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Clair Brown

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The working paper is based on contributions from the Sloan Industry Center Researchers: Financial Services (Larry Hunter), Retail Food (Elizabeth Davis), Semiconductors (Clair Brown, Ben Campbell, and Yooki Park), Trucking (Michael Belzer and Stan Sedo), and Software (Kathryn Shaw); statistical analyses by Fredrik Andersson and Hyowook Chiang at LEHD; and the career path simulator developed by Yooki Park.

5.1 Introduction

This paper looks at how economic turbulence affect workers' career paths (i.e., their earnings trajectory over time) and on firm's job ladders (i.e., initial earnings and earnings growth of on-going jobs lasting at least five years). In particular, we ask to what extent the costs and benefits from the adjustment process are differentially borne by certain groups of workers and firms?

Different firms offer workers very different job opportunities, and we find these differences within an industry as well as across industries. Landing a job at which firm, as well as which industry, has a powerful influence on a worker's career path. Here we examine a number of popular perceptions of the impact of economic turbulence to see if the images are grounded in fact. One view is that workers are *churning from bad job to bad job*. In fact, we do not find this to be a dominant pattern--not even in retail food, where many workers leave the industry for better jobs, or in trucking, where a worker's alternative job is worse. Another view is that there are "*big rewards for job hopping*". Here we find that workers are rewarded for staying with one firm (called "loyalists"), but that usually workers must compete to gain access to a long job ladder that offers career development. Workers who do not gain access to these long job ladders do better by changing jobs. Those who are rewarded with long job ladders have much better jobs than workers who must keep changing jobs to improve their job opportunities. Workers who start off with relatively low initial earnings and low earnings growth must change jobs to get a better job. The evidence suggests that workers vary in how long it takes them to finally work for a firm with good job ladders, and their earnings trajectories cannot make up for the period when they were working in firms with inferior job ladders.

Across industries and firm types, we distinguish several types of human resource management (HRM) practices, all of them variants of performance-based HRM. Some companies create and reward loyalty. They provide their workers with long job ladders with high initial earnings and earnings growth that reflects the skill development of workers, and the workers tend to stay. This type of HRM is called *an internal labor market (ILM)*, and in the past was found in large growing companies that had market power. However competitive pressures over the past two decades have forced companies to revamp their ILMs (and HRM generally) to be more market-driven and performance-based (see, for example, Cappelli, Osterman). Within growing companies, we often see that new hires compete for coveted job ladders within the ILM, often in an up-or-out

situation where workers not promoted are terminated or encouraged to find another job. In shrinking companies, experienced workers often compete to "survive" or keep their jobs during downturns, and even may have to compete so as not to be replaced by a less expensive new hire. Initial earnings and earnings growth have become more market-driven and performance based, even in ILMs that provide long job ladders with career development. We see both up-or-out and survivor competition in semiconductor, financial services, and software companies. Software companies also tend to provide many short jobs lasting less than three years that reflect market wages for technical employees. In contrast, trucking companies and retail food companies, tend to have three types of HRM: the traditional unionized firm with rule-based job ladders; the nonunion firm that may offer some workers access to ILMs; and nonunion firms that offer competitive market wages. In food services, both the unionized firm and nonunion firm with limited ILMs also rely on market-based temporary and short jobs.

We find that economic turbulence can affect workers in two ways: it can affect their job ladders *within* a given firm, and it can affect their career paths *between* jobs, both within and across industries. In semiconductors and software, economic turbulence undermines a shrinking firm's ability to provide good job ladders compared to growing firms, but firm fortunes do not affect the quality of job ladders in financial services and retail food, where both expanding and shrinking large firms provide equally good job ladders. Within-firm turbulence as observed by excess turnover has a less pronounced association with the quality of job ladders, since high turnover is associated with better job ladders in financial services and software and doesn't matter in the other industries.

In this paper we exploit our ability to directly characterize both worker career paths and firm job ladders over the period 1992 through 2001 by describing the basic career paths (number of jobs, plus within- and between-job wage growth) that exist in each industry for different types of workers. Then we examine the underlying job ladders that are offered by firms, and how economic turbulence seem to affect job ladders as firms vary by growth, size, and turnover.

5.2 Background

There is an extensive body of literature on the determinants of workers' earnings profiles over time. Few, however, directly incorporate the effect of firm dynamics. Precisely because it has been difficult to capture the interaction of firms and workers, existing large-scale empirical research has focused on how workers' earnings profiles may be driven by the acquisition of education and training, by job displacement, or by job change (xx citations). Other research based on case studies of firms has examined within-firm promotion, hiring patterns, and wage structures (see Brown and Campbell for references).

5.2.1 Theoretical Background

Firms operate within industries, and since there are differences in technology and capital stock, as well as the degree of competitiveness across industries, we should expect industries to place different values on workers' skill and firm-specific experience. But theory differs substantially as to why and how different firms *within a particular industry* will choose different human resource practices (including skill development, compensation, internal labor markets, or presence of unions).

One branch of the literature emphasizes that some firms will develop long job ladders with career development and earnings growth, i.e., internal labor markets, for a

wide variety of reasons, including: Providing incentives to retain workers with firm-specific knowledge, to motivate workers when it is difficult to monitor staff, and to promote team sharing of knowledge (Doeringer and Piore, 1971; Bulow and Summers, Akerlof and Yellen). Research on firm practices indicates that most firm HRM incorporates varying degrees of market-driven and internal labor market practices (Cappelli; 1999; Osterman, 1996). Theoretically it is difficult to produce testable hypotheses that distinguish competing theories of performance-based or matching versus rationed access to "good" jobs (Prendergast, 1996).

Using data from a single firm, Baker, Gibbs and Holmstrom (1994) found that their one large firm has a clear hierarchy of jobs and promotions and a strong relationship between jobs and pay that leads to a tendency toward long careers. However, they found little evidence of "ports of entry" into the firm, since the firm does a fair amount of outside hiring even at higher levels. Earlier work by Topel and Ward (1992) a longitudinal panel of earnings records from the social security program produced results that question the standard notion of human capital investment and lifecycle earnings growth. They observed high mobility and high returns to job change among young male workers that is consistent with performance-based ILMs. Topel and Ward interpreted this as matching a model with on-the-job search. Once good matches are found, these young workers eventually settle down into jobs that are more stable. Lazear and Oyer (2003) use matched data from the Swedish Employers Confederation from 1970 to 1990. They find that internal labor markets that incorporate external forces play a large role in firms' wage setting policies, or what we consider a market-driven or performance-based ILM. Note that even "performance-based" ILMs, where workers compete for access to long job ladders with career development, may reflect rationed access to a limited number of jobs and may not be merit-based (i.e., based on objective criteria). (xx Hunter has citation).

5.2.2 Empirical Background

Whatever the theoretical reasons to hire and layoff workers, the empirical evidence shows convincingly that there are vast amounts of job and worker reallocation in the economy. Burgess et al. (2000) find that one in four job matches either forms or breaks up each quarter, translating into a roughly 12% quarterly turnover rate. Thus almost one million people leave a job every week, and almost one million people start a job every week. In 2001 through 2003, U.S. workers experienced 143 million separations – 56 million involuntary layoffs and discharges and 87 million quits and other forms of separation (Schuh et al, Boston Fed).

What is the impact of these enormous rates of mobility on workers? In studies using administrative data, Ong and Mar (1992) study the effects of layoffs in the semiconductor industry in California. They find that for workers who return to the semiconductor industry, earnings increase at a rate comparable to those who are not laid off. However, those who end up with jobs in other industries suffer a decline in earnings.

Job loss is likely to have substantial impact on the least educated workers. Research shows that for these workers such loss is particularly likely to lead to lower re-employment probabilities, higher probabilities of part time work and lower earnings (Farber 1999). There are longer-term consequences for these workers as well. Lost work time is likely not only to lead to lost earnings, but also to skill depreciation (Topel 1993), and lower training (Royalty 1996). There are also likely to be substantial costs to older workers. Jacobson, LaLonde and Sullivan (1993) used Unemployment Insurance records from Pennsylvania to show that high-tenure workers experience substantial earnings

losses with displacement, even if jobs are found with similar firms in the same industry. One interesting finding is that lower earnings are evident up to three years prior to the displacement, especially if it is part of a larger scale layoff in their firm. A study using LEHD data to examine a group of low-wage earners over a nine-year period to analyze the behaviors and characteristics of individuals and employers that lead low-wage workers to successful career outcomes (Andersson, Holzer, Lane, 2005). The authors find that, in general, workers who "moved on" to different employers fared better than those who tried to "move up" within the same firm. These findings are consistent with our findings that workers who cannot gain access to a good job ladders within their firm do better by changing jobs until they finally land on a long job ladder with career development. (xx: julia please revise as needed)

The evidence to date neither directly documents workers' career paths as they piece together jobs, nor directly ties firm fortunes to the jobs offered by the firms. In the following sections we document workers' career paths and firms' job ladders and describe the worker/firm relationships in each industry.

