0.033
Mean Outcome	0.031	0.115	0.102	0.097	0.101
Obs.	40.4M	40.4M	40.4M	40.4M	40.4M
R-squared	0.318	0.370	0.372	0.392	0.381

Source: LEHD 2014 snapshot.
Notes: Column Specifications: "Avg. Annual Growth": The average of year-to-year earnings growth over the 5 year window. "Begin-to-End Growth": The difference between year $t+5$ earning and year t earnings as a share of year t earnings. "t and $(t-1)$ Base": Mean earnings in years $t+1$ through $t+5$ relative to mean earnings in years $t-1$ and t as a share of mean earnings in years $t-1$ and t. "PDV": Earnings in each year $t+1$ through $t+5$ are converted to their year t present discounted value using a 3% interest rate prior to constructing our baseline growth measure. "Less Winsorizing": Earnings growth for any given individual over the following 5 years is winsorized at 400% growth rather than 200% growth. Controls and Predicted Effects: See Table 3 notes. Clustered two-way standard errors by firm and worker in parentheses.
‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

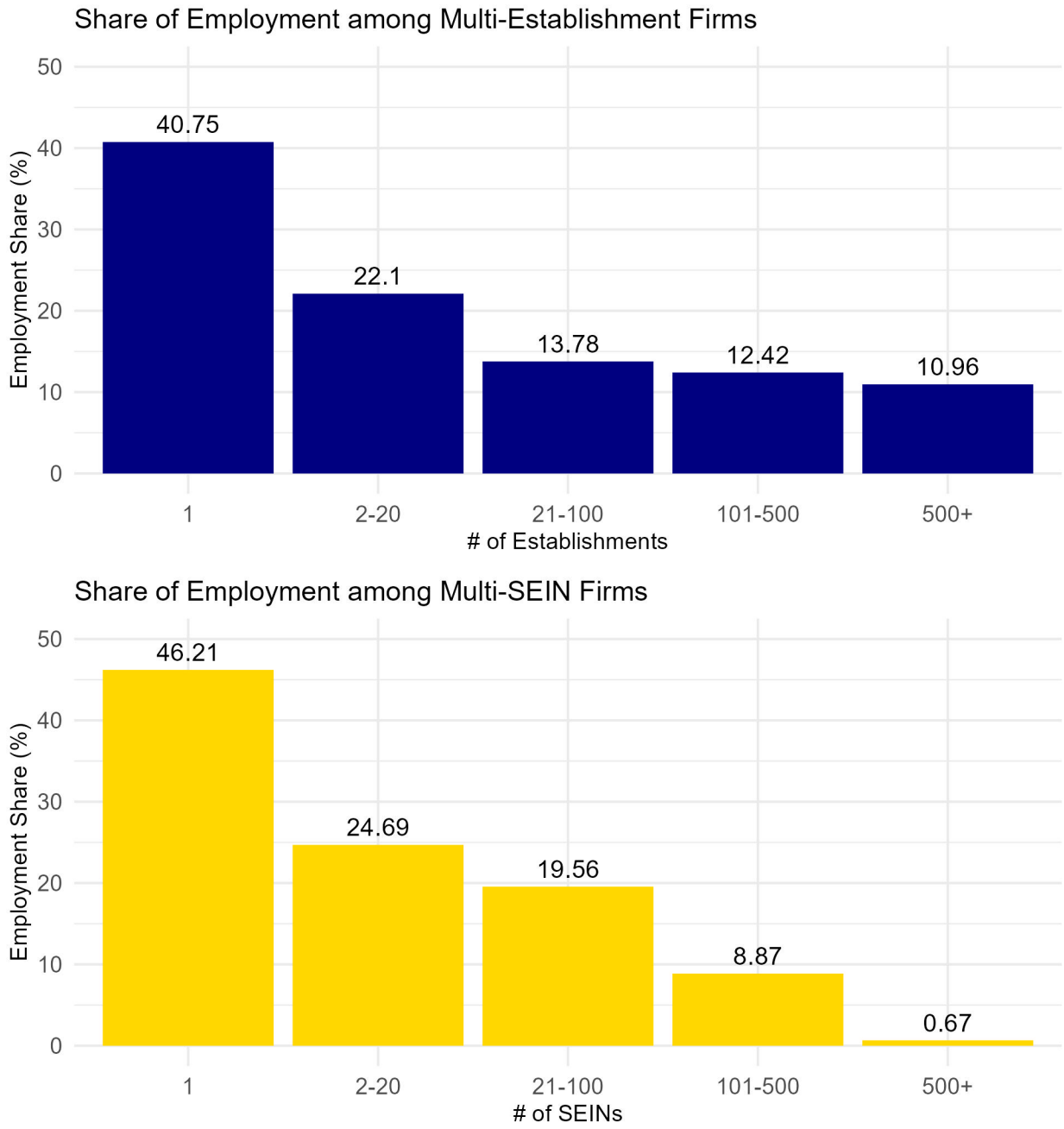
Table 10: Estimates of the Annual Rate of Between Establishment Mobility within Firms, Overall and by Initial Firm Size Category

SEIN Mobility	Overall	Firm Size				
		1-100	101-500	501-1K	1K-5K	>5K
Observed	1.34%	0.85%	0.68%	0.77%	0.99%	1.77%
Controls adjustment						
Employment distance shares	+0.16%	+0.01%	+0.05%	+0.10%	+0.15%	+0.22%
Employment size bins	+0.12%	+0.01%	+0.13%	+0.22%	+0.30%	+0.33%
Firm-Year FE adjustment						
Employment size bins	+0.04%	+0.00%	+0.00%	+0.01%	+0.03%	+0.05%
In-SEIN employment	+0.16%	+0.00%	+0.01%	+0.03%	+0.10%	+0.28%
Out-of-Sample adjustment						
State transitions	+0.50%	+0.03%	+0.11%	+0.19%	+0.30%	+0.63%
Adjusted Estimate						
Multi-SEIN Firms	2.31%	1.14%	1.04%	1.28%	1.7%	2.86%
All Multi-Unit Firms	2.23%	1.12%	1.04%	1.30%	1.71%	2.87%
All Firms	1.45%	0.14%	0.63%	1.08%	1.57%	2.85%
BEM Share of Movers						
Multi-SEIN Firms	15.02%	6.56%	6.17%	7.72%	10.77%	19.64%
All Multi-Unit Firms	14.50%	5.93%	6.21%	7.83%	10.82%	19.74%
All Firms	9.66%	0.80%	3.76%	6.51%	9.95%	19.57%
BEM Share of State Movers						
Multi-SEIN Firms	30.12%	23.26%	17.12%	16.09%	21.19%	38.79%
All Multi-Unit Firms	26.97%	18.24%	12.47%	13.02%	19.42%	37.34%
All Firms	20.78%	2.45%	7.54%	10.83%	17.86%	35.64%

Source: LEHD 2014 snapshot.

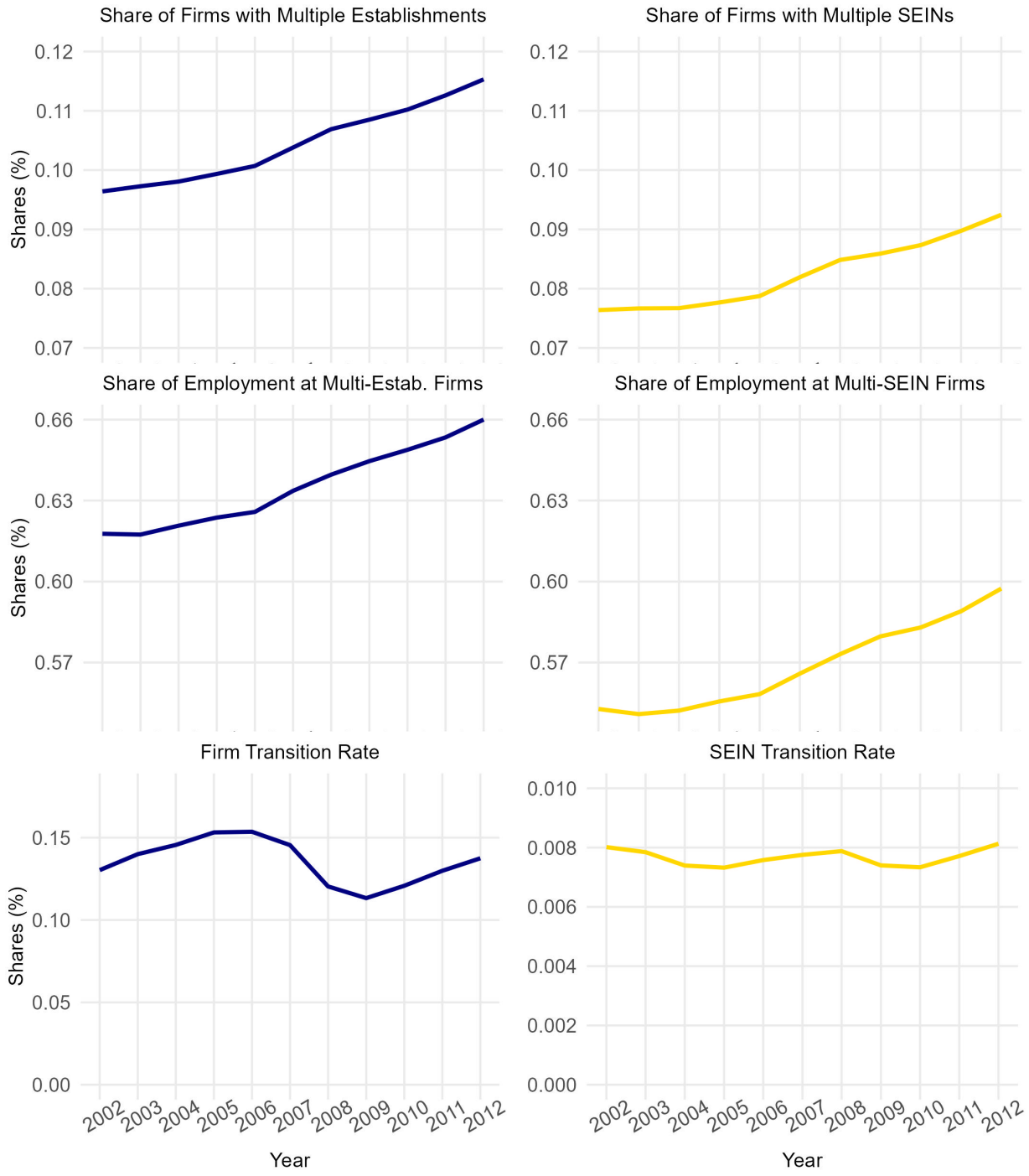
Notes: Each row in the top panel captures the increase in predicted within-firm establishment mobility rate from a different adjustment to the prediction methodology. See sections 6 and A.2 for details about each adjustment. "Controls adjustment - Employment distance shares": uses employment at all other establishments rather than only at establishments in other SEINs when forming distance shares of BEM options. "Controls adjustment - Employment size bins": uses employment at all other establishments rather than only at establishments in other SEINs when assigning workers to the employment size bins that are interacted with distance shares of BEM options. "Firm-Year FE adjustment - Employment size bins": uses employment at all other establishments rather than only at establishments in other SEINs when assigning workers to the employment size bins used to predict firm-year fixed effect values and other firm-level components of the original predicted value. "Firm-Year FE adjustment - In-SEIN employment": Sets to zero the indicators for categories of total within-SEIN employment when predicting firm-year fixed effect values, since within-SEIN transitions are not an outside option when predicting all establishment transitions rather than only between-SEIN transitions. "Out-of-Sample adjustment": includes the predicted probability of making a between-SEIN transition within the firm to a destination state outside of the 25 states observed in the data. "Adjusted Estimate - Multi-SEIN Firms": Estimated annual within-firmestablishment mobility rate among workers at Multi-SEIN firms after making the adjustments in the top panel to account for unobserved within-SEIN transitions and between-SEIN transitions to out-of-sample states. "Multi-Unit-Single-SEIN firms", "All Multi-Unit Firms", and "All Firms" provide analogous adjusted estimates among workers in these subpopulations. "Movers" estimates the share of all establishment transitions that are within the same firm, while "State Movers" estimates the share of all between-state establishments transitions that are within the same firm.

Figure 1: Shares of U.S. Workers Employed by Firms in Each Establishment Count and SEIN Count Bin



Source: LEHD 2014 snapshot
Notes: Blue bar heights capture the shares of U.S. employment among sample worker-years accounted for by firms whose number of establishments falls within the range given by the bar label. Yellow bar heights capture the analogous shares for bins based on the firm's number of SEINs rather than number of establishments.

