PRELIMINARY DRAFT

Rank and Job Search: Information or Irritation?

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Abstract

There have been many theories about how an individual's rank in his comparison group relates to job search behavior, but little empirical evidence. I use the Longitudinal Employer-Household Dynamics (LEHD) data to study how a worker's positions in the earnings distributions of his comparison groups correlates with the probability that he leaves his job. I find that workers with lower rank in their firm comparison groups are more likely to leave their job and that these low ranked leavers see significantly greater earnings gains than low ranked stayers. Along with the positive relationship between rank and future earnings, this suggests that worker's apparent preferences for rank can be explained by pecuniary motives instead of behavioral ones.

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1 Introduction

In this paper, I make use of a unique data set to investigate the relationship between a worker's rank in the earnings distribution of his comparison groups, his job search decisions, and his outcomes. I find that lower ranked workers are more likely to leave their jobs. These transitions appear to be voluntary, and comparison group rank is not negatively correlated with being fired. Further, the lower ranked leavers workers see greater earnings gains than low ranked stayers, and see greater percentage earnings growth from leaving than higher ranked leavers. I find no evidence that workers treat status as a form of compensation that substitutes for higher pay. Combining this finding with the relationship between rank, job transition, and earnings growth, I conclude that the patterns in the data can be explained without using a behavioral story. I also show that rank is correlated with two measures of search intensity: the distance between a worker's old and new jobs and whether or not a worker who changes jobs also changes NAICS sectors.

Previous attempts to explore the impact of comparison income on worker behavior have been limited by lack of large, linked employer-employee data set. To study turnover, you need a panel data set. To study comparison groups, you need a cross-sectional data set that contains information on a reasonal comparison group. Most previous studies used ad-hoc comparison groups; those that had natural comparison groups had at most a few firms in their groups. No study could follow workers and firms over time to isolate the impact of rank from firm or worker factors that might also influence the worker's turnover decision.

In contrast, my data set contains earnings for over 200 million American workers, and I can follow these workers across firms and time. I use this to construct accurate ranks of workers in firm-based comparison groups and tie a workers' group ranks to their outcomes; thanks to the breadth of the data, my specifications can include controls unavailable to previous authors.

It is natural to think that workers might care about their income and its relation to the incomes of their co-workers. Many economists have found relative income to be positively correlated with measures of subjective well-being: Ferrer-i Carbonell [2005] and Luttmer [2005] are some of the more recent economists to find evidence of the relationship posited by Easterlin [1974, 1995, 2001], Duesenberry [1949], Pigou (1920), Veblen [1965], and Smith [1759]. If workers prefer jobs where they enjoy higher relative earnings, we would expect them (other factors constant) to report higher satisfaction at those jobs. Evidence linking relative pay to job satisfaction has been found by Oswald and Clark [1996], Hamermesh [2001] and Brown et al. [2008]. Card et al. [2010] actually find evidence of a causal relationship between

exposure to information about relative income and self reported job satisfaction. Relative income may also be related to behavior; experimental evidence from Cohn et al. [2011] suggests that a worker's relative income is positively correlated with his effort provision.

There is also a small but growing body evidence directly linking a worker's relative income to his decision to look for a new job. While Baker et al. [1994] find no evidence that low relative income relates to turnover at a single American financial firm, Galizzi and Lang [1998] examine a small Italian data set and find higher average wages at manufacturing firms decrease the probability a worker at those firms quits his job, even holding his wage constant. Kwon and Milgrom [2009] find that a worker's position in the wage distribution of his within firm-occupation before a merger or acquisition as well as his "expected" post-merger position in that distribution are predictive of his decision to stay at or leave the (newly formed) firm. The early results of Rege and Solli (2013) indicate that when Norwegian workers received an information shock about a co-worker's (labor and non-labor) income, the workers with low relative income were more likely to leave for new jobs. Evidence from Haltiwanger and Vodopivec [2003] and Brown et al. [2008] could also be interpreted as linking relative income to turnover.

I document the relationship between an individual's relative income, as measured by his rank in his comparison group, on his behavior and outcomes. I also provide insight into what constitutes the most relevant "comparison group". As Kwon and Milgrom [2009] note, the current work in the literature seems to choose the comparison group in an arbitrary fashion; previous choices have included neighbors, similarly aged and educated individuals in the geographic region, or even similar individuals from different time periods.

No empirical model has controlled for the individual's position in multiple comparison groups. A question of "which" comparison group to use may also be misleading in the sense that an agent may have multiple reference points (the model of Koszegi and Rabin [2006] provides one example of this). A worker's comparison groups and his position in them may also give information about other unobserved factors in a worker's decision, even if a worker's position does not come into his decision. As an example, suppose there are two possible comparison groups for a worker in a legal firm: workers in a firm, and all workers of a given education level within that firm. A lawyer may not be concerned about his position in the firm distribution (which includes support staff); she only cares about how she is paid relative to other lawyers. However, to the econometrician, a high rank in the firm distribution means the employee is probably a lawyer, whereas a lower paid worker is more likely a secretary. Thus, her rank within the firm is predictive of her behavior to extent that rank in the firm is correlated to occupation (and behavior varies with occupation).

By using the Longitudinal Employer-Household Dynamics (LEHD) data from the US Census Bureau, I can look at the individual's on the job earnings relative to a much more local (and theoretically, more visible) comparison group: a person's coworkers or those coworkers with similar education and age profiles. The vast scope of the LEHD and the worker-firm links it provides mean I can look at the relationship between status and job turnover on a truly representative sample of US workers and firms while controlling for their key characteristics.

The study of future earnings growth is crucial to disentangling the mechanisms by which status influences workers transition decisions. Even if I had the exogenous variation in information about relative earnings available to Card et al. [2010] and Rege and Solli [2013], I would still need to study future earnings to understand peoples' response to information about their status. The primary explanations for peoples preferences for higher status can be categorized as informational and behavioral stories. Examples of informational stories are the match-effect models advanced by Jovanovic [1979a,b, 1984] or the tournament model advanced by Lazear and Rosen [1981]. In both cases, higher relative income indicates higher earnings in the future; Baker et al. [1994] and Galizzi and Lang [1998] find evidence that they interpret as supporting these types of models. In contrast, Frank [1984] and Kwon and Milgrom [2009] both find evidence supporting the notion that high relative income is associated with less rapid wage growth. This suggests high relative income is itself a form of compensation, which might be purchased in a market for "status" of the kind suggested by Frank [1984] and Becker et al. [2005].

Table 1 shows predictions concerning transition probability and future earnings made by different theories[1].

[Insert Table 1 Here]

These provide a starting point for my own tests. To see which theory best describes individual behavior, I will first look see whether a worker's rank in his comparison group(s) is positively or negatively correlated with his decision to leave a firm. Next I will test how his future earnings are predicted by his present rank as well as look for evidence that status is an alternate form of compensation. After, I examine how rank relates to a worker's search intensity, I conclude with some ideas that may explain my results and can be explored further.

[1]Kwon and Milgrom [2009] use a similar table

2 Empirical

2.1 Data: The LEHD

The Longitudinal Employer-Household Dynamics (LEHD) data are the result of a partnership between the federal government and the governments of all 50 states, with most states' records going back into the early nineties. Every state provides the Census Bureau (via the Local Employment Dynamics federal/state partnership) with raw data from the state's Unemployment Insurance (UI) administrative files. In effect, each state provides the LEHD with a job-level report of UI-covered quarterly earnings for nearly all wage and salary payments to workers in non-farm jobs. When combined with a state supplied extract of the ES-202/QCEW report, these reports uniquely identify the worker, the employer which the worker was employed during the quarter, the industry of that employer, and her earnings at that firm. The LEHD data are created by integrating employer-worker (job-level) payment information from state UI wage records, payroll, industry, location data from each establishment of a firm in the Quarterly Census of Employment and Wages (QCEW), and demographic information provided by records from the Social Security Administration administrative records, decennial census, American Community Survey (ACS), Current Population Survey (CPS), and the Survey of income and Program Participation (SIPP).