5.3 Data

In order to capture the impact of firm dynamics on worker career paths, we focus on prime-aged workers divided into a "younger" group (aged 25-34 years old) and into an "older" group (aged 35-54 years old). These workers constitute 70% to 80% of the workforce in our industries. We exclude younger workers who are often involved with finishing school and working part time, and seniors, who are often involved with retirement decisions.¹ We further divide the two age groups by two key personal characteristics: gender (female, male) and education ("low", roughly approximating high school and less; "medium", some college; and "high", college graduate and above). This gives us twelve groups of workers.

We focus on three key characteristics of firms: size (large, small); employment growth (positive, negative), excess turnover (high, low).²

For each Sloan industry, we analyze three types of career paths, which represent most job histories over the ten-year period:

- Loyalist: one job over the ten year period in the Sloan industry
- Two-jobber: two jobs over the period (with at least one in the Sloan industry)
- Job Hopper: three jobs over the period (with at least one in the Sloan industry).

¹ Analyzing prime-aged workers allows us to avoid data problems associated with many younger and older workers not being in the sample for many quarters. We exclude workers with more than three employers in order to simplify the analysis, since they are a small number of prime-aged workers. We defined workers as working in an industry if their "primary employer" in 2001 (and 1995?) was in Sloan industry.

Observations are at the SEIN (State Employer Identification Number) level, which is establishment for single unit, but not necessarily for multi-unit firm. In general, SEIN is smaller than firm: Establishment \leq SEIN \leq Firm within a state. SEIN is state specific and thus is different in each state.

² *Size*: large (≥ 100 workers) and small (< 100 workers); *Employment growth*: positive (employment same or increased) or negative (employment declined) over the period of each job (i.e. if the job lasted from t_1 to t_2 , $\text{sign}(\text{firmsize}(t_2) - \text{firmsize}(t_1))$)

Turnover: high (turnover is 20% above the turnover predicted by change in employment) or low (turnover is less than 20% above the turnover predicted by change in employment).

For each career path type, we use simple regressions to estimate within- and between-job wage growth, which are used to simulate the career paths of workers for the modal firm and industry characteristics. (See Appendix for details.)

We then simulate job ladders (initial earnings and earnings growth) in firms in order to understand how the quality of job ladders varies by firm characteristics (size, growth, and turnover) for the twelve worker groups. We estimate job ladders for completed jobs as well as for on-going jobs in 2001 that lasted at least five years and for one-to-three years. (See Appendix for details.)

5.4 Career Paths

(xx: let's put end earnings on table 5.2, or go back to the one-table-per-industry that includes the entire career path, or else show some career path figure. Drop Table 5.1 since it is a lot of numbers for not too much important information.)

The calculation of canonical career paths permits us to answer several key questions: What career paths provide the best outcomes for workers? How do career paths vary by demographic groups and across industries? How frequent are the superior versus inferior career paths?

Our analysis of career paths provide a very clear answer to the first question: Loyalists have the best career paths, followed by job changers who move from an inferior job outside to a superior job inside certain Sloan industries. Other workers must do more job changing before they finally are able to land a job with relatively high initial earnings and earnings growth.

Three distinct types of career paths are observed across our five industries, one for loyalists and two for job changers, regardless of gender, age, and education (see Table 5.2).

- Loyalists, who have high initial earning and experience good earnings growth in one job in all five Sloan industries;
- Job changers (2 or 3 jobs), who have much lower initial earnings in a job outside the Sloan industry, and then experience substantial earnings growth by landing a job in a given Sloan industry (semiconductor, software, financial services for men, trucking);
- Job changers (2 or 3 jobs), who begin their career paths with a job in the Sloan industry (but on a worse job ladder than loyalists), and which is followed by jobs outside the Sloan industry that offer even lower initial pay but eventually result in good earnings growth (women in financial services, older workers in retail food) or is followed by jobs outside the Sloan industry that offer superior job ladders (younger workers in retail food).

Loyalists experience the best career paths in all five industries because they start off with highest initial earnings, experience good earnings growth, and end the period with the highest earnings. Workers who start the period in inferior jobs, both in and out of the Sloan industries, are able to improve their career paths through job change. In one typical pattern, workers begin the period with an industry job that has relatively low earnings and earnings growth. Then they switch out of the industry and eventually find a high-earnings-growth job in either their second or third job. This is typical of workers in retail food and women in financial services. In the other typical pattern, workers begin the period in a job outside the industry that has relatively low earnings and earnings growth. Then they switch into a job in the Sloan industry that has higher initial earnings

and higher earnings growth, but they are not able to catch up to the earnings of the loyalists. This pattern is typical of workers in semiconductor, software, trucking, and men in financial services. Overall two-jobbers do better on their first job change than job hoppers, who must change jobs again to find a comparably good job, and so two-jobbers experience a better career path than job hoppers

In all, loyalists have landed a better job than the job changers, which may reflect any number of factors, such as luck in landing a job with an employer that shares market rents, or individual unobserved ability. Although the reason needs to be examined, we know that most workers were still looking for a better job at the beginning of the period, and improved their career paths by changing jobs.

Demographics clearly play a role. Men's career paths dominate women's career paths in term of both initial earnings and earnings growth across all industries except trucking, where low education women's few job opportunities allow them to catch up to male earnings over time. Only in financial services are the career path patterns different for men and women, where women job changers end up with inferior jobs outside the industry and must work their way back up to a good job outside financial services. As expected, the career paths of older workers have higher initial earnings and lower earnings growth, with the notable exception being software, where the earnings growth of younger workers is extraordinarily high and their earnings exceed the earnings of older workers at the end of the period. This indicates that the younger workers experience very high returns to experience that is not maintained over time.

Although the loyalist career path is common, it rarely accounts for more than 40%, and sometimes as few as 25%, of workers in a demographic group. The five industries exhibit differences in their dominant career paths, with loyalists more likely to be the dominant career path in retail food, financial services, and trucking; job hoppers in software; and two-jobbers in semiconductors. However loyalists, two-jobbers, and job hoppers are well represented in all five industries.

Let us now look in more detail at the career paths in each industry.

5.4.1 Industry Specific Career Paths

Workers in the *semiconductor industry* exhibit two of the three distinct types of career paths described above. The first is that of loyalists, who have high initial earnings and experience good earnings growth in one job in a semiconductor company; the second is that of job changers (2 or 3 jobs), who have much lower initial earnings in a job outside the semiconductor industry, and then experience substantial earnings growth (usually 20 to 30% for younger and 10 to 20% for older workers) by taking a job in the semiconductor industry. Among job changers, two-jobbers begin with higher pay outside the industry and are able to enter the semiconductor industry sooner than the job-hopper. Although job hoppers experience healthy earnings increases when they change jobs outside the semiconductor industry, the increase is below the increase experienced when they take a semiconductor job. The overall earnings growth of two-jobbers and job hoppers is about the same over the ten year period, so the two-jobbers usually maintain their initial earnings advantage. Although job changers usually experience higher

⁴ Medium-education males in financial services exhibit career paths of the second type.

⁵ Here we give the *annualized* BJWG growth rate; the modal between-job time may be shorter and is often longer, so the total earnings change over the period is different than the annualized growth rate given here. In the simulations the between-job growth rate is calculated for the modal time between jobs.

earnings growth over the decade than the loyalist, it is not enough to offset their much lower initial earnings, and so loyalists end the period with substantially higher earnings.

The *software industry* also exhibits the two distinct career paths observed in semiconductors. Loyalists, who have high initial earnings and experience good earnings growth in one job in a software company, are exemplified by older workers who experience equally high, or slightly higher earnings growth than job changers, and so their initial earnings advantage grows over time. Job changers (2 or 3 jobs) have relatively low initial earnings in jobs outside software and then experience substantial earnings growth (18 to 26% for younger workers and 11 to 20% for older high-educated workers) by landing a job in software.

Job changers experience higher within-job earnings growth in their software job than in their earlier jobs outside software. Younger job hoppers experience healthy earnings gains (14 to 20%) when they change jobs outside the software industry, but the increase is below the gain experienced when they take a software job. Older job hoppers experience lower earning gains (4 to 11%) when they change jobs outside the software industry. While two-jobbers usually have higher initial earnings and lower earnings growth than job hoppers, higher earnings growth than two-jobbers, the two-jobbers have end earnings that typically exceed job-hopper earnings by 20 to 40%.