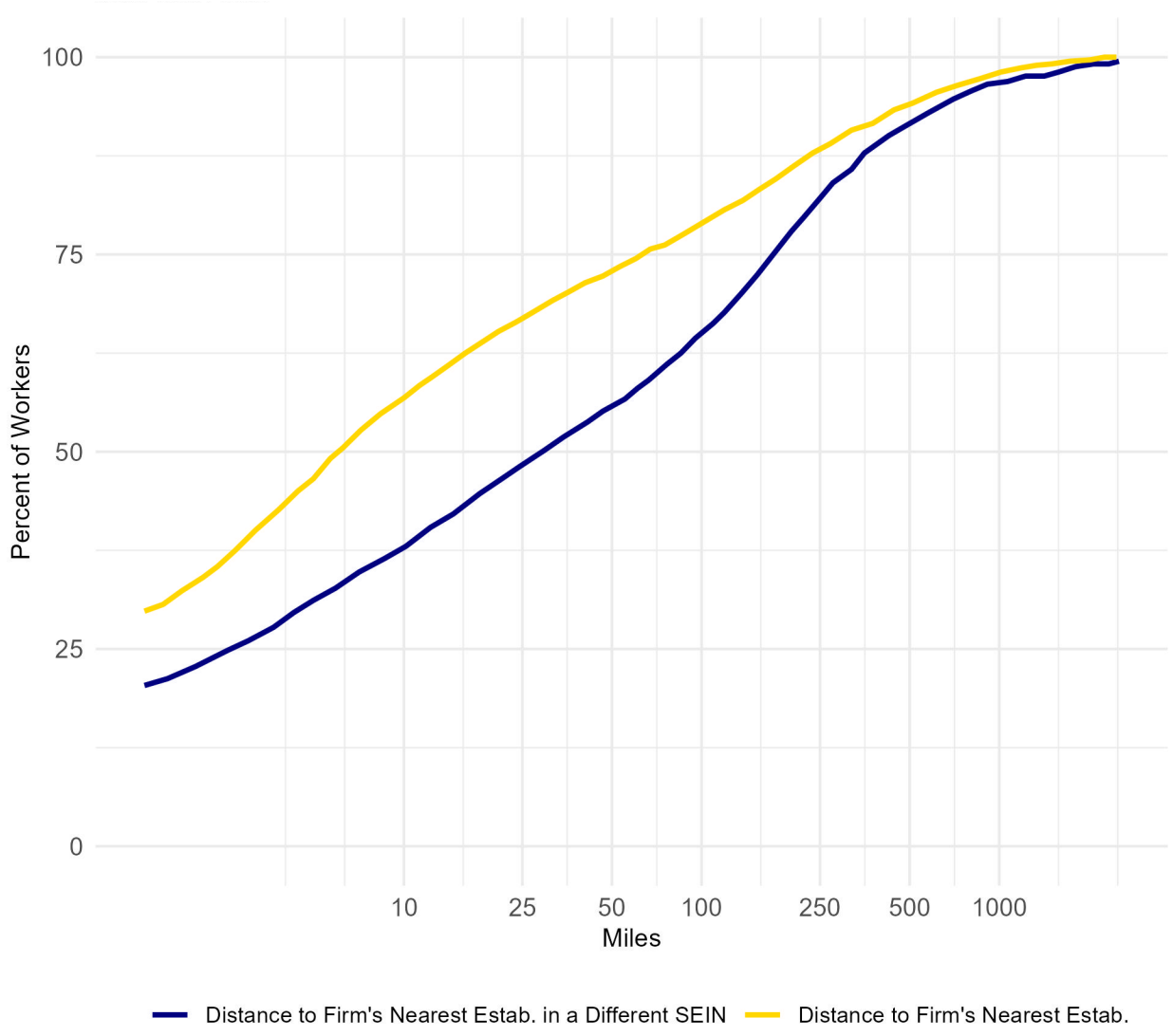
Figure 2: Evolution of Multi-SEIN and Multi-Unit Percentages of Employment and of Firms and SEIN and Firm Transition Rates over the Sample Period (2002-2013)



Source: LEHD 2014 snapshot

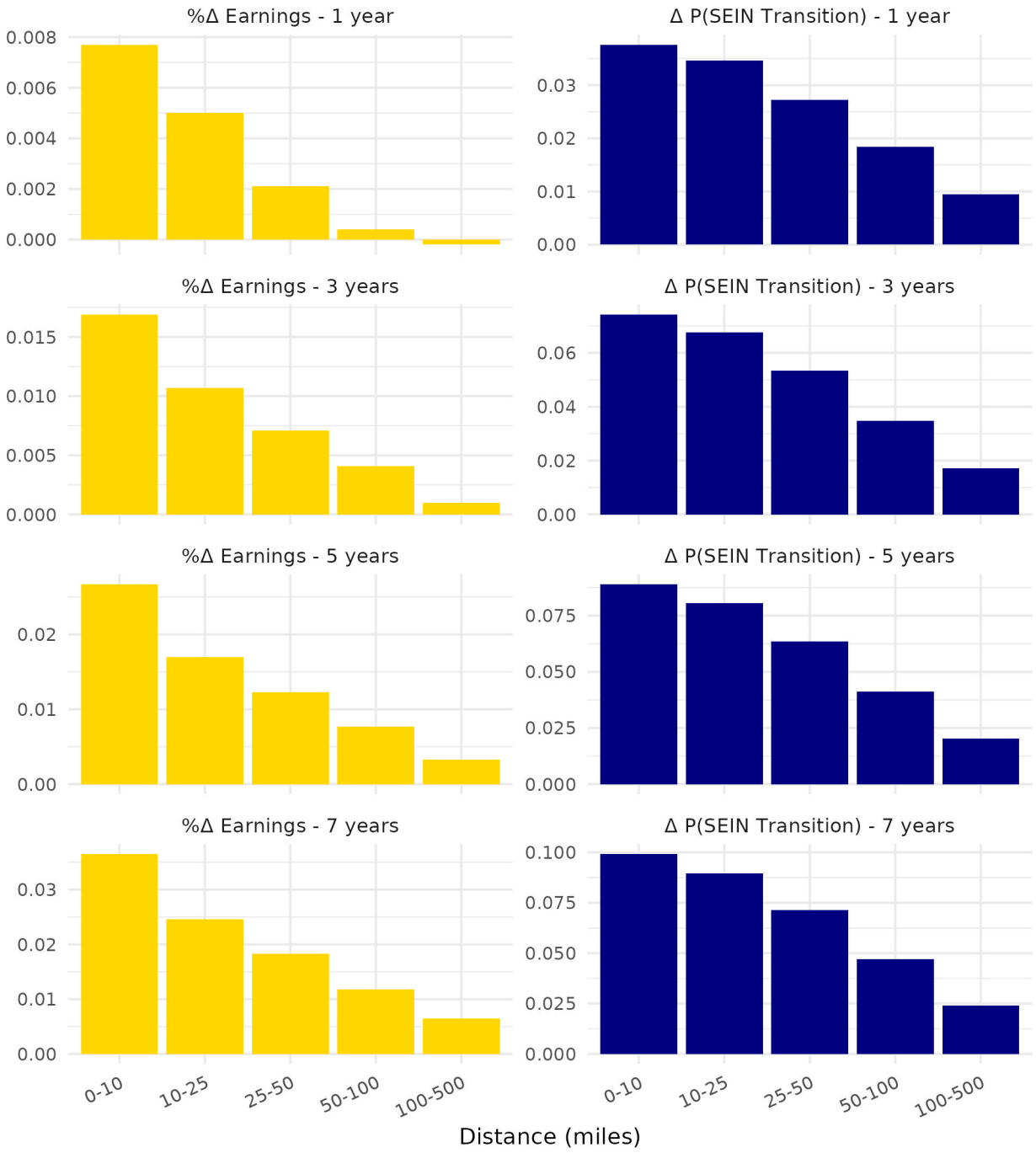
Notes: The blue lines in the top left and middle left panels display the changes in the share of firms and the share of employment at firms, respectively, operating multiple establishments between 2002 and 2012, while the corresponding yellow lines in the top and middle right panels display the corresponding changes in the shares of firms and employment at firms who operate multiple SEINs. The blue and yellow lines in the bottom left and right panels depict the changes in the annual firm and SEIN transition rates between 2002 and 2012.

Figure 3: The Cumulative Distribution Functions for the Distance from a Worker's Current Establishment to the Next Closest Establishments among All the Firm's Establishments and among Establishments in the Firm's other SEINs



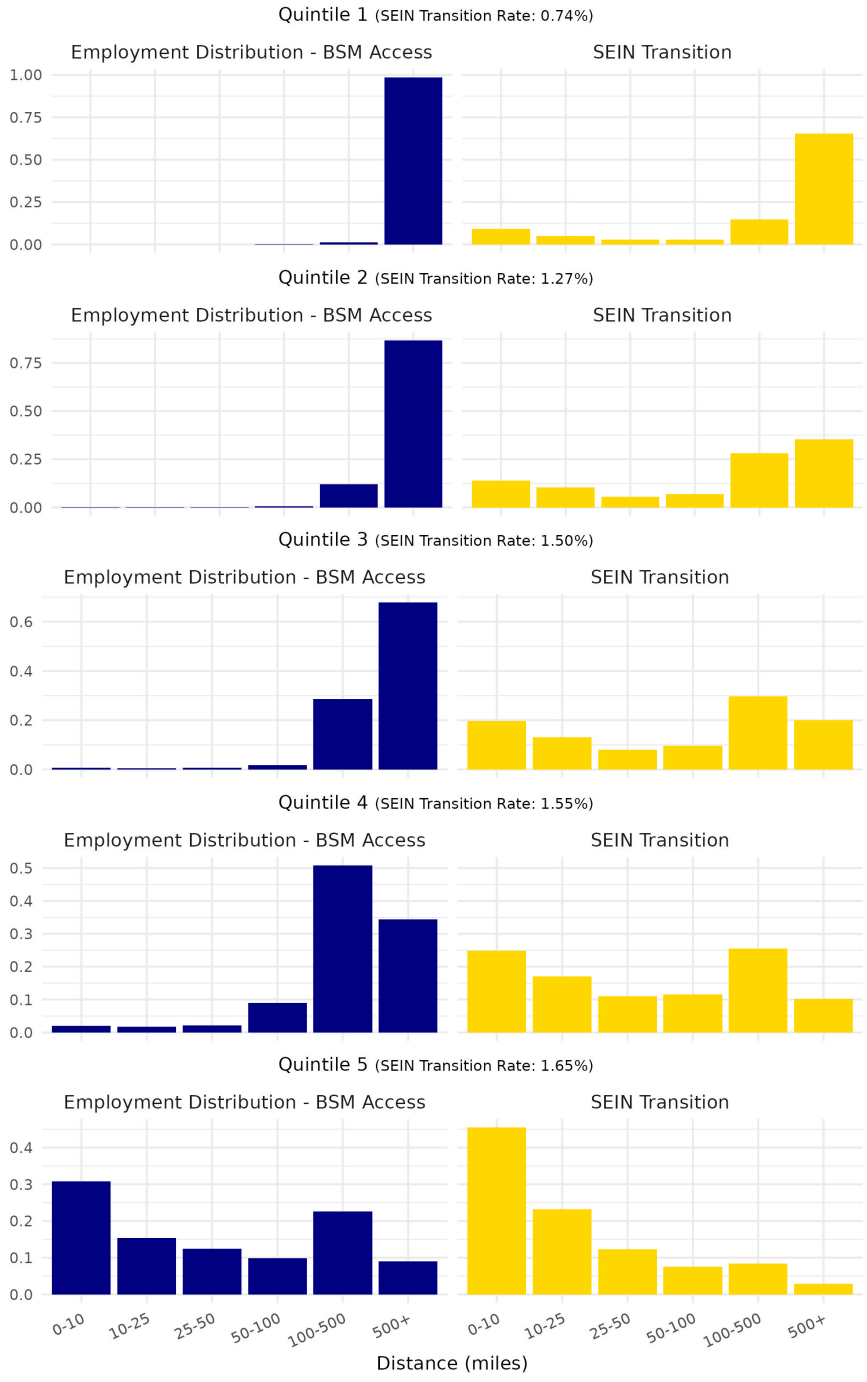
Source: LEHD 2014 snapshot
Notes: The sample consists of all worker-years in which the worker works in a multi-unit (i.e. multi-establishment) firm. The X-axis measures miles of distance between establishments on a log (base 10) scale. The blue curve displays the CDF across worker-years of the distance from the worker's current establishment to the next closest establishment within the same firm. The yellow curve displays the CDF across worker-years of the distance from the worker's current establishment to the next closest establishment within other SEINs at the same firm.

