



# ECONOMIC TURBULENCE

IS A VOLATILE ECONOMY  
GOOD FOR AMERICA?



CLAIR BROWN • JOHN HALTIWANGER • JULIA LANE

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CLAIR BROWN,  
JOHN HALTIWANGER,  
AND JULIA LANE

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TO

RALPH GOMORY

NANCY GORDON

AND

FREDERICK “KNICK” KNICKERBOCKER

WHOSE COMMITMENT TO, AND UNDERSTANDING OF,  
THE IMPORTANCE OF THE LEHD AND SLOAN INDUSTRY  
CENTERS PROGRAMS MADE THIS BOOK POSSIBLE.



# Contents

Acknowledgments ix

CHAPTER 1. Overview of the Book i

CHAPTER 2. Economic Turbulence: What, Who, and How Much? 10

CHAPTER 3. The Industries 23

CHAPTER 4. Firms, Their Workers, and Their Survival 39

CHAPTER 5. Firm Turbulence and Job Ladders 60

CHAPTER 6. Turbulence and Worker Career Paths 79

CHAPTER 7. Economic Turbulence and Middle-Income Jobs 100

CHAPTER 8. Conclusions and Implications for Policy 119

APPENDIX A. The Data 129

APPENDIX B. Chapter 4 Background 143

APPENDIX C. Chapters 5 and 6 Background 149

APPENDIX D. Chapter 7 Background 155

Notes 161

Bibliography 177

Index 191





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## Overview of the Book

It's better to be a dog in a peaceful time than be a man in a chaotic period.—Chinese proverb

**T**he U.S. economy is both celebrated and reviled for its dynamism. New jobs are constantly created, new firms replace old, and the American economic model is the one adopted around the world. Yet its unceasing and turbulent change creates enormous angst about the loss of jobs, the loss of earnings, and the loss of competitiveness of American firms. At the same time that employment is at an all-time high, CNN reporter Lou Dobbs captures the national angst in his book, *Exporting America*.

What is the overall impact of this change on jobs, workers, and firms? Every week, in every part of the economy and in every corner of the country, some firms shut down and others start up, some jobs are created and others are destroyed, some workers are hired and others quit or are laid off. Giant Food, a fixture in the Washington, D.C., economy, is one example. It shut down its Maryland headquarters in May 2005 and laid off five hundred workers. The local news was full of stories about the demise of good middle-class jobs and how the local community would be hurt.<sup>1</sup> But almost unnoticed in the very same week was a small report that MOM (My Organic Market) was creating fifty new jobs by opening a new store in western Maryland.<sup>2</sup> Of course, the nature of the news industry is to report on visible and traumatic events, which tend to be job losses, worker layoffs, and plant closings. Yet maybe small startups like MOM will turn into many more jobs, although added slowly and over time. And maybe workers laid off at Giant will end up with better jobs. It's also possible that MOM will

fail and that workers at Giant will never land the kind of jobs that they had before.

Finding out what happens to jobs, workers, and firms—like Giant workers and workers at MOM’s new store—is what this book is about. While stories point out the successes and traumas for individual businesses and in individual lives, decisions need to be based on facts. This book does just that. It uses new information to go beyond anecdotes and establish some facts about economic turbulence and its impact on things that people, and their politicians, worry about: firm survival, worker job ladders and career paths, and the future of middle-class incomes.

The book focuses on five industries that are familiar to all Americans: semiconductors, software, financial services, retail food, and trucking. These industries have been affected by the same sets of forces that have affected all industries in the economy, but to different degrees. The semiconductor industry has experienced rapid technological change combined with restructuring caused by the rise of foundries and startup fabless companies—semiconductor companies that outsource the actual manufacturing—combined with the proliferation of product markets. In software, small startup firms also have played a critical role in the explosion of new products and applications, and these startups are closely linked to dominant firms like Microsoft. In financial services, the range of changes has also been staggering. Regulatory restructuring increased competition both within and between sub-industries and led to industry consolidation during a period of massive technological change, including the introduction of the ATM, widespread use of call centers, and the introduction of online services. In food stores, changes in market structure have been enormous, with power retailers like Wal-Mart playing an increasingly large role. In trucking, deregulation has led to tremendous heterogeneity across firms as they pursue different business strategies and seek to serve different segments of the for-hire transportation market.