The *trucking industry* also exhibits the two distinct career paths observed in semiconductors and software. Loyalists have relatively high initial earnings and good annual earnings growth (5 to 13%)⁶ in one job with a trucking company; and job changers (2 or 3 jobs) have lower initial earnings in a job outside trucking, and then experience a large earnings gain (11 to 19%) by taking a job in trucking. Their within-job earnings growth rates, at 8 to 18%, are then substantially higher in trucking than in their earlier jobs outside trucking. However the earnings gap between loyalists and job changers grows over the decade.

In sum, then, job changers experience higher earnings growth by entering trucking, where they usually see their entry earnings jump and then continue to grow. The sooner they can enter trucking, the better will be their career paths. One possible reason for this is that since most of these workers do not have a high school degree, obtaining a CDL with employment in trucking represents a significant improvement in job options. In simulations of career paths that included a series of jobs in trucking, overall earnings growth and final earnings were higher the longer a worker was in the trucking industry.⁷

⁶ It is worth noting that two characteristics of our dataset are particularly relevant for the trucking industry. First, the large earnings increase that workers enjoy upon moving into trucking may be gained by more hours worked rather than higher wage rates. Since most drivers are paid by the mile, and enforcement of hours of service regulations is spotty, at best, the increase in earnings may be the result of working more hours. There is some evidence that truck drivers operate with 'target earnings' in mind. If this target cannot be reached in other low-wage employment, the option of working longer hours in trucking may be attractive. Second, the total amount of observed time in the sample may be less than 40 quarters, and this is true whether the last job is right-censored or uncensored. Given the nature of the trucking industry, it is possible that these workers did not have reported earnings sufficient to be reported in our sample. A large proportion of workers in the trucking industry are so called 'owner-operators' who are classified as self employed. This means that their earnings are not reported by any firm, and therefore not observed in our sample.

⁷ The simulated career paths are sensitive to right-censoring of the last job, i.e., if the worker is still observed in a job or has left the sample. However 70% of all long trucking jobs (5+ years) in the sample are ongoing in 2001. Only 30% were completed earlier, as the worker moved on to another job or left the

In the *financial services industry*, all three distinct types of career paths are observed. Here female job changers and some male job changers exhibit the third type of career path, where workers begin with a job in the financial services sector, which is followed by one or two jobs outside the industry. While the initial earnings of these job changers (2 or 3 jobs) are lower than loyalists, and within-job earnings growth is considerably lower in first financial services job of job changers compared to loyalists, the transition out of financial services is not a smooth one. For older women, the move outside the industry involves a period without employment and a 16% to 22% decline in earnings. The older high-education male job hoppers also take a job outside the industry with an earnings loss. Both the men and women eventually experience good within-job earnings growth in their second or third jobs, but they never enjoy the earnings of those who stay in the industry.

The overall picture suggested by these career paths is one in which workers who manage to find and keep a good job with an employer in financial services do very well over the ten-year span. Earnings gains for workers who stay with a single employer in the industry through the end of the sample are substantial. However, this job path is less common for women, who, at substantial cost, are more likely to leave the industry.

Workers in the *retail food industry* exhibit the loyalist career path observed in all industries, and the job changer path similar to the one observed in financial services. Loyalists in retail food have relatively high initial earnings and experience good annual earnings growth (5 to 13%) in one job¹⁰. The earnings gap between loyalists and job changers grows over the decade. Job changers (2 or 3 jobs) begin with a job in the retail food industry followed by one or two jobs outside the industry; they experience lower initial earnings and smaller within-job earnings growth in their retail food job than do the loyalists. For younger job changers, the earnings gain when entering a job outside retail

sample. The completed jobs all had negative earnings growth, which indicates that these workers are in troubled companies and have left (or been terminated) in order to find a job with better prospects.

⁸ It is worth noting that two characteristics of our dataset are particularly relevant for the trucking industry. First, the large earnings increase that workers enjoy upon moving into trucking may be gained by more hours worked rather than higher wage rates. Since most drivers are paid by the mile, and enforcement of hours of service regulations is spotty, at best, the increase in earnings may be the result of working more hours. There is some evidence that truck drivers operate with ‘target earnings’ in mind. If this target cannot be reached in other low-wage employment, the option of working longer hours in trucking may be attractive. Second, the total amount of observed time in the sample is typically less than 40 quarters, and this is true whether the last job is right-censored or uncensored. The construction of our sample provides two possible explanations for this result. Workers can leave the sample if they do not earn the minimal threshold of earnings for a quarter, or if they are employed in a state not covered in our sample. Given that these are modal career paths for these groups, and that the number workers in the overall sample is quite large, it is not likely that so many workers moved to other states. However, given the nature of the trucking industry, it is possible that these workers did not have reported earnings sufficient to be reported in our sample. A large proportion of workers in the trucking industry are so called ‘owner-operators’ who are classified as self employed. This means that their earnings are not reported by any firm, and therefore not observed in our sample

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¹⁰ The simulated career paths are sensitive to right-censoring of the last job, i.e., if the job is on-going or has been completed earlier. Almost 60% of long retail food jobs in the sample are on-going in 2001. Although the complete jobs may have had higher initial earnings than the on-going jobs, their earnings growth rates are all negative, which indicates that these workers are in troubled companies and have left (or been terminated) in order to find a job with better prospects.

food is above the within-job earnings growth in their previous retail food jobs. Older job changers typically experience an earnings loss when they take jobs outside retail food. As in financial services, job changers eventually experience good within-job earnings growth in their second or third jobs, but they never enjoy the earnings of those who stay in the industry.

Since loyalists experience much better career paths than job changers across all industries, we must ask to what extent the differences in career paths are being driven by employment practices across employers. Do some employers offer long job ladders with strong earnings growth, while some employers offer jobs of short duration with lower earnings growth, even within the same industry?

5.5. Job Ladders: The Role of the Firm

Here we look at firm job ladders (i.e., initial earnings and earnings growth) to see how they vary within and across our five industries in order to understand better how economic turbulence affects jobs and workers' career paths. First we look at the tenure distribution (i.e., job tenure is <1, 1-3, 3-5, or 5+ years in 2001) by firm characteristics in order to see how mobility patterns vary across firm types and across industries. Then we compare the quality of long job ladders (on-going jobs of >5 years tenure) across worker and firm types. We explore how firm job ladders are affected by firm fortunes by comparing job ladders in growing and shrinking firms and in large and small firms, and we compare long job ladders and short (1-3 years tenure) completed jobs in order to compare the jobs of stayers (i.e., loyalists) and movers (i.e., job changers).

Our five industries are all dominated by growing firms; 65% to 70% of jobs are in growing firms in 2001. Large firms provide the majority of jobs, from 55% in software to 85% in semiconductors, except in trucking, where only 45% of jobs are in large firms. Overall the tenure distribution of on-going jobs in 2001 is approximately the same across industries: 24% are new hires; 36% are one to three years old; 18% are three to five years old; and 22% are more than five years old. As discussed below, we interpret these patterns with more new hires than long jobs to reflect revisions of firm HRM from more traditional rules-based systems to more performance-based and market-driven systems. Software, with higher mobility and shorter jobs, is the exception: 30% current jobs are new hires, and 11% are over five years. This pattern reflects the swings in employment at software firms and the high mobility of workers in the software industry.

A detailed look at job tenure patterns by firm characteristics shows that firms with the same characteristics (growing/shrinking, large/small, high/low turnover) have very different mobility patterns (i.e., tenure distributions).

Large growing firms with low turnover generally are the firm group providing the most jobs, and are usually known for providing good jobs in their industries. This group accounts for 50% of jobs in semiconductors, almost 40% in financial services, 20% to 25% in software and retail food, and only 12% in trucking. The tenure distribution within this group of large growing low-turnover firms shows large variation in mobility across industries. New hires within the past year account for approximately one in three jobs in software, retail foods, and financial services, but only one in six jobs in semiconductors and trucking. The percent of long-term workers varies equally dramatic: retail foods and trucking have almost 40% of workers with over five years tenure; semiconductors has 27%, financial services has 21%, and software has only 14% workers with over five years tenure. These differences reflect both variation in growth rates and variation in competition for access to long job ladders with career ladders.

Large shrinking firms with low turnover provide an interesting contrast to their growing counterparts in semiconductors and financial services, when they account for 20% to 25% of jobs. Even though the firms are reducing employment, new hires still account for 30% of jobs in semiconductors, and less than 20% of jobs have lasted over five years. As we will explore later in more detail, these firms are replacing experienced workers with new hires. In financial services, new hires account for 20% of jobs, and 25% of jobs have lasted over five years. Shrinking financial services firms are replacing experienced workers with new hires at a much slower pace than semiconductors firms.

Trucking has the most varied distribution of jobs by firm type. *Small growing firms with high turnover* are the largest provider of jobs, accounting for 25% of jobs, two-thirds of which have lasted less than three years. This tenure pattern reflects the reorganization of the industry with deregulation resulting in more competition, especially at the local and regional level.