Figure 4: The Effect of More Proximate Access to Potential BEM Opportunities on Earnings Growth and SEIN Mobility over Various Time Windows



Source: LEHD 2014 snapshot. Notes: This figure reports results from our baseline and "first stage" specifications (1) and (2) from Section 4. The histograms on the figure's left side display coefficients on shares of the firm's other-establishment employment in each distance bin (our $BEM\ Access$ vector) when the outcome is the growth in mean earnings over the panel's time window relative to base year earnings. The right side displays coefficients on other-SEIN employment shares by distance bin when the outcome is an indicator for switching SEINs within the chosen time window. The reference category in each case is the employment share over 500 miles away, so bar heights capture the outcome change from shifting 100% of firm employment in other establishments or SEINs from 500+ miles away to the chosen distance bin. The two specifications' samples include all worker-years in which the employer is a multi-establishment and multi-SEIN firm, respectively.

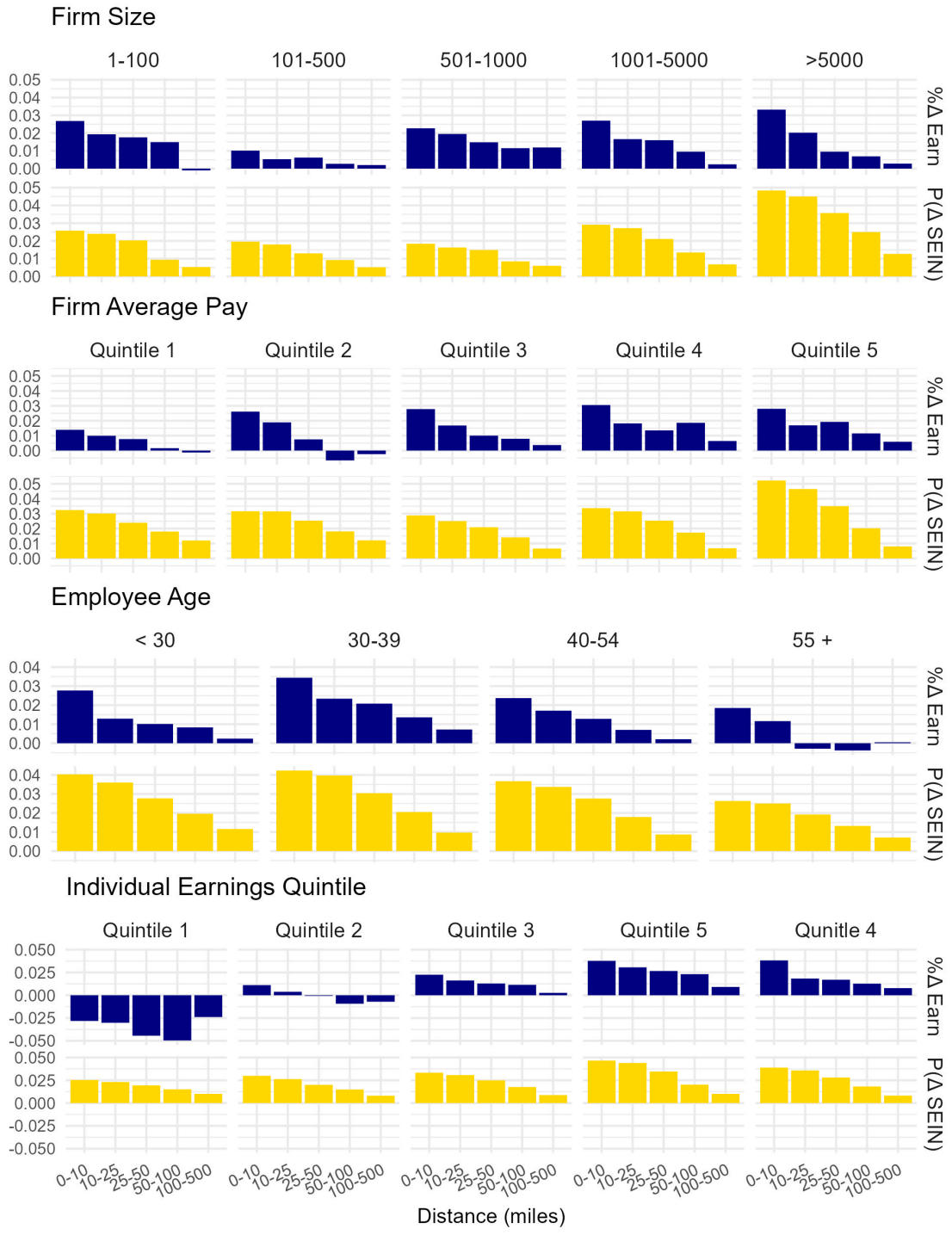
Figure 5: Distance Distributions of Existing Other-SEIN Employment (i.e. $BSM\ Access$) and Observed SEIN Transitions by $BSM\ Access$ Regression Index Quintile



Source: LEHD 2014 snapshot

Notes: Each panel displays the distance distribution of other-SEIN employment at a worker's firm (our BSM Access measures defined in Section 4) alongside the distance distribution of realized SEIN transitions among workers whose value of a regression index combining BSM access shares and coefficients places them in a given quintile of the distribution of access to potential SEIN mobility opportunities. The chosen quintile is labeled to the right of each histogram pair along with its mean annual within-firm SEIN transition rate (in parentheses). The sample consists of all worker-years from the baseline sample in which the worker is employed at a multi-SEIN firm.

Figure 6: Heterogeneity Across Worker and Firm Subpopulations in the Profile of Effects of Shares of Other-Establishment Employment in Various Distance Bins on SEIN Transition Rates and Average Percent Gains in Earnings over 5 years



Notes: Each group of bars displays coefficients on interactions between the share of other-establishment workers in a given distance bin (relative to the worker's own establishment) and an indicator for belonging to the category of the firm characteristic given by the group label. The share of workers in establishments over 500 miles away is treated as the reference category, so its coefficient normalized to 0. Yellow bars correspond to the SEIN mobility outcome and blue bars correspond to the 5-year earnings growth outcome.

Appendix

A.1 Additional Analysis of Heterogeneous Effects

Rather than treating job counts and job shares at different distance bins as competing access measures, another approach is to examine whether the sensitivity of earnings gains and SEIN mobility to the shares of other-establishment workers at different distance bins varies with the overall size of the firm. To this end, the blue bars in the top panel of Figure 6 display coefficients from a specification that interacts the distance bin shares with a vector of indicators for five firm size categories: 0-100, 101-500, 501-1,000, 1,001-5,000, and over 5,000 workers. The pattern of increasing coefficients with closer distance bins is observed for all employment size categories, but is somewhat stronger for firms in the larger size categories. Increasing sensitivity of earnings growth to more proximate BEM opportunities with size is more pronounced when size is categorized based on SEIN or establishment (SEINUNIT) count. This is consistent with the idea that a greater and more diverse set of options increases a worker's probability of finding a sufficiently good job match at another establishment. Hazell et al. (2022) show that large firms tend to exhibit very similar pay distributions across establishments, suggesting that the greater earnings growth from workers at more centrally located establishments is likely driven primarily by greater ability to find promotions to higher management tiers or avoid job loss from establishment shocks rather than greater opportunity to move to higher paying establishments.

Interestingly, despite a slightly steeper distance profile for the largest firms, the predicted earnings growth gain at the mean firm-size specific employment distribution across distance bins for a 5000+ employee firm relative to exclusively long-distance BEM opportunities is 0.6%, while the same predicted gain for a typical worker at a 501-1000 employee firm is 1.0%. This is because the largest firms tend to be national in scope, and thus have substantially larger mean shares of positions over 500 miles away (54% vs. 37%, from Table A.3), so that the large coefficients associated with nearby distance bins are given little weight when generating mean predicted values. As discussed earlier, this finding reflects the fact that the need to normalize to zero the coefficient on the 500+ mile employment share precludes the ability to value access to very distant BEM opportunities, which are particularly plentiful and frequently exploited at the largest firms.

The same basic pattern of increasing distance sensitivity with greater firm size emerges when we use a SEIN transition indicator as the outcome variable in Figure 6 (yellow bars), except with a particularly pronounced profile among the largest firms. This may indicate that larger firms are more likely to have well-established procedures for advertising vacancies internally and facilitating establishment transfers.

More generally, the various panels of Figure 6 and the various columns of Appendix Tables A.8-A.11 explore how the sensitivity of earnings gains and SEIN mobility to more proximate BEM access varies across categories of several other firm and worker characteristics.

The second panel shows that the steepness of the distance profile increases as one moves from the lowest to the second-highest paying quintile of firms, consistent with the idea that higher productivity firms may place greater value on optimal assignment of workers and limiting vacancy duration in high-value positions. There is a slight reversal for the highest paying firms, perhaps because firms employing almost exclusively high-paid workers tend to be smaller. SEIN mobility rates are sensitive to distance bins' employment shares across all average pay categories.

Industry-specific distance profiles (middle panels of Tables A.8 and A.9) are a bit noisy, particularly for supersectors with small shares of at-risk multi-establishment workers. However, the manufacturing, trade/transportation/utilities, information, finance & real estate, and leisure & hospitality sectors all exhibit profiles of generally increasing coefficients with closer distance bins, both for earnings and for SEIN mobility. The predicted earnings contributions at the mean distance bin shares for these industries (relative to full employment concentration at 500+ miles) are 0.7%, 0.4%, 0.8%, 0.8%, and 0.4% in these sectors.

Moving to worker characteristics (Tables A.10 and A.11), we find that sensitivity of earnings changes to the distance distribution of BEM opportunities is concentrated among the three highest quintiles of worker baseline earnings. These quintiles also exhibit strong relationships between SEIN mobility and the distance distribution of BEM opportunities. The predicted mean 5-year earnings growth contributions (relative to having only distant BEM opportunities) for the top two quintiles are 1.0% and 0.9% versus essentially zero for the second lowest quintile. This reinforces the idea that firms particularly prize the ability to reallocate their most skilled workers to the highest value location. Indeed, the increased distance sensitivity for the highest paid workers is even stronger when earnings quintiles are assigned based on pay relative to their own firm's other

workers. The presence of a strong distance profile for SEIN transitions but not for earnings growth for initially low-paid workers suggests that these workers may be more likely than their firms to value and initiate establishment transitions, so that no increase in pay is necessary to induce the transition.

Among age groups, the distance profile of earnings coefficients is strongest for 30-39 year old workers, with distance share coefficients generally shrinking by 25-50% or so for workers under 30 or between 40 and 54, and by 50% or more for workers over 55. The age pattern of coefficients for SEIN mobility is quite similar. Smaller earnings effects for older workers are consistent with their lower SEIN mobility rates, so that potential opportunities are less likely to translate into realized transitions or earnings gains. Indeed, workers 30-39 years old reap an expected 0.9% higher per-year earnings from the average distance distribution of other-establishment employment relative to exclusively long-distance jobs, compared to just 0.3% for workers over 55. However, since older workers are less likely to generate earnings growth through firm switching, their mean earnings growth is actually negative (-1.2%), so that improved BEM access and subsequent establishment mobility is one of the few avenues they have to generate continued earnings growth.

The earnings and SEIN mobility distance profiles are fairly similar for men versus women. We see relatively similar distance profiles of SEIN mobility coefficients across race/ethnicity categories, but the earnings gains from greater shares of nearby within-firm jobs accrue primarily to non-Hispanic white workers, with less pronounced and noisily estimated distance profiles for other race/ethnicity categories. Thus, we do not find evidence that historically underprivileged workers disproportionately rely on within-firm promotion opportunities due to statistical discrimination in the broader labor market (Miller and Schmutte, 2021; Altonji, 2005). Instead, smaller gains from nearby jobs may partly reflect the fact that black and Hispanic white workers are underrepresented in the baseline earnings and industry categories where within-firm promotion ladders are most prominent and lucrative.

Finally, we see limited heterogeneity by categories of tenure at the firm, with slightly larger earnings and SEIN mobility payoffs to greater shares of nearby jobs for workers with 3-5 years of tenure relative to those with less or more tenure, consistent with the idea that one needs some degree of firm-specific human capital and a sufficient remaining length of career to generate sufficient value from switching establishments.

More broadly, a glance from afar at Figure 6 reveals that larger shares of jobs at closer establishments within the firm predict both larger earnings increases and greater probabilities of switching SEINs for the vast majority of worker and firm subpopulations we consider. This demonstrates that responses to greater access to BEM opportunities are widespread throughout the economy and that our baseline results are not driven by unrealistically steep distance profiles for one small group. Furthermore, although not perfectly aligned, subpopulations that exhibit greater earnings sensitivity to the proximity of BEM opportunities also tend to show greater sensitivity for SEIN mobility. This provides further evidence, albeit suggestive, that the mechanism generating the earnings gains is in fact establishment transitions rather than other earnings-relevant unobserved worker, establishment, or location attributes correlated with distance bin shares of employment at other establishments. It also suggests that BEM is generating considerable value for firms, since they seem to be willing to pay more to facilitate these transfers.

