

How Good Are U.S. Jobs? Characteristics of Job Ladders across Firms in Five Industries¹

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Introduction

This paper uses a national firm-employee linked data set that is informed by fieldwork in five industries (financial services, retail food, semiconductors, software, and trucking) to document and examine firms' job ladders (i.e., initial earnings, earnings growth, and tenure) over the decade 1992-2001.² In particular, we ask to what extent do firms in the same industry provide jobs of varying quality to workers, and how do women and men of different age and education fare in their job ladders?

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 job quality. We find that even firms that offer good job ladders with career development also have job without career development, and workers compete (i.e., are selected by management) for access to the good job ladders. The workers who do best are those who are able to access these good job ladders (and keep their jobs). However most workers are not able to land these good jobs, and instead have jobs with relatively low initial earnings and low earnings growth. In a related study, we find that these workers must change firms to get a better job (Brown et al, 2006, ch 6).

Across industries and within industry (firms grouped by growth, size, and turnover), the data indicate several types of human resource management (HRM) in practice. Some companies 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, 1999; Osterman, 1996). Often industry-focused fieldwork³ finds that within growing companies, new hires compete for coveted job ladders within the ILM, where workers not promoted are terminated or encouraged to find another job (in an up-or-out situation). In shrinking companies, experienced workers often compete to "survive" or keep their jobs during downturns, and may even have to compete so as not to be replaced by a less expensive new hire. Initial earnings and earnings growth have

¹ This paper is based on contributions from the Sloan Industry Studies 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. An overview of the larger research project upon which this paper draws can be found at <http://economics.turbulence.com/> with research results summarized in Brown et al (2006).

² See *Economic Turbulence* ch 5 for results that use the same data and examine how workers piece together jobs to form a career path.

³ This paper draws upon the fieldwork conducted by the Sloan Industry Studies Center researchers, who are cited in footnote 1. For more information on these Industry Centers, see <http://www.industry.sloan.org/centershome.htm>.

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 that has rule-based job ladders; the nonunion firm that offers some workers access to ILMs; and nonunion firm that only offers 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.

Over the period 1992-2001, we observe that the types of jobs offered by firms some times reflected firm fortunes (ie, where employment was growing or not.) In semiconductors and software, shrinking firms were less likely to provide good job ladders compared to growing firms. In contrast, shrinking firms offered better job ladders in trucking than growing firms. Firm fortunes are not related to the quality of job ladders in financial services and retail food, where both expanding and shrinking large firms provide equally good job ladders. Overall mobility (reflected in the relative turnover rate) is associated with better job ladders in financial services and software and doesn't matter in the other industries.

In this paper we briefly review previous research on job ladders, and summarize the LEHD data used. Then we directly characterize firm job ladders over the period 1992 through 2001 by describing the basic job ladders that are provided by firms, and how job ladders vary by industry and by firms' growth, size, and turnover. In the final section, we address the policy implications of these findings.

Background

There is an extensive body of literature on the determinants of workers' earnings profiles over time. Few, however, directly study the variation in job ladders across firms. 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.⁴ Other research based on case studies of firms has examined within-firm promotion, hiring patterns, and wage structures.⁵

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 internal labor markets, i.e., long job ladders with career development and earnings growth, for a wide variety of reasons, including providing incentives to retain workers with firm-specific knowledge, to motivate workers

⁴ See, for example, Topel and Ward (1992) on wage profiles and job change for young men, and Jacobson, LaLone and Sullivan (1993) for Gibbon and Katz for job profiles of displaced workers.

⁵ See Brown and Campbell (2002) for references and overview.

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 a variety of ILM systems exist, and most HRM practices incorporate 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 systems that efficiently match workers and firms versus systems that ration access to "good" jobs (Prendergast, 1996).

In the institutional ILM (Doeringer and Piore, 1971), workers gain access to firms through ports of entry, and opportunities are rationed largely through seniority. Seniority also protects job security by serving as an objective criterion for layoffs. In contrast, in a stylized version of a "performance-based" ILM, workers compete for access to long job ladders and for opportunities to gain skills and wages. Our use of the term "performance-based" conveys the central idea that the winners of these opportunities (and those that are weeded out) are generally identified through their job performance. Management determines the criteria for advancement and dismissal, and thus "performance" in a performance-based ILM may not include employee input (or even broadly-based management input) on performance, or may not be based on objectively measured criteria (Trevor, Gerhart, and Boudreau, 1997; Ferris, Buckley, and Allen, 1992). Further, as Pinfield (1995) showed, considerable managerial discretion often governs the establishment as well as the assignment of jobs in internal labor markets and the salaries associated with them.

One well-known study of an internal labor market uses data from a single large firm (Baker, Gibbs and Holmstrom, 1994). This study finds the 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 find little evidence of "ports of entry" into the firm, since the firm does a fair amount of outside hiring even at higher levels. Similarly, Lazear and Oyer (2003), which uses matched data from the Swedish Employers Confederation from 1970 to 1990, 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, which differs from the more rules-based institutional ILM described by Doeringer and Piore (1971).

In the following sections we use LEHD data to document firms' job ladders and to tie firm size and fortunes to the jobs offered by the firms. Case studies research from the five industries is used to inform our interpretation of the statistical results below (e.g., to describe the observed worker/firm relationships).

Data

The data for estimating firms' job ladders are drawn from the LEHD program data of matched employer-employee records based on UI wage records from the first quarter of 1992 to the fourth quarter of 2001.⁶ (See Appendix for details.) The job ladder simulations are based primarily upon the results of within-job earnings growth regressions for the five industries. These regressions provide estimates for earnings growth by different job types (defined by duration, employer, and employee characteristics). The unit of observation is a job spell. Each worker is

⁶ 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. For detailed information on LEHD data, see http://instruct1.cit.cornell.edu/~jma7/abowd_haltiwanger_lane_20040107_submitted.pdf.

assigned to one dominant employer in each quarter that positive earnings of at least \$250 (2001 dollars) are observed.⁷ 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. Each job spell is also characterized by: *worker characteristics* for twenty-four groups of workers (defined by *gender*, *age* (four groups: 18-24, 25-34, 35-54, 55-65), *education* (three groups: low, medium, high; roughly corresponding to high school, some college, and college, depending on the industry), and *employer characteristics* for forty groups of firms (defined by *industry*, *size* (≤ 100 or > 100 employees), *excess turnover or churning* (\leq or $> 20\%$), *net employment growth* (negative or positive (including zero)).⁸

The interested reader can replicate the simulation on the web site www.economicsturbulence.com.

We focus on jobs held by prime-aged workers divided into a "younger" group (aged 25-34 years old) and into an "mature" group (aged 35-54 years old). These workers constitute 70% to 80% of the workforce in our industries. We exclude the youngest workers (under age 25) who are often involved with finishing school and working part time, and older workers (over age 54) who are often involved with retirement decisions.⁹ 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 simulate job ladders (initial earnings and earnings growth for ten years) 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.

For comparison, 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.

We analyze firm job ladders in five industries that have Sloan Industry Studies Centers (financial services, retail food, semiconductors, software, and trucking), and we worked with researchers from these Sloan Industry Centers in setting up the study and in analyzing the statistical results. These five industries include both manufacturing and service industries. They span the technology spectrum, with high-tech industries that create new technology (semiconductors and software), service industry that is heavy user of new technology (financial services), retail and transportation industries that use new technology (retail food and trucking). They also span the earnings spectrum with higher earnings reflecting both required higher education and industry pay premiums; the highest earnings generally are in software and semiconductors and the lowest in retail foods. All five industries have been undergoing restructuring in response to increased competition that reflects the forces of technological change, globalization, and deregulation. The **semiconductor** industry, which has its roots in manufacturing, is a new economy industry that has experienced technological change, restructuring, and global competition. The **software** industry is another new economy, high-wage industry that has experienced rapid growth and industry restructuring as its value chain activities have become located around the globe with many being outsourced. **Financial services**

⁷ We use the deviation about the national mean to control for a calendar effect on earnings.

⁸ Firm characteristics are calculated over the period of each job (i.e. if the job lasted from t_1 to t_2 , growth is determined by sign of $(\text{firmsize}(t_2) - \text{firmsize}(t_1))$). High turnover is 20% above the turnover predicted by change in employment, and low turnover is less than 20% above the predicted turnover.

⁹ Analyzing jobs of prime-aged workers allows us to avoid data problems associated with younger and more senior workers not being in the sample for many quarters.

industry is a rapidly-growing industry that has been transformed through deregulation and the use of new technology. The **retail food** industry, which is essentially a low-wage, old economy, mature industry, has experienced substantial changes in technology and new forms of competition. The **trucking** industry can be characterized as a low-wage, old economy industry, albeit one that has undergone enormous restructuring as a result of deregulation. Unionization, an important force in retail food and trucking, has declined. Together these industries provide us with broad view of the variation in the types of job provided workers across industries and their firms.

Tenure Distribution of Jobs by Industry

Here we look at the job 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 (see Table 1).

Our five industries are all dominated by growing firms (i.e., that have zero or positive increase in number of employees over life of job); 65% to 70% of jobs are in growing firms in 2001. Large establishments (i.e., ≥ 100 workers at the location) 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 (see Table 1) is approximately the same across industries (except software): approximately one-quarter are new hires and one-fifth are more than five years old; approximately one-third are one to three years old and another one-fifth are three to five years old. As discussed below, we interpret this pattern of 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 firms display even more mobility and shorter jobs: 30% current jobs are new hires, and only 11% current jobs have lasted 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) display different mobility patterns.