When we look at firm job ladders, or earnings trajectories, within an industry, we confirm the well-known result that larger firms offer better jobs than do smaller firms. However in semiconductors and financial services, small growing firms also offer job ladders with relatively high earnings growth. (xx other patterns)

We also find new evidence of the impact of economic turbulence on worker career paths. Firm fortune especially matters in the job ladders offered by growing firms compared to shrinking firms in semiconductors and software. Workers are more protected from firm fortunes in financial services and retail food, and the impact of firm fortunes in trucking seems harder on older workers.

The relationship between quality of job ladders and relative turnover rates is ambiguous, partly because we cannot differentiate if the firm or worker is initiating the turnover. Financial services and software firms with high turnover offer better job ladders than comparable low-turnover firms. In retail foods and trucking, by contrast, the association between turnover and firm job ladder varies across workers and firms. Turnover is low in the semiconductor industry, and is not associated with firm job ladders.

5.5.1 Industry Specific Job Ladders

Figures yy provide a visual demonstration of the job ladders (average initial earnings and predicted earnings growth over a ten year spell) associated with firms with different sets of characteristics in each industry. Color codes are used to identify the eight firm types: blue (large growing low-turnover), red (large growing high-turnover), yellow (small growing low-turnover), aqua (small growing high-turnover), pink (large shrinking low-turnover), green (large shrinking high-turnover), black (small shrinking low-turnover), and plum (small shrinking high turnover). Xx: some of these firm types may not be shown; don't think we need to state color codes.

These figures show that even within these narrowly-defined worker groups within well-defined industries, the effect of turbulence as seen through firm fortunes, size, and turnover on the quality of job ladders is quite different.

Semiconductors

In the *semiconductor* industry, a comparison of long job ladders offered by *large low-turnover* firms with a *growing workforce* versus similar firms that with a *shrinking workforce* provides insight into how economic turbulence affects the quality of workers' jobs (see Figure yy). The impact varies by both gender and education. In growing firms relative to shrinking firms, low- and medium-education men and all women receive much higher initial earnings (by 19 to 37%), but the men in growing firms have lower earnings growth (by -0.3 to -0.7 percentage points) while women have higher earnings growth (by 0.3 to 0.7 percentage points). High-education men have smaller differences in job ladders in growing and shrinking firms; initial earnings are slightly higher (by 7 to 11%) and earnings growth is similar (-0.2 to 0.1 percentage point) in growing compared to shrinking firms. These results indicate that high-education men are more protected from the economic turbulence in a firm than other workers, and that men's job ladders deteriorate less than those of women.

We observed earlier that tenure distributions indicate that shrinking large firms are replacing experienced workers with less expensive new hires. A comparison of ongoing and completed long (>five years) jobs indicates that shrinking large firms are shedding experienced workers with lower earnings growth, since earnings growth is higher (by 0.5 percentage point) in ongoing jobs than completed jobs across all groups.

A comparison of stayers (i.e., on-going long jobs) and movers (i.e., completed 1-3 years jobs) shows that short jobs have only two-thirds of the annualized earnings growth of long jobs in both growing and shrinking large firms. Over time, growing large firms pay higher initial earnings coupled with slightly lower earnings growth, and their short job ladders have become flatter. These results indicate that growing firms use high initial earnings to attract talented workers, and then only a select group is given access to an ILM that provides career development with long steep job ladders. Compared to growing firms, large shrinking firms pay lower initial earnings along with higher earnings growth for short jobs, and the job ladders for younger men have improved relative to older men. The trends in shrinking firms' short job ladders are consistent with market-driven HRM practices.

The results indicate that large firms, both growing and shrinking, are practicing performance-driven HRM. Large semiconductor firms have been known for HRM practices with ILMs that developed workers skills and commitment. However beginning in the mid-1980s, these established companies faced intense competition from foreign rivals and an ever-increasing pace of technological change, and they began modifying their HRM practices to be more market-driven and to induce more layoffs and mobility. The growing firms appear to have ILM practices with career development for a select group, and the other workers face either a plateau or "up or out" (although possibly those not on the fast track voluntarily leave for better jobs elsewhere). The shrinking firms appear to be selecting which experienced workers will keep their jobs, and replacing the other experienced workers with new hires at market rates. These new hires appear not to have access to ILMs, even if ILMs are still functioning for older workers, who seem to be on better job ladders than available elsewhere. These findings are consistent with changes we observed in large U.S. companies during fieldwork in the 1990s.

In addition to the large firms with low turnover, *small growing firms with low turnover* merit mention in the semiconductor industry, since these firms are likely to be early stage fabless companies, who mainly hire technical personnel and offer relatively good job ladders for the college educated (see fig yy). Although these firms offer relatively low initial earnings, earnings growth is high and at the end of a decade, earnings have passed those of experienced workers in large shrinking firms and have drawn close to earnings at large growing firms with low turnover. However the job ladders for low-educated workers are not as good.

In general, job ladders in large semiconductor firms are superior to job ladders in small firms, job ladders in growing firms are better than job ladders in declining firms, and turnover does not mark a firm as having better or worse job ladders. Overall the economic turbulence experienced by large firms has worsened the job ladders for workers, and women's jobs deteriorate more than men's jobs. Over the period even growing large firms with low turnover seem to have highly-paid new hires compete for access to ILMs with career development, while the shrinking large firms with low turnover have experienced workers compete to keep their jobs, which are being either destroyed or

filled with new hires, whose earnings reflect the market rate. Firm size and firm fortune (dynamic or shrinking) matter for workers.

Financial Services

As in semiconductors, the majority of jobs in financial services are found in large firms with low turnover. Unlike semiconductors, however, job ladders offered by large financial services firms are not as dependent upon firm fortunes--internal labor markets were holding up as well in shrinking as in growing large low-turnover firms (see Fig. Yy). Also in contrast to semiconductors, a key indicator of the types of job ladders offered by financial services firms is excess turnover, with high turnover firms offering higher earnings growth than comparable low turnover firms.

Most commonly, job ladders are found in firms featuring relatively low turnover. Low-turnover firms appear to have similar internal labor markets regardless of firm size or the extent to which the firm was growing or declining. In these firms, starting salaries and earnings growth by age-education group are quite similar. For example, younger male workers in long jobs experience about 10% estimated annualized growth; older men have slightly lower growth rates. However the tenure distribution, with approximately one-quarter long jobs and another one-quarter new hires, indicates that not all workers (across all education groups) gain access to the ILM with career development. As in semiconductors, even large firms that offer ILMs seem to have workers compete for access to good jobs, although the proportion who advance is much greater in low-turnover than in high-turnover firms.

A second type of firm, the *high-turnover growing* firm, seems to feature a performance-based model in which considerably fewer workers enjoyed long jobs. Workers with given characteristics (gender, age, education) in low-turnover firms are about twice as likely to have worked at the firm more than five years than comparable workers in high-turnover firms. For example, compare high-education men in large growing firms. Although the percent of new hires is similar (approximately one-fourth), in the low-turnover firms over 20% of the workers are have been employed five or more years compared to only 11% in high-turnover firms.

High-turnover firms feature significantly greater opportunities for earnings growth than low-turnover firms. In growing firms, for example, high-education men average about 11% annual earnings growth in long jobs in high-turnover firms, but only about 7% annual earnings growth in low-turnover firms. Similar patterns hold for other demographic groups. These results appear consistent with the existence of different HRM approaches. High-turnover firms couple a higher probability of dismissal with more lucrative payouts to those workers who stay. Low-turnover firms, in contrast, feature higher probabilities of obtaining long jobs but couple this likelihood with lower earnings growth. Interestingly, while initial earnings are typically higher for workers in low-turnover firms, the higher gains enjoyed by similar workers in high-turnover firms mean that the workers who do manage to keep their jobs end up overtaking their counterparts.

Women's job ladders offer lower initial earnings and earnings growth than men's job ladders, but their job-ladder patterns are similar across firm types with age and education having only modest effects on workers' job ladders.

Job retention appears to be critical to earnings growth in financial services. Stayers (on-going long jobs) experienced much higher earnings growth than movers (completed short jobs) regardless of firm size or fortune. For both short jobs and long

jobs, ongoing jobs feature much higher earnings growth than completed jobs regardless of firm size or fortune. Two out of three long jobs in the sample were still on-going in 2001.

Overall, the results are consistent with the notion that most long job ladders in financial services are found in relatively stable internal labor markets, especially prevalent in large firms with low turnover. However, the differences in ILMs across firms are more in degree than in kind and generally do not offer guarantees of employment to a large share of the workforce. Rather, practices seem to be somewhat performance based; workers' access to long job ladders with career development is limited in all firms. Such access is simply more limited, and the payoff to keeping the jobs, higher in some firms than in others. Jobs in relatively high-turnover firms that offer opportunities for more earnings growth but are harder for workers to access. These results are consistent with a set of firms placing even more emphasis on "up or out" performance-based job ladders.