A.2 Methodology for Estimating the National Rate of Establishment Mobility within Firms

In this appendix, we provide a more complete description of how we construct our estimate of the overall share of U.S. workers who switch establishments within the same firm each year.

Because we find marked heterogeneity in SEIN mobility rates by firm size category, we use as our starting point the predicted values from the version of our SEIN mobility regression reported in Appendix Table A.9 that allows separate distance bin profiles by out-of-SEIN employment bin:

$$\begin{aligned} SEIN\ Transition_{it}^{p} = & \sum_{s \in size\ bins} \sum_{d \in bins} SizeCat_{SEINt}^{s,SN} \times BSM\ Access_{SEINt}^{d} \times \theta_{sd} \\ & + \sum_{s \in size\ bins} \sum_{d \in bins} Size\ Cat_{SEINt}^{s,SN} \times BEM\ Access_{SEINt}^{d,In\text{-}SN} \times \zeta_{sd} \\ & + X_{it}\chi + X_{et}\eta + \rho_{ft}^{F} + \rho_{ct}^{C} + \rho_{nst}^{NS} + \varsigma_{it} \end{aligned} \tag{4}$$

These naive predicted values contain four sources of mismeasurement when used to capture predicted rates of all between-establishment mobility (not just between-SEIN mobility). First, we replace our exposure measures for the SEIN mobility outcome, $BSM\ Access_{SEINt}^{d}$, with $BEM\ Access_{et}^{d}$,

so that they capture shares of the firm's employment in any other establishments besides the worker's own that fell into each distance bin, including those within the worker's SEIN. This step assumes that the parameters κ that govern the relationship between SEIN mobility rates and out-of-SEIN employment shares by distance bin also correctly capture the corresponding relationship between establishment mobility rates and firm-wide employment shares by distance bin.

Second, we replace the indicators for the size category of employment at other SEINs that interact with the distance bin shares, $Size\ Cat^{s,SN}_{SEINt}$ with corresponding size category indicators for employment among all the firm's other establishments (with the same category cutoffs), so as to capture the relevant measure of the scale of establishment transition opportunities within the firm. These swaps assume that the heterogeneity in sensitivity of SEIN mobility to the distance distribution across different out-of-SEIN size classes captured in the original regression translates to the relationship between any establishment mobility and out-of-establishment size classes.

Third, the components of the naive predicted values contributed by the other control variables also have a mean that is scaled to fit observed SEIN mobility rates rather than overall establishment mobility rates. To estimate an appropriate re-scaling of these components, we isolate this predicted value component from the component related to distance bin shares of employment:

$$\hat{Y}^{controls}_{it} = X_{it}\hat{\chi} + X'_{et}\hat{\eta} + \hat{\rho}^{F}_{ft} + \hat{\rho}^{C}_{ct} + \hat{\rho}^{N}_{nst}$$

We then run an auxiliary regression of $\hat{Y}^{controls}_{it}$ on the same set of controls except for the firm-year fixed effects, which we replace with indicators for categories of both within-SEIN and out-of-SEIN employment, $Size\ Cat^{X\text{-}SN}_{SEIN,t}$ and $Size\ Cat^{In\text{-}SN}_{SEIN,t}$:

$$\begin{aligned}\hat{Y}^{controls}_{it} = &\sum_{s \in size\ bins} Size\ Cat^{s,X\text{-}SN}_{SEIN,t} \times \phi^{X\text{-}SN}_{d} + \sum_{s \in size\ bins} Size\ Cat^{s,In\text{-}SN}_{SEINt} \times \phi^{In\text{-}SN}_{s} \\ &+ X'_{et}\tilde{\eta} + \tilde{\rho}^{C}_{ct} + \tilde{\rho}^{N}_{nst} + \upsilon_{it}\end{aligned} \tag{5}$$

These estimates capture the (conditional) relationship between firm scale and SEIN mobility that was previously absorbed by the firm-year fixed effects. As before, we replace the out-of-SEIN employment categories with out-of-establishment employment categories, and impose that the coefficients capturing the relationship between SEIN mobility and out-of-SEIN employment also apply to the relationship between establishment mobility and out-of-establishment employment.

We also set to zero all of the within-SEIN employment indicators, since these captured the role of unobservable "outside options" for establishment mobility that are now reflected in the out-of-establishment size categories. We then add the change in the auxiliary regression's predicted values created by these adjustments, $\left(Size\ Cat_{et}^{s,X\text{-}Estab} - Size\ Cat_{SEINt}^{s,X\text{-}SN}\right) \hat{\phi}_s^{X\text{-}SN} - Size\ Cat_{SEINt}^{s,In\text{-}SN} \hat{\phi}_s^{In\text{-}SN}$, to the predicted rate of establishment mobility for multi-SEIN workers.

Fourth, we use the same procedure to generate predicted establishment mobility rates for workers at multi-unit, single SEIN firms that were previously excluded from the regression sample, since we observe all variables needed to form their predicted values: distance bin employment shares, out-of-establishment size bins, and other worker, establishment, and location controls.

Finally, we add to these values an estimate of the rate of between SEIN transitions to out-of-sample states. Our goal is compute annual rates of within-firm establishment mobility among workers initially at multi-SEIN firms, $P(Estab.\ trans.|Multi\text{-}SEIN)$, among those at multi-establishment firms, $P(Estab.\ trans|Multi\text{-}unit)$, and among all initially employed workers $P(Estab.\ trans.|Employed)$.

We start by decomposing $P(Estab.\ trans.|Multi\text{-}SEIN)$ using the law of total probability:

$$\begin{aligned} &P(Estab.\ trans.|Multi\text{-}SEIN) = \\ &\quad P(Estab.\ trans.|In\ sample, Multi\text{-}SEIN) * P(In\ sample|Multi\text{-}SEIN) \\ &+ P(Estab.\ trans.|Out\ of\ sample, Multi\text{-}SEIN) * P(Out\ of\ sample|Multi\text{-}SEIN) \end{aligned} \tag{6}$$

The four steps above generate an estimate of $P(Estab.\ trans.|In\ sample, Multi\text{-}SEIN)$, the annual within-firm establishment transition rate among workers from multi-SEIN firms whose origin and destination establishments (regardless of firm) are within our sample states.

Next, we use the fact that the LEHD reports an indicator for whether a worker is employed in some U.S. state even if that state does not grant data access to our project. This allows us to estimate the share of all workers in multi-SEIN firms originating in our sample states whose destination establishment is inside (or outside) of our sample states, $P(In\ sample|Multi\text{-}SEIN)$ and $P(Out\ of\ sample|Multi\text{-}SEIN)$.

To estimate $P(Estab.\ trans.|Out\ of\ sample, Multi\text{-}SEIN)$, we assume that the share of job transitions that are within-firm is the same for transitions to out-of-sample states as for transitions to other in-sample states: $P(Estab.\ trans.|Out\ of\ sample, Multi\text{-}SEIN) \approx P(Estab.\ trans.|Change$

$state, In\ sample, Multi\text{-}SEIN$). Since any within-firm transition across states requires a SEIN change, we can correctly measure the latter share. Combining the terms in equation (6) generates our estimate of the rate of establishment transitions among multi-SEIN workers. To compute the analogous rate among workers at multi-unit firms, we replace "Multi-SEIN" with "Multi-Unit" in equation (6), and use the fact that $P(Estab.\ trans.|Out\ of\ sample,\ Multi\text{-}unit) = P(Estab.\ trans.|Out\ of\ sample,\ Multi\text{-}SEIN) * P(Multi\text{-}SEIN|Multi\text{-}unit)$ under the assumption that firms that operate only a single SEIN within our sample do not operate any SEINs in states outside our sample. To compute the rate of establishment mobility among all initially employed workers, we use the fact that $P(Estab.\ trans.|Employed) = P(Estab.\ trans.|Multi\text{-}unit) * P(Multi\text{-}unit|Employed)$.

Finally, because within-firm establishment transition rates vary so strongly by firm size category, we perform the same set of adjustments separately by initial size category.

A.3 Earnings Growth Measures

To construct our baseline and alternative earnings growth measures, we first create each worker i's annualized earnings in each year t. The LEHD reports earnings at each SEIN at which a worker workers in each quarter of the year. We select the SEIN featuring the highest annual raw earnings in t as worker i's "primary" or "dominant" SEIN for year t. We then identify worker i's full quarters in year t as quarters in which the chosen SEIN reported earnings in the selected quarter as well as the previous and subsequent quarters, so that one can be confident that the worker was employed at the primary SEIN during the entire quarter. We then multiply average earnings among the full quarters at the chosen SEIN by 4 to produce an estimate of the expected annual salary or total earnings a worker would receive if they spent the entire year at the primary SEIN. We denote these annualized earnings $Earnings_{it}$. If annualized earnings is less than \$5,000, we consider the worker unemployed for the year and set $Earnings_{it}$ to missing. As a robustness check, we also report results that use raw total earnings in year t at the primary SEIN as $Earnings_{it}$.

Next, let p denote the window over which we want to define earnings growth (i.e., 1, 3, 5, or 7 years). Our favored measure of earnings growth is then calculated as follows:

$$\%\Delta Earnings_{it}^{p} = \frac{\frac{1}{p}\sum_{k=1}^{p} Earnings_{i,t+k}}{Earnings_{it}} - 1$$

Note that this measure will be undefined if worker i reports zero or missing earnings at time t. In the case that we do not observe a worker's earnings for a subset of years from $t+1$ to $t+p$, we take an average of earnings using available data, subject to the requirement that they report at least two years of earnings for our three-year measure of growth, at least three years of earnings for our five-year growth measure, and at least five years of earnings for our seven-year growth measure. This requirement allows us to preserve as many observations as possible while ensuring our measure is not unduly influenced by earnings in any one year. We further winsorize this variable at a 200 percent growth threshold to ensure that our regression estimates are not overly sensitive to outliers.

As our first alternative measure of earnings growth, we take a simple average of year-to-year earnings growth, calculated as:

$$Average\ Annual\ Earnings\ Growth_{it}^{p} = \frac{1}{l}\sum_{k=1}^{p}\left(\frac{Earnings_{i,t+k}}{Earnings_{i,t+k-1}} - 1\right)$$

As in our primary measure of earnings growth, we use the average of available year-to-year earnings growth in the case that earnings are missing from year $t+1$ to $t+j$, subject to the above-described requirement that our 3, 5, and 7-year earnings growth measure utilize data from at least 2, 3, and 5 years of annual earnings growth, respectively. Note that this measures produces more missing values than our favored measure. For example, a worker who is observed in years $t+1$ and $t+3$ but not $t+2$ will have two out of three years of earnings with which to produce an average using our favored measure, but will only have one year in the three year window in which both the current and previous year is observed (t and $t+1$). To keep samples consistent for comparison, in the cases where $Average\ Annual\ Earnings\ Growth_{it}^{p}$ is missing but $\%\Delta Earnings_{it}^{p}$ is observed, we replace it with $\%\Delta Earnings_{it}^{p}$. This occurs in 9% of observations for the 5-year window that we emphasize in our discussion of results.

Our second alternative measure of earnings growth calculates the percentage change in annualized earnings from the start to the end of our desired window:

$$Start\text{-}to\text{-}End\ Earnings\ Growth_{it}^{p} = \frac{Earnings_{i,t+p}}{Earnings_{it}} - 1$$

If the end year's earnings are missing, we use earnings from the nearest observed year to calculate

earnings growth.

Next, we calculate earnings growth using using two-year average of earnings in year t and $t-1$ as the baseline:

$$Expanded\,Baseline\,Earnings\,Growth_{it}^{p} = \frac{\frac{1}{j}\sum_{k=1}^{p} Earnings_{i,t+k}}{\frac{1}{2}(Earnings_{it} + Earn_{i,t-1})} - 1$$

This reduces volatility in growth stemming from having unusually low earnings in year t relative to worker i's establishment standard. If earnings in year $t-1$ are missing, we revert to our favored measure with only year t earnings as the baseline to preserve sample comparability. This occurs in 25% of observations, in part because we lose the entire first year of our sample.

Next, we construct a measure that takes an average of the approximate present discounted value of earnings, assuming a three percent discount rate. This calculation is given by:

$$PDV\,Earnings\,Growth_{it}^{p} = \frac{\frac{1}{p}\sum_{k=1}^{p} 0.97^{k} \times Earnings_{i,t+k}}{Earnings_{it}} - 1$$

Results based on estimating equation (1) with these alternative earnings growth measures are presented in Section 5.6.