While many data sources are integrated into the LEHD, the UI wage records and QCEW files are the core of the LEHD data. Each UI wage records report a worker-employer link; therefore, by virtue of the LEHD records being based on the existence of a worker-employer pair, the data are a job frame from which we can sample workers or firms. In the LEHD universe, there are over 200 million unique observed worker records. The unique person identifier for all UI records allows for linkages to other individual data sets, where information on workers' demographic characteristics can be found (e.g. the Social Security Administration). Thus the LEHD data include sex, date and place of birth, citizenship status, race, and education. Place of residence can also be linked from the other administrative data assembled at the Census Bureau; Schmutte [2011] describes this in more detail. The LEHD data are described in detail in Abowd et al. [2009].

For reasons of confidentiality, access to the LEHD data is highly restricted. It requires a Census-approved research proposal and security clearance; there are also restrictions on what results may published. I discuss these restrictions in more detail later. Researchers interested in using the LEHD data products may start with the public Quarterly Workforce Indicators (QWI) data or contact the administrator of a Census-sponsored Research Data

Center (RDC) about using the restricted-access LEHD.

2.2 Advantages of the Data

The LEHD data provide unique advantages when studying the role of comparison group rank on worker behavior. Few studies have comparison groups as local as the within firm comparison groups I can construct from the LEHD. Fewer still can construct comparison groups for multiple firms, much less the universe of US firms. Further, as the earnings records in the LEHD are from an administrative source, there is less need for concern about measurement error. The data also provide me with the ideal measure of earnings for the firm comparison groups[2].

Just as crucially, I can follow workers and firms across time, which will allow me to control for their idiosyncrasies in a way that is impossible without linked data [3]. Likewise, following firms over time allows me to control for unobservable firm characteristics that may influence a worker's transition decision, to say nothing of firm observables that vary over time. Observing employment changes allows me to account for the possibility that firms fire lower-ranked workers when they begin shedding jobs. The linked nature of the data also allow me to observe the long-term earnings or employment consequences for low ranked individuals. I can follow these workers' future earnings and employment paths and see how they are predicted by current rank in their comparison group.

2.3 Methodology

In order to justify the empirical choices described below, I begin with some motivation. I am imagining a continuous time theoretical model. Individuals are born, acquire education, and then enter into the labor force. While in the labor force, they have one job at any given time, where they receive a time varying wage that is a function of age, experience, tenure, and education plus some random variable. Individuals receive only wages (dollars per hour) as compensation. They use their wage information and information about their co-workers' wages to make job transition decisions. I will attempt to adapt this model to the constraints

[2]Rege and Solli is restricted to using a person's total earnings compared against the total earnings of his co-workers; this incongruently matches an individual's total (job plus other labor plus non-labor) income to the total income of other workers at the same firm. In contrast, I compare a worker's earnings from his job to the earnings of his co-workers from their job at the same firm.

[3]For example, if low rank workers are also bad workers, and this causes them to change all jobs at a greater rate (not just in one firm, as is Baker et al. [1994]), then I can control for this using a worker fixed effect.

of administrative data, which will introduce difficulties that can be resolved only by making assumptions.

2.3.1 No Hours or Benefits Information

I only observe quarterly earnings in the LEHD, not hours worked, so I must assume that the individual works a constant number of hours per week and earnings only vary because weeks worked vary across quarters. Likewise, I do no not observe benefits, and so I must also assume that benefits are equivalent across individuals, or at least distributed in a manner that is orthogonal to relative earnings. Ideally, I could reduce earnings and benefits to some wage (dollars per unit of effort/time) which would allow for apples to apples compensation comparisons of individuals and the wage distribution of their comparison earnings group in a given time t. As it is, I instead use an individual's quantile in his comparison-earnings group to predict job transition, future earnings, and search behavior. In an effort to deal with the lack of information on hours worked, I use the average full quarter earnings (an employee i is said to have worked a full quarter t when the employee was employed at that same firm in $t-1$, t, and $t+1$) of individual i at firm j in year t multiplied by four to define an individual's "annualized" (counterfactual) earnings. The advantage of using full quarter earnings is that I do not need to worry that an individual's quarterly earnings were affected by his beginning or ending the job in that quarter. If no full quarter earnings exist for an individual's primary job, I modify them according to the formula in the appendix.

2.3.2 Workers at Multiple and Overlapping Jobs

Another key administrative record difficulty is that the LEHD records individuals working multiple jobs in one quarter, whereas my model assumes individuals holding only one job at a given time. XX% of the individual-quarter observations in the LEHD have have only one job in the quarter. These observations obviously fit nicely with the theoretical model.

Now consider the individual-quarter observations that have two or more jobs. Approximately XX% of individual quarters in my sample from the LEHD have two jobs in them. At first this looks like a job overlap, but there are two cases that fit into the model. If an individual has two jobs that overlap for one quarter, it may be the case that he quit the old job at the beginnning of the quarter and started the new job thereafter, which is consistent with the theoretical model. Even with an overlap of two quarters, we may still have a gap between the first and second job due to normal lags in payroll processes. Observations of two

jobs with overlap of 1-2 quarters account for XXX percent of the observations in the LEHD sample, and I will assume these arise in a manner in keeping with the theoretical model.

The rest of the observations, where an individual has three or more jobs or has two jobs with overlap of more than two quarters, do not seem to fit cleanly into the model. Although it is sometime the case that individuals will get late bonuses (being paid well past their last period on the old job), long job overlaps (3+ quarters) should make us suspicious that the old job is continuing in some part time capacity. These non-ideal observations comprise XXX% of individual-quarter observations in the LEHD sample, a very limited percentage. They are troublesome because they directly suggest that an individual is working one or both jobs part time. These workers may behave differently than workers with a single job, and it is strange to compare full time workers to part time or itinerant workers. To limit the irregularities caused by these cases while still including these individuals in the set of individuals at risk for a job transition, I define an individual's "dominant" job in year t as the job which gave him the greatest earnings in year t. I am concerned only by an individual changing the employer who gives him the most earnings; people leaving or starting part time or otherwise secondary jobs are not interesting to me. I will focus on dominant-job to dominant-job changes between years t and $t+1$.

Despite having quarterly data I use yearly time increments when performing my analyses. Seasonality issues, worker-differences in vacation or sick leave used, or the differential arrival of paychecks across quarters[4] can cause the appearance of earnings changes when in fact individual pay is steady and hours worked are constant. Comparisons across larger units of time reduce this noise from the quarterly data. Thus, I use yearly units of time in my analysis, although I sometimes make use of quarterly information to construct other informative variables; I discuss this in more detail below.

2.3.3 The issue of tenure

The importance of turnover to a worker's decision to leave his job has been well documented, e.g. by Topel and Ward [1992]; see Farber [1999] for a more exhaustive review of the role of tenure in job changing. I can only know a worker's tenure precisely if he arrives at a firm after the first year and quarter that a state has appeared in the data - if he arrives before that time, it is impossible for me to know long he has been at the firm. Fortunately, I can know tenure for YY.YY% of the worker-year-dominant-job observations in the data. Furthermore, as time progresses, the importance of the difference between my observed tenure and actual

[4]I thank Erika McEntarfer for pointing this last item out to me.

tenure declines; put diffently, my predicted probability that a worker quits will be further off in the case where I have observed one year of tenure but actual tenure is six years than it will be in the case where observed tenure is six years and actual tenure is 11 years.