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, and only 12% in trucking. The tenure distribution even 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 and retail foods, but only around one in seven jobs in semiconductors and trucking. The percent of long-term jobs in these large growing low-turnover firms varies even more, from approximately 35% in retail foods and trucking to only 13% in software. These differences reflect both variation in firms' growth rates and variation across firms in provision of good job ladders.

In contrast to these growing firms, *large shrinking firms with low turnover* provide an interesting contrast in financial services and semiconductors, where they account for 19% and 25% of all jobs, respectively. Even though these semiconductor firms are reducing employment, new hires still account for 28% of jobs, and only 19% of jobs have lasted over five years. We would have expected that growing large firms would

have relatively more new hires and fewer long jobs than shrinking large firms, but the reverse is true. These semiconductor firms appear to be replacing experienced workers with new hires. Large shrinking low-turnover financial services firms do have relatively fewer new hires and more long jobs than the comparable growing firms, as expected: new hires account for only 21% of jobs, and 26% of jobs have lasted over five years. Financial services firms are replacing experienced workers with new hires at a much slower pace than semiconductors firms. In contrast, large growing and shrinking low-turnover firms in the software industry have similar proportions of new hires and long jobs.

Trucking has an unusual distribution of jobs by firm characteristics. *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. Only one-quarter of all trucking jobs are in large low-turnover firms, and these jobs are equally split between growing and shrinking firms. This tenure pattern reflects the reorganization of the industry with deregulation resulting in more competition, especially at the local and regional level.

Now let us see how firm job ladders (i.e., initial earnings, earnings growth) vary across the five industries.

Job Ladders by Industry

Here 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 related to firm size and firm fortune by comparing job ladders in large and small firms and in growing and shrinking firms. We also compare long job ladders and short completed jobs (1-3 years tenure) in order to compare the jobs of stayers and movers.

Table 2 shows the job ladders for workers aged 35-54 years by gender and education in our five industries where firms are grouped by growth, size, and turnover. For each job ladder (shown by education for males, females in each industry), the top line shows average initial earnings, the next line shows the predicted net annualized earning growth rate, and the third line shows the simulated final earnings as a proportion of the average final earnings of the jobs held by higher-education men in that industry.

These job ladders confirm some well-known results: Financial services, software, semiconductors are “high wage” industries, and retail food and trucking are “low wage” industries. Job ladders held by men are much better than those held by women.

Some other comparisons are not so clear cut. Although larger firms often provide better jobs than smaller firms, this is not always true, as for women in financial services. In semiconductors, small firms provide comparable (and sometimes better) job ladders compared to the larger firms. Small firms also have job ladders with relatively high earning growth in financial services.

We find evidence that firm fortune (i.e., growing versus shrinking employment) matters in the job ladders provided by large firms in software (for high education workers), semiconductors, financial services (male jobs only), and retail foods. Jobs held by women in financial services and by low education software workers do not vary by growth status. Declining employment in trucking is associated with the best job ladders in the industry, which we will see reflects the decline of the large unionized carriers under deregulation.

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. Software firms with high turnover tend to provide better job ladders than comparable low-turnover firms. Semiconductor firms with low turnover tend to provide better job ladders than comparable high-turnover firms. In financial services, retail foods, and trucking, by contrast, the association between turnover and firm job ladder varies across workers and firms. Often the higher initial earnings of firms with low turnover is offset by the higher earnings growth of high turnover firms, and so the quality of the job ladder depends on how long the worker is able to keep the job.

We see that even for fairly homogenous groups of workers and firms, the relationship between firm characteristics and quality of job ladders varies across industries. “Landing a good land” translates into “where you work matters”.

Now let us look in more detail at the job ladders by firm characteristics within an industry for specific demographic groups.

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 the quality of workers' jobs is related to firm fortunes (see Figure yy). The jobs provided to workers vary 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's job ladders exhibit smaller differences: 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 than other workers from the firm's ups and downs, and that men's job ladders deteriorate less than those of women when employment contracts.

We observed earlier that tenure distributions indicate that shrinking large firms are replacing experienced workers with new hires. We compare ongoing and completed long (>five years) jobs to see how the job ladders of workers who leave or are terminated compare to those who stay. Performance seems to play a role in deciding which experienced workers stay, since shrinking large firms are shedding experienced workers with lower earnings growth (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 mature 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 mature 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, and internal labor markets hold 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 relative turnover, with high turnover firms offering higher earnings growth than comparable low turnover firms. Job ladders are most commonly 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 is growing or shrinking. 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% annualized wage growth; mature men have slightly lower growth rates.

However the tenure distribution, with approximately one-quarter long jobs and 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 varies across firms since it is much greater in low-turnover than in high-turnover firms (as would be expected). The *high-turnover growing* firm seems to feature a performance-based model in which considerably fewer workers enjoy 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 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 keep their jobs. 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 in low-turnover firms.

Job retention appears to be critical to earnings growth in financial services. Stayers (on-going long jobs) experience 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.

Financial services firms, especially local banks, insurance agencies, and the like, had long provided opportunities for workers with relatively little education to enter organizations, gain skills, and to advance over time to well-paying positions. Such advancement has become increasingly rare over the past twenty years amid increasing segmentation between jobs with different educational requirements (Hunter 1999). High school graduates and workers with some college education have found their routes to advancement blocked, particularly in larger organizations, as formal educational requirements have begun to replace industry and firm experience as prerequisites for high-earning jobs. This trend intensified as merger activity heated up in the 1990s in the banking industry. As larger companies purchased small, locally owned firms, local managerial jobs such as those in branches were devalued, and firm experience was increasingly dispensable (Skuratowicz and Hunter 2004).

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

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 appears 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 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.

The swings in employment in financial services appear to have 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. Generally workers in long jobs in declining firms enjoy only slightly lower earnings growth than those in growing firms. Overall firm fortune and firm size do 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 mature men), but workers in high-turnover software firms are not likely (2 to 10%) to be on long job ladders.

Software engineers rely upon on-the-job training, as well as formal training, to build skills. "Challenge of job" was the top factor that "matter most to you about your job" (for over 80% of both managers and staff) and "Educational or training opportunities" (for over 60% of staff respondents) in *InformationWeek's* 1999 national IT salary survey.¹⁰ The importance of having knowledge of and experience with the most current programming languages is supported by the anecdotal evidence that middle-age technical workers have difficulty finding IT jobs, since a large part of their experience may be with obsolete languages that are no longer in demand.¹¹

¹⁰ <http://www.informationweek.com/731/salsurvey.htm>, p. 4

¹¹ THE DIGITAL WORK FORCE: Building Infotech Skills at the Speed of Innovation (June 1999) U.S. Department of Commerce; Technology Administration; Office of Technology Policy, p. 17

As in semiconductors (and in contrast to financial services), firm fortune affects the job ladders for high-education workers in large low-turnover software firms, which account for one-third (male) to two-fifths (female) of all jobs. *High-turnover growing large* firms offer the best job ladders in the industry for low-education workers (see figure yy), but they account for only one-fourth of all long on-going jobs. However 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, since job ladders in small software firms generally have slightly lower initial wages. 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.

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 sheltered than in other firm types from the external 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 operates in a very fluid labor market. 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 jobs are held by prime-aged workers in large growing retail foods firms, which provide some of the best job opportunities in the industry. As in financial services, job quality does not seem to vary with firm fortune; 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 do vary with 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 ladders with career development and high earnings growth. In contrast, *low-turnover growing large* firms have a more compressed wage scale, which suggests that 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 with low turnover had 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), so the declining fortunes at these firms have led to a decrease in both long-term and temporary job opportunities for their workers.

Retail industries, including food stores, are generally not known for innovative or high-performance human resources practices. Indeed, the typical food retailer maintains a hierarchical and centralized approach to labor (Ben-Ner et al., 1999). Waves of consolidation and increased competition from nontraditional food retailers (such as mass merchandiser Wal-Mart and warehouse club store Costco) dramatically changed the retail food industry during the 1990s. Earlier, 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). Over the past three decades, the predominant type of job in the supermarket industry has changed from a full-time, relatively well paid position (often unionized), to a job with irregular and part time hours, low pay, and few options for training and career advancement (Hughes 1999). 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 restructuring in the 1990s may have been expanded their use. Growing large low-turnover firms have both many new hires and many long jobs (each about one-third 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, good 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, which reduce overhead costs such as health care benefits, to meet a large proportion of its workforce requirements, a number of firms do stand out as offering an alternative HRM strategy. For example, large growing firms with low turnover, appear to provide training and promotional opportunities for at least some employees, since they have a large proportion of long jobs (35%). Their reliance on new hires (29% for men and 35% for women) indicates that they also use part-time and temporary positions for flexible staffing. In contrast, large growing firms with high turnover seem to provide long job ladders to fewer employees, since only 19% of jobs last more than five years.

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.

These findings are consistent with fieldwork observations.¹² Food retailers know that most of their workers are going to leave, and they may use that to their advantage 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.

Big difference in retail food job ladders exist between small and large firms. Small firms, which are typically local or small regional food retailers, have lower initial earnings and lower earnings growth than comparable large firms. In small firms, earnings growth typically ranged from 6 to 8%. The small firms in retail food tend to be growing and have high turnover; those with low turnover represent fewer than one-third of small firms. Small firms with high turnover typically offer higher initial earnings and higher earnings growth than do low-turnover small firms. At the end of ten years, jobs in small firms with low turnover ended up paying the lowest earnings of any retail food firms.

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 retail food job ladders, 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 earnings grow little). Firm size still matters, since temporary jobs in small firms offer lower initial earnings than in large firms. Short jobs have higher initial earnings than the temporary jobs.