A.4 Exposure Measures

Here we describe how we construct our baseline and alternative sets of measures of exposure to potential opportunities to another establishment within one's firm.

The first step is to assign each worker i to an establishment within their primary (i.e. highest earnings) SEIN in year t. While firms must report the employment counts and locations of each of its establishments associated with each of its SEINs (contained in the employer characteristics file or ECF) as well as the identification numbers and earnings of all workers receiving pay from some establishment in each SEIN, they are not required to specify which workers work at which establishments within a SEIN.

The Census Bureau thus constructs a set of 10 imputed establishments for each observed worker-SEIN combination in a separate unit-to-worker (U2W) file (Vilhuber and McKinney, 2014). These 10 "implicates" are drawn for a posterior distribution of possible establishment assignments based on a model that uses worker residential locations (from IRS data) and establishment em-

ployee counts (from the ECF) to actual establishment assignments from the one state (Minnesota) that requires true worker-establishment links to be reported by firms. We generally base worker's establishment assignments on the first implicate, but show robustness in Section 5.5 to using the second implicate instead. Importantly, these implicates are generally drawn only once during the worker's spell at the SEIN to avoid creating spurious establishment transitions, which prevents us from even observing imputed within-SEIN mobility across establishments.

Our preferred set of measures, denoted $BEM\ Access_{it}$, are calculated as the percentages of employment within worker i's firm ID at other establishments that are located in each of six distance bins relative to the worker's own (imputed) establishment in year t: 0-10 miles, 10-25 miles, 25-50 miles, 50-100 miles, 100-500 miles, or more than 500 miles. Establishment locations are reported at the census block level, and latitude-longitude coordinates of census block centroids are used to assign distances between establishments.

Let $\mathcal{E}^f$ denote the set of all establishments that worker i's firm $f(i,t)$ operates.[20] Further, denote the distance (in miles) between two establishments, $e, \tilde{e} \in \mathcal{E}^f$, by $Dist(e,\tilde{e})$. Note that this distance represents the Great Circle Distance, and does not account for road or transportation networks or topological features like rivers and mountains. Finally, let the employment of a given establishment $\tilde{e} \in \mathcal{E}^f$ in year t be given by $Emp_{\tilde{e},t}$. The vector $BEM\ Access_{e(i,t),t}$ is comprised of the following share variables:

$$
\begin{aligned}
BEM\ Access_{et}^{10} &= \frac{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) \in (0.125, 10]\right) \times Emp_{\tilde{e},t}}{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) > 0.125\right) \times Emp_{\tilde{e},t}} \\
BEM\ Access_{et}^{25} &= \frac{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) \in (10, 25]\right) \times Emp_{\tilde{e},t}}{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) > 0.125\right) \times Emp_{\tilde{e},t}} \\
BEM\ Access_{et}^{50} &= \frac{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) \in (25, 50]\right) \times Emp_{\tilde{e},t}}{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) > 0.125\right) \times Emp_{\tilde{e},t}} \\
BEM\ Access_{et}^{100} &= \frac{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) \in (50, 100]\right) \times Emp_{\tilde{e},t}}{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) > 0.125\right) \times Emp_{\tilde{e},t}} \\
BEM\ Access_{et}^{500} &= \frac{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) \in (100, 500]\right) \times Emp_{\tilde{e},t}}{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) > 0.125\right) \times Emp_{\tilde{e},t}} \\
BEM\ Access_{et}^{500+} &= \frac{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) > 500\right) \times Emp_{\tilde{e},t}}{\sum_{\tilde{e}\in\mathcal{E},\tilde{e}\neq e} 1\left(Dist(e,\tilde{e}) > 0.125\right) \times Emp_{\tilde{e},t}}
\end{aligned} \tag{7}
$$

[20] To simplify notation, we omit any time subscripts. However, all exposure measure are year-specific, as both the set of establishments that a firm operates and the distribution of employment across these locations will change from year to year.

As made evident by the above equations, we omit from our calculation of exposure any alternate establishment that falls within one-eighth of a mile of the establishment in question. These nearby establishments operate ostensibly in the same physical location (e.g., a warehouse connected to a wholesale or retail space), so that they are only listed as separate establishments for tax liability purposes, and potential transitions between such establishments would not constitute a meaningful location change.

When analyzing SEIN mobility, we instead seek to measure access to between-SEIN mobility opportunities, and use the vector $BSM\ Access$ in place of $BEM\ Access$. Each component of $BSM\ Access$ uses the share of employment among establishments in other SEINs than the worker's own rather than among all of the firm's establishments besides the worker's own.

We also consider altered versions of $BEM\ Access$ in three other robustness checks. First, we utilize alternative exposure measures based on the distribution of establishments rather than employment, so that $Emp_{\tilde{e},t}$ is removed in each equation in (7). Second, we replace distance bins' shares of other-establishment employment with their log counts of other-establishment employment to assess whether differences in the scale vs. distribution of opportunities across distance bins better capture access to BEM opportunities. Third, we restrict the eligible other-establishment employment when constructing employment shares by distance bin to positions whose existing worker's annual earnings fell into the same or higher decile as worker i's own earnings in year t. This allows us to assess whether workers are primarily responsive to potential within-firm opportunities that are higher paying than their own current position, and thus more likely to represent promotions.

A.5 Classification of Firms by Number of SEINs and Establishments

At various points in the paper, we classify establishments (and their associated workers) based on whether the establishment's firm operates multiple SEINs and whether the the establishment's SEIN encompasses other establishments as well. Specifically, we assign establishments (or, equivalently, units) to the following four classifications: (i) MUMS ("multi-unit, multi-SEIN"): the establishment's firm operates multiple SEINs and multiple units within the chosen unit's SEIN; (ii) multi-unit, single-SEIN (MUSS): the establishment's firm operates only one SEIN, but operates

multiple units within the one SEIN; (iii) single-unit, multi-SEIN (SUMS): the establishment's firm operates multiple SEINs, but the chosen establishment is the only unit within its SEIN; and (iv) single-unit, single-SEIN (SUSS): the chosen establishment is the only one operated by the firm. Intuitively, MUMS firms comprise large, multi-establishment firms that typically span multiple states (for example, major retail, grocery stores, or fast-food chains). MUSS firms, in contrast, are local chains: smaller firms located within a single state that incorporate a few locations (for example, a popular local restaurant that operates multiple establishments). SUMS firms operate one establishment per SEIN, but could span multiple states; these entail, for instance, professional service firms that operate in a few (possibly large) establishments in major cities. Finally, SUSS firms are small, "mom-and-pop" stores that operate a single establishment.

A.6 Appendix Tables and Figures

Table A.1: Descriptive Statistics Summarizing the Size, Geographic Scope, and Worker Mobility of Firms Classified by the Number of SEINs and Establishments They Operate and Weighted by Employment

	All	Multi-Unit	Multi-SEIN	SUSS	MUSS	SUMS	MUMS
Employment	27212.4	42716.3	46082.2	239.8	13900.0	11520.0	72400.0
per SEIN	1367.4	2015.5	628.4	239.8	13900.0	243.0	921.9
per Unit	135.8	76.0	66.1	239.8	161.2	53.5	75.7
Number SEIN	37.4	58.3	65.1	1	1.0	47.4	78.5
Estabs per SEIN	11.8	18.0	10.1	1	86.2	2.3	16.0
Number SEIN per State	4.8	7.0	7.7	1	1.0	7.4	7.9
Share of Employment	1	0.635	0.568	0.365	0.066	0.246	0.322
within State	0.087	0.136	0.152	0.001	0.000	0.169	0.139
Between-SEIN within State	0.079	0.124	0.093		0.392	0.081	0.102
in Other Industries	0.043	0.068	0.052		0.204	0.042	0.060
at 0-10 miles	0.033	0.052	0.043		0.131	0.034	0.049
at 10-25 miles	0.038	0.060	0.054		0.112	0.042	0.064
at 25-50 miles	0.143	0.226	0.234		0.159	0.226	0.240
at 50-100 miles	0.299	0.470	0.525		0.003	0.576	0.486
at 100-500 miles	0.008	0.012	0.013		0.001	0.013	0.014
at 500+ miles	0.002	0.003	0.003		0.000	0.003	0.003
SEIN Transition	0.008	0.012	0.013		0.001	0.013	0.014
at 0-10 miles	0.002	0.003	0.003		0.000	0.003	0.003
at 10-25 miles	0.001	0.002	0.002		0.000	0.002	0.002
at 25-50 miles	0.001	0.001	0.001		0.000	0.001	0.001
at 50-100 miles	0.001	0.001	0.001		0.000	0.001	0.001
at 100-500 miles	0.002	0.003	0.003		0.000	0.003	0.003
at 500+ miles	0.002	0.003	0.003		0.000	0.003	0.003
Share of SEIN Transition within State	0.595	0.596	0.593		0.964	0.516	0.649
Firm Transition	0.126	0.122	0.122	0.132	0.119	0.132	0.116
at 0-10 miles	0.044	0.038	0.038	0.054	0.040	0.046	0.032
at 10-25 miles	0.028	0.027	0.027	0.031	0.026	0.029	0.025
at 25-50 miles	0.015	0.015	0.015	0.014	0.016	0.013	0.016
at 50-100 miles	0.012	0.013	0.013	0.010	0.013	0.010	0.015
at 100-500 miles	0.020	0.022	0.023	0.015	0.018	0.024	0.022
at 500+ miles	0.007	0.007	0.007	0.006	0.005	0.008	0.006
Share of Firm Transition within State	0.905	0.900	0.897	0.913	0.924	0.875	0.915

Source: LEHD 2014 snapshot.
Notes: Statistics for all firm and establishment subpopulations are weighted by employment. "All": Full Sample of Worker-Years. "Multi-Unit": Firms that operate multiple establishments (regardless of SEIN grouping). "Multi-SEIN": Firms that group establishments ("units") into multiple State Employer Identification Numbers. "SUSS": Firms that operate only a single establishment. "MUSS": Firms that group all of their (multiple) establishments into a single SEIN. "SUMS": SEINs with only a single establishment within multi-SEIN firms; "MUMS": SEINs with multiple establishments within firms that operate multiple SEINs. Note that SUMS and MUMS categories are defined at the establishment level, so that the same firm can operate both SEINs with multiple establishments and SEINs with only a single establishment.

Table A.2: Descriptive Statistics Summarizing the Size, Pay, Industry Composition, and Worker Earnings Distribution of Firms Classified by the Number of SEINs and Establishments They Operate

	All	Multi-Unit	Multi-SEIN	SUSS	MUSS	SUMS	MUMS
Workers Earnings							
Q1	0.106	0.087	0.082	0.138	0.135	0.052	0.104
Q2	0.225	0.197	0.189	0.274	0.267	0.166	0.206
Q3	0.226	0.215	0.212	0.244	0.248	0.218	0.207
Q4	0.215	0.228	0.231	0.193	0.199	0.247	0.219
Q5	0.228	0.272	0.286	0.151	0.151	0.316	0.264
Industry							
Min.	0.012	0.011	0.012	0.014	0.007	0.011	0.013
Const.	0.066	0.030	0.031	0.129	0.018	0.051	0.015
Manuf.	0.141	0.160	0.174	0.107	0.044	0.210	0.146
Trade & Trans.	0.224	0.246	0.254	0.185	0.174	0.176	0.314
Infor.	0.031	0.041	0.045	0.012	0.007	0.047	0.045
Fin. & Real Estate	0.082	0.097	0.100	0.056	0.069	0.080	0.116
Prof. Bus. Serv.	0.147	0.151	0.161	0.141	0.068	0.209	0.123
Educ. & Health	0.178	0.169	0.135	0.194	0.456	0.135	0.136
Leis. & Hosp.	0.076	0.060	0.055	0.104	0.097	0.046	0.063
Other Serv.	0.031	0.016	0.014	0.057	0.033	0.019	0.011
Firm Average Pay							
Q1	0.200	0.144	0.133	0.298	0.232	0.094	0.163
Q2	0.200	0.172	0.165	0.249	0.228	0.143	0.183
Q3	0.200	0.194	0.190	0.210	0.236	0.214	0.171
Q4	0.200	0.231	0.232	0.147	0.216	0.246	0.222
Q5	0.200	0.259	0.279	0.097	0.089	0.303	0.261
Firm Size:							
1-100 Employees	0.324	0.069	0.060	0.769	0.142	0.133	0.005
101-500 Employees	0.154	0.147	0.120	0.167	0.382	0.212	0.050
501-1K Employees	0.057	0.075	0.068	0.026	0.137	0.099	0.044
1K-5K Employees	0.134	0.194	0.199	0.030	0.155	0.236	0.171
>5K Employees	0.330	0.515	0.553	0.008	0.184	0.320	0.731

Source: LEHD 2014 snapshot.