The five industries studied here include a wide range of different human resource practices. High-tech, high-skill industries such as semiconductors and software should have more skill development with lower turnover and higher wages than a low-skill service industry such as food stores and a low-skill infrastructure industry such as trucking, which differs again from a high-skill infrastructure service industry such as financial services.

The analysis in this book combines facts gleaned from studying millions of data points on millions of firms and workers, as well as from interviews with firms in each industry to answer some key questions.

1. How much turbulence is there and why does it happen?
2. What is the impact of economic turbulence on:
  - a. *Firm performance and survival*: What is the relationship between work-force quality, turnover, and firm survival?
  - b. *Firm job ladders*: What has happened to jobs within a firm? Is it still possible to land a good job that pays good initial earnings with good raises? What kinds of firms offer the best job ladders?
  - c. *Worker career paths*: What impact has economic turbulence had on workers' lifetime earnings and employment? How much impact does job loss have on a worker's earnings?
  - d. *Wage distribution*: What has happened to middle-, low-, and high-income jobs? Are there still "good" jobs? Do new firms pay more or less than the firms that fail?

The next sections provide a brief preview of the answers to these questions, which are discussed in much more detail in later chapters.

## **What Is Turbulence, Why Does It Happen, and What Is the Impact?**

Turbulence is the entire process of economic change: worker reallocation as workers change jobs and job reallocation from firms contracting and shutting down, to firms expanding and starting up. Chapter 2 spells this out in more detail, but the sheer amount of turbulence is staggering. In any given quarter, about one in *four* job matches either begins or ends, one in *thirteen* jobs is created or destroyed, and one in *twenty* establishments closes or is born. Why does it happen? Some turbulence reflects the natural selection processes, and some reflects the fundamental changes in the economy, like globalization, technological change, and deregulation.

### *Dynamic Selection of Workers*

The refrain to a well-known song begins "Take this job and shove it," and one of the most famous lines in television is "You're fired." Put more prosaically, turbulence can be caused by a shuffling of workers across jobs. Firms will hire workers, and workers will accept jobs, but then one or both sides will decide that the job match isn't right. The worker then leaves and is replaced by someone else. In a lot of low-wage industries, like the retail



food industry, this *worker reallocation* is quite high because the skills required are easily learned and it is easy to replace workers once they leave. In a lot of high-wage industries, like the semiconductor industry, worker reallocation is lower because the costs of replacement are high.

Wal-Mart has made headlines both because of its low prices and because of its low wages. Other firms, like Costco, have workers lining up to work for them. Different firms, even within the same industry, can have different levels of worker turnover simply because firms choose different personnel strategies. This means that different firms have different levels of wages and different amounts of worker turnover. An article in the *Seattle Times* pointed out the differences between Costco and Wal-Mart:

A cashier at Costco can make more than \$40,000 annually within four years. The average store manager makes \$107,000, with a crack at \$40,000 in performance bonuses on top. The company also pays hourly workers annual bonuses from \$4,000 to \$7,000. No wonder they stick around: Turnover at Costco is less than a third the industry average.<sup>3</sup>

Costco follows a high-wage, low-turnover strategy, while Sam's Club, owned by Wal-Mart, has substantially higher turnover and lower wages. The net impact on overall economic turbulence can be substantial: Costco has become one of the ten largest retailers worldwide<sup>4</sup> and has outstripped Sam's Club in terms of employment, which has had the result of lowering worker turnover in the industry.