These patterns of job ladders are consistent with the fieldwork observations of deteriorating job opportunities in the unionized sector, as it must compete with the growing nonunion sector, which pioneered the two-tier system. Some workers in the nonunion large firms may eventually catch up to their union brethren, whose higher initial wages are growing more slowly. In both groups of large firms, however, even the best jobs are not very good compared to the jobs in other industries.

Trucking

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.

Initial earnings, but not earnings growth, varies by firm size. 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 initial 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%.

Job ladders for low-education men vary with firm fortune. The job ladders in growing firms, with one exception¹³, have initial earnings that are 1% to 6% higher than their counterparts in shrinking firms (see fig yy). However the difference in earnings

¹² Fieldwork observations are supplied by Liz Davis of the Retail Food Center at the University of Minnesota.

¹³ One exception is mature workers with high-school degrees have initial earnings that are 8% lower in small growing firms.

growth in growing versus shrinking firms varies by age. For mature men, the growth in earnings is higher (from .2 to 2.7 percentage points) in shrinking firms than in growing firms. This higher earnings growth rate means that by the end of a decade, mature 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 trucking firms have tended to shrink, while employment growth has been in non-unionized firms. These patterns are consistent with fieldwork that has observed higher earnings growth for unionized jobs compared to nonunion jobs, despite the fact that the relative number of unionized jobs has been shrinking.¹⁴

For younger workers, the earnings growth patterns vary by firm size and fortune. Among large firms, the earnings growth rates are higher in growing firms, while for small firms the earnings growth rates are higher in shrinking firms. By the end of the decade, earnings for younger workers in large growing firms are 13% higher than in large shrinking firms, and earnings for younger workers in small growing firms are 2% to 12% lower than in small shrinking firms. In fact, both younger and mature low-education men truckers do better in shrinking small firms compared to growing small firms. However shrinking small firms provide only one-in-eight jobs to low-education men, while growing small firms provide one-in-three jobs.

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 being displaced from good jobs, especially since ongoing short jobs are inferior to completed short jobs.

Firm job ladders for low-education men also differ by firm turnover. Low-turnover firms offer initial earnings that are 5% and 20% higher than in comparable high-turnover firms, which have substantially higher growth rates (1.5 to 4.1 percentage points). Fieldwork found that trucking firms that offer training often have high turnover rates, because workers receive their commercial drivers' license after training. 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.¹⁵

For female workers, firm fortunes especially matters in large firms with low turnover, which account for 26 to 36% of female trucking jobs¹⁶. 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 mature 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 (mature workers) than their counterparts in growing firms. 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 mature men have better job ladders in these large shrinking firms, although this is not true for younger men. These results indicate that the large unionized

¹⁴ Fieldwork observations are supplied by Mike Belzer and Stan Sedo of the Trucking Center at University of Michigan.

¹⁵ Ibid.

¹⁶ This analysis of female job ladders includes low- and medium-education workers. High-education female workers have too few observations to be included

firms are able to protect the jobs of their experienced workers, but that these good job opportunities are disappearing. In contrast, the younger men have better job opportunities in growing large firms (or in the few jobs 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).

These differences between younger and mature male workers are an indication that the good job opportunities for younger men are in different firms than for mature 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 mature men. Women are even more dependent upon large shrinking firms for good jobs than mature 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 of industry restructuring for truckers is that, unlike other industries, job movers have higher earnings growth than stayers across firm types. 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. Most likely, these workers continue to compete for the better jobs offered by some firms.

7. Conclusions and Policy Implications

Our analysis of firm job ladders helps us to understand to what extent the firm job ladders vary by firm size and fortune as well as excess turnover. Many factors, such as technological change, deregulation, rate of unionization, changes in global competition—shape firm size and fortune, and this affects the number and type of jobs offered by the firms. These forces may change the competitive advantage of different types of firms, as well as affect the macroeconomic conditions under which the industries operate, and firm HRM systems respond over time to these economic forces.

The jobs that firms offer vary both across and within the five industries studied. As expected, the five industries display wide variations in mobility and job ladders. In addition, workers similar in age and education end up on very different job ladders at firms within the same industry, where the quality of jobs varies by firm characteristics (and firm HRM practices). Across firms within the same industry, the difference in pay to comparable workers (same age, education, and gender) after ten years may average 50% to 100% higher in one firm than another.

Software firms display the most mobility, with new hires accounting for 30% of all jobs, and long jobs (those lasting over five years) account for only 11% of jobs in 2001. Semiconductor firms display the least mobility, with new hires accounting for 21% of all jobs, although their 22% percentage of long jobs is similar to the percentage of long jobs in retail foods and trucking (and only slightly above the percentage in financial services).

As expected, software, financial services, and semiconductors have the best job ladders (given education and age), and retail food and trucking have the worst job ladders. Earnings in financial services, software and semiconductors are about three times earnings in retail food.

Large, growing firms provide the most jobs to workers, and these firms provide some of the best job ladders. Small shrinking firms, which tend to provide the worst job ladders, account for few jobs. Small growing firms often provide excellent job ladders, especially in semiconductors and financial services. The tenure distribution of jobs and a comparison of earnings of movers and stayers indicate that even growing companies with good job ladders that provide career development may allow only selected workers access to them (“up or out”). Shrinking firms appear to replace at least some experienced workers with cheaper new hires, and some experienced workers may remain on long job ladders that are not available to new hires.

Firms with growing employment usually offer better jobs than shrinking firms, except in trucking, where shrinking firms offered the best job ladders. The impact of declining unionized jobs is seen in retail foods and trucking, where jobs in large low-turnover firms (both growing and shrinking) account for only one-third of jobs in retail food and one-fourth of jobs in trucking.

We do not know if firms with good job ladders operate in nonclearing or rationed labor markets that pays a wage premium (e.g., an efficiency wage), and have a queue of fairly-homogenous workers waiting for job openings. Alternatively the firms with good job ladders might be able to select and hire more skilled, more productive workers, so that firms are able to discern unobserved worker characteristics either at hire or within a short time period after hire. Most likely both forces are at work, where firms set up their jobs and then place workers into these jobs, by screening workers as best they can over time. Further research on this is important for policy makers, who need to know to what extent the quality of job ladders available to different groups of workers reflects workers’ rationed access to firms with excellent job ladders and to what extent it reflects workers’ unobserved ability and/or need for more training.

Note: job ladder figures by industry are in zip files.

Note: also have tenure freq files by gender, age, and ed

Table 1 Tenure Distribution for Jobs of Workers Age 25–54 (2001)

			Tenure (Years)				Total Obs.	% of Total Obs.
			< 1	1–3	3–5	5 +		
<i>Financial Services</i>								
+ Growth	Large	Low T/O	26.9%	35.6%	17.9%	19.6%	183,766	38.2%
+ Growth	Large	High T/O	28.4%	39.6%	21.6%	10.4%	54,842	11.4%
+ Growth	Small	Low T/O	23.4%	32.8%	19.5%	24.4%	64,878	13.5%
+ Growth	Small	High T/O	33.4%	36.0%	17.0%	13.6%	35,051	7.3%
– Growth	Large	Low T/O	20.8%	33.0%	20.3%	25.9%	89,702	18.6%
All Firms			24.8%	36.0%	19.3%	19.9%	481,092	100.0%
<i>Retail Food</i>								
+ Growth	Large	Low T/O	32.2%	19.9%	13.2%	34.8%	41,990	21.3%
+ Growth	Large	High T/O	27.9%	37.1%	16.2%	18.9%	50,105	25.4%
+ Growth	Small	Low T/O	32.5%	31.5%	16.8%	19.3%	12,094	6.1%
+ Growth	Small	High T/O	32.3%	32.2%	16.7%	18.8%	29,094	14.7%
– Growth	Large	Low T/O	7.6%	54.8%	14.5%	23.1%	23,669	12.0%
All Firms			25.3%	36.2%	16.1%	22.3%	197,534	100.0%
<i>Semiconductors</i>								
+ Growth	Large	Low T/O	14.5%	33.2%	24.7%	27.6%	28,655	50.6%
+ Growth	Large	High T/O	19.7%	49.0%	18.8%	12.4%	3,480	6.1%
+ Growth	Small	Low T/O	26.8%	33.8%	18.8%	20.6%	3,504	6.2%
+ Growth	Small	High T/O	25.5%	42.9%	15.0%	16.6%	2,150	3.8%
– Growth	Large	Low T/O	27.6%	39.5%	13.9%	19.0%	14,120	24.9%
All Firms			21.0%	36.6%	20.1%	22.3%	56,646	100.0%
<i>Software</i>								
+ Growth	Large	Low T/O	33.8%	35.4%	17.4%	13.4%	33,024	23.0%
+ Growth	Large	High T/O	19.2%	51.5%	21.6%	7.7%	21,896	15.3%
+ Growth	Small	Low T/O	34.4%	32.7%	17.5%	15.3%	20,971	14.6%
+ Growth	Small	High T/O	30.5%	43.5%	16.8%	9.1%	21,268	14.8%
– Growth	Large	Low T/O	31.5%	41.8%	12.6%	14.0%	17,687	12.3%
All Firms			30.4%	42.0%	16.8%	10.9%	143,315	100.0%
<i>Trucking</i>								
+ Growth	Large	Low T/O	17.1%	24.9%	20.0%	38.1%	12,110	12.1%
+ Growth	Large	High T/O	27.4%	33.5%	18.1%	20.9%	13,888	13.9%
+ Growth	Small	Low T/O	28.7%	30.6%	17.4%	23.2%	13,953	13.9%
+ Growth	Small	High T/O	31.9%	33.5%	16.8%	17.8%	24,720	24.7%
– Growth	Large	Low T/O	10.5%	42.6%	15.9%	31.0%	12,736	12.7%
All Firms			24.3%	35.6%	17.5%	22.7%	100,042	100.0%

Table contains tenure distributions for all workers age 25-54.