Notes: Statistics for all firm and establishment subpopulations are weighted by employment. "All": Full Sample of Worker-Years. "Multi-Unit": Firms that operate multiple establishments (regardless of SEIN grouping). "Multi-SEIN": Firms that group establishments ("units") into multiple State Employer Identification Numbers. "SUSS": Firms that operate only a single establishment. "MUSS": Firms that group all of their (multiple) establishments into a single SEIN. "SUMS": SEINs with only a single establishment within multi-SEIN firms; "MUMS": SEINs with multiple establishments within firms that operate multiple SEINs. Note that SUMS and MUMS categories are defined at the establishment level, so that the same firm can operate both SEINs with multiple establishments and SEINs with only a single establishment. See Table 2 for full names of the abbreviated row labels for characteristic categories.

Table A.3: Characterizing Between-Establishment Mobility Access: Distance Bin Shares of Within-Firm Employment by Categories of Worker and Firm Characteristics

	Firm Heterogeneity					Worker Heterogeneity				
Distance Share	**Firm Size**					**Earnings**				
	1-100	**101-500**	**501-1K**	**1K-5K**	**>5K**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
500+ miles	0.434	0.345	0.367	0.439	0.538	0.434	0.441	0.443	0.466	0.528
100-500 miles	0.238	0.217	0.227	0.226	0.227	0.231	0.230	0.234	0.234	0.208
50-100 miles	0.068	0.080	0.075	0.060	0.051	0.069	0.065	0.064	0.061	0.051
25-50 miles	0.061	0.077	0.070	0.056	0.039	0.065	0.059	0.054	0.050	0.043
10-25 miles	0.082	0.102	0.098	0.074	0.049	0.081	0.074	0.070	0.064	0.060
0-10 miles	0.117	0.179	0.162	0.145	0.096	0.119	0.131	0.136	0.125	0.111
	Firm Average Pay					**Tenure**				
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Hires**	**1-2 yrs**	**3-5 yrs**	**>5 yrs**	
500+ miles	0.441	0.464	0.401	0.431	0.576	0.498	0.491	0.472	0.434	
100-500 miles	0.236	0.234	0.242	0.240	0.191	0.228	0.224	0.225	0.227	
50-100 miles	0.070	0.065	0.071	0.058	0.046	0.057	0.057	0.060	0.065	
25-50 miles	0.066	0.057	0.060	0.049	0.037	0.049	0.049	0.051	0.056	
10-25 miles	0.082	0.068	0.072	0.071	0.053	0.063	0.066	0.067	0.072	
0-10 miles	0.106	0.112	0.153	0.150	0.096	0.105	0.113	0.125	0.144	
	Industry					**Age**				**Sex**
	Min.	**Const.**	**Manuf.**	**Trade & Trans.**	**Infor.**	**< 30**	**30-39**	**40-54**	**55 +**	**F**	**M**
500+ miles	0.358	0.400	0.565	0.551	0.655	0.486	0.483	0.453	0.421	0.433	0.502
100-500 miles	0.370	0.340	0.238	0.238	0.186	0.224	0.223	0.230	0.228	0.213	0.237
50-100 miles	0.077	0.087	0.049	0.058	0.036	0.059	0.058	0.063	0.066	0.062	0.059
25-50 miles	0.055	0.058	0.038	0.044	0.027	0.050	0.049	0.053	0.058	0.057	0.047
10-25 miles	0.068	0.057	0.042	0.051	0.036	0.066	0.064	0.069	0.078	0.079	0.058
0-10 miles	0.072	0.058	0.068	0.059	0.058	0.115	0.123	0.132	0.148	0.155	0.097
	Industry (Cont)					**Race**				
	Fin. & Real Estate	**Prof. Bus. Serv.**	**Educ. & Health**	**Leis. & Hosp.**	**Other Serv.**	**White**		**Black**	**Asian/ Pac. Is**	**Other**
						N-Hisp	**Hisp**			
500+ miles	0.522	0.596	0.172	0.401	0.453	0.462	0.499	0.450	0.527	0.484
100-500 miles	0.210	0.209	0.194	0.200	0.201	0.234	0.222	0.212	0.176	0.223
50-100 miles	0.051	0.048	0.081	0.064	0.056	0.065	0.052	0.054	0.045	0.058
25-50 miles	0.042	0.039	0.088	0.067	0.057	0.053	0.048	0.053	0.045	0.050
10-25 miles	0.063	0.050	0.134	0.089	0.090	0.066	0.066	0.081	0.069	0.065
0-10 miles	0.111	0.059	0.330	0.179	0.144	0.121	0.113	0.150	0.138	0.120

Source: LEHD 2014 snapshot.

Notes: Each entry captures the average among all workers in the worker or firm category defined by the column label of share of within-firm employment that is within the row label's distance bin from the worker's current establishment in the chosen year. The distance bin vector of within-firm employment shares is used as our preferred measure of access to between-establishment mobility opportunities. See Table 2 for full names of the abbreviated column labels for characteristic categories.

Table A.4: Characterizing Between-SEIN Mobility Access: Mean Distance Bin Shares of the Firm's Employment in Other SEINs by Categories of Worker and Firm Characteristics

	Firm Heterogeneity					Worker Heterogeneity				
Distance Share	**Firm Size**					**Earnings**				
	1-100	**101-500**	**501-1K**	**1K-5K**	**>5K**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
500+ miles	0.562	0.528	0.532	0.561	0.630	0.596	0.585	0.568	0.577	0.630
100-500 miles	0.277	0.272	0.269	0.236	0.210	0.247	0.241	0.243	0.237	0.204
50-100 miles	0.053	0.058	0.054	0.044	0.036	0.046	0.045	0.045	0.044	0.037
25-50 miles	0.034	0.039	0.036	0.034	0.027	0.032	0.033	0.032	0.032	0.027
10-25 miles	0.036	0.043	0.043	0.039	0.032	0.032	0.033	0.036	0.037	0.037
0-10 miles	0.037	0.061	0.066	0.087	0.065	0.047	0.063	0.075	0.074	0.065
	Firm Average Pay					**Tenure**				
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Hires**	**1-2 yrs**	**3-5 yrs**	**>5 yrs**	
500+ miles	0.602	0.609	0.517	0.542	0.675	0.615	0.610	0.589	0.568	
100-500 miles	0.259	0.245	0.254	0.241	0.183	0.231	0.227	0.231	0.234	
50-100 miles	0.045	0.045	0.054	0.041	0.033	0.040	0.041	0.043	0.046	
25-50 miles	0.028	0.030	0.040	0.036	0.022	0.028	0.029	0.031	0.034	
10-25 miles	0.031	0.027	0.038	0.045	0.033	0.032	0.034	0.037	0.038	
0-10 miles	0.035	0.044	0.097	0.095	0.054	0.054	0.059	0.070	0.080	
	Industry					**Age**				**Sex**
	Min.	**Const.**	**Manuf.**	**Trade & Trans.**	**Infor.**	**< 30**	**30-39**	**40-54**	**55 +**	**F**	**M**
500+ miles	0.477	0.468	0.658	0.659	0.721	0.617	0.605	0.581	0.558	0.569	0.613
100-500 miles	0.364	0.338	0.244	0.239	0.178	0.226	0.224	0.235	0.241	0.221	0.238
50-100 miles	0.046	0.066	0.032	0.038	0.028	0.040	0.040	0.044	0.048	0.045	0.041
25-50 miles	0.029	0.045	0.018	0.021	0.017	0.028	0.029	0.032	0.035	0.036	0.027
10-25 miles	0.045	0.042	0.020	0.021	0.023	0.032	0.035	0.037	0.041	0.042	0.030
0-10 miles	0.039	0.041	0.027	0.023	0.032	0.058	0.067	0.071	0.078	0.087	0.051
	Industry (Cont)					**Race**				
	Fin. & Real Estate	**Prof. Bus. Serv.**	**Educ. & Health**	**Leis. & Hosp.**	**Other Serv.**	**White**		**Black**	**Asian/ Pac. Is**	**Other**
						N-Hisp	**Hisp**			
500+ miles	0.647	0.686	0.314	0.571	0.638	0.578	0.654	0.565	0.667	0.617
100-500 miles	0.210	0.198	0.221	0.216	0.229	0.245	0.204	0.216	0.165	0.223
50-100 miles	0.038	0.034	0.064	0.041	0.040	0.046	0.033	0.044	0.030	0.037
25-50 miles	0.023	0.023	0.074	0.032	0.023	0.032	0.024	0.038	0.024	0.028
10-25 miles	0.028	0.028	0.093	0.036	0.029	0.034	0.030	0.051	0.038	0.032
0-10 miles	0.054	0.031	0.232	0.103	0.041	0.066	0.056	0.085	0.075	0.064

Source: LEHD 2014 snapshot.

Notes: Each entry captures the average among all workers in the worker or firm category defined by the column label of share of their firm's employment in other SEINs that is within the row label's distance bin from the worker's current establishment in the chosen year. The distance bin vector of other-SEIN employment shares within the firm is used as our preferred measure of access to between-SEIN mobility opportunities. See Table 2 for full names of the abbreviated column labels for characteristic categories.

Table A.5: Distance Bin Distributions of Observed SEIN Transitions within Firms Across Categories of Worker and Firm Characteristics

	Firm Heterogeneity					Worker Heterogeneity				
Distance Share	**Firm Size**					**Earnings**				
	1-100	**101-500**	**501-1K**	**1K-5K**	**>5K**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
500+ miles	0.562	0.528	0.532	0.561	0.630	0.596	0.585	0.568	0.577	0.630
100-500 miles	0.277	0.272	0.269	0.236	0.210	0.247	0.241	0.243	0.237	0.204
50-100 miles	0.053	0.058	0.054	0.044	0.036	0.046	0.045	0.045	0.044	0.037
25-50 miles	0.034	0.039	0.036	0.034	0.027	0.032	0.033	0.032	0.032	0.027
10-25 miles	0.036	0.043	0.043	0.039	0.032	0.032	0.033	0.036	0.037	0.037
0-10 miles	0.037	0.061	0.066	0.087	0.065	0.047	0.063	0.075	0.074	0.065
	Firm Average Pay					**Tenure**				
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Hires**	**1-2 yrs**	**3-5 yrs**	**>5 yrs**	
500+ miles	0.602	0.609	0.517	0.542	0.675	0.615	0.610	0.589	0.568	
100-500 miles	0.259	0.245	0.254	0.241	0.183	0.231	0.227	0.231	0.234	
50-100 miles	0.045	0.045	0.054	0.041	0.033	0.040	0.041	0.043	0.046	
25-50 miles	0.028	0.030	0.040	0.036	0.022	0.028	0.029	0.031	0.034	
10-25 miles	0.031	0.027	0.038	0.045	0.033	0.032	0.034	0.037	0.038	
0-10 miles	0.035	0.044	0.097	0.095	0.054	0.054	0.059	0.070	0.080	
	Industry					**Age**				**Sex**
	Min.	**Const.**	**Manuf.**	**Trade & Trans.**	**Infor.**	**< 30**	**30-39**	**40-54**	**55 +**	**F**	**M**
500+ miles	0.477	0.468	0.658	0.659	0.721	0.617	0.605	0.581	0.558	0.569	0.613
100-500 miles	0.364	0.338	0.244	0.239	0.178	0.226	0.224	0.235	0.241	0.221	0.238
50-100 miles	0.046	0.066	0.032	0.038	0.028	0.040	0.040	0.044	0.048	0.045	0.041
25-50 miles	0.029	0.045	0.018	0.021	0.017	0.028	0.029	0.032	0.035	0.036	0.027
10-25 miles	0.045	0.042	0.020	0.021	0.023	0.032	0.035	0.037	0.041	0.042	0.030
0-10 miles	0.039	0.041	0.027	0.023	0.032	0.058	0.067	0.071	0.078	0.087	0.051
	Industry (Cont)					**Race**				
	Fin. & Real Estate	**Prof. Bus. Serv.**	**Educ. & Health**	**Leis. & Hosp.**	**Other Serv.**	**White**		**Black**	**Asian/ Pac. Is**	**Other**
						N-Hisp	**Hisp**			
500+ miles	0.647	0.686	0.314	0.571	0.638	0.578	0.654	0.565	0.667	0.617
100-500 miles	0.210	0.198	0.221	0.216	0.229	0.245	0.204	0.216	0.165	0.223
50-100 miles	0.038	0.034	0.064	0.041	0.040	0.046	0.033	0.044	0.030	0.037
25-50 miles	0.023	0.023	0.074	0.032	0.023	0.032	0.024	0.038	0.024	0.028
10-25 miles	0.028	0.028	0.093	0.036	0.029	0.034	0.030	0.051	0.038	0.032
0-10 miles	0.054	0.031	0.232	0.103	0.041	0.066	0.056	0.085	0.075	0.064

Source: LEHD 2014 snapshot.