### *Dynamic Selection of Firms*

PanAm, Montgomery Ward, Bethlehem Steel. There is a long list of firms that have gone out of business in recent years, with an equally long list of new ones. Turbulence can result from new, more productive firms replacing old, less productive ones, even within the same industry. This process, which Joseph Schumpeter called "creative destruction," means that *jobs get re-allocated* from one set of firms to another, and accounts for a large fraction of aggregate (industry) productivity growth. In a vivid example of this, some call centers can be closed by firms like Capital One and JPMorgan Chase in the very same city—Tampa Bay—at the very same time that firms like HSBC are opening them.<sup>5</sup>

This turbulent selection process means that economic growth in the U.S. is unsteady and complex. There is much trial and error in companies

searching for the “right” way of doing business—the right technology, the right market niche, and the right workforce. As a result, most turbulence occurs within industries: even though more than one in ten jobs are created and destroyed every year in the U.S. economy, only about 10 percent result in employment growing or shrinking across industries.

However, there are big differences across industries. In the software industry, for example, businesses enter and exit quite quickly, but entry and exit rates are much lower in the semiconductor industry.

### *External Shocks*

CNN reporter Lou Dobbs’s book *Exporting America* (2004) paints a vivid picture of the third reason for economic turbulence: there are fundamental changes in the way in which goods and services are produced. He focuses on globalization, but others have lamented the impact of technological change and deregulation. Changes like these are much harder to measure in a systematic way, which is why our book focuses on an industry-by-industry analysis. As will become clear in chapter 3, globalization is a driving force in the software, semiconductor, and financial services industries with the relocation abroad of some design, manufacturing, and back office activities; technological change has been important in financial services industry, retail food, and semiconductors as is clear from the advent of ATM machines, scanning technology, and smaller, faster chips. And deregulation has had a major impact in the trucking and financial services industries.

A good way to understand how dramatic economic changes like these affect how business is done is to go and directly talk to firms in the industry. That is precisely what the researchers who contributed to this book did. They talked to dozens of firms in each industry using case study techniques that permitted them to describe very specifically the nature and type of external shocks in each industry.

The combination of this approach and the direct measurement of job and worker reallocation and firm entry and exit can lead to a very different view of the world than one gets by reading the newspaper. To take one example, Austin, Texas, has been featured as an example of the negative impact of globalization because semiconductor employment in that city dropped in four years by about sixteen thousand workers, and one-half of its major semiconductor factories closed.<sup>6</sup> However, the facts do not show that Austin’s experience is representative of the industry. The data show

that the number of jobs in the semiconductor industry has actually increased, and case study evidence suggests that Austin's job loss was other cities' job gain because the structure of the industry changed substantially.

### *The Impact*

Some things are known about the impact of economic turbulence, but much is not. To start with, not much is known about the relationship between economic turbulence and economic growth. Is the shuffling of jobs across firms and workers across jobs efficient? Does it contribute to economic growth? Chapter 4 begins to answer this question by showing the relationship between the reallocation of workers with varying levels of skill to different types of firms and workers' earnings and firms' performance.

Not much is known about the relationship between economic turbulence and either the job ladders provided by firms or the career paths of workers. Chapter 5 examines the impact of economic turbulence on job ladders by examining the impact of working for high-turnover and low-turnover firms, or for expanding and shrinking firms, on workers' earnings and earnings growth. Chapter 6 looks at how much job change there is in different industries and examines the impact of job change on worker *career paths*.

Finally, not much is known about the impact of economic turbulence on the earnings distribution, particularly what has happened to *low-income, middle-income, and high-income jobs*. A popular concern is that "good" jobs have been lost because the old high-paying firms have been replaced by new firms that pay much less. Chapter 7 examines the evidence on this.

### *A Preview of the Rest of the Book*

Chapter 2 provides an overview of the amount of economic turbulence in the economy,) and chapter 3 surveys the economic change sweeping the five industries. Chapters 4 through 7 are analytical; they discuss the impact of economic turbulence on firms, on firm job ladders, on worker career paths, and on the earnings distribution, respectively. Chapter 8 gives an idea of how the information in the book, and the sources that are used here, can be used in policy analysis. The data appendices provide the background material, including information about the new and rich databases linking outcomes for firms and workers, that underlies the analysis and discussion in this book.