Only large low-turnover shrinking firms are shown, since the number of observations for other types of shrinking firms is small.

Table 5.2 Job Ladders, Workers Age 35–54

	Males					Females				
	+ Growth Large	+ Growth Large	+ Growth Small	+ Growth Small	– Growth Large	+ Growth Large	+ Growth Large	+ Growth Small	+ Growth Small	– Growth Large
	Low T/O	High T/O	Low T/O	High T/O	Low T/O	Low T/O	High T/O	Low T/O	High T/O	Low T/O
<i>Financial Services</i>										
Medium Education	\$19,436	\$15,765	\$17,688	\$18,101	\$14,602	\$8,780	\$8,038	\$6,655	\$7,256	\$7,835
	0.081	0.118	0.087	0.109	0.085	0.062	0.086	0.070	0.090	0.065
	0.69	0.81	0.67	0.85	0.54	0.26	0.30	0.21	0.28	0.24
High Education	\$30,236	\$23,447	\$28,012	\$24,119	\$19,817	\$11,081	\$11,479	\$8,955	\$9,830	\$9,937
	0.074	0.117	0.077	0.106	0.082	0.055	0.086	0.060	0.086	0.061
	1.00	1.19	0.96	1.10	0.71	0.30	0.43	0.26	0.37	0.29
<i>Retail Food</i>										
Low Education	\$9,401	\$7,143	\$4,468	\$5,628	\$8,028	\$5,243	\$3,880	\$3,655	\$3,437	\$3,488
	0.108	0.141	0.088	0.092	0.123	0.095	0.126	0.060	0.079	0.116
	0.85	0.90	0.33	0.44	0.84	0.42	0.42	0.20	0.23	0.34
High Education	\$12,483	\$10,339	\$8,059	\$8,452	\$10,230	\$7,971	\$5,482	\$4,542	\$4,845	\$5,450
	0.096	0.131	0.073	0.082	0.089	0.083	0.116	0.044	0.069	0.082
	1.00	1.17	0.51	0.59	0.77	0.56	0.54	0.22	0.30	0.38
<i>Semiconductors</i>										
Medium Education	\$19,458	\$13,427	\$14,068	\$15,517	\$16,330	\$11,808	\$9,600	\$7,712	\$8,050	\$8,630
	0.054	0.063	0.068	0.076	0.061	0.039	0.021	0.048	0.085	0.036
	0.88	0.67	0.74	0.88	0.80	0.46	0.31	0.33	0.50	0.33
High Education	\$20,904	\$19,391	\$19,102	\$18,676	\$19,530	\$12,765	\$11,264	\$9,694	\$8,973	\$9,369
	0.059	0.040	0.075	0.055	0.061	0.044	-0.002	0.054	0.064	0.036
	1.00	0.77	1.07	0.86	0.95	0.53	0.29	0.44	0.45	0.36
<i>Software</i>										
Low Education	\$16,316	\$18,174	\$15,372	\$15,524	\$17,074	\$10,397	\$12,232	\$9,348	\$10,001	\$11,265
	0.078	0.104	0.083	0.099	0.077	0.054	0.082	0.069	0.093	0.061
	0.67	0.97	0.66	0.78	0.69	0.34	0.52	0.35	0.48	0.39
High Education	\$22,551	\$22,895	\$19,898	\$22,402	\$19,748	\$15,204	\$14,587	\$13,434	\$12,205	\$14,584
	0.086	0.087	0.074	0.084	0.075	0.062	0.065	0.061	0.078	0.059
	1.00	1.03	0.79	0.97	0.78	0.53	0.53	0.46	0.50	0.49
<i>Trucking</i>										
Low Education	\$11,519	\$9,140	\$9,214	\$8,798	\$10,815	\$7,212	\$6,040	\$5,717	\$5,765	\$7,700
	0.036	0.077	0.057	0.080	0.063	0.032	0.072	0.078	0.090	0.086
	0.83	0.99	0.82	0.98	1.02	0.50	0.62	0.62	0.72	0.92
Medium Education	\$11,946	\$9,876	\$11,001	\$9,669	\$11,279	\$9,204	\$7,931	\$7,210	\$8,390	\$9,005
	0.051	0.073	0.058	0.075	0.075	0.047	0.068	0.079	0.086	0.099
	1.00	1.03	0.99	1.02	1.21	0.74	0.79	0.80	0.99	1.22

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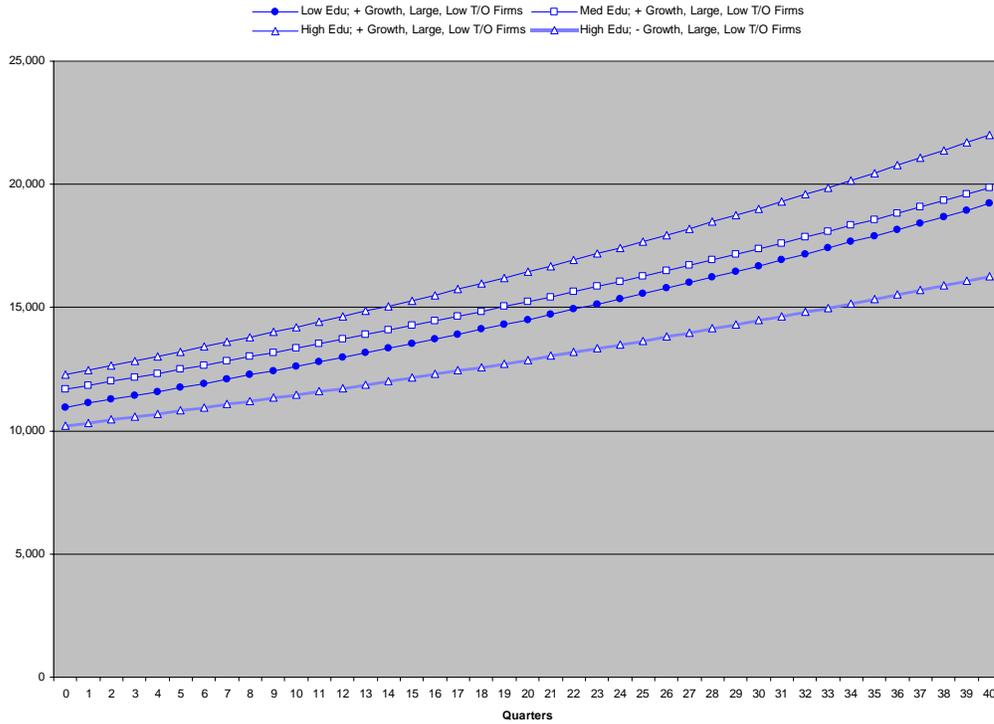
· mean initial earnings

· net annualized earnings growth rate across the simulated career path

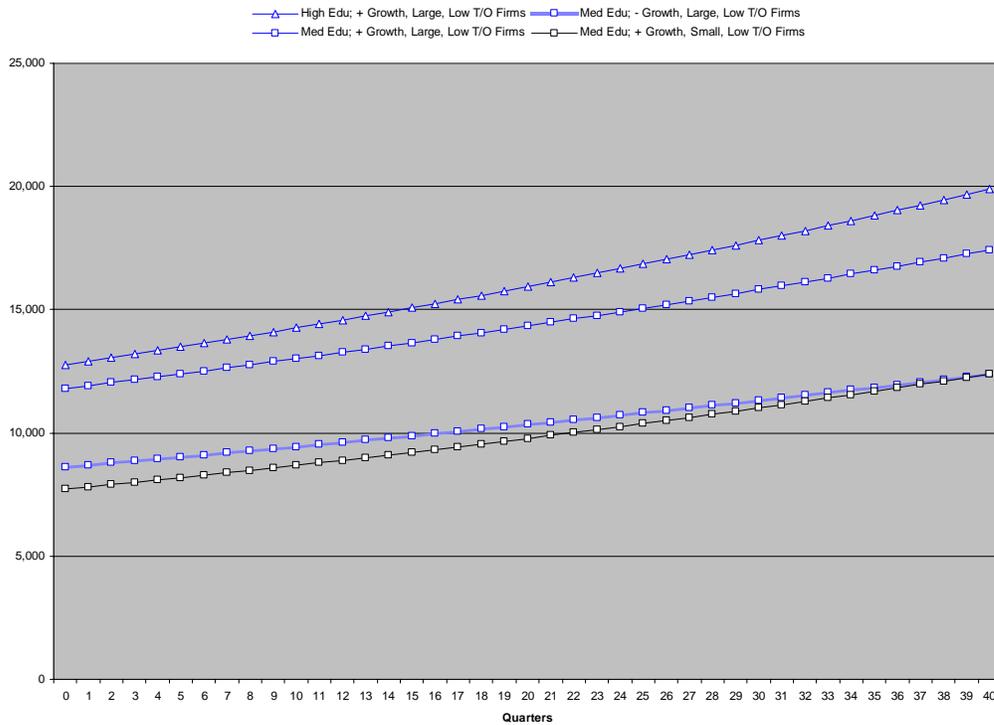
· simulated final earnings level as a percentage of the final earnings of the corresponding, highest-education male worker shown in a growing, large, low-turnover firm

Benchmark levels of final earnings are: FS \$63,377; RF \$32,556; SC \$37,699; SW \$53,082; TR \$19,901.