Economic turbulence in financial services has had only modest effects on opportunities through job ladders for workers. For a given set of worker and firm characteristics, shrinking firms tend to have a higher proportion of long job ladders than do growing firms. Firm fortune does directly impact the quality of the firm's long job ladders, since generally workers in long jobs in declining firms enjoy only slightly lower earnings growth than those in growing firms. Overall economic turbulence as observed in firm fortune and firm size does not seem to matter in financial services firms as much as the degree to which the firm's HRM is performance based.

Software

The distinguishing characteristic of the software industry is mobility of the workforce. Like financial services jobs, 70% of software jobs are in growing industries, but financial services jobs last longer. In 2001, approximately 10% of on-going software jobs had more than five years tenure and 30% were new hires, compared to 20% long jobs and 25% new hires in financial services. These differences in mobility patterns are reflected in the job ladders in the two industries. The software job ladders in *low-turnover* (large) firms are similar to financial services job ladders in *high-turnover* (growing) firms, where workers seem to face an "up-or-out" situation with the select few (13%) experiencing high earnings growth. As in financial services, long jobs in *high-turnover* software firms have higher earnings growth than long jobs in comparable low-turnover firms (except for high-educated older men), but workers in high-turnover software firms are not likely (2 to 10%) to be on long job ladders.

As in semiconductors (and in contrast to financial services), firm fortune affects the job ladders for large low-turnover software firms, which account for one-third (male) to two-fifths (female) of all jobs. *Growing* large low-turnover firms are able to provide higher earnings growth than comparable shrinking firms. *High-turnover* growing large firms offer even higher earnings growth than the *low-turnover* growing large firms. In fact, *high-turnover growing large* firms offer the best job ladders in the industry for younger and older low-education workers (see figure yy), but they account for only one-fourth of all long on-going jobs. Older high-education workers experience equally good job ladders in low-turnover growing large firms, where these workers are most likely in traditional ILMs.

Firm size matters in software. The job ladders in small software firms generally have slightly lower initial wages and slightly higher earnings growth compared to large

firms. Since more than 70% of software jobs last for less than three years, initial earnings tend to be more important than earnings growth in determining job quality. For older workers, shrinking large firms offer job ladders equivalent to growing small firms.

As expected, women's job ladders were inferior to men's. Women experienced the same job ladder patterns across firm types as men.

Because of high labor mobility, only slightly more than one-half of the sample's long jobs (5+ years) were still in progress in 2001. The on-going jobs have higher earnings growth than the completed jobs, and the difference is less marked (1-2 percentage points) in large growing firms compare to other types of firms, where the difference is 4 to 7 points. This improvement indicates that long jobs in ILMs in large growing firms were more protected than in other firm types from the tight labor markets in the second half of the sample period that caused upward pressure on earnings.

Stayers (i.e., those with on-going long jobs) experience better earnings growth than leavers (i.e., those with short completed jobs), as in semiconductors and financial services. This indicates a performance-based HRM with workers competing for access to long jobs with career development. Stayers in growing firms have at least 2 to 3 percentage point higher earnings growth than leavers. In growing small *low-turnover* firms, stayers have 5 percentage point higher earnings growth than leavers, who experience much lower earnings growth than those in the other growing firms. However few workers (6% to 16%) are in long jobs in growing small low-turnover firms in 2001.

The difference in the earnings growth of stayers and movers tends to be even higher (4 to 6 percentage points) in *shrinking* firms, which are still hiring new workers even as the proportion of workers with long tenure is declining. New hires in shrinking firms were approximately 30% of jobs in 2001, while the proportion of jobs lasting over five years ranged from 2% in large high-turnover firms to 12% in large low-turnover firms. The tenure distribution indicates that long-term workers were competing to keep their jobs and not be replaced by a new hire, and the degree of replacement varied across firms.

The software industry is in a state of constant economic turbulence. Mobility is a hallmark of the software jobs, and firm fortune and firm size affect the quality of a software firm's jobs.

Retail Food

As in the semiconductor industry, about 60 percent of prime-aged workers in retail foods had jobs in large growing firms, which provide some of the best job opportunities in the industry. As in financial services, firm fortune does not affect job quality much; the job ladders offered by large shrinking retail food firms was almost as good as in the growing firms.

The good job ladders in large growing retail food firms vary by turnover. Firms with high-turnover rates offer lower initial earnings but higher earnings growth rates than firms with low turnover rates. This difference suggests that *high-turnover growing* large firms rely more on performance-based HRM as workers compete for positions on good job ladder with career development and high earnings growth. In contrast, jobs in *low-turnover growing large* firms offer high initial earnings but considerably lower rates of earning growth. The compressed wage scale and low turnover suggests that the workforces in these firms are more likely to be unionized.

Job ladders in all large firms, whether growing or shrinking, provided good job ladders to at least some workers. Large shrinking firms that fostered low turnover had very few new hires (6 to 8%) and those with high turnover had very few long jobs (13%).

In contrast to these growing firms, industry consolidation and increased competition have led to a reduction in workforces at other large firms. Shrinking large firms have both very few new hires (6% to 8%) and relatively few long jobs (about 25% for less educated workers and 16% to 21% for the high-education). Economic turbulence has led to a decrease in both long-term and temporary job opportunities for workers in these firms.

Waves of consolidation and increased competition from nontraditional food retailers (such as mass merchandisers and warehouse club stores) created significant economic turbulence in the retail food sector during the 1990s. Promotion from within the store or chain had been a very common practice, but today's store managers are increasingly hired from outside the store and even outside the industry (Walsh 1993). Many employers continue to express concern about the high level of labor turnover in the industry, but according to *The Progressive Grocer*, most supermarkets "are looking for ways to cut, rather than invest in people" (Nov. 1, 2003, p. 20).

Two-tier wage structures became increasingly common in the retail food sector during the 1980s, and the turbulence of the 1990s may have been expanded their use. Growing large low-tenure firms have both many new hires and many long jobs (each about 30-35% of the workforce). One case study of a supermarket chain describes the shift in predominant job type from full-time, relatively well-paid jobs to more temporary and part-time positions (Hughes 1999). Nonetheless, job ladders appear to still exist for some workers, particularly in large growing firms.

While much of the industry relies on part-time, temporary jobs to meet a large proportion of its workforce requirements, a number of firms do stand out as offering an alternative HRM strategy. These companies, often large growing firms, provide training and promotional opportunities for at least some employees. At the same time, however, the increased use of part-time and temporary positions has become commonplace as a means of cutting overhead costs such as health care benefits. Two tiers seem to exist even in large growing firms that foster low turnover, since they have a large proportion of both long jobs (35%) and new hires (29% for men and 35% for women). In large growing firms with high turnover, the proportion of new hires was slightly lower (28%) with a much lower proportion of long jobs (19%).

These findings are consistent with fieldwork observations. Food retailers know that most of their workers are going to leave, and they may use that to their advantage both by having workers compete for the good jobs in their ILMs and by keeping down labor costs overall through voluntary turnover. Although retailers complain about turnover, most don't use HRM practices that would reduce it.

The biggest difference in retail food job ladders is between small and large firms. Small firms are typically local or small regional food retailers. Earnings growth is considerably higher in large firms than in small firms, regardless of turnover or growth. Small shrinking firms typically offered the lowest earnings growth.

The worst job ladders are in small firms. Initial earnings are somewhat lower in small than in large firms, and earnings growth was much lower. In small firms, earnings growth is under 10% per year for all age-education groups and typically ranged from 6 to

8%. Jobs at small firms with high turnover typically offered better earnings growth and often-higher initial wages than jobs at low-turnover small firms. In most cases, jobs in small firms with low turnover ended up paying the least after ten years.

When we look at short (1-3 years) and temporary (<1 year) jobs, we see further evidence that while some workers land on relatively well-paid job ladders in the industry, for many workers the industry offers few opportunities for promotion and wage growth. Ongoing jobs with tenure of less than one year offer low initial earnings and low earnings growth. Firm size still matters, even for temporary jobs. Temporary jobs in small firms offer lower initial earnings than in large firms. Short jobs have higher initial earnings than the temporary jobs.

Large growing firms have a sizeable proportion of their workforce in new hires, yet those with high turnover have fewer long jobs than low-turnover firms. Large high turnover firms offer high wage growth to workers who gain access to ILM jobs with career development. Some workers in shrinking large firms manage to keep their good jobs, but overall the evidence suggests that firm turbulence results in more temporary and short term jobs, and fewer good job ladders.