2.3.4 Voluntary and Involuntary Turnover

I don't directly observe whether a worker quit or was fired. I am primarily concerned with how relative income affects voluntary transitions, so it would be useful to distinguish between these two. Fortunately, I can observe:

1. Whether a worker holds any job in a year (or for how many quarters in each year he is observed working at least one job)

2. The worker's year to year (or quarter to quarter) earnings changes

3. The employment change at a worker's firm. If I see significant cuts in the number of worker's at a firm I could treat all leavers of that firm as involuntary leavers (as a robustness check)

For my initial estimates, I define a job to job transition as voluntary if the person switches employers and has records of employment in each quarter of the years t and $t+1$. If the individual has one or more quarters in those years where I do not observe him as unemployed, I classify the transition as involuntary. Later, when performing robustness checks, I also categorize as involuntary any job transition where the individual's earnings declined by more than 10% or the firm of the individual's time t dominant job experienced an employment contraction of 30% or more between $(t-1, t$ or $(t, t+1)$.

2.3.5 The Actual Knowledge of Rank

I have no idea about how much each worker knows about his co-workers' earnings. Further, many corporations in America forbid workers from discussing their pay [5]. Even if such discussions were legal, there is no guarantee they would take place, and so it is not clear just how much workers know about where they fall in the earnings distribution of their comparison group. Despite this, it seems likely that worker's have some knowledge of their co-workers' incomes; discussions may occur, but even in their absence, the presence of a corner office or an instance of conspicuous consumption would provide workers with clues not only about absolute but also relative incomes.

[5] This practice is common, despite federal laws prohibiting such restrictions.

However, in an effort to mitigate the concern about the lack of information about others' earnings, I run special tests on an "Ideal Sample" (see below) that includes workers in industries where there exists a high degree of information about other workers' pay. I choose finance and information technology workers. Indivglio [2011] observes that financial workers have unusually high knowledge of their co-workers' pay. There is some quantitative evidence to back this up; the frequency with which salaries are reported in finance and technology sectors on Glassdoor.com, as opposed to the frequency of reporting in health care, suggests that in these industries there is a greater availability of and interest in information about the earnings of one's fellow workers.

2.4 Sample

The sampling universe is defined as follows. I use observations from all workers at the largest 20% of firms between the years 1995-2005 in the states of Illinois, Missouri, and North Carolina [6]. I use only worker-year observations from the largest firms so that a worker's rank in his comparison group would have a meaningful interpretation - being in the 60^{th} quantile in a group of five does not seem the same as being 60^{th} in a group of 100. I chose the states because of their relatively high finance employment to total population ratio, giving me a larger ideal sample size (see below). An argument could also be made for using contigous states to better observe job transitions across state borders. I will later bring in all individual records for any individual ever observed working in these states so that I have all available individual information regardless of the states they traversed.

The sampling frame is formed by taking a 50% sample of all the workers ever observed in the sampling universe. For a given worker, I use only his dominant job in each year - the job which yielded the greatest earnings that year. This gave me a net 10.5 million unique workers and 230,000 unique firms in my sample.

2.4.1 The Ideal Sample

One concern is about the robustness of the results: could they be driven by some factor that varies across different sub-populations? To test this, I will study a sample of workers where my analysis should suffer from the fewest possible confounds. I believe that the group of workers with the fewest confounds will be highly educated men ages 30-40 in

[6] Here the restrictions on the results that can be published come into play. Without using data from three or more states, individual state agreement is required to publish results. Using three states makes it easier to have results released while keeping the sample size tractable

regions (and times) that are not suffering from depressed job growth. Highly educated men will presumably be eligible for more jobs in more places, have better information about the available markets, and greater means to undertake job search than their less educated counterparts. Men are less likely than women to drop out of the labor force due to the birth of a child. By age 30 most men should have decided on a career, and so changing careers should not be a motive for a job transition. At 40, men still have a long career ahead of them, so the cost of searching for a new job and moving should not discourage them, as the potential gains are still relatively large. As one can think of status as a form of compensation Frank [1984], I would prefer men with above median earnings (relative to the male population); they have more income to give up for status. They are also less likely to experience involuntary transitions to unemployment; see Strain [2011] for more on this subject. As I noted earlier, there are concerns about workers' knowledge of their rank. Thus, I want to select industries where knowledge of others' compensation is well known. I choose the Finance and Technology industries, which are in the NAICS sectors 51 and 52.

2.5 Descriptive Statistics

A simple descriptive statistic show the relationship between relative income and the likelihood of changing jobs. First, I define some key table variables:

1. Between Firm Earnings Deciles: This assigns all firms to a decile (in a given year) based on the average of its workers' average full quarter earnings. Basically, this ranks a firm against other firms based on the average earnings of workers at the firms.

2. Within Firm Earnings Deciles: I use the annualized full quarter earnings for each worker i at firm j in year t to construct an earnings distribution for firm j in year t and assign each worker to an earnings decile within their firm.

3. Job to Job Transition: I say that worker's make a job-to-job transition if their primary job in t is different from their primary job in $t+1$ and they had no quarters of observed unemployment in the years t and $t+1$.

[Insert Table 2 Here]

Table 2 shows the percentage of workers of each (between firm earnings decile, within firm earnings decile) cell who have a job to job transition in the next year. There appears to a strong negative relationship between rank in the comparison earnings' distribution and

the decision to leave a firm. So a worker in (2,7) works at a firm in the 20^{th} percentile[7] and she earns more than 70% of her coworkers at that firm. As average firm earnings go from lowest (firm decile 1) to highest (firm decile 10), workers quit at lower rates. Within firms of a given average earnings decile, as you increase workers' rank in the distribution (moving from worker decile 1 to worker decile 10) they are also less likely to change jobs[8].

2.6 Individual Worker Regressions

2.6.1 Rank and Probability of Leaving

Table 2 suggests that relatively higher firm earnings and relatively higher individual earnings are associated with lower turnover. Recall, that in terms of Table 1, this would suggest that worker's either have a direct preference for status or that it is positively associated with future earnings. However, in Table 2, the higher relative earnings of workers and firms are also associated with higher absolute earnings. Thus, I use multi-variate regressions to isolate the impact of relative income in a worker's decision to leave.

I start by looking at how a worker's rank changes his predicted probability of leaving for a new job. A negative correlation between a worker's rank in the earnings distribution of his comparison group and probability of leaving would suggest that workers prefer directly prefer status or that it is a signal of future monetary rewards, which workers would also prefer. A positive correlation would suggest that workers dislike high status or see it as a signal of an earnings dead end. I estimated the linear probability model[9]:

$$\begin{aligned} Prob(JobChange_{(i,t,t+1)}) = {} & \beta_0 + \theta_i + \psi_j + f(Exper_{i,t}) + f(Age_{i,t}) + \beta_3 TotalEarn_{i,t} \\ & + \beta_4 FirmSize_{j,t} + \beta_5 FirmAvgEarnings_{j,t} \\ & + \beta_6 FirmLagEmpChange_{j,(t-1,t)} \\ & + \beta_7 FirmLeadEmpchange_{j,(t,t+1)} \\ & + f(Tenure_{i,j,t}) + \beta_9 LogAnnualJobEarn_{i,j,t} \\ & + \delta_1 FirmRank_{i,j,t} + \delta_2 FirmEducRank_{i,j,t} \end{aligned} \tag{1}$$

[7] Said differently, a firm with lower average wages than 80% of all firms.

[8] Although not shown here, the same is true even when I look within firm-education-year groups.

[9] A logit model seems a more natural choice, given that we have a binary dependent variable. However, the linear probability model allows the inclusion of many individual and firm fixed effects. Since SAS cannot use "absorb" to create separate person and firm effects, I used proc glm to absorb person effects and created firm effects as a class variable. The 5,000 largest firms got their own dummy variable, while other firms were put into a bin based on their firm-size decile in year t and their NAICS sector. The largest 5,000 firms account for YY.YY% of the worker-year observations in the sampling frame.