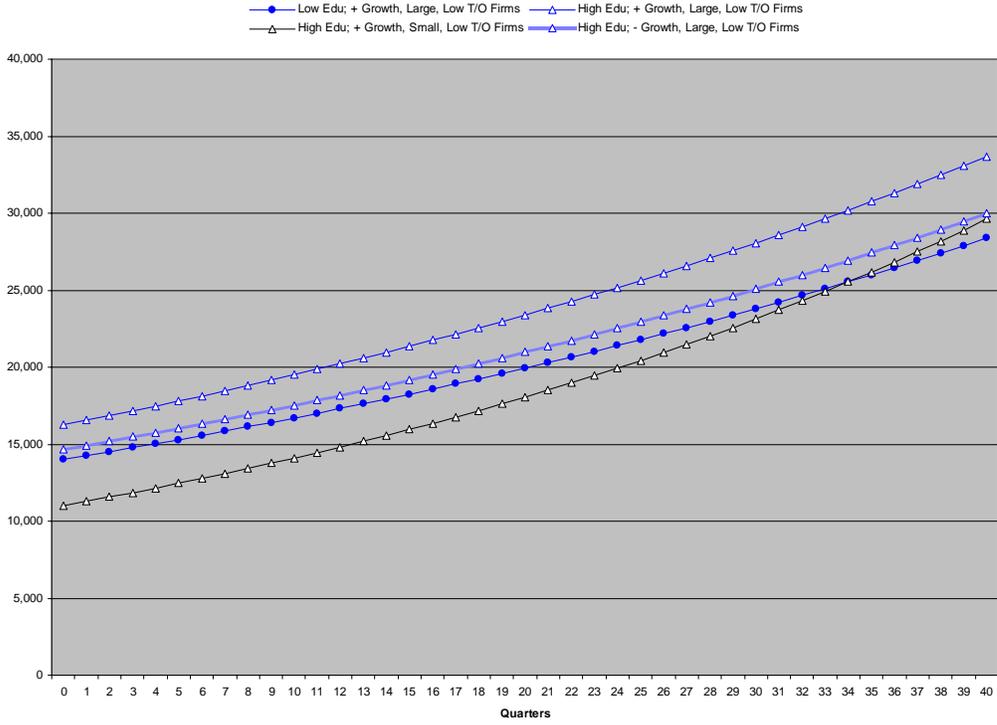
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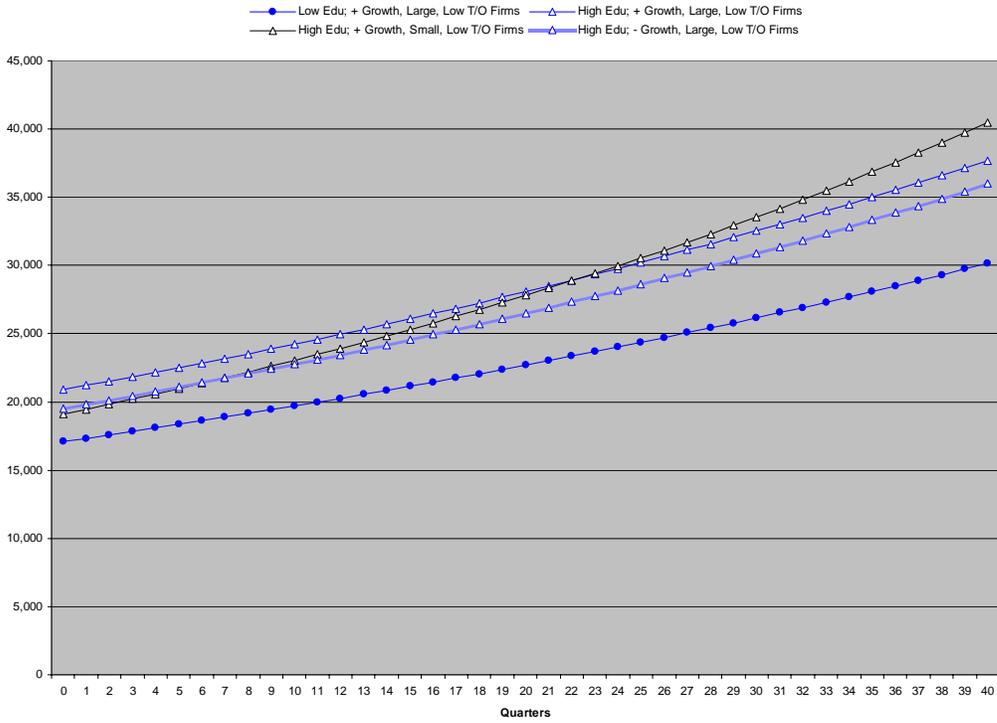
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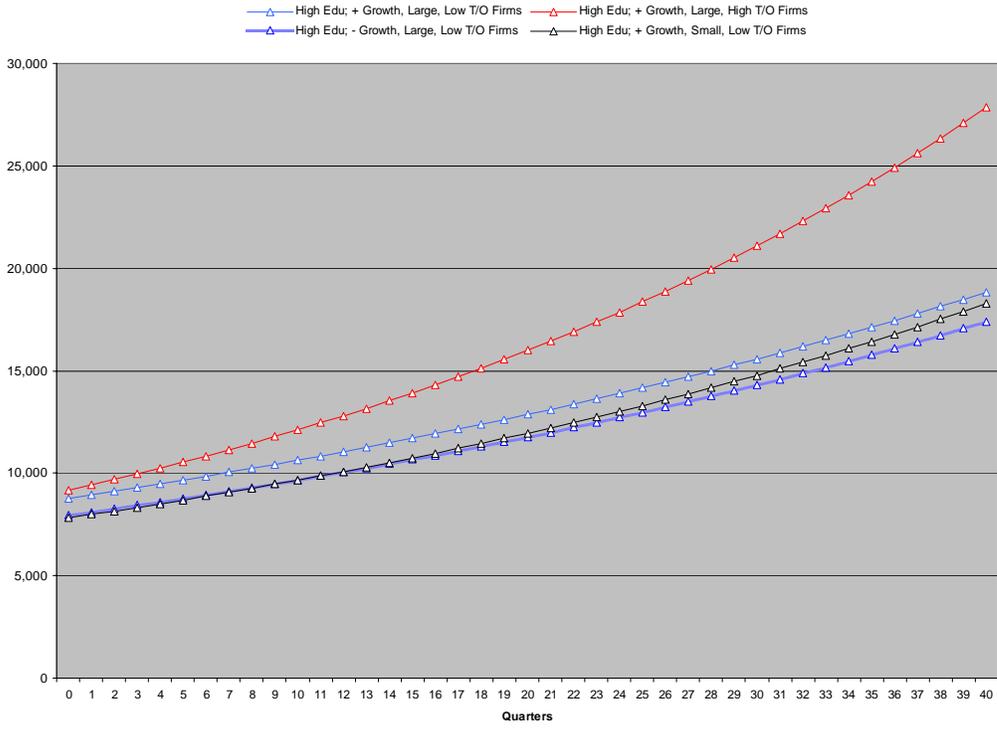
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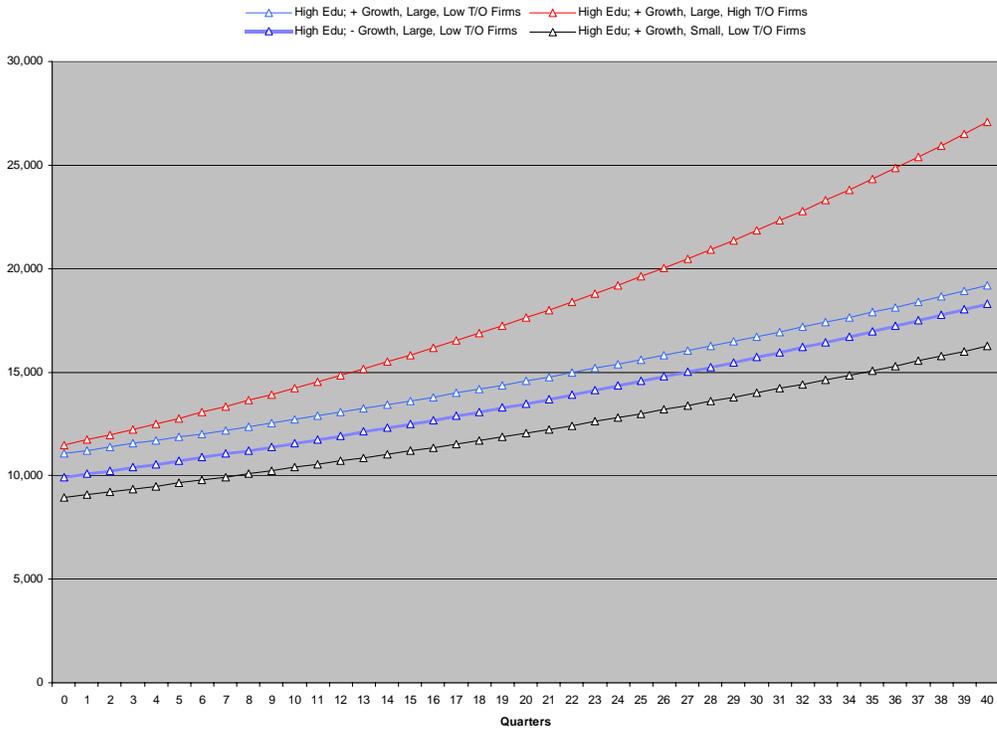
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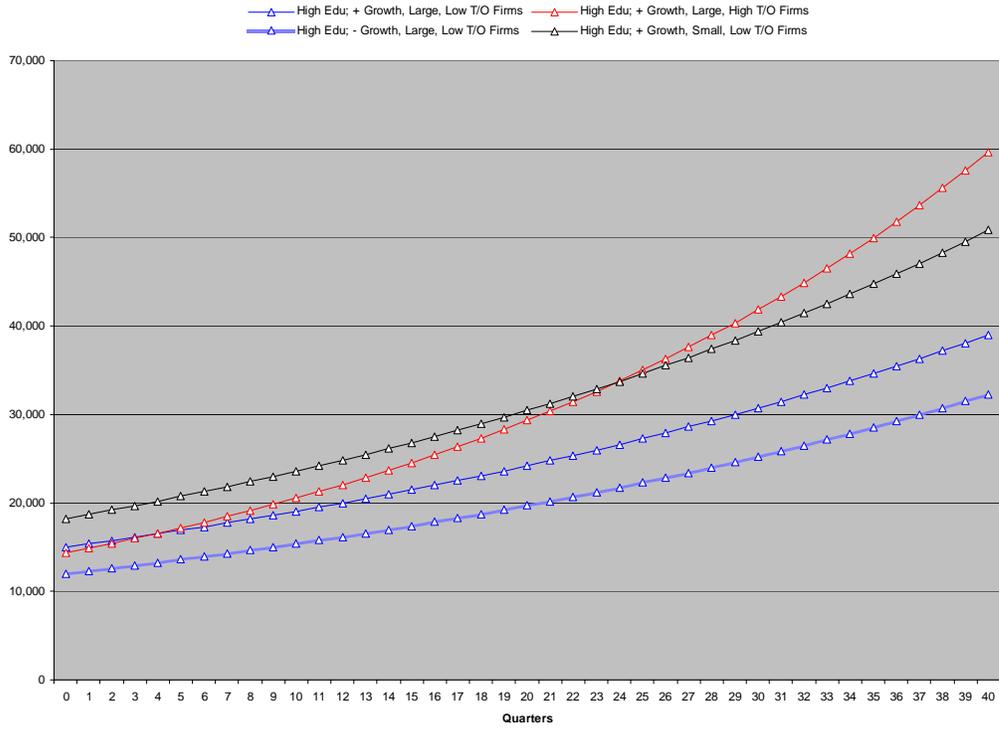