The retail food sector historically has had higher rates of unionization than other retail jobs, but the proportion of employment that is unionized has been declining. Workers in large low-turnover firms, which are more likely to be unionized, face a tradeoff in terms of initial earnings versus wage growth compared to jobs in high turnover firms. Industry restructuring may continue this trend toward two tiers, with low initial earnings, high turnover, and fewer job ladder opportunities for most new hires. For workers who successfully compete for the few job ladder positions in large firms, wage growth can be significant.

Trucking

(xx: sorry, still need to get more input from Stan on things marked xx; this is third iteration)

Workers in the *trucking* industry are predominantly low-education men, and so we focus primarily on the job ladders of male workers with a high school degree or less. When we compare the long job ladders for low-education men in growing firms with those of shrinking firms to see how economic turbulence has affected workers jobs, we see that the impact on earnings growth, but not on initial earnings, varies by age. All workers in growing firms, with one exception¹¹, have initial earnings that are 1% to 6% higher than their counterparts in shrinking firms (see fig yy).

For older men, the growth in earnings is higher (from .2 to 2.7 percentage points) in shrinking firms than in growing firms. This higher rate of growth means that by the end of a decade, older workers in shrinking firms have earnings that are as much as 23% higher than those in comparable growing firms. One possible explanation is that over this period, unionized firms have tended to be shrinking, while non-unionized have grown. Since earnings growth has been higher for unionized workers, this would explain why these workers have been able to do better despite the fact that their firms are shrinking. (xx do union jobs really have great Egrowth within a job ladder? I thought unions compressed the wage scale).

¹¹ One exception is older workers with high-school degrees have initial earnings that are 8% lower in small growing firms.

For younger workers, the earnings growth patterns vary by firm type. For large firms the earnings growth rates are higher in growing firms, while for small firms the earnings growth rates are lower in growing firms. By the end of the decade, these growth rates result in earnings for younger workers in large growing firms that are 13% higher than their counterparts in shrinking firms, and earnings for younger workers in small growing firms that are 2% to 12% lower than their counterparts in shrinking firms.

Compared to older workers, younger workers do better in large growing firms than in large shrinking firms, and all men do better in shrinking small firms compared to their counterparts in growing firms. However shrinking small firms provide only one-in-eight jobs to low-education men compared to growing small firms share of one-in-three jobs. (xx: can you interpret this in terms of the changes in industry structure other than just unions? You say that older workers are more likely to work in unionized firms, and this may explain why older workers do better in shrinking firms. But note that younger workers more likely to be in LL- than older workers)

Across firm types, movers (completed jobs of 1-3 years) tended to experience higher earnings growth than stayers (ongoing jobs > 5 years). This indicates that the industry restructuring resulted in some workers were being displaced from good jobs rather than leaving voluntarily, especially since ongoing short jobs are inferior to completed short jobs. (xx: stan please check this and make sure you agree with my mover - stayer analysis. Can you explain it from an industry change viewpoint?)

Firm size also plays a role in initial earnings as well as earnings growth for low-education men in trucking. Workers in large growing firms tend to have higher initial earnings than comparable workers in small growing firms. However, earnings growth does not show a distinct pattern, with small and large firms are almost equally likely to provide higher earnings growth. Overall the difference in the rate of earnings growth ranges from plus or minus 2 percentage points between large and small growing firms. However, workers in large firms tend maintain at least some of their earnings advantage over workers in small firms. After a decade, earnings of workers in large firms exceed earnings of comparable workers in small firms by 1% to 25%. (xx: can you relate to industry changes?) Once again, younger workers in large growing firms with high turnover are an exception; they have lower initial earnings and a 2% earnings gap after ten years compared to their counterparts in similar small firms.

Firm job ladders for low-education men also differ by firm turnover. Low-turnover firms offer initial earnings are between 5% and 20% higher than in comparable high-turnover firms, which have substantially higher growth rates (1.5 to 4.1 percentage points). By the end of the decade, earnings are 3% to 20% higher in high-turnover firms, younger workers in large growing firms, where the final earnings are 19% higher in low turnover firms. (xx: at some point can we say why this group is exceptional? Is it a sign of the new HRM--higher turnover and lower initial E and Egrowth?)

In our fieldwork, we found that trucking firms that offer training often have high turnover rates. Upon hire, these workers do not have a commercial drivers' license. For these workers, completion of the training program represents a relatively large increase in their human capital, which translates into higher rates of earnings growth either at their current employer or another trucking firm. (xx: how does this relate to the job ladders we see? Why do some firms provide training? We need to tie into job ladders by firm characteristics or drop.)

For female workers, firm fortunes especially matters in large firms with low turnover, which account for 26 to 36% of female trucking jobs¹². In contrast to male workers, shrinking firms provide higher initial earnings and higher earnings growth to women than comparable growing firms, and the differences are substantial for older female workers (see fig yy). At the end of ten years, female workers in long jobs in shrinking firms can expect to have earnings that are 21% to 30% higher (younger workers) and 65% to 84% higher (older workers) than their counterparts in growing firms. (xx: I found your numbers wrong and changed them, so please check them carefully, both for women and men.) Women are only three-fourths as likely as men to be on long job ladders in large low-turnover firms, both growing and shrinking.

HRMs based upon internal labor markets seem to be holding up in large low-turnover shrinking firms, where only one-in-ten workers (male and female) are new hires in 2001. Women and older men have better job ladders in the large shrinking firms, although this is not true for younger men. These results indicate that the large unionized firms are able to protect the jobs of their experienced workers, but that these good job opportunities are not growing. In contrast, the younger men have better long job opportunities in growing large firms or in shrinking small firms. However large growing firms vary by their HRM, with only some providing access to long job ladders with good earnings growth (and also lower turnover). Small shrinking firms seem to protect some long jobs as well as make many new hires, and so experienced workers seem to be competing to keep their good jobs. (xx: stan do you agree?)

These differences between younger and older male workers are an indication that the opportunities facing younger men are finding good job opportunities in different firms than older men, who especially rely upon the unionized but shrinking large firms. The younger men have better job opportunities in large growing firms, where their job ladders are as good as in the large shrinking firms for older men. Women are even more dependent upon large shrinking firms for good jobs than older men. As the young men age, we need to see if health constraints cause their job opportunities to worsen or if they can continue to rely upon market forces to create good job ladders in growing firms. Another indication of the impact on turbulence on workers is that, unlike other industries, movers had higher job growth than stayers across firm types. Although economic turbulence has greatly affected the trucking industry, these results indicate that at least some workers have found ways to minimize the deterioration to jobs either through their unions or through market forces. Other workers have been bumped from good job ladders to inferior job ladders that are shorter with lower earnings growth. These workers must continue to compete for the better jobs offered by some firms. (xx: Stan, do you agree?)

7. Conclusions and Lessons Learned

(xx: this has not been revised yet, since we decided to write these sections after we each list "major findings")

Firm turbulence appears to be less harmful to workers' job ladders in both retail food and financial services than to workers' jobs in semiconductors.

The LEHD data show us that career paths of workers can be characterized for loyalists and job changers. Across industries the loyalists experience better career paths than job changers for all education groups of prime-aged men and women. The career

¹² This analysis of female job ladders includes low- and medium-education workers. High-education female workers have too few observations to be included

paths of job changers take on two distinct patterns across the five industries, as workers change jobs to improve their earnings prospects.

We see that over time many workers are able to improve their career paths through changing jobs until they finally land on a relatively good job ladder, where a job ladder is described by initial earnings and earnings growth. Workers who already work for an employer with good job ladders (high initial earnings and good earnings growth) become “loyalists”, i.e., they do not change jobs over the period studied. The high initial earnings in semiconductors, software, financial services, and to a slightly less extent trucking and retail food, provide loyalists, who typically have above-average earnings growth, with career paths that are considerably above the career paths of job changers. Workers on inferior job ladders become “job hoppers”, or workers who change jobs until they end up on a good job ladder. Since most workers quite job hopping once they land on a relatively good job ladder, we see that job hoppers have had worst jobs that two-jobbers. Over the ten year period, the three types of career paths—loyalists, two-jobbers, and job hoppers—are well represented across all industries.

Even though workers improved their career paths by piecing together continually improving job opportunities, these patterns vary across industries. Career paths for a given education-gender group vary greatly across the five industries, with retail food at the bottom and software and semiconductors at the top. High-Tech earnings are about three times Retail Food earnings. These differences in earnings are also observed in the job ladders across the industries. In general, workers improved their career paths by *moving into* the software, semiconductor, and trucking industries, and *by moving out of* the retail food and financial services (with medium-education males the exception). Only the loyalists in retail food and financial services had decent job ladders, with their one job constituting their career path. However the job hoppers who leave a retail food job are able to do better over time than the loyalists who remain with a retail food employer, which indicates that the job ladders in retail food are inferior to those in other industries. This is not true in financial services, where the women who leave the industry do not catch up with the loyalists. This outcome implies that the financial services employers were using a tournament or “winner-take-all” model where a few chosen workers are put on excellent job ladders and the others are put on job ladders with slow growth and encouraged to leave (or forced to leave).