In words, I am regressing a worker $i's$ decision to voluntarily leave firm j between years t and $t+1$ on worker and firm fixed effects, a cubic function of the worker's experience in year t, a cubic function of the worker's age in year t the worker's total (all jobs) yearly earnings, the size of the firm, the average earnings of the firm, the employment changes at the firm between $t-1$ and t, the employment change between t and $t+1$, a cubic function of the worker's tenure, the log of the worker's job earnings in year t, and finally, his rank in the firm earnings distribution and the earnings distribution of workers at the firm with his same level of education. $FirmRank_{i,j,t}$ and $FirmEducRanki, j, t$ are the variables of interest, which I will use as measures of $i's$ position in his comparison group. In the first regression, I place workers in deciles within their group to allow the effect of rank to vary in a non-linear way. Thus the "Rank" variables capture the decile location of the worker in his comparison group.

The controls all address various confounds. Since I am interested in the impact of the worker's position in his comparison group, I need to control for the workers on the job earnings. Otherwise, rank earnings will be correlated with income and the coefficient will reflect the impact of income. In a related way, I must control for the worker's age, experience, and tenure. Younger, less experienced, and lower-tenured workers usually leave their job at higher rates. These variables also indirectly relate to position in the comparison group; you can imagine that being in the 30th percentile of the income distributions has very different implications for young workers with little experience or tenure as opposed to older workers with greater tenure. Thus, we want to control for age, experience and tenure so that their impact does not distort the coefficients on the rank variables. Since the effects of these variables, particularly tenure, are non-linear, I use cubic functions of them. Although firm size and average earnings should not directly relate to a worker's position in the within firm comparison groups, they likely predict systematic differences in turnover and so they should be included as controls. Firm-size (employment) changes must necessarily be correlated with *some* individuals' job transition decisions. One particular concern would be that when a firm shrinks it fires/forces out all workers with low relative income. If we exclude size changes as a control in this situation, we would find a spurious correlation between relative earnings and a worker's job transition decision. Finally, the worker and firm fixed effects control for unobserved factors that may affect the worker's decision to leave the job and/or correlate with his position in the relative income distribution. The results of the regression are in Table 3:

[Insert Table 3 Here]

I interpret the coefficents on the deciles in column (3), which is a regression controlling

for the worker's position in both comparison groups, as follows: being in the lowest (decile=1) firm decile makes a worker 9.5% more likely to leave his job than he would be were he in the highest decile (decile=10 - omitted). Likewise, being in the lowest firm-education-year earnings decile makes a worker 2.5% percent more likely to change his primary job in a given year than he would be if he were in the 10th (highest) firm-education-year earnings decile.

The estimation of the rank effects by deciles was to verify that the effect of rank is linear. Although there is a slight uptick from the first to the second decile, it is clear the effect of decile is largely monotone and linear; as rank increases, the probability a worker leaves his dominant job decreases. See the graph in Figure 1.

[Insert Figure 1 Here]

Due to space constraints, I did not list the controls in the first table. Table 4 is the detailed version of the regression run in the fourth column of the above table, which uses continuous versions of rank in the comparison groups. The combination of a continuous measure of rank in the firm and firm-education group earnings distribution will be the preferred specification going forward.

[Insert Table 4 Here]

I interpret the coefficient on quantiles as follows: ceteris paribis, increasing a worker's percentile in his firm-year earnings distribution (the firm-year comparison group) by X causes the probability he leaves to decrease by $.13 * X/100$. Increasing his rank in the earnings distribution of workers at the firm with the same education by Y causes his probability of leaving for a new job to decrease by $\approx .03 * Y/100$. Thus, moving a worker from the 25^{th} percentile in the firm distribution to the 75^{th} percentile will mean a decrease in the probability of him leaving the firm by approximately $.13 * \frac{75-25}{100} = .13 * .5 = .065$. Increasing his rank within the group of workers with the same education by 50 percentiles would only lead to a $.5 * .03 = .015$ decrease in the probability that he leaves his job. It what will become a trend, we see that rank effects are significant but small when compared to the impact of other variables such as earnings level, age, and tenure.

2.6.2 Future Earnings

The results of the first test suggest that workers do have a preference for status - that is, we are in the first two rows of Table 1. To further disentangle the theories and understand why they prefer status, we must look at how status is correlated with future earnings. If status is correlated with *lower* future earnings, this would suggest a preference for status not related

to a preference for higher wages. If status/rank is correlated with higher future earnings, then workers may only prefer status for it's pecuniary implications. To test this, I regress a worker's current rank on cumulative earnings one year and five years out from time t:

$$\begin{aligned} E(CumEarn_{(i,t,t+X)}) = \beta_0 + \theta_i + \psi_j + f(Exper_{i,t}) + f(Age_{i,t}) + \beta_3 TotalEarn_{i,t} \\ + \beta_4 FirmSize_{j,t} + \beta_5 FirmAvgEarnings_{j,t} \\ + \beta_6 FirmLagEmpChange_{j,(t-1,t)} + \beta_7 FirmLeadEmpchange_{j,(t,t+1)} \\ + f(Tenure_{i,j,t}) + \beta_9 LogAnnualJobEarn_{i,j,t} + \delta_1 FirmRank_{i,j,t} \\ + \delta_2 FirmEducRank_{i,j,t} + \delta_3 JobChange_{(i,t,t+1)} + \delta_4 FirmRank_{i,j,t} \\ * JobChange_{(i,t,t+1)} + \delta_5 FirmEducRank_{i,j,t} * JobChange_{(i,t,t+1)} \end{aligned} \tag{2}$$

In words, I am regressing a worker $i's$ total future earnings in year $t + X$ on worker and firm fixed effects, a cubic function of the worker's experience in year t, the worker's total (all jobs) yearly earnings, the size of the firm, the average earnings of the firm, the employment changes at the firm between $t-1$ and t and t and $t+1$, a cubic function of the worker's tenure, the log of the worker's job earnings in year t, his rank in the firm earnings distribution, and his rank in the earnings distribution of workers at the firm with his level of education. $FirmRank_{i,j,t}$ and $FirmEducRank_{i,j,t}$ are the variables of interest, which I will use as measures of $i's$ position in his comparison group.

Age, experience, and tenure are all related to current worker earnings, and these variables correlate strongly with their future values (age linearly so), which are in turn tied to future earnings. These factors also are tied to relative earnings in the sense that without holding them fixed, one's position in the earnings distribution might have very different meanings. Likewise, a firm's size and earnings can be reasonably expected to be correlated with a worker's career path (and therefore future earnings), which we might also expect to be related to the worker's relative earnings. Firm employment change tends to be related to earnings growth (particularly next year's earnings). The worker's current job and total earnings also correlated with future earnings; job earnings will correlate with future income and relative income, and total earnings might as well. High total earnings might signal the worker has high productivity this year, which could lead to promotions or other forms of earnings growth. Firm and worker fixed effects control for (time invariant) unobservables that might related to both the rank variables and future earnings. The regression results are in Table 5:

[Insert Table 5 Here]

Generally, it looks like higher rank is associated with higher future earnings, although much of the gap seems to have closed at the end of five years. I interpret the coefficients on the deciles as follows: if John is observably equivalent to Bill but ranked X quantiles higher in the firm earnings distribution, he will have $X * .097/100$ higher log cumulative earnings one years out and $X * .034/100$ higher cumulative earnings five years in the future. It should be noted that the negative sign on Firm-Education-Year-Quantile for five years in the future is sensitive to specification and subsample selection.