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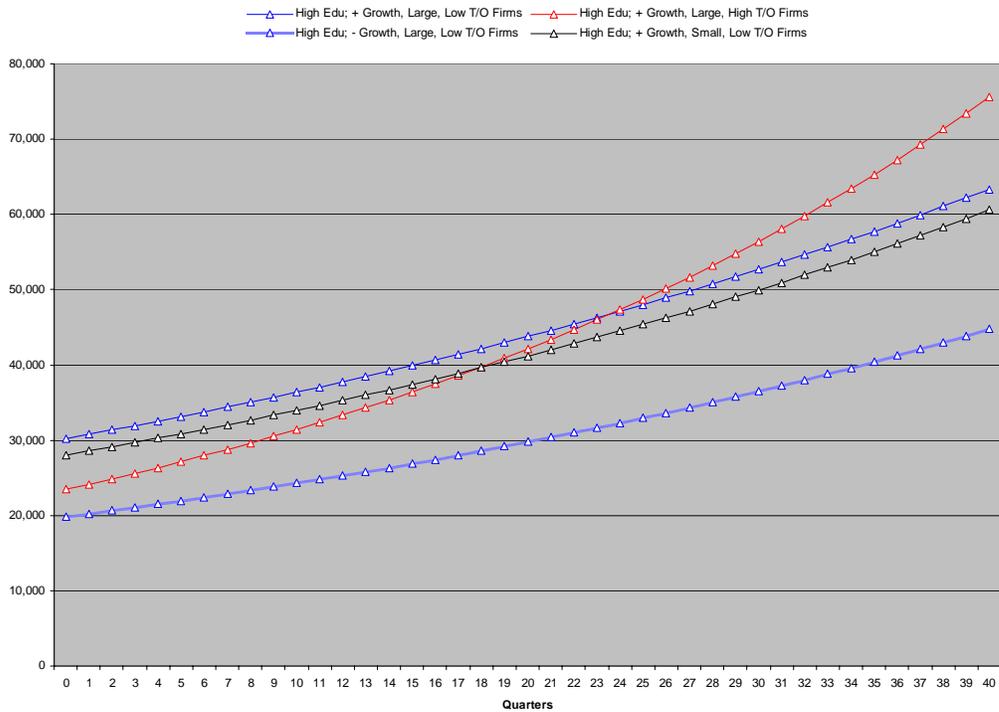
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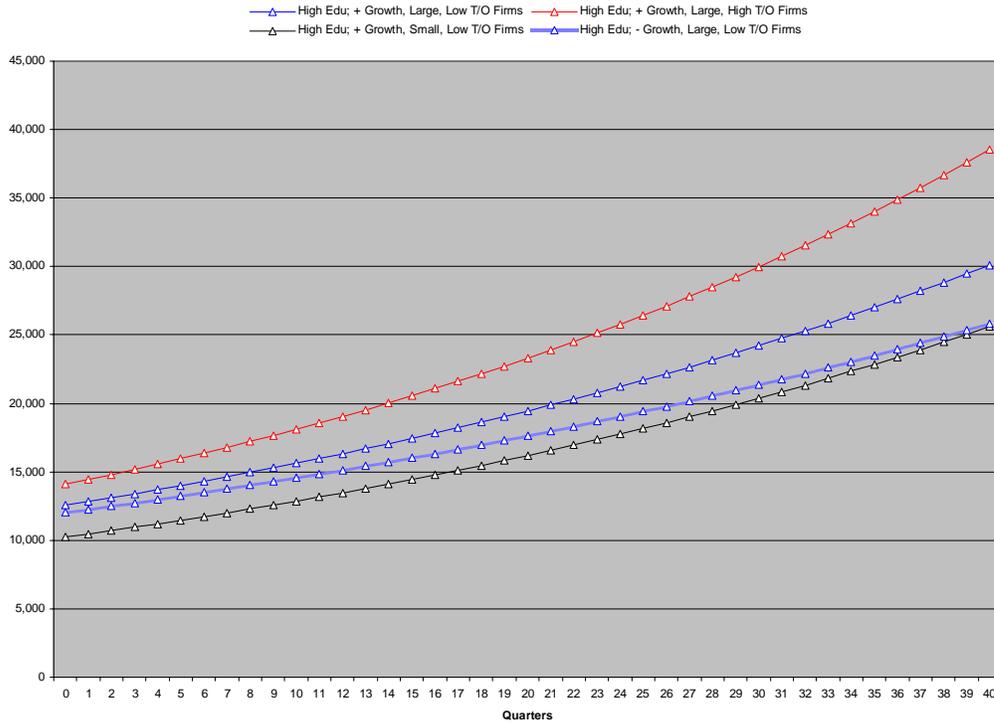
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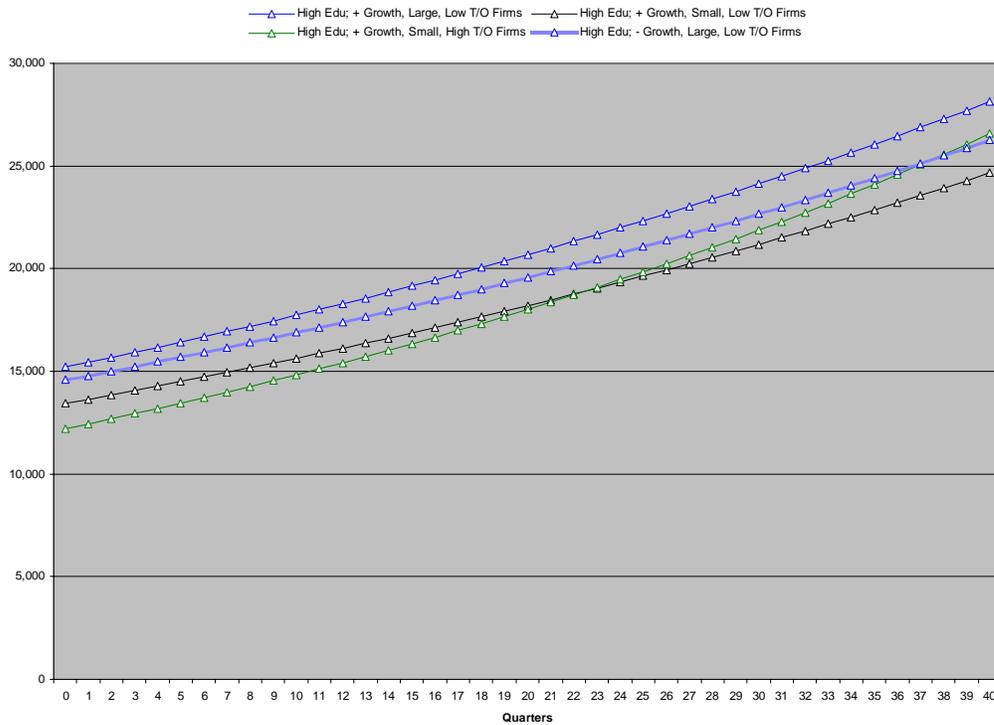
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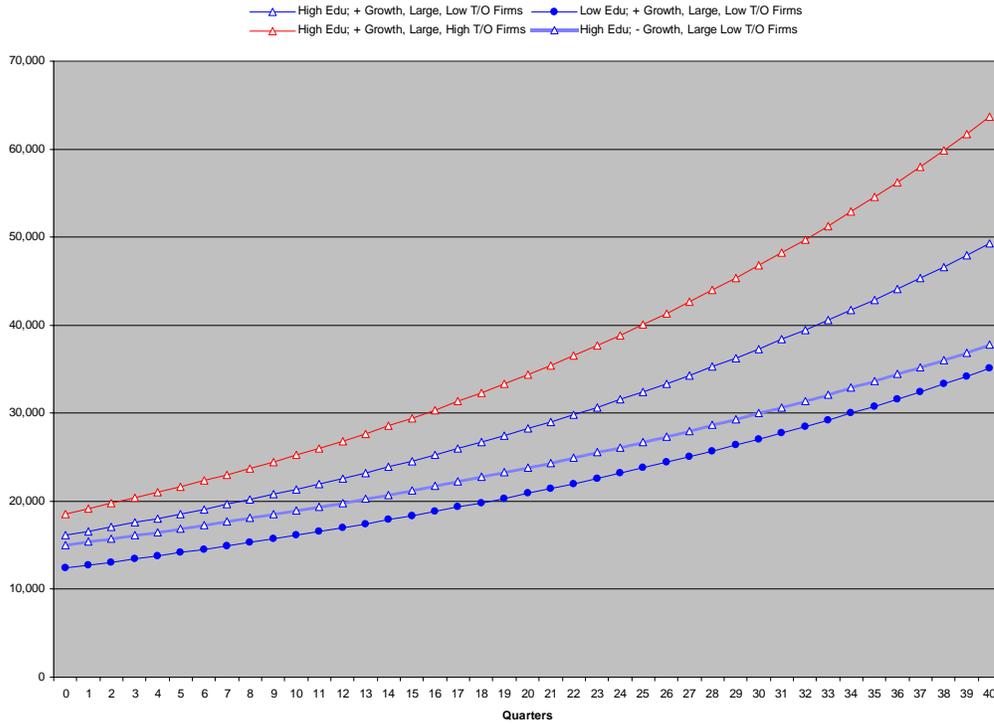
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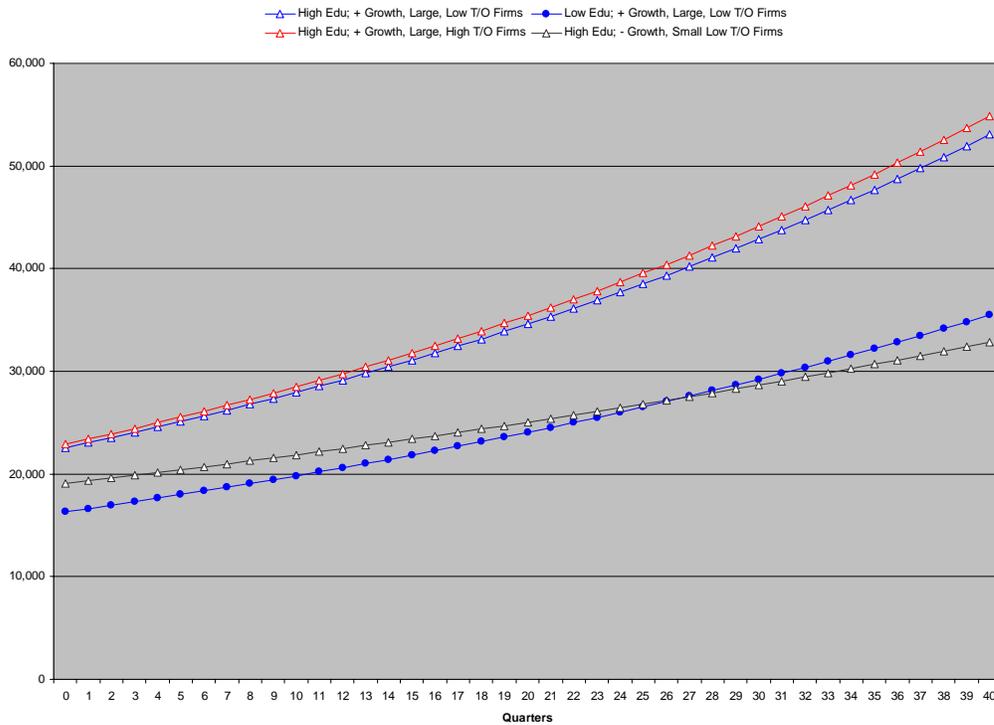
Mature Prime-Age Females, Software