Several underlying economic forces could explain these different outcomes in career paths by personal characteristics. The loyalists in the good jobs may have superior ability or other unobserved characteristic that would make them be more valuable to their employer than the job changers, who may need to increase their skills through experience before landing a better job. Alternatively firms with good job ladders may operate in nonclearing or rationed labor markets with efficiency wages, and have a queue of fairly-homogenous workers waiting for job openings. A third possibility is that it takes time for firms and workers to learn which workers are a good match for which jobs, and workers must change jobs until this information is learned and results in a “good match”. This third explanation, however, incorporates the first two possibilities in that the match may depend upon unobserved worker characteristics or upon access to rationed good jobs. With the data set we have, we cannot explain to what extent the superior career paths of loyalists and to what extent the improvement in job ladders through job changing reflect an information process or a rationing process. We think both forces, through a matching

process, are at work. To the extent that workers tend to end up in jobs that eventually have equivalent initial earnings to the loyalists' initial earnings and earnings growth indicates that many firms determine job ladders and then place workers into these jobs, by screening workers as best they can over time. This is reinforced by the observation that earnings improvement between jobs is considerably higher than the earnings growth within a job. Improved career paths depend upon higher initial wages. Further research on this is important for policy makers, who need to know to what extent career paths reflect workers' access to firms with excellent job ladders and to what extent career paths reflect workers' unobserved ability and/or need for more training.

Our analysis of firm job ladders helps us to understand to what extent the firms are providing job ladders according to their own characteristics and fortunes. Economic turbulence clearly affects the types of firms—small or large, growing or shrinking—in an industry, and this affects the number and type of jobs offered by the firms. Economic turbulence to the extent it creates uncertainty and less than full employment undermines a firm's ability to provide good job ladders to employees. Large growing firms provide some of the best job ladders to workers, and small shrinking firms tend to provide the worst job ladders. Small growing firms often provide excellent job ladders, especially in semiconductors and financial services. Firms with growing employment offer better jobs than shrinking firms, except in trucking, where shrinking firms offered the best job ladders. Although large firms are the largest supplier of long-term job ladders, the importance of small and growing firms in providing excellent job ladders in semiconductors, financial services, and trucking indicates that these firms may be an important source of good job ladders over time.

One of the perceived costs of economic turbulence is the disappearance of the good jobs provided by large growing firms. However we were impressed by the ability of many workers to continually improve their career paths by finding better job opportunities with another firm. Given the observed career paths, we think that unemployment insurance should continue to define a suitable job as “a comparable job”, since most workers seem to do very well in making job transitions, and relatively few need government intervention. For workers who take longer than normal to find another or better job, policy makers should provide assistance in learning how to search for jobs and how to seek training if required. Although workers' career paths are unequal according to their industry and their current employer, workers who have missed out on obtaining the better job ladders will continue to search and obtain better jobs. Although they typically will never catch up, they will improve their career paths over time.

Table 5.1 Frequency of Career Patterns by Industry and Demographic Group

		Loyalist	Two Jobs	JobHopper	Loyalist	Two Jobs	JobHopper
		Male			Female		
Semiconductors							
High Education	25-34	3.30%	3.00%	2.80%	2.20%	2.70%	2.90%
	35-54	4.70%	5.10%	4.70%	4.00%	4.30%	4.00%
Medium Education	25-34	3.20%	3.00%	2.90%	2.90%	3.30%	3.10%
	35-54	3.50%	3.60%	3.40%	5.00%	4.90%	4.10%
Low Education	25-34	2.50%	2.70%	2.50%			
	35-54	2.40%	2.50%	2.20%			
Software							
High Education	25-34	5.46%	5.03%	4.45%	4.83%	5.31%	5.31%
	35-54	5.77%	5.83%	5.71%	4.92%	5.65%	5.73%
Medium Education	25-34	1.76%	2.03%	2.05%			
	35-54	1.48%	1.61%	1.62%			
Low Education	25-34	1.73%	2.26%	2.39%			
	35-54	1.35%	1.48%	1.38%			
Financial Services							
High Education	25-34	3.30%	2.90%	2.60%	3.70%	3.90%	3.50%
	35-54	9.40%	6.70%	4.70%	6.90%	6.00%	4.70%
Medium Education	25-34	3.20%	3.50%	3.40%	3.20%	3.70%	3.30%
	35-54	5.60%	4.30%	3.30%	5.30%	4.90%	3.80%
Low Education	25-34						
	35-54						
Trucking							
High Education	25-34						
	35-54	1.50%	1.30%	1.00%			
Medium Education	25-34	1.70%	1.90%	1.80%			
	35-54	3.90%	3.30%	2.60%			
Low Education	25-34	5.30%	5.60%	5.00%	4.70%	4.80%	4.30%
	35-54	9.80%	7.60%	5.70%	8.10%	6.20%	4.90%
Retail Food							
High Education	25-34	2.10%	1.90%	1.60%	2.40%	2.20%	1.80%
	35-54	3.60%	2.60%	1.90%	3.40%	2.70%	2.00%
Medium Education	25-34	2.90%	2.70%	2.20%	3.30%	3.20%	2.40%
	35-54	4.00%	2.80%	1.90%	4.70%	3.70%	2.50%
Low Education	25-34	3.60%	3.40%	2.70%	3.10%	3.00%	2.20%
	35-54	4.50%	3.20%	2.00%	4.50%	3.60%	2.40%

Notes: The frequencies show the proportion of workers in each industry who are in each demographic group, and whose career paths can be categorized into one of the three groups. If there were negligible numbers of workers in a particular demographic group (notably female workers in the trucking industry), that category is simply not reported. The highlighted cells identify the most frequently occurring path for each demographic group

Table 5.2 Initial Earnings in Different Career Patterns by Industry and Demographic Group

		Loyalist	Two Jobs	JobHopper	Loyalist	Two Jobs	JobHopper
		<i>Male</i>			<i>Female</i>		
Semiconductors							
High Education	25-34	22,963	13,610	11,044	15,238	8,455	7,575
	35-54	32,714	20,755	16,498	13,590	9,186	8,430
Medium Education	25-34	19,219	11,263	8,518	12,597	7,294	6,450
	35-54	29,523	13,641	11,295	11,863	7,387	6,631
Low Education	25-34	16,085	9,116	6,709			
	35-54	19,900	10,613	9,471			
Software							
High Education	25-34	20,444	15,411	11,965	15,097	10,740	9,079
	35-54	26,342	22,743	19,228	16,456	12,358	11,020
Medium Education	25-34	16,658	12,256	9,334			
	35-54	20,766	17,397	14,315			
Low Education	25-34	15,025	10,530	8,097			
	35-54	18,966	15,226	11,693			
Financial Services							
High Education	25-34	21,335	11,452	8,768	9,678	7,084	6,442
	35-54	31,524	30,492	15,133	11,538	8,522	7,861
Medium Education	25-34	13,409	7,527	6,626	7,010	5,492	5,197
	35-54	16,874	10,494	8,906	7,456	5,861	5,743
Low Education	25-34						
	35-54						
Trucking							
High Education	25-34						
	35-54	10,596	8,717	8,099			
Medium Education	25-34	7,522	5,791	5,617			
	35-54	9,341	7,439	7,175			
Low Education	25-34	6,690	5,289	4,900	4,909	3,947	3,868
	35-54	7,840	6,299	6,203	5,323	4,093	3,902
Retail Food							
High Education	25-34	5,763	4,764	4,539	4,019	3,443	3,215
	35-54	9,002	6,883	6,559	4,761	3,945	3,809
Medium Education	25-34	4,699	4,195	4,101	3,351	2,992	2,960
	35-54	5,810	5,039	4,999	3,620	3,098	3,169
Low Education	25-34	4,042	3,820	3,715	2,969	2,766	2,740
	35-54	4,555	4,157	4,189	3,037	2,765	2,707

Notes: The bolded cells show both the highest initial earnings for each demographic group as well as the highest earnings at end of 40 quarter spell

Table 5.3 Within Job Earnings Growth in Different Career Patterns by Industry and Demographic Group