2.6.3 The Market for Status

The third test explores one idea from Frank [1984], namely that status acts as a form of compensation - in essence, this is another attempt to test whether we are in the first row of Table 1 (prestige, equity) or the second row (signalling, tournament). Supose that status has a social value independent of the monetary value. Then when a worker's status decreases, the firm must offer him more money to keep him from quitting. Likewise, a worker should be willing to accept lower raises that come with growth in status. For all workers, I regress the percentage change in their earnings on the the change in quantile from their comparison group ranks in years t to $t+1$. My specification is:

$$\begin{aligned} E(PctEarnChange_{(i,t,t+1)}) = \beta_0 &+ \theta_i + \psi_j + \beta_1 Exper_{i,t} + \beta_2 Age_{i,t} + \beta_3 TotalEarn_{i,t} \\ &+ \beta_4 FirmSize_{j,t} + \beta_5 FirmAvgEarnings_{j,t} \\ &+ \beta_6 FirmLagEmpChange_{j,(t-1,t)} \\ &+ \beta_7 FirmLeadEmpchange_{j,(t,t+1)} + \beta_8 Tenure_{i,j,t} \\ &+ \beta_9 LogAnnualJobEarn_{i,j,t} + \delta_1 FirmRank_{i,j,t} \\ &+ \delta_2 FirmEducRank_{i,j,t} + \delta_3 FirmRankChange_{(i,t,t+1)} \\ &+ \delta_4 FirmEducRankChange_{(i,t,t+1)} \end{aligned} \tag{3}$$

$FirmRank_{i,j,t}$, $FirmEducRank_{i,j,t}$, $FirmRankChange_{(i,t,t+1)}$, and $FirmEducRankChange_{(i,t,t+1)}$ are the variables of interest. A negative coefficient on these variables would support the hypothesis that rank substitutes for monetary compensation. Since earnings growth is concave in age, experience, and tenure, all of which relate to relative income, we want to include these controls. Job earnings seems to be linked to earnings growth; see Baker et al. [1994]. Firm size, earnings, and employment changes will also correlate with earnings growth (e.g. via raise/promotion scheme) for most workers at the firm. If these are also correlated with a worker's relative earnings, excluding them from the regression would lead to biased coefficients on the relative income variables.

The results of this regression can be found in Table 6:

[Insert Table 6 Here]

I interpret the coefficients on the rank change variables as saying that an increase of a worker's firm-year quantile by X from years t to $t+1$ is associated with a $14.6 * X/100$ increase in the percentage earnings increase obtained by a worker. An increase of a worker's firm-education-year quantile by X from years t to $t+1$ is associated with a $2.8 * X/100$ increase in the percentage earnings increase obtained by a worker. The coefficients are high and are driven by outliers, but with outliers removed, the coefficients are of reasonable size and the signs and significance of the coefficients do not change.

Rank changes and earnings changes should be expected to mechanically correlated (positively), so this result should not be surprising. However, this result means there is an absence of evidence that a "market for status" exists, and further tests of behavioral models will not be possible in this paper. Taken together with the results from expected cumulative future earnings, worker's apparent prefernce for status can be explained by a pecuniary rewards model such as those in row two of Table 1.

2.6.4 Scope of Search Part I: How Far Workers Travel

The fourth and fifth empirical tests explore a relationship between rank and (observed) job search behavior. Based on the fact that lower relative earnings are associated with higher likelihood of leaving the job and lower future earnings, it seems that lower rank is either a sign of a poor match effect (or poor tournament prospects) or causes the worker greater disutility. Either way, lower rank is associated with stronger incentives to find a new job. Therefore, I expected lower rank to be correlated with greater search intensity; not only will low ranked workers be more likely to leave, but they will search farther for a new job.

However, an alternate hypothesis is that workers with good rank have found a job that is a great fit for them; consequently, it will be harder for them to find a job that's a better fit in the nearby area. Thus, when these high ranked workers move to a new job, it's farther away (on average).

The fourth empirical test explores how the (great-circle) distance between a worker's old and new job is associated with his percentiles in his comparison-group earnings distributions at his old job. To test this, I will run a regression on distance between the old and new jobs and rank at the old job for all observed job changes.

$$
\begin{aligned}
&E(MilesTraveled_{i,(t,t+1)}|JobChange_{(i,t,t+1)}=1)=\beta_0 \\
&+\psi_j+f(Exper_{i,t})+f(Age_{i,t})+\beta_1 TotalEarn_{i,t} \\
&+\beta_2 FirmSize_{j,t}+\beta_3 FirmAvgEarnings_{j,t}+\beta_4 FirmSize_{k,t+1} \\
&+\beta_5 FirmAvgEarnings_{k,t+1}+\beta_6 FirmLagEmpChange_{k,(t,t+1)} \\
&+\beta_7 FirmLeadEmpchange_{j,(t,t+1)}+f(Tenure_{i,j,t})+\beta_8 LogAnnualJobEarn_{i,j,t} \\
&+\beta_9 LogAnnualJobEarn_{i,k,t+1}+\delta_1 FirmRank_{i,j,t}+\delta_2 FirmEducRank_{i,j,t}
\end{aligned}
\tag{4}
$$

$FirmRank_{i,j,t}$ and $FirmEducRanki,j,t$ are the variables of interest. A worker's current and destination firm (and their size, earnings, and employment changes) might impact the opportunities offered to a worker and the intensity of his search; therefore, it is reasonable to expect these relate to the distance between the worker's old and new jobs. There are more opportunities (from a variety of locations) for workers with higher job earnings; the market for managers is broader than the market for carpenters. For the same reason, workers who got high earnings on their next job probably faced a broader job market than other workers. The results are in Table 7:

[Insert Table 7 Here]

I interpret the coefficients on the deciles as follows: ceteris parabis, increasing a job changer's rank in the earnings distribution of similarly educated workers at his former firm by X decreases the distance between his old and new jobs (in expectation) by $X * 4.2/100$ miles. It is natural to ask why the firm-quantile and firm-education-quantile have different signs here. I believe this is because the firm-quantile measure may be correlated with a number of aspects (such as occupation) that I would like to control for when looking at the impact of status in what I feel is the more natural comparison group - similarly educated workers at the firm.

2.6.5 Scope of Search Part II: Searching in Different Industries

The fifth empirical test examines whether or not the NAICS sector of a worker's employer changes when he changes from an old job to a new job. I interpret this is an indicator that a worker undertook a more intense search than just searching for jobs within the sector of his current employer. In an ideal world, I would know if a worker's occupation; the worker might interpret low rank in his comparison group as a sign that he might benefit from an occupation change. However, I have to use NAICS sector of the worker's establishment (or firm) as a proxy for occupation. This assumption is less problematic for an analysis on the ideal sample, where I assume the high earners are in relatively specialized occupations

that are less likely to exist in different NAICS sectors. I use a linear probability model and estimate:

$$
\begin{aligned}
&E(IndustryChange_{i,(t,t+1)}|JobChange_{(i,t,t+1)} = 1) = \beta_0 \\
&+ \psi_j + f(Exper_{i,t}) + f(Age_{i,t}) + \beta_1 TotalEarn_{i,t} \\
&+ \beta_2 FirmSize_{j,t} + \beta_3 FirmAvgEarnings_{j,t} + \beta_4 FirmSize_{k,t+1} \\
&+ \beta_5 FirmAvgEarnings_{k,t+1} + \beta_6 FirmLagEmpChange_{k,(t,t+1)} \\
&+ \beta_7 FirmLeadEmpchange_{j,(t,t+1)} + f(Tenure_{i,j,t}) + \beta_8 LogAnnualJobEarn_{i,j,t} \\
&+ \beta_9 LogAnnualJobEarn_{i,k,t+1} + \delta_1 FirmRank_{i,j,t} + \delta_2 FirmEducRank_{i,j,t}
\end{aligned}
\tag{5}
$$

$FirmRank_{i,j,t}$ and $FirmEducRanki, j, t$ are the variables of interest. It is widely noted that older, more experienced, and higher tenure workers are less likley to change careers (and therefore, by this model's assumption, industries); these workers might be higher ranked in the earnings distribution of their comparison groups, because all of these variables correlate positively with job earnings. Likewise, we might expect individuals with higher earnings to be managers or higher skill workers, and consequently have more job opportunities across industries. Firm variables such as size, earnings, and unemployment changes might be expected to correlated with a worker's job search intensity as well as the opportunities available to its workers. Firm fixed effects also help to control for this. The results are in Table 8:

[Insert Table 8 Here]

I interpret the coefficients on the deciles as follows: changing a worker's quantile in the (old job's) firm-education-year earnings distribution by X means new job is $12.6 * X\%$ more likely to be in a different NAICS sector. If we follow the hypothesis that lower ranks predicts greater search intensity, this result is at odds with this.