Notes: Each entry captures the average share of realized transitions to an establishment in a different SEIN within the same firm whose distance between origin and destination establishments falls within the row label's distance bin among all workers in the worker or firm category defined by the column label. See Table 2 for full names of the abbreviated column labels for characteristic categories.

Table A.6: Distance Bin Distributions of Observed Firm Transitions Across Categories of Worker and Firm Characteristics

Distance Share	Firm Heterogeneity					Worker Heterogeneity				
	Firm Size					Earnings				
	1-100	101-500	501-1K	1K-5K	>5K	Q1	Q2	Q3	Q4	Q5
500+ miles	0.049	0.052	0.053	0.058	0.055	0.043	0.048	0.051	0.057	0.071
100-500 miles	0.120	0.154	0.176	0.190	0.182	0.154	0.150	0.153	0.164	0.169
50-100 miles	0.073	0.088	0.096	0.100	0.118	0.108	0.097	0.090	0.090	0.079
25-50 miles	0.109	0.116	0.118	0.119	0.128	0.119	0.116	0.117	0.121	0.117
10-25 miles	0.237	0.228	0.220	0.216	0.220	0.214	0.225	0.234	0.233	0.228
0-10 miles	0.411	0.362	0.338	0.317	0.296	0.362	0.363	0.355	0.335	0.336
	Firm Average Pay					Tenure				
	Q1	Q2	Q3	Q4	Q5	Hires	1-2 yrs	3-5 yrs	>5 yrs	
500+ miles	0.192	0.202	0.170	0.199	0.259	0.048	0.057	0.054	0.046	
100-500 miles	0.271	0.251	0.230	0.221	0.174	0.166	0.160	0.149	0.136	
50-100 miles	0.104	0.100	0.094	0.086	0.061	0.097	0.094	0.091	0.089	
25-50 miles	0.101	0.101	0.093	0.088	0.073	0.120	0.117	0.116	0.117	
10-25 miles	0.149	0.149	0.142	0.147	0.156	0.228	0.226	0.226	0.231	
0-10 miles	0.183	0.196	0.271	0.259	0.277	0.341	0.347	0.364	0.381	
	Industry					Age				Sex
	Min.	Const.	Manuf.	Trade & Trans.	Infor.	< 30	30-39	40-54	55 +	F	M
500+ miles	0.076	0.050	0.058	0.048	0.064	0.058	0.054	0.045	0.047	0.049	0.056
100-500 miles	0.275	0.162	0.134	0.182	0.150	0.159	0.154	0.155	0.159	0.145	0.166
50-100 miles	0.128	0.095	0.088	0.113	0.073	0.098	0.088	0.093	0.091	0.092	0.095
25-50 miles	0.125	0.133	0.128	0.128	0.095	0.118	0.116	0.119	0.117	0.114	0.121
10-25 miles	0.168	0.254	0.252	0.226	0.212	0.223	0.230	0.230	0.225	0.223	0.230
0-10 miles	0.227	0.305	0.339	0.303	0.406	0.344	0.358	0.358	0.360	0.378	0.332
	Industry (Cont)					Race				
	Fin. & Real Estate	Prof. Bus. Serv.	Educ. & Health	Leis. & Hosp.	Other Serv.	White N-Hisp	White Hisp	Black	Asian/ Pac. Is	Other
500+ miles	0.044	0.052	0.053	0.063	0.049	0.053	0.056	0.034	0.071	0.058
100-500 miles	0.165	0.162	0.129	0.137	0.130	0.160	0.169	0.131	0.131	0.168
50-100 miles	0.091	0.086	0.086	0.088	0.075	0.101	0.084	0.077	0.068	0.097
25-50 miles	0.112	0.112	0.116	0.104	0.102	0.120	0.116	0.113	0.116	0.114
10-25 miles	0.224	0.227	0.222	0.207	0.225	0.221	0.230	0.251	0.241	0.215
0-10 miles	0.364	0.361	0.394	0.401	0.419	0.345	0.345	0.394	0.373	0.348

Source: LEHD 2014 snapshot.

Notes: Each entry captures the average share of realized job transitions to an establishment in a different firm whose distance between origin and destination establishments falls within the row label's distance bin among all workers in the worker or firm category defined by the column label. See Table 2 for full names of the abbreviated column labels for characteristic categories.

Table A.7: Percentiles of the Worker-Level Distributions of Predicted Contributions to 5-Year Earnings Growth and Annual SEIN Transition Rates of Access to Between-Establishment Mobility Opportunities

	Mean %Δ(Earnings)		𝕀(SEIN Transition)		𝕀(Unit Transition)
Percentile	**Baseline**	**Within-Firm**	**Baseline**	**Within-Firm**	**Baseline**
0.10	0.000	-0.002	0.000	-0.002	-0.006
0.20	0.001	-0.001	0.001	-0.001	-0.001
0.30	0.001	0.000	0.001	0.000	0.002
0.40	0.002	0.000	0.002	0.000	0.006
0.50	0.003	0.000	0.003	0.000	0.011
0.60	0.004	0.000	0.005	0.000	0.015
0.70	0.007	0.000	0.008	0.001	0.020
0.75	0.009	0.001	0.010	0.001	0.023
0.80	0.012	0.001	0.011	0.001	0.027
0.85	0.016	0.001	0.017	0.002	0.032
0.90	0.020	0.002	0.026	0.003	0.039
0.95	0.025	0.003	0.034	0.004	0.052

Source: LEHD 2014 snapshot.

Notes: Each entry in the column entitled "Mean %Δ(Earnings) - Baseline" provides the percentile associated with the row label from the worker-level distribution of predicted contributions ($BEM\ Access_{it}\hat{\beta}$) to average 5-year earnings as a share of baseline-year earnings from the worker's access to between-establishment mobility (BEM) opportunities (as measured by distance bin shares of other-establishment employment within the firm), relative to a worker whose establishment is more than 500 miles away from all others in the same firm (whose contribution has been normalized to 0). The column "Mean %Δ(Earnings) - Within-firm" reports percentiles from an analogous distribution of predicted contributions from workers' BEM access relative to the mean BEM access contribution at the worker's firm. "𝕀(SEIN Transition) - Baseline" and "𝕀(SEIN Transition) - Within-firm" report the analogous percentiles of the distributions of predicted contributions of BEM access to annual SEIN transition rates ($BEM\ Access_{it}^{X-SN}\hat{\beta}$). "𝕀(Unit Transition - Baseline" reports the analogous percentiles of the distributions of predicted contributions of BEM access to the probability of making any establishment transition within the firm, including to those within the same SEIN. These requires additional assumptions that justify extrapolating BEM access coefficients for the 𝕀(SEIN Transition) outcome to within-SEIN transitions and to firms with multiple establishments but only a single SEIN. See Section 6 for further detail.

Table A.8: Heterogeneity across Firm Subpopulations in the Effects of Distance-Based Access to Opportunities for Between Establishment Mobility on Workers' Earnings over the Following 5 Years

	Mean %Δ(Earnings)									
Distance	**Firm Size**					**Firm Average Pay**				
(mi.)	**1-100**	**101-500**	**501-1K**	**1K-5K**	**>5K**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
100-500	-0.001	0.002	0.012‡	0.002	0.003	-0.001	-0.002	0.004	0.006°	0.006
	(0.005)	(0.003)	(0.003)	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
50-100	0.015	0.003	0.011°	0.009°	0.007	0.002	-0.007	0.008	0.019‡	0.011
	(0.008)	(0.004)	(0.005)	(0.004)	(0.005)	(0.006)	(0.005)	(0.004)	(0.004)	(0.006)
25-50	0.018°	0.006	0.015†	0.016‡	0.009	0.008	0.007	0.010°	0.013°	0.019°
	(0.009)	(0.004)	(0.005)	(0.004)	(0.006)	(0.006)	(0.005)	(0.004)	(0.005)	(0.008)
10-25	0.019°	0.005	0.019‡	0.017‡	0.020‡	0.01	0.019‡	0.017‡	0.018‡	0.017†
	(0.009)	(0.004)	(0.005)	(0.004)	(0.005)	(0.006)	(0.005)	(0.004)	(0.004)	(0.006)
0-10	0.027†	0.010†	0.023‡	0.027‡	0.033‡	0.014°	0.026‡	0.028‡	0.030‡	0.028‡
	(0.009)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.004)	(0.007)
Pred. Eff. at $\bar{X}$	0.007	0.003	0.010	0.007	0.006	0.003	0.004	0.008	0.009	0.006
Mean	0.098	0.085	0.087	0.087	0.103	0.152	0.096	0.073	0.072	0.092
	Industry									
	Min.	**Const.**	**Manuf.**	**Trade & Trans.**	**Infor.**	**Fin. & Real Estate**	**Prof. Bus. Serv.**	**Educ. & Health**	**Leis. & Hosp.**	**Other Serv.**
Distance (mi.)										
100-500	-0.040†	0.009	0.006	0.001	0.017	0.008	0.005	-0.008	-0.005	0.006
	(0.013)	(0.007)	(0.004)	(0.003)	(0.011)	(0.006)	(0.003)	(0.007)	(0.006)	(0.009)
50-100	-0.038	0.029†	0.015°	0.012°	0.002	0.015	0.008	-0.007	-0.024°	0.037°
	(0.024)	(0.011)	(0.006)	(0.005)	(0.014)	(0.009)	(0.005)	(0.007)	(0.010)	(0.016)
25-50	-0.015	0.038†	0.020‡	0.009	0.048	0.024†	0.004	-0.005	0.005	0.041°
	(0.020)	(0.014)	(0.006)	(0.005)	(0.034)	(0.008)	(0.006)	(0.007)	(0.009)	(0.017)
10-25	-0.061°	0.008	0.038‡	0.021‡	0.014	0.025†	0.008	-0.002	0.012	0.048°
	(0.026)	(0.013)	(0.006)	(0.005)	(0.013)	(0.009)	(0.007)	(0.007)	(0.008)	(0.019)
0-10	-0.003	0.017	0.033‡	0.024‡	0.052†	0.030†	0.032‡	0.011	0.026°	0.025
	(0.022)	(0.011)	(0.006)	(0.005)	(0.016)	(0.010)	(0.006)	(0.007)	(0.011)	(0.016)
Pred. Eff. at $\bar{X}$	-0.023	0.009	0.007	0.004	0.008	0.008	0.004	0.001	0.004	0.013
Mean	0.127	0.082	0.043	0.097	0.087	0.110	0.123	0.100	0.144	0.094
Distance	**Number of Establishments**					**Within-Firm Pay**				
(mi.)	**2-3**	**4-10**	**11-25**	**26-100**	**>100**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
100-500	0.006	0.007°	0.005	0.003	0.001	-0.001	-0.005	-0.006°	0.002	0.007†
	(0.007)	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
50-100	0.003	0.011†	0.004	0.007	0.01	0.015	-0.008	-0.004	0	0.010†
	(0.010)	(0.004)	(0.004)	(0.004)	(0.005)	(0.008)	(0.006)	(0.004)	(0.004)	(0.004)
25-50	0.021	0.014‡	0.007	0.008	0.017°	0.018°	-0.004	0	0.004	0.012†
	(0.011)	(0.004)	(0.004)	(0.004)	(0.008)	(0.009)	(0.007)	(0.004)	(0.004)	(0.004)
10-25	0.024°	0.015‡	0.012†	0.015‡	0.021‡	0.019°	0.005	0.001	0.003	0.018‡
	(0.010)	(0.004)	(0.004)	(0.004)	(0.006)	(0.009)	(0.006)	(0.004)	(0.004)	(0.004)
0-10	0.024°	0.020‡	0.017‡	0.032‡	0.035‡	0.027†	0.016°	0.006	0.022‡	0.029‡
	(0.009)	(0.004)	(0.004)	(0.004)	(0.008)	(0.009)	(0.007)	(0.004)	(0.004)	(0.004)
Pred. Eff. at $\bar{X}$	0.009	0.007	0.004	0.005	0.003	0.006	0.000	-0.001	0.004	0.008
Mean	0.092	0.092	0.089	0.089	0.103	0.266	0.107	0.066	0.037	0.009