		Loyalist	Two Jobs	JobHopper	Loyalist	Two Jobs	JobHopper
		<i>Male</i>			<i>Female</i>		
Semiconductors							
High Education	25-34	7.3%	7.3%	5.8%	5.8%	5.8%	4.4%
	35-54	5.9%	4.4%	4.4%	4.4%	4.4%	3.0%
	25-34	6.7%	6.7%	5.3%	5.3%	5.3%	3.8%
Medium Education	35-54	5.4%	3.9%	3.9%	3.9%	1.4%	2.4%
	25-34	7.1%	7.1%	3.6%			
Low Education	35-54	5.7%	5.7%	4.2%			
	Software						
High Education	25-34	12.3%	11.2%	11.4%	8.8%	8.8%	8.6%
	35-54	8.6%	8.4%	8.4%	5.9%	6.0%	6.0%
Medium Education	25-34	13.5%	10.6%	12.5%			
	35-54	8.0%	7.8%	7.8%			
Low Education	25-34	14.6%	14.0%	13.1%			
	35-54	7.7%	7.6%	7.6%			
Financial Services							
High Education	25-34	9.6%	10.3%	13.1%	7.6%	10.9%	11.7%
	35-54	8.2%	9.2%	10.5%	6.1%	9.8%	9.8%
Medium Education	25-34	10.3%	10.3%	12.1%	8.2%	8.6%	11.4%
	35-54	8.5%	9.0%	10.0%	6.5%	7.7%	11.3%
Low Education	25-34						
	35-54						
Trucking							
High Education	25-34						
	35-54	4.7%	10.1%	10.9%			
Medium Education	25-34	8.7%	10.1%	15.2%			
	35-54	7.5%	7.5%	13.8%			
Low Education	25-34	9.5%	9.5%	14.5%	13.1%	13.1%	8.2%
	35-54	8.0%	8.1%	13.2%	11.8%	11.8%	16.8%
Retail Food							
High Education	25-34	10.6%	13.6%	16.0%	9.9%	14.8%	13.5%
	35-54	8.9%	16.6%	14.3%	8.2%	8.5%	10.9%
Medium Education	25-34	11.4%	13.5%	14.7%	11.2%	10.0%	14.7%
	35-54	10.5%	9.7%	11.7%	10.3%	9.0%	11.0%
Low Education	25-34	12.2%	14.0%	14.9%	12.0%	12.2%	14.2%
	35-54	8.3%	7.9%	11.9%	11.1%	9.2%	11.1%

Notes: The cell entries report annualized earnings growth rates within jobs within each industry. The highlighted cells show the highest growth rate for each demographic group.

References

Appendix. Career Path and Job Ladder Simulations

The career path and job ladder simulations are based primarily upon the results of within-job and between-job earnings growth regressions for each Sloan industry, hereafter referred to as the WJWG and BJWG regressions, respectively. These regressions provide estimates for earnings growth by different job types (defined by duration, employer, and employee characteristics.) We then take the modal characteristics of various career paths and construct simulated 10-year earnings growth trajectories for each.

WJWG and BJWG Regressions

The data for the WJWG and BJWG growth are drawn from the LEHD program data of matched employer-employee records based on UI wage records of three large states. Quarterly earnings are observed for almost all workers in those three states. Our sample runs from the first quarter of 1992 to the fourth quarter of 2001.

The unit of observation for the WJWG regression is a job spell. Each worker is assigned to one full-quarter dominant employer in each quarter that positive earnings of at least \$250 (2001 dollars) are observed. The dominant employer is the employer who pays the highest earning to a worker in a given quarter. The worker is considered full quarter employed at quarter t if positive earnings are reported in quarters $t - 1$, t , and $t + 1$. The job spell's starting quarter is the first full quarter when positive earnings are reported for a given employer-employee match, and the ending quarter is the last full quarter for which positive earnings are reported for that employer-employee match, provided that employee did not have full-quarter earnings at another dominant employer in the interim. The annualized log earnings change from the starting quarter the ending quarter of employment, deviated from the national mean earnings growth during the period, defines the job spell's within-job earnings growth. Job spell length is divided into four tenure groups <1 year, 1-3 years, 3-5 years, 5+ years, and are left, right, and uncensored. We also associate the following on the job observation:

- Worker characteristics:
 - Gender
 - Age in 1995 (in four groups: 18~24, 25~34, 35~54, 55~65)
 - Education in 1995 (in three groups: low, medium, high; roughly corresponding to high school, some college, and college. Education categories vary across the Sloan industries.)
- Employer characteristics:
 - In or out of Sloan industry (see below)
 - Mean employer size over the job spell (≤ 100 employees, > 100 employees)
 - Mean employer churning over the job spell ($\leq 20\%$ or $> 20\%$), defined as:
$$\frac{(Accessions + Separations - |\Delta Employment|)}{Average_Employment(t, t-1)}$$
 - Net employment growth over the job spell (<0 , ≥ 0)

Employers are defined at the SEIN (State Employer Identification Number) level, which is the establishment for single-unit firms. For multi-unit firms, the definition of SEIN units is state-specific; generally, however, the SEIN unit is smaller than firm.

We divide the job observations into five samples, one per Sloan industry, with some overlap. Each sample contains *all* of the job spells for a given worker if that worker had at least one full-quarter dominant employer in that Sloan industry during the sample period. Therefore, if

a worker has one job in retail food followed by one job in trucking, *both* observations will appear in *both* samples. In the retail food sample, the first job will be “in” industry, and the second will be “out”; vice-versa in the trucking sample. In each sample, we regress the worker characteristics by employer characteristics, job tenure, and censoring on the within-job earnings growth measure.

The BJWG is similarly estimated. The unit of observation for the BJWG regression is a spell of non-employment between full-quarter jobs as defined above for the WJWG regression. The variable of interest is the annualized log earnings change between the last full-quarter earnings at the old job and the first full-quarter earnings at the new job. In the regression specification, we no longer consider the length of the non-employment spell, but include the employer characteristics of both the old job and the new job.

Regression specifications: Two specifications were estimated for each group of workers (defined by gender, age, education, and industry) to characterize within job earnings growth and between job earnings growth.

Within-job wage growth: by firm characteristics (size, turnover, employment growth) and in/outside Sloan sectors.

$$wjwg_{in} = sex_i + censor_{in} + age_i + education_i + tenure_{in} + \varepsilon_{in}$$

Between-job wage growth: by firm characteristics (size, turnover, employment growth) and in/outside Sloan sectors of old and new jobs.

$$bjwg_{in} = sex_i + censor_{in} + age_i + education_i + \varepsilon_{in}$$

Career Path Simulation

To simulate career paths in each industry, we first find the modal tenure profile and employer characteristics for each career path of interest, then use the results from our WJWG and BJWG regressions to simulate the earnings growth profiles of each career path.

Within each industry and worker type (by gender, age, and education group,) we define three career path types: “loyalists” who hold one job, workers holding two jobs, and “job-hoppers,” who hold three jobs over the period. We exclude workers with more than three jobs from the analysis. Conditional on the number of jobs, the industry, and worker characteristics, we first find the modal sequence of jobs held within and out of the industry (e.g. the modal young, high-educated male job hopper in the semiconductor industry holds two jobs outside of the semiconductor industry followed by one job in semiconductors.) Conditional on this job sequence, and that the first job is not left-censored, we then compute the mean first full-quarter earnings as the initial earnings level for the specified career path. Also conditional on the job sequence, we find the modal tenure group and employer characteristics (size, churning, and growth,) for each job in the sequence, and the mean duration of non-employment spells between each job. This procedure thus defines, for each industry-worker’s career path type, the modal sequence of jobs, with within and between-job durations and associated firm characteristics. Using the WJWG and BJWG regressions, we obtain the estimated earnings growth rates within and between each job in the sequence, assuming that the final job in each sequence is right-censored and that the other jobs are uncensored.

In order to provide comparisons of earnings profiles, we use this data to simulate career paths spanning exactly 40 quarters. As the modal career paths defined above only specify tenure *groups* for each job, we assign a specific number of quarters to each job in order to total 40 quarters. First, each job was assigned the median duration for the specified tenure group (e.g. 18 months for a job in the 1-3 year tenure group.) Additional quarters were then added or subtracted evenly across all of the jobs in the career path in order for the total between- and within- job time

to equal 40 quarters, provided the within-job duration within each job did not fall outside the amount specified by that job's modal tenure group. In the event that this was insufficient to extend the career path to 40 quarters, the job in the highest tenure group was extended to the required duration. Career paths where such an extension was required are noted below.

Job Ladder Simulation

For the job ladder analysis, earnings growth is the predicted value of the WJWG regression for the specified job tenure. Initial earnings are the mean initial earnings for the specified cell, using the same variables as in the WJWG regression (firm characteristics, demographic group, and job tenure). On-going jobs are jobs that are right-censored in 2001; completed jobs are all uncensored jobs during the sample. Cells containing fewer than 50 observations, comprise less than 5% of jobs for the gender/age/edu group, or contain fewer than 0.5% of the total 5+ year jobs for the industry are not considered in the analysis unless otherwise specified.