2.7 Robustness Checks

2.7.1 Involuntary Transitions

One concern is that I do not actually observe whether a worker experienced a spell of unemployment when he left his primary job or how long that spell was; if a worker works even a single day in the quarter, I will see him as employed for that quarter in the LEHD even if he was unemployed the rest of the quarter. This makes it possible to confuse a job to job transitions with a job-unemployment-job transition. The particularly worrying possibility

is that the relationship I have found between relative income and job to job transitions is actually one between relative income and transitions to unemployment. However, if the relationship is between relative income and unemployment, then relative income should also be negatively correlated with higher transitions to unemployment (as I define it), which is the absence of any employment records in the LEHD for one or more quarters.

To make sure that I'm capturing all transitions to unemployment, not just very extended ones, I take a more expansive definition of an involuntary transition. If a transition leads to at least one month of no recorded employment, or leads to a decrease in the worker's annual earnings by 10% or more, or originates from a firm in a year where the firm shrank by 30 percent or more [10], then I categorize the transition as involuntary. Even with the necessary reduction in the number of voluntary transitions, the negative correlation between rank and the probability of leaving one's job remains significant. The results are below.

[Insert Table 9 Here]

Interestingly, the only indicators of statistical significance are where lower rank is associated with a lower rate of transition to unemployment. This seems to reject the idea that the negative correlation between rank and job-job transition is driven by a correlation between lower rank and transitions to unemployment.

As an additional test,

2.7.2 Tests on the Ideal Sample

To minimize the likelihood of contamination from unobservable factors, all of the tests run above were re-run on the ideal sample of 30 to 40 year old men working in finance and information technology who earned yearly income above the sample median. The results that higher rank correlates with lower probability of leaving and higher future earnings were replicated. There was no evidence of a market for status in the ideal sample. Also, there was no discernible correlation between rank and distance traveled or the propensity to switch industries.

2.7.3 Single Unit Sample

One concern is about the appropriate comparison group. It is intuitively more plausible that a worker would have better informaton and be more concerned with his position in

[10] This is often cited as a cutoff point in the mass-layoff literature.

the establishment group instead of the firm group. Ideally, I would know the worker's establishment. However, the LEHD does not record a worker's establishment(s), only his firm; his establishment is imputed based on a variety of characteristics (distance being the primary factor). To check that using a worker's position among other workers in his firm (instead of his establishment) has not altered the results, I run the above tests on single establishment firms. The results that higher rank correlates with lower probability of leaving and higher future earnings were replicated. There was no evidence of a market for status in the ideal sample. Also, there was no discernible correlation between rank and distance traveled or the propensity to switch industries.

3 Conclusion

In this paper, I have found several empirical facts:

1. Workers who are lower in the firm earnings distribution are more likely to leave for a new job - even holding constant their level of earnings.

2. Workers who are lower in the earnings distribution of similarly educated workers at the firm are more likely to leave for a new job. I am the first author, that I know of, to provide evidence of this.

3. Workers who have higher present rank in these comparison groups have higher earnings over the next few years. Workers with lower rank who leave for a new job see greater gains than low ranked stayers and "relatively" greater gains than workers with a high rank who leave.

4. The correlation between rank change and earnings change is strictly positive, as is the correlation between earnings and rank. Thus, I find no evidence of a "market for status" of the kind proposed by Frank [1984].

5. Rank is only weakly and erratically correlated with search intensity.

My results seem to support a role of rank as a signal of things to come, as is the case in a signalling / informational model. Given that lower ranked workers saw such significant earnings gains (relative to low ranked stayers and high ranked leavers), this suggests one possible a story where rank captures some information about match quality; low ranked leavers see larger gains than low ranked stayers because they draw a new match effect which on average is higher than their old match effect. Likewise, high ranked leavers draw a new

match effect which is on average worse than the previous one (which helped them attain their high ranking).

The fact that my results hold for a representative sample of US workers and firms suggests that relative income has meaningful informational content and should be the subject of further study. One possible extension would be to explore the relationship between a worker's rank in the first year on the job and the duration of the job. If higher rank is due to higher match quality, then higher initial ranking should suggest a longer job duration.

4 Tables and Figures

Table 1

Measure	Effect	Theory	$\frac{\partial(prob.of\ turnover)}{\partial s_i}$	$\frac{\partial(wage\ growth)}{\partial s_i}$
$s_i = status$	$\frac{\partial U_i}{\partial s_i} > 0$	Social Rewards (Prestige, Equity)	-	-
		Pecuniary Rewards (Signaling, Tournament)	-	+
	$\frac{\partial U_i}{\partial s_i} < 0$	Social Rewards (Group Status)	+	+
		Pecuniary Rewards (Dead-End, Learning)	+	-

Table 2

Worker Transition Rate By Firm Earning and Worker Earning Types

	W dec 1	W dec 2	W dec 3	W dec 4	W dec 5	W dec 6	W dec 7	W dec 8	W dec 9	W dec 10
F dec 1	0.316	0.296	0.283	0.273	0.257	0.253	0.252	0.242	0.227	0.2
F dec 2	0.341	0.316	0.296	0.282	0.27	0.261	0.252	0.244	0.236	0.206
F dec 3	0.358	0.325	0.302	0.286	0.271	0.262	0.25	0.238	0.226	0.192
F dec 4	0.367	0.322	0.295	0.272	0.254	0.239	0.223	0.208	0.189	0.161
F dec 5	0.361	0.31	0.274	0.246	0.223	0.206	0.192	0.177	0.165	0.143
F dec 6	0.336	0.278	0.237	0.207	0.185	0.169	0.157	0.141	0.129	0.111
F dec 7	0.325	0.248	0.207	0.178	0.157	0.146	0.136	0.125	0.112	0.0944
F dec 8	0.32	0.235	0.191	0.163	0.145	0.132	0.124	0.114	0.103	0.088
F dec 9	0.297	0.21	0.168	0.145	0.13	0.119	0.112	0.106	0.0974	0.0827
F dec 10	0.295	0.203	0.166	0.148	0.135	0.126	0.12	0.112	0.103	0.0866