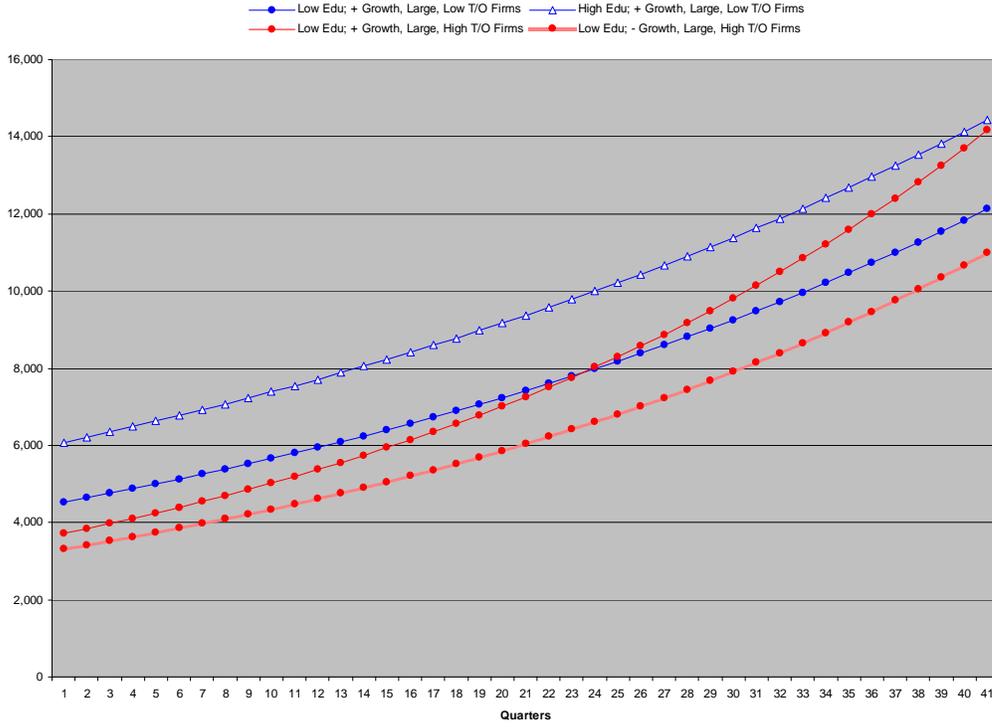
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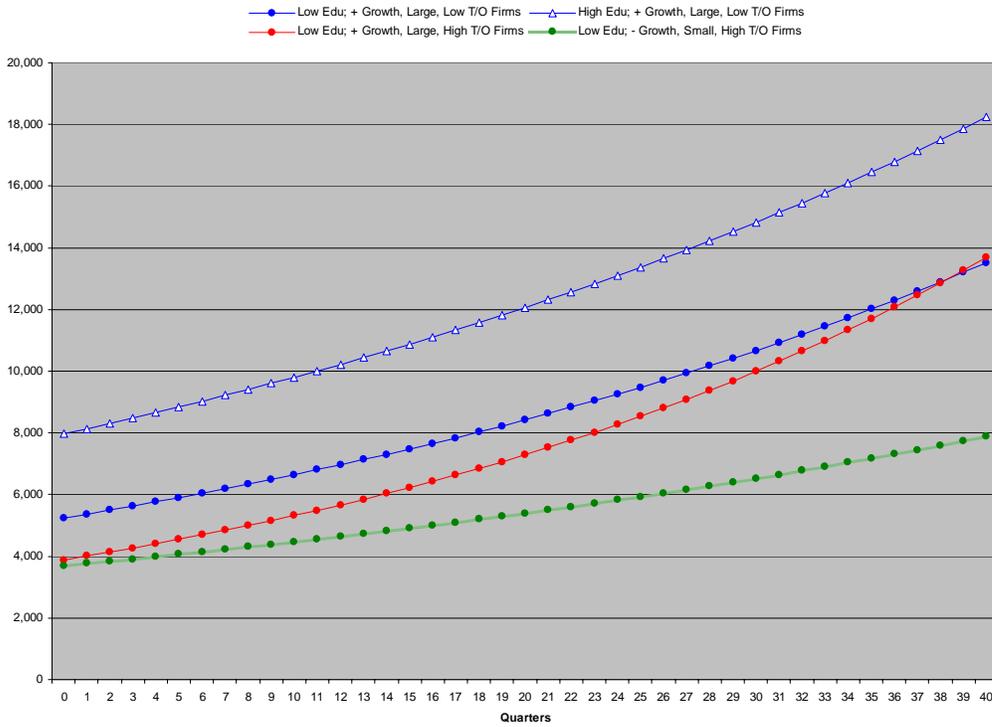
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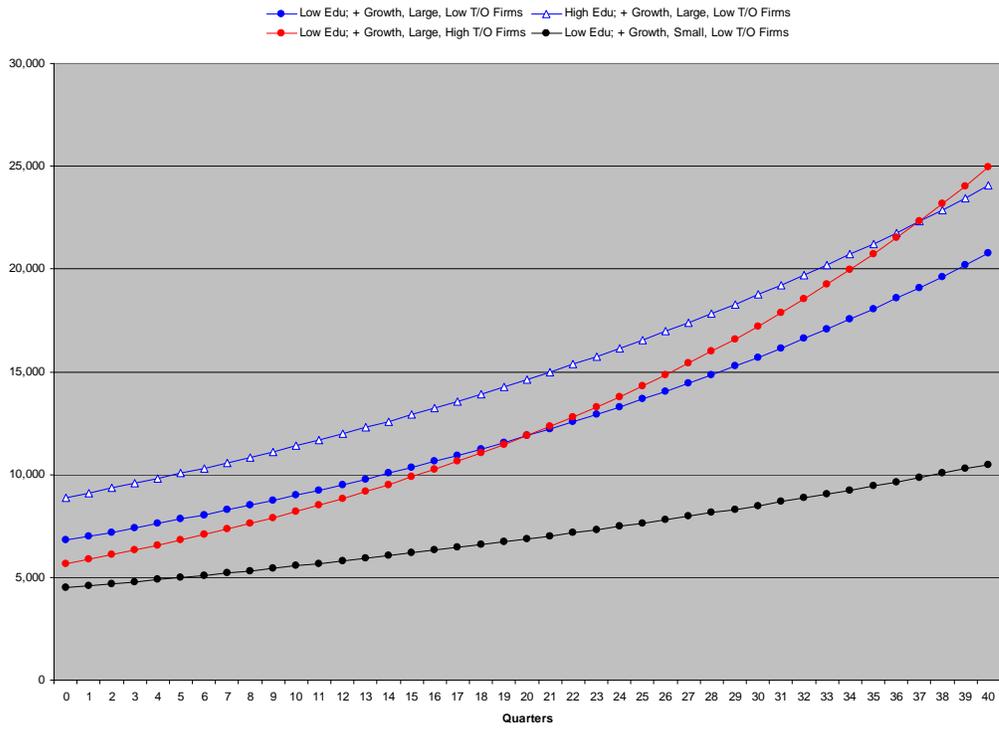
Young Prime-Age Females, Retail Food