Source: LEHD 2014 snapshot. Notes: The reported coefficients capture interactions between distance bins' shares of the firm's other-establishment employment and indicators for the labeled firm subpopulations. The outcome is a worker's mean earnings over five years as a share of baseline year earnings. Each panel reports results from a different regression. ‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table A.9: Heterogeneity across Firm Subpopulations in the Effects of Distance-Based Access to Opportunities for Between Establishment Mobility on Workers' Annual SEIN Transition Rates

	𝕀(SEIN Transition)									
Distance	**Firm Size**					**Firm Average Pay**				
(mi.)	**1-100**	**101-500**	**501-1K**	**1K-5K**	**>5K**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
100-500	0.005‡	0.005‡	0.006‡	0.007‡	0.013‡	0.012‡	0.012†	0.007‡	0.007‡	0.008‡
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)
50-100	0.009‡	0.009‡	0.009‡	0.013‡	0.025‡	0.018‡	0.018‡	0.014‡	0.017‡	0.020‡
	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.005)	(0.003)	(0.003)	(0.003)
25-50	0.020‡	0.013‡	0.015‡	0.021‡	0.036‡	0.024‡	0.025‡	0.021‡	0.025‡	0.035‡
	(0.003)	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	(0.005)	(0.003)	(0.003)	(0.004)
10-25	0.024‡	0.018‡	0.016‡	0.027‡	0.045‡	0.030‡	0.032‡	0.025‡	0.032‡	0.046‡
	(0.003)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.005)	(0.003)	(0.003)	(0.005)
0-10	0.026‡	0.020‡	0.018‡	0.029‡	0.048‡	0.032‡	0.032‡	0.029‡	0.034‡	0.052‡
	(0.003)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)
Pred. Eff. at $\bar{X}$	0.004	0.004	0.005	0.006	0.009	0.007	0.007	0.007	0.008	0.007
Mean	0.008	0.007	0.008	0.010	0.017	0.013	0.012	0.011	0.012	0.017
	Industry									
	Min.	**Const.**	**Manuf.**	**Trade & Trans.**	**Infor.**	**Fin. & Real Estate**	**Prof. Bus. Serv.**	**Educ. & Health**	**Leis. & Hosp.**	**Other Serv.**
Distance (mi.)										
100-500	0.010°	0.007°	0.004°	0.013‡	0.005	0.015‡	0.008‡	0.002	0.006°	0.010‡
	(0.005)	(0.003)	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)	(0.004)	(0.003)	(0.003)
50-100	0.011	0.007	0.017‡	0.019‡	0.028‡	0.030‡	0.016‡	0.009	0.016‡	0.011†
	(0.008)	(0.004)	(0.003)	(0.003)	(0.006)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
25-50	0.015	0.018†	0.024‡	0.026‡	0.053‡	0.046‡	0.024‡	0.015†	0.024‡	0.024‡
	(0.010)	(0.007)	(0.003)	(0.004)	(0.009)	(0.006)	(0.003)	(0.004)	(0.003)	(0.006)
10-25	0.034‡	0.036‡	0.037‡	0.032‡	0.070‡	0.048‡	0.036‡	0.020‡	0.029‡	0.025‡
	(0.009)	(0.010)	(0.005)	(0.004)	(0.016)	(0.006)	(0.004)	(0.004)	(0.003)	(0.006)
0-10	0.031†	0.017°	0.045‡	0.037‡	0.073‡	0.051‡	0.041‡	0.022‡	0.028‡	0.031‡
	(0.010)	(0.006)	(0.005)	(0.004)	(0.011)	(0.006)	(0.004)	(0.004)	(0.003)	(0.007)
Pred. Eff. at $\bar{X}$	0.007	0.006	0.004	0.006	0.007	0.009	0.005	0.009	0.007	0.005
Mean	0.020	0.021	0.008	0.013	0.020	0.017	0.015	0.010	0.014	0.011
Distance	**Number of Establishments**					**Within Firm Pay**				
(mi.)	**2-3**	**4-10**	**11-25**	**26-100**	**>100**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
100-500	0.004°	0.005‡	0.006‡	0.008‡	0.014‡	0.008‡	0.010‡	0.009‡	0.010‡	0.011‡
	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
50-100	0.008†	0.008‡	0.012‡	0.016‡	0.026‡	0.016‡	0.019‡	0.018‡	0.019‡	0.020‡
	(0.003)	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
25-50	0.021‡	0.014‡	0.018‡	0.023‡	0.037‡	0.024‡	0.027‡	0.027‡	0.029‡	0.030‡
	(0.004)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
10-25	0.024‡	0.019‡	0.022‡	0.029‡	0.051‡	0.032‡	0.034‡	0.034‡	0.036‡	0.038‡
	(0.004)	(0.002)	(0.002)	(0.003)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
0-10	0.022‡	0.016‡	0.024‡	0.036‡	0.055‡	0.035‡	0.037‡	0.039‡	0.040‡	0.038‡
	(0.004)	(0.002)	(0.002)	(0.003)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Pred. Eff. at $\bar{X}$	0.006	0.005	0.005	0.007	0.007	0.005	0.007	0.008	0.008	0.008
Mean	0.006	0.007	0.010	0.013	0.018	0.010	0.012	0.013	0.015	0.019

Source: LEHD 2014 snapshot. Notes: The reported coefficients capture interactions between distance bins' shares of the firm's other-establishment employment and indicators for the labeled worker subpopulations. The outcome is a worker's mean earnings over five years as a share of baseline year earnings. Each panel reports results from a different regression. ‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table A.10: Heterogeneity across Worker Subpopulations in the Effects of Distance-Based Access to Opportunities for Between Establishment Mobility on the Average Percent Change in Workers' Earnings Across the Following 5 Years

	Mean %△(Earnings)									
	Earnings					Race				
Distance	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**White**		**Black**	**Asian/**	**Other**
(mi.)						**N-Hisp**	**Hisp**		**Pac. Is**	
100-500	-0.024†	-0.007	0.003	0.008†	0.009†	0.005†	0.000	0.004	-0.013°	0.007
	(0.008)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.004)	(0.004)	(0.006)	(0.006)
50-100	-0.050‡	-0.009	0.011†	0.013‡	0.023‡	0.010‡	-0.008	0.007	0.014	0.029†
	(0.010)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.006)	(0.006)	(0.011)	(0.009)
25-50	-0.044‡	-0.001	0.013‡	0.017‡	0.027†	0.014‡	0.008	0.014°	0.006	0.004
	(0.011)	(0.005)	(0.004)	(0.004)	(0.008)	(0.003)	(0.005)	(0.007)	(0.010)	(0.010)
10-25	-0.030†	0.004	0.016‡	0.018‡	0.031‡	0.020‡	0.006	0.015†	0.007	0.018
	(0.011)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.005)	(0.006)	(0.009)	(0.009)
0-10	-0.028°	0.011°	0.022‡	0.038‡	0.038‡	0.033‡	0.014†	0.006	0.020°	0.026†
	(0.012)	(0.005)	(0.003)	(0.004)	(0.006)	(0.003)	(0.005)	(0.006)	(0.008)	(0.009)
Pred. Eff. at $\bar{X}$	-0.018	-0.001	0.006	0.009	0.010	0.008	0.002	0.004	0.002	0.008
Mean	0.152	0.096	0.073	0.072	0.092	0.093	0.096	0.086	0.130	0.110

Distance	**Age**				**Sex**		**Tenure**			
(mi.)	**< 30**	**30-39**	**40-54**	**55 +**	**F**	**M**	**Hires**	**1-2 yrs**	**3-5 yrs**	**>5 yrs**
100-500	0.002	0.007†	0.002	0.001	-0.001	0.006†	0.001	0.003	0.006°	0.005
	(0.003)	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)
50-100	0.008	0.014‡	0.007°	-0.004	0.007°	0.009†	0.004	0.006	0.009°	0.012†
	(0.005)	(0.004)	(0.003)	(0.005)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
25-50	0.010°	0.021‡	0.013‡	-0.003	0.011†	0.014‡	0.014†	0.012†	0.014‡	0.012°
	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)
10-25	0.013†	0.023‡	0.017‡	0.012°	0.019‡	0.015‡	0.012†	0.013‡	0.021‡	0.022‡
	(0.005)	(0.004)	(0.003)	(0.005)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)
0-10	0.028‡	0.034‡	0.024‡	0.018‡	0.027‡	0.027‡	0.023‡	0.026‡	0.031‡	0.028‡
	(0.005)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Pred. Eff. at $\bar{X}$	0.006	0.009	0.006	0.003	0.006	0.006	0.004	0.005	0.008	0.008
Mean	0.217	0.098	0.045	-0.012	0.092	0.098	0.152	0.144	0.080	0.027

Source: LEHD 2014 snapshot.

Notes: The coefficients reported in this table are interactions between shares of other-establishment employment within the firm that fall into the distance bin given by the row label and indicators for the worker subpopulation defined by the characteristic category in the column label. The outcome is the average percent change in a worker's earnings across the subsequent five years relative to the baseline year. Interactions featuring all the characteristic categories in a given panel are included in the same regression, but different panels featuring different characteristics represent different regressions. See the Table 2 notes for definitions of the categories defined by the column labels. Clustered two-way standard errors by firm and worker in parentheses.

‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.

Table A.11: Heterogeneity across Worker Subpopulations in the Effects of Distance-Based Access to Opportunities for Between Establishment Mobility on Workers' Annual SEIN Transition Rates

	$\mathbb{I}$(SEIN Transition)									
	Earnings					Race				
Distance	Q1	Q2	Q3	Q4	Q5	White		Black	Asian/	Other
(mi.)						N-Hisp	Hisp		Pac. Is	
100-500	0.010‡	0.008‡	0.009‡	0.008‡	0.010‡	0.009‡	0.009‡	0.010‡	0.012‡	0.009‡
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
50-100	0.015‡	0.015‡	0.018‡	0.018‡	0.020‡	0.018‡	0.015‡	0.021‡	0.021‡	0.020‡
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
25-50	0.019‡	0.020‡	0.025‡	0.028‡	0.035‡	0.026‡	0.024‡	0.033‡	0.038‡	0.025‡
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)
10-25	0.023‡	0.026‡	0.031‡	0.036‡	0.044‡	0.034‡	0.029‡	0.043‡	0.044‡	0.032‡
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.005)	(0.003)
0-10	0.025‡	0.030‡	0.033‡	0.039‡	0.047‡	0.038‡	0.031‡	0.042‡	0.046‡	0.035‡
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.005)	(0.003)
Pred. Eff. at $\bar{X}$	0.006	0.006	0.007	0.008	0.008	0.008	0.006	0.010	0.009	0.007
Mean	0.009	0.010	0.011	0.014	0.019	0.014	0.011	0.013	0.014	0.013

	Age				Sex		Tenure			
	$<$ 30	30-39	40-54	55 +	F	M	Hires	1-2 yrs	3-5 yrs	$>$5 yrs
100-500	0.012‡	0.010‡	0.009‡	0.007‡	0.011‡	0.009‡	0.011‡	0.010‡	0.011‡	0.008‡
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.0015)	(0.0013)	(0.0026)	(0.0018)
50-100	0.020‡	0.021‡	0.018‡	0.013‡	0.021‡	0.017‡	0.019‡	0.018‡	0.022‡	0.018‡
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.0021)	(0.0020)	(0.0031)	(0.0023)
25-50	0.028‡	0.030‡	0.028‡	0.019‡	0.029‡	0.026‡	0.030‡	0.029‡	0.031‡	0.026‡
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.0024)	(0.0022)	(0.0032)	(0.0029)
10-25	0.036‡	0.040‡	0.034‡	0.025‡	0.035‡	0.034‡	0.038‡	0.039‡	0.037‡	0.031‡
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.0032)	(0.0027)	(0.0030)	(0.0031)
0-10	0.040‡	0.042‡	0.037‡	0.026‡	0.039‡	0.036‡	0.041‡	0.040‡	0.039‡	0.036‡
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.0032)	(0.0025)	(0.0030)	(0.0035)
Pred. Eff. at $\bar{X}$	0.008	0.008	0.008	0.006	0.009	0.006	0.007	0.007	0.008	0.007
Mean	0.014	0.015	0.013	0.010	0.013	0.014	0.012	0.015	0.015	0.012

Source: LEHD 2014 snapshot.

Notes: The coefficients reported in this table are interactions between shares of other-establishment employment within the firm that fall into the distance bin given by the row label and indicators for the worker subpopulation defined by the characteristic category in the column label. The outcome is an indicator for whether the worker changed its primary SEIN within the same firm between the baseline and subsequent year. Interactions featuring all the characteristic categories in a given panel are included in the same regression, but different panels featuring different characteristics represent different regressions. See the Table 2 notes for definitions of the categories defined by the column labels. Clustered two-way standard errors by firm and worker in parentheses.

‡, †, and ° denote statistical significance at the 1%, 5%, and 10% levels.