Figure 1

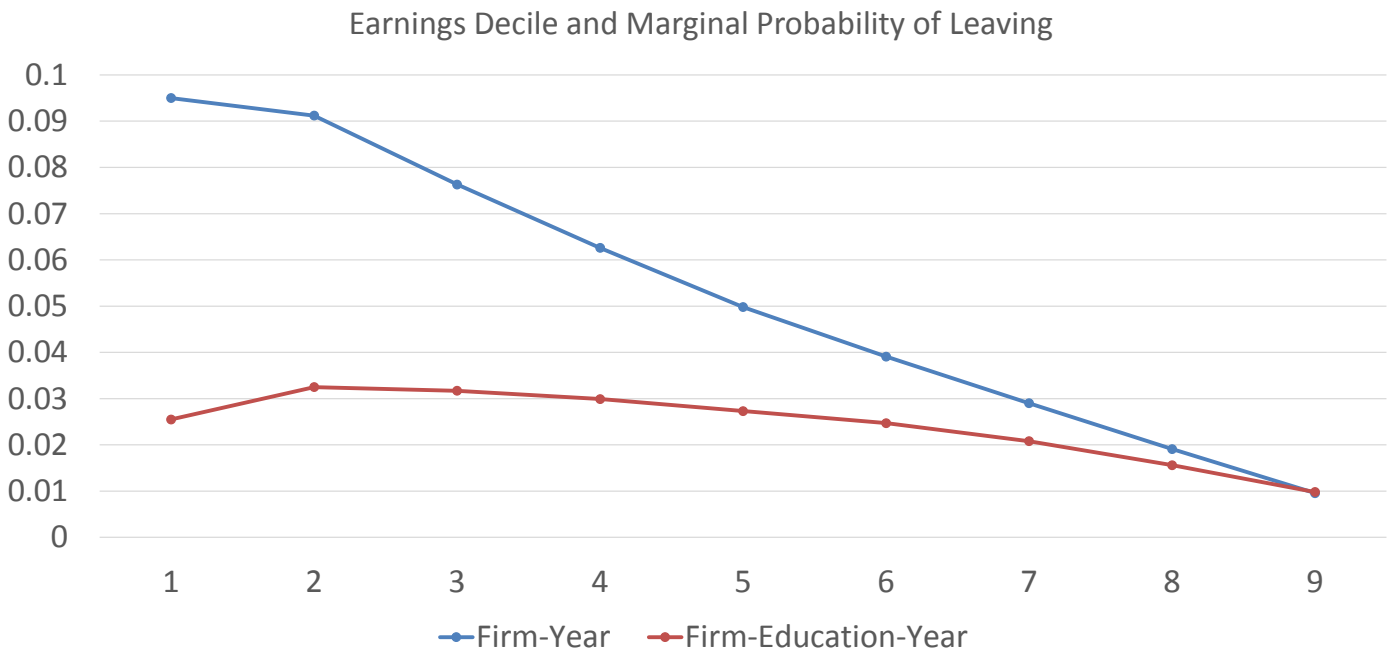
Earnings Decile and Marginal Probability of Leaving
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1
2
3
4
5
6
7
8
9
Firm-Year
Firm-Education-Year

Table 3: Probability a Worker Leaves Given Her Comparison Group Ranking(s)

Variable	**(1)**	**(2)**	**(3)**	**(4)**
Firm_Quantile				-0.13***
				(0.000891)
Firm-Education-Quantile				-0.0267***
				(0.000821)
Firm-Year-Decile 1	0.119 ***		0.095***	
	(0.000478)		(0.000752)	
Firm-Year-Decile 2	0.12 ***		0.0912***	
	(0.000393)		(0.000659)	
Firm-Year-Decile 3	0.105 ***		0.0763***	
	(0.000361)		(0.000601)	
Firm-Year-Decile 4	0.089 ***		0.0626***	
	(0.000342)		(0.000553)	
Firm-Year-Decile 5	0.0738 ***		0.0498***	
	(0.000328)		(0.00051)	
Firm-Year-Decile 6	0.0603 ***		0.0391***	
	(0.000317)		(0.000471)	
Firm-Year-Decile 7	0.0464 ***		0.029***	
	(0.000304)		(0.000428)	
Firm-Year-Decile 8	0.0319 ***		0.0191***	
	(0.00029)		(0.000377)	
Firm-Year-Decile 9	0.0165 ***		0.00955***	
	(0.000264)		(0.000306)	
Firm-Year-Decile 10				
Firm-Year-Educ-Decile 1		0.0962***	0.0255***	
		(0.000441)	(0.00069)	
Firm-Year-Educ-Decile 2		0.103***	0.0325***	
		(0.000362)	(0.000609)	
Firm-Year-Educ-Decile 3		0.0915***	0.0317***	
		(0.000334)	(0.000557)	
Firm-Year-Educ-Decile 4		0.0784***	0.0299***	
		(0.000315)	(0.000511)	
Firm-Year-Educ-Decile 5		0.0652***	0.0273***	
		(0.000301)	(0.00047)	
Firm-Year-Educ-Decile 6		0.0533***	0.0247***	
		(0.000295)	(0.000437)	
Firm-Year-Educ-Decile 7		0.0413***	0.0208***	
		(0.000283)	(0.000398)	
Firm-Year-Educ-Decile 8		0.0282***	0.0156***	
		(0.00027)	(0.00035)	
Firm-Year-Educ-Decile 9		0.0149***	0.00979***	
		(0.000251)	(0.000287)	
Firm-Year-Educ-Decile 10				

Table 4: Probability a Worker Leaves Given Her Comparison Group Rankings - Detailed

Variable	**Coefficient**
Firm-Quantile	-0.13***
	(0.000891)
Firm-Education-Quantile	-0.0267***
	(0.000821)
Controls:	
Person Effects	Yes
Firm Effects	Yes
Firm Earning Effects	Yes
Industry Effects	Yes
Firm Size Effects	Yes
Industry*Size Effects	Yes
Lead Emp Change	Yes
Lag Emp Change	Yes
Age (Cubic)	Yes
Experience (Cubic)	Yes
Tenure (Cubic)	Yes
Individual Earnings Decile	Yes
Log Job Earnings	Yes

This sample comes from all job-year observations from 1995-2005 from a worker's highest paying job in a given year. The sample was limited to worker-years at firms in the two largest employment size deciles. Standard errors in parentheses. "*" means significant at the 10% level. "**" means significant at the 5% level. "***" means significant at the 1Log Job Earnings project a worker's annualized dominant job earnings based on his average full quarter earnings at the dominant job.

Table 5: Worker Cumulative Earnings X Years Out

Variable	1 Year Earnings	5 Year Earnings
Firm-Year-Quantile	0.0973***	0.0337***
	(0.00196)	(0.00115)
Firm-Educ-Year Quantile	0.0134***	-0.00946***
	(0.00182)	(0.00107)
Left for New Job	0.35***	0.0621***
	(0.000518)	(0.000303)
Firm-Quant * Left	-0.243***	-0.0707***
	(0.0032)	(0.00185)
Firm-Educ-Quant*Left	-0.0601***	-0.00401***
	(0.00318)	(0.00184)
Controls:		
Person Effects	Yes	Yes
Firm Effects	Yes	Yes
Firm Earning Effects	Yes	Yes
Industry Effects	Yes	Yes
Firm Size Effects	Yes	Yes
Industry*Size Effects	Yes	Yes
Lead Emp Change	Yes	Yes
Lag Emp Change	Yes	Yes
Age (Cubic)	Yes	Yes
Experience (Cubic)	Yes	Yes
Tenure (Cubic)	Yes	Yes
Individual Earnings Decile	Yes	Yes
Log Job Earnings	Yes	Yes
FutureTransitions	Yes	Yes

This sample comes from all job-year observations from 1995-2005 from a worker's highest paying job in a given year. Counterfactual Earnings project a worker's annualized dominant job earnings based on his average full quarter earnings at the dominant job.

Table 6: Worker's Year-Year Earn Change as a Function of Their Rank Change

Variable	**Coefficient**
Firm-Year Quantile	62.3***
	(0.341)
Firm-Educ-Year Quantile	11.6***
	(0.321)
Firm-Year Rank Change	14.6***
	(0.218)
Firm-Educ Rank Change	2.79***
	(0.212)
Controls:	
Person Effects	Yes
Firm Effects	Yes
Firm Earning Effects	Yes
Industry Effects	Yes
Firm Size Effects	Yes
Industry*Size Effects	Yes
Lead Emp Change (New)	Yes
Lag Emp Change (Old)	Yes
Age-Cubic (Old)	Yes
Experience-Cubic (Old)	Yes
Tenure-Cubic (Old)	Yes
Individual Earnings Decile (Old)	Yes
Log Job Earnings (Old)	Yes

This sample comes from all job-year observations from 1995-2005 from a worker's highest paying job in a given year. Log Job Earnings project a worker's annualized dominant job earnings based on his average full quarter earnings at the dominant job.