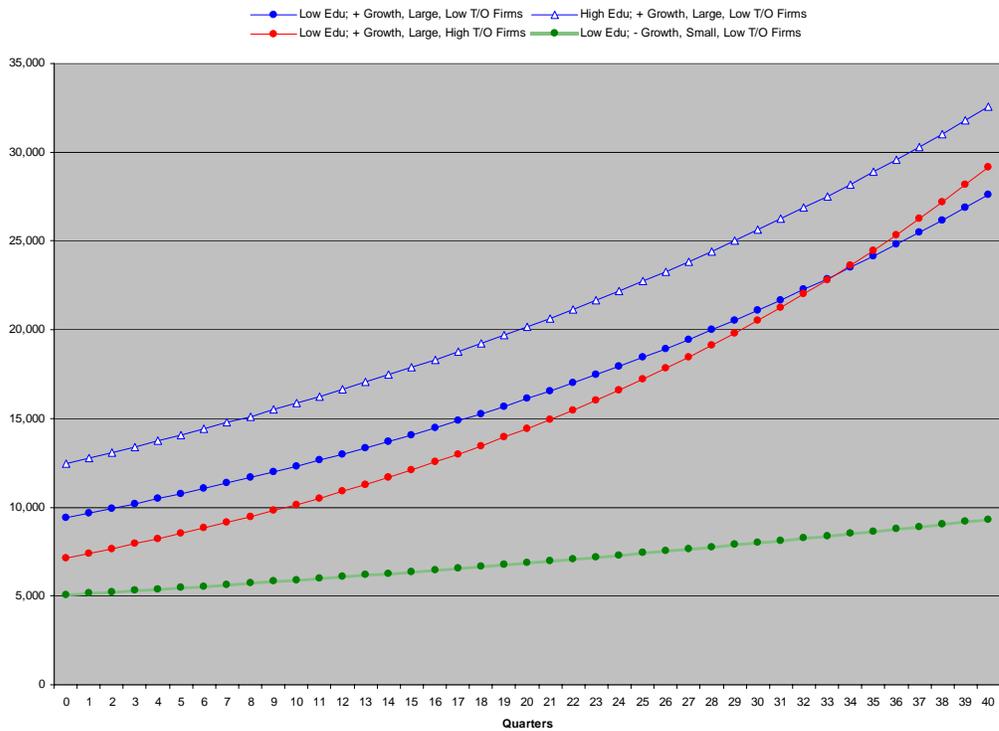
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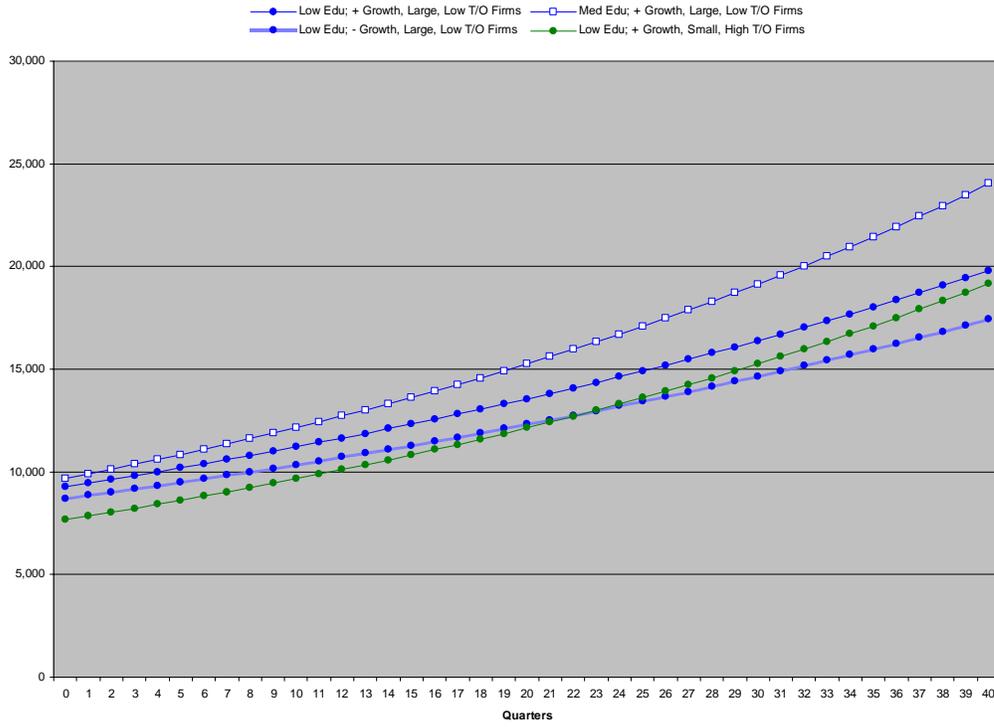
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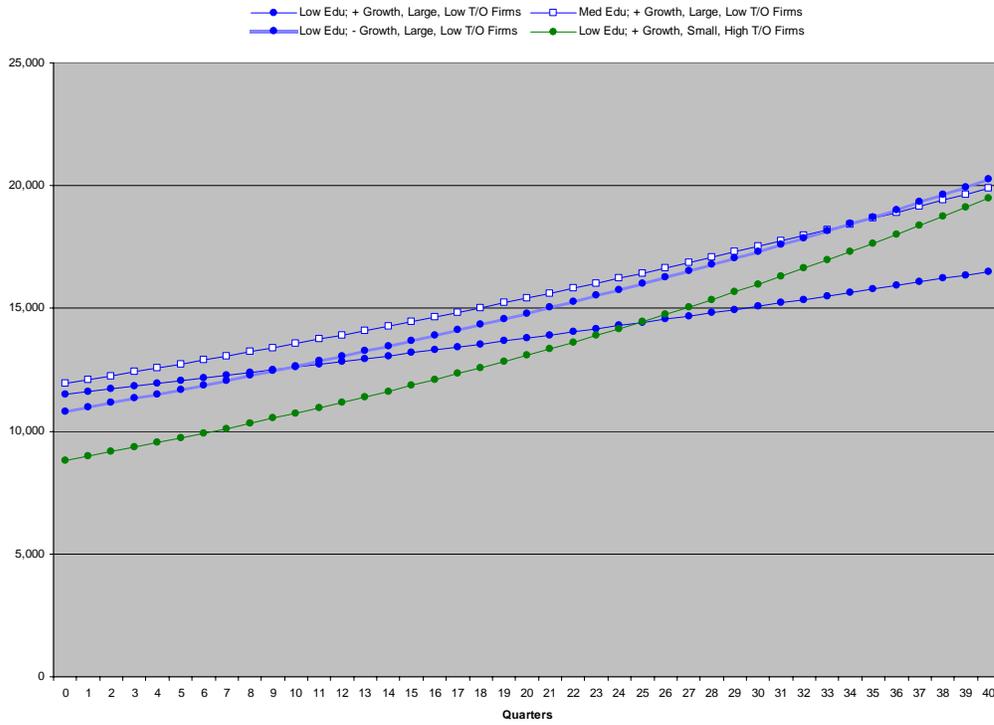
Mature Prime-Age Males, Retail Food



Young Prime-Age Males, Trucking



Mature Prime-Age Males, Trucking



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Appendix. Job Ladder Simulations

The job ladder simulations are based primarily upon the results of within-job earnings growth regressions for each industry, hereafter referred to as the WJWG regressions. These regressions provide estimates for earnings growth by different job types (defined by duration, employer, and employee characteristics.)

WJWG Regressions

The data for the WJWG 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.¹⁷ 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:
 - Mean employer size over the job spell (>50 and ≤ 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 industry. In each sample, we regress the within-job earnings growth measure on the worker characteristics such as gender, censoring, age, education, and job tenure on by employer characteristics for each industry.

¹⁷ We use the deviation about the national mean to control for a calendar effect on earnings.

Regressions of within job wage growth for the jobs (*in*) within each of the five Sloan industries subdivided by firm characteristics (size, turnover, employment growth), estimated over employee characteristics (sex, age, education) and tenure of job (with controls for right- and left-handed censoring):

$$Wjwg_{in} = sex_i + age_i + education_i + tenure_{in} + censor_{in} + e_{in}$$

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 (by industry and firm characteristics), using the same variables as in the WJWG regression (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 that contain 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 because of confidentiality reasons unless otherwise specified.