THE IMPACT OF ECONOMIC TURBULENCE ON FIRMS. Firms' survival depends on how they organize themselves. Firms behave differently, and these differences matter for their performance and survival. Different firms organize themselves differently, have different levels of workforce quality and workforce turnover, and these differences have significant effects on *firm performance*. High-productivity businesses have a large share of high-skill workers, with either general skills or experience, and also have low turnover, or churning, of workers. All of these factors independently affect firm survival—businesses with high productivity, low churning, and high skill (especially general skills) are more likely to survive. There are substantial differences across industries—one size does not fit all. For example, low worker turnover is especially important in the semiconductor industry, and having a highly skilled workforce is especially important in the trucking industry. New businesses have a disproportionately important impact in changing production methods, which deserves an important role in the study of entrepreneurship.

There is no “one size fits all” lesson even within an industry, and firms need to be examined within the context of their industry. For example, the popular press makes much of the importance of “small business.” Yet small businesses are very different things across industries, and their importance has changed. In the semiconductor industry, for example, industry restructuring has meant that the industry has moved more to fabless semiconductor establishments. These fabless design firms, which are small, highly skill intensive, and volatile, are changing the dynamics of firm performance in that industry. Similarly, in the retail food and trucking industries, large, national chains operate very differently from small, local entities. And large software producers, like Microsoft, are different from small, agile software producers that typically target small market niches.

THE IMPACT OF ECONOMIC TURBULENCE ON JOB LADDERS. Economic turbulence, as measured by firm growth, substantially affects the number and type of jobs offered by firms. The data confirm what one would expect: across industries, large, growing firms provide some of the best job ladders (initial earnings and earnings growth), and small shrinking firms tend to provide the worst job ladders (and few in number). In general, firms with growing employment offer better jobs than shrinking firms, except in trucking, where large, shrinking firms, often unionized, offer some of 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 excel-

lent job ladders in semiconductors, financial services, and trucking indicates that these firms may be a growing source of good job ladders over time.

Economic turbulence often results in low initial earnings but higher than average wage growth at a firm, particularly in semiconductors and financial services. The combination of high turnover with high wage growth for workers that stay suggests that firms are sorting workers and workers are deciding whether to stay, within an “up or out” wage-setting system. Another way of thinking of this is that the job market within a firm is like a tournament: workers compete for “good jobs,” and those who are selected do well, and those who don’t move on to another job.

**ECONOMIC TURBULENCE AND CAREER PATHS.** The data show that there are three common career paths (individual earnings trajectories over time) that are observed in each industry. The data are consistent with the popular opinion that loyalists experience better career paths than job changers for all education groups of prime-aged (twenty-five- to fifty-four-year-old) men and women. However, the data also show that, over time, most workers who stay in the labor market are able to improve their career paths through changing jobs until they finally find a relatively good job ladder in a firm, despite not being able to catch up to the loyalists.

Career paths are very different across industries. Just as firm performance varies across industries, career paths for each education-gender group vary greatly across the five industries, with retail food at the bottom and software and semiconductors at the top. In general, workers improved their career paths by *moving into* the software, semiconductor, financial services, and trucking industries, and *by moving out of* retail food. Several underlying economic forces might explain these different outcomes in career paths. One force is individually based: loyalists in good jobs may have superior knowledge or other unobserved characteristics that make them more valuable to their employer than the job changers, who may need to increase their skills through experience before landing a better job. Another force is firm based: firms with good job ladders may operate in non-clearing or rationed labor markets with a wage premium—that is, with a wage higher than the market average, and have a queue of fairly homogeneous and qualified workers waiting for job openings. A third force is market based: firms and workers must learn which workers are good matches for which jobs; in effect, workers must change jobs in order to find a “good match.” Most likely it is a combination of these factors.

Many workers continually improve their career paths by finding better job opportunities with other firms, although the typical spell between jobs can be as long as twelve to eighteen months. Although the recent economic downturn has highlighted the costs associated with lost jobs, the long-run evidence is that the consequences of such losses, while important for some workers, are not substantial for most.

**ECONOMIC TURBULENCE AND JOB QUALITY.** The popular perception that jobs are vanishing is not correct. There are more jobs in each of the five industries than at the start of the period—and this is not an increase in “bad” jobs. The proportion of low-income workers declined in all five industries. The decline is larger in semiconductors, software, and financial services and smaller in retail food and trucking.

The proportion of high-income jobs increased substantially in high-skilled industries, contrary to fears about the impact of globalization on high-skilled workers. The percentage of high-income workers increased substantially in software, financial services, and especially semiconductors. However, in the retail food and trucking industries, there are *fewer* high-income workers at the end of the period.

A rising tide has lifted all boats in the high-skilled, high-tech industries. Workers in financial services, semiconductors, and software have seen increases in earnings across the board. By contrast, the retail food and trucking industries have experienced an increase in the middle group with fewer workers in the top and bottom groups.

In sum, although turbulence is very often equated with negative factors, this is only half the story. People see workers getting fired, and jobs being lost as firms shut down because that makes news. The other side of the story, workers getting hired and firms starting up and expanding, is not as visible. This book has been written because new data now exist that can measure many dimensions of turbulence: the reallocation of jobs and workers into as well as out of jobs; the entry and expansion as well as the contraction and exit of businesses. The following chapters explain the basic results in much more detail.

# Economic Turbulence: What, Who, and How Much?

## Introduction

The facts are breathtaking. In any given quarter, about one in *twenty* establishments opens or goes out of business, and one in *thirteen* jobs begins or ends. And these changes have enormous impact on people's lives. One example is Mark McClellan, who had worked at a Kaiser Aluminum plant in Spokane, Washington, all his life but was out of a job in 2001, when the plant closed. As the *New York Times* reported:

He still lives in a grand house in one of the nicest parts of town, and he drives a big white Jeep. But they are a facade. "I may look middle class," said Mr. McClellan, who is 45, with a square, honest face and a barrel chest. "But I'm not. My boat is sinking fast."<sup>1</sup>

Newspapers and policy briefs are full of anecdotes like these about job loss. But there are other types of job loss as well. In the summer of 2004, the daughter of one of the authors—a seventeen-year-old high school senior—worked at an ice cream parlor at minimum wage. It was a lousy job by any standards: her hours and work schedule changed every week, she could be called in, or told not to come in, at half an hour's notice, and she took home under \$200 a week. Not surprisingly, few workers stayed with the business for long, and she was the only one who stayed the whole summer. The other workers, who were older and had more experience, were able to get better jobs elsewhere. Their job loss reflected a move up, not down, the economic ladder.

The aluminum company and ice cream parlor stories reflect very different types of turbulence, with very different impacts on workers and their jobs, but raise the same questions. What are the different types of economic turbulence, how much is there, and how are workers and firms affected?

Answering these questions is the focus of this chapter. We introduce the measures that are needed to discuss the types of economic turbulence: job creation and destruction, hires and separations, firm births and deaths. We also discuss how much economic turbulence there is, and how different it is across different industries and for workers of different ages. In other words, after reading the chapter you will have a sense of how vulnerable Mark McClellan would be if he were twenty instead of fifty. Or if instead of working for Kaiser Aluminum, he had worked in a different industry. Or if he had been laid off in a boom, instead of a recession.

In sum, this chapter lays out a set of newly available facts about turbulence. These facts will provide a baseline for the next chapters. At the end of the chapter questions will arise like:

- Why do firms shut down?
- What has happened to the job ladders provided by firms?
- What has happened to workers' career paths?
- What does turbulence mean for middle-, low-, and top-income jobs?

## **Defining and Measuring Turbulence**

There is a ritual in Washington. On the first Friday of every month, at 8:30 AM, the secretary of labor, accompanied by the commissioner of the Bureau of Labor Statistics, reports what has happened to employment in the previous month. The press then dutifully reports whether employment is up or down or has stayed the same. But these numbers, which are typically about net changes in hundreds of thousands of jobs, are just the tip of the employment iceberg, since literally millions of workers will have changed jobs over that period. Even though the numbers signal important changes in levels of economic activity, they're a little like reporting changes in the level of a lake, without information about the rivers that flow into and out of the lake. Not surprisingly, these *turnover* measures are much more dynamic and capture much more economic activity than net changes.

Statistics about net changes in employment don't tell us about how many times the boss at the ice cream store replaces his workers. Statistics



about worker turnover do. Counts of worker turnover are created by counting the flow of workers into and out of jobs at a firm as they get hired and as they separate (either because they are laid off or because they quit). The *worker turnover rate* is the average of the hiring rate (the number of workers who are new to the firm in a given quarter or year divided by employment) and the separation rate (the number of workers who left the firm in the previous quarter or year divided by employment).<sup>2</sup>

Statistics about net changes in employment also don't capture how many jobs were lost at shrinking or closing plants like Kaiser Aluminum and how many were created by expanding or new firms. The *job turnover rates* used in this book capture the total job destruction (or job creation) from firms shrinking or shutting down (or expanding and starting up). Job turnover counts are measured by counting the flow of jobs to and from different firms as some firms expand and exit and others contract and enter. The *job turnover rate* used for illustrative purposes in this chapter is the average of the job creation rate (the number of jobs added at all expanding firms divided by employment) and the job destruction rate (the number of jobs lost at all contracting firms divided by employment).

What is the difference between job turnover and worker turnover? Simply put, job turnover reflects the shift of jobs across companies, worker turnover the shift of workers across jobs. The worker turnover rate includes both the loss of jobs at Kaiser Aluminum and the replacement of workers at the ice cream store. If employment at the ice cream store didn't change, there would be no job turnover, even though there was worker turnover. So worker turnover represents the ebb and flow of workers and can reflect a worker's life cycle decisions as well as the matching of workers and jobs. *Job turnover*—exemplified by the closing of Kaiser Aluminum—reflects something very different. It represents a shift in demand away from some firms and towards others.

The differences in turbulence across industries and age groups are striking, as figure 2.1 shows for the second quarter of 2003. The first point to recognize is *what a difference the measures make*. The first set of bars in the retail food graph shows that employment for all workers actually declined in that quarter. Yet the job turnover rate was about 6 percent, while quarterly worker turnover was greater than 10 percent. So even though newspapers and magazines would have trumpeted net job losses, the turnover measures show there was enormous turbulence in the flow of workers and the reallocation of jobs across firms underlying the small net decline in jobs. Workers were still getting hired, and jobs were still being created, despite

the gloomy aggregate statistics. It's worth remembering, though, that there were a lot of people laid off, just like Mark McClellan.

The second point is that the *age of a worker makes a difference*. Younger workers (aged 25–34 years old) have both more opportunities to be hired and a higher likelihood of being fired than older workers. The second set of bars for each industry shows this clearly: worker turnover for younger workers is 30 to 100 percent higher than job turnover, which can be two or three times higher than net employment growth. Older workers are subject to less economic turbulence, as the third set of bars, for 45–54 year olds, show. Turbulence is a fact of life for younger workers, like high school seniors, but much less likely to concern fifty-year-olds.

The third point is that there are large *differences across industries*. There are some differences in the net employment changes across industries: the financial services industry, for example, was growing rapidly in mid-2003, while retail trade was shrinking. But the worker and job flow differences across industries are also large. Workers in low-skill industries, such as retail food and trucking, are much more vulnerable to economic turbulence than are workers in high-skill industries, such as semiconductors and software. The importance of this for workers' career paths will become clear in later chapters.

In general, from a variety of studies using statistics on job and worker turnover, following set of facts have been established:

- Younger workers are more likely to leave or be hired than older workers. So the ice cream shop experience is typical. Not only is turbulence a fact of life for younger workers, but firms that hire younger workers should expect much more turnover. It is also likely that as America's workforce ages, national turnover rates will drop.
- Worker turnover is higher in low-skill industries (like trucking and retail food) than in high-skill industries (like semiconductors and parts of financial services). In other words, economy-wide turbulence, and job instability, can change simply because the industrial structure is changing.
- Worker turnover rates are substantially higher than job turnover rates. Even when the number of jobs in a firm has not changed, there are still job opportunities, simply because firms need to hire workers who have retired, been laid off or quit. The ice cream shop always had a "help wanted" sign in the window.
- Job turnover is higher in small and young businesses. Small firms are much more volatile in both creating and destroying jobs. Hence, industries that are dominated by such firms are more likely to be affected by economic turbulence than are industries with large, older firms.

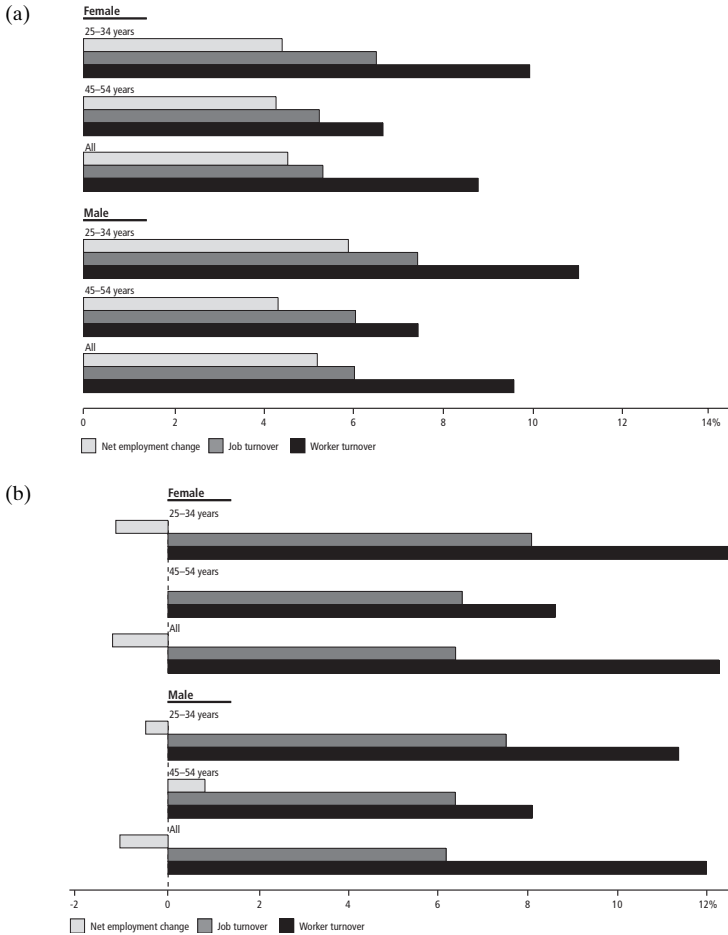
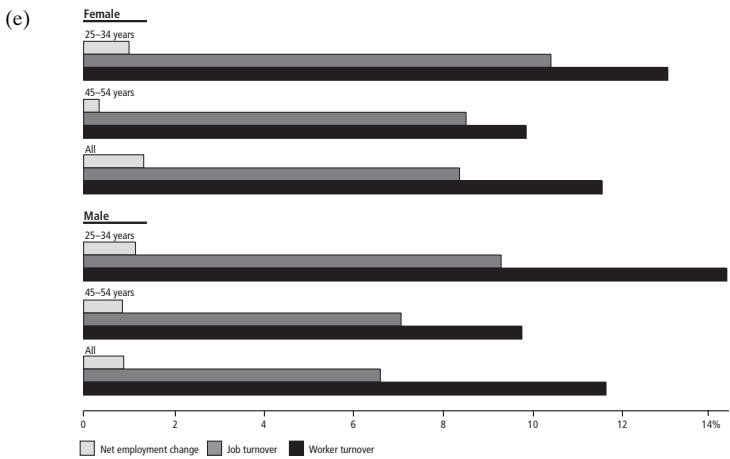