Table 7: Expected Distance Between Jobs For Workers Who Voluntarily Change Employers

Variable	**Coefficient**
Firm-Quantile	8.72***
	(0.332)
Firm-Education-Quantile	-4.23***
	(0.311)
Controls:	
Person Effects	No
Firm Effects	Yes
Firm Earning Effects	Yes
Industry Effects	Yes
Firm Size Effects	Yes
Industry*Size Effects	Yes
Lead Emp Change (New)	Yes
Lag Emp Change (Old)	Yes
Age-Cubic (Old)	Yes
Experience-Cubic (Old)	Yes
Tenure-Cubic (Old)	Yes
Individual Earnings Decile (Old)	Yes
Log Job Earnings (Old)	Yes
Log Job Earnings (New)	Yes

This sample comes from all dominant job observations from 1995-2005 where a worker changed jobs. Log Job Earnings project a worker's annualized dominant job earnings based on his average full quarter earnings at the dominant job.

Table 8: Probability a Job Changer Also Changes Industries

Variable	**Coefficient**
Firm-Quantile	-0.198***
	(0.00199)
Firm-Education-Quantile	0.126***
	(0.00187)
Controls:	
Person Effects	No
Firm Effects	Yes
Firm Earning Effects	Yes
Industry Effects	Yes
Firm Size Effects	Yes
Industry*Size Effects	Yes
Lead Emp Change (New)	Yes
Lag Emp Change (Old)	Yes
Age-Cubic (Old)	Yes
Experience-Cubic (Old)	Yes
Tenure-Cubic (Old)	Yes
Individual Earnings Decile (Old)	Yes
Log Job Earnings (Old)	Yes
Log Job Earnings (New)	Yes

This sample comes from all dominant job observations from 1995-2005 when a worker changed jobs that year. Log Job Earnings project a worker's annualized dominant job earnings based on his average full quarter earnings at the dominant job.

Table 9: Probability Worker Makes an Involuntary Job Change

Variable	**Coefficient**
Firm-Quantile	0.0559***
	(0.000983)
Firm-Education-Quantile	0.0202***
	(0.000913)
Controls:	
Person Effects	Yes
Firm Effects	Yes
Firm Earning Effects	Yes
Industry Effects	Yes
Firm Size Effects	Yes
Industry*Size Effects	Yes
Lead Emp Change	Yes
Lag Emp Change	Yes
Age (Cubic)	Yes
Experience (Cubic)	Yes
Tenure (Cubic)	Yes
Individual Earnings Decile	Yes
Log Job Earnings	Yes

The dependent variable is equal to one if the worker's job change was characterized by one or more of the following: one or more full quartesr of unemployment between jobs, an earnings decrease of at least 10% from the old job the new job, or the or an employment contraction of 30% or more at the origin firm. This sample comes from all job-year observations from 1995-2005 from a worker's highest paying job in a given year. The sample was limited to worker-years at firms in the two largest employment size deciles. Standard errors in parentheses. "*" means significant at the 10% level. "**" means significant at the 5% level. "***" means significant at the 1Log Job Earnings project a worker's annualized dominant job earnings based on his average full quarter earnings at the dominant job.

5 Appendices

5.1 Variable Definition and Construction

1. θ_i - the individual fixed effect of worker i

2. ψ_j - the firm fixed effect. However, since calculating worker and firm fixed effects is probably asking too much of SAS, we'll using worker fixed effects for all workers, firm effects for the largest 5000 firms, and then NAICS and size variables for the rest of the firms.

3. $FirmSize_{j,t}$ - I assign a firm j into a size decile based on the average number of workers employed at j in year t. The average number of workers is obtained by taking the sum of the worker-full-quarter observations and dividing by four.

4. $FirmAvgEarnings_{j,t}$ is the average earnings decile of the firm j in year t, based on the average annualized earnings of workers at the firm.

5. $FirmLagEmpchange_{j,t-1,t}$ the percentage employment change (growth or decline) of firm $j's$ size from years $t-1$ to t.

6. $FirmLeadEmpchange_{j,t,t+1}$ the percentage employment change (growth or decline) at firm j from years t to $t+1$.

7. $TotalEarn_{i,t}$ is the decile into which a worker falls based on his total (all-job) earnings in year t (relative to the total earnings of all other workers in the sample).

8. $Age_{i,t}$ - The average age in years of the worker i across all quarters in year t. The f(.) denotes a cubic function.

9. $Exp_{i,t}$ - The average experience in years of the worker i across all quarters in year t. The f(.) denotes a cubic function.

10. $Tenure_{i,j,t}$ - The average tenure in years of worker $i's$ tenure at firm j across all quarters in year t. The f(.) denotes a cubic function.

11. $LogAnnualJobEarn_{i,j,t}$ - The natural log of worker$i's$ annualized earnings at firm j in year t. I use annualized earnings so that I can compare worker's who have worked at

firm for two (full) quarters to workers who have worked at the firm for a year (or longer) - it is meant to allow for an apples to apples earnings comparison across workers. To create annualized measures of earnings I take a worker's average full quarter earnings at the firm in year t and multiply them by four.

12. $FirmRank_{i,j,t}$ is worker i's position in the annualized job earnings distribution of all worker's at firm j in year t. The lowest value is $1/N$, where N is the number of workers at firm j in year t. The highest value is 1.

13. $FirmEducRank_{i,j,t}$ is worker i's position in the annualized earnings distribution of workers at firm j in year t who have the same level of education as i. I estimate the variables first as deciles to test for possible non-linearities in the effect of rank, but as the effect seems linear, I switch to a continuous measure. The lowest value is $1/N$, where N is the number of workers at firm j in year t with the same education as worker i. The highest value is 1.

14. $JobChange_{(i,t,t+1)}$ is a binary variable that is equal to 1 if I observed that the SEIN of worker $i's$ employer at his dominant job changed from years t to $t+1$ and this change meets my criteria for being voluntary - namely, that a worker had a registered employer in the data in all quarters of t and $t+1$.

15. $E(CumEarn_{(i,t,t+X)})$ is the expected cumulative earnings to date a worker i in year t can expect to have in year $t+X$, that is, it is the total of his earnings over the years $t+1, t+2, ..., t+X-1, t+X$.

16. $E(PctEarnChange_{(i,t,t+1)})$ is the expected percentage earnings change for a worker i at his dominant job between years t and year $t+1$ (using earnings in t as the base). Note that the worker can be at different jobs in t and $t+1$; I am not just considering stayers or leavers.

17. $FirmRankChange_{(i,t,t+1)}$ is the change in firm ranks that worker i experiences between years t and $t+1$. It equals $FirmRank_{i,j,t+1} - FirmRank_{i,j,t}$

18. $FirmEducRankChange_{(i,t,t+1)}$ is the change in firm-education-group ranks that worker i experiences between t and $t+1$. It equals $FirmEducRank_{i,j,t+1} - FirmEducRank_{i,j,t}$

19. $E(MilesTraveled_{(i,t,t+1)})$ is the expected miles between worker $i's$ dominant jobs in years t and year $t+1$ (calculated an using a worker's SEIN unit's latitude and longitude in the great-circle distance formula).

20. $E(IndustryChange_{(i,t,t+1)})$ is a binary variable that equals one if a worker's old and new jobs are in different NAICS sectors and equals zero otherwise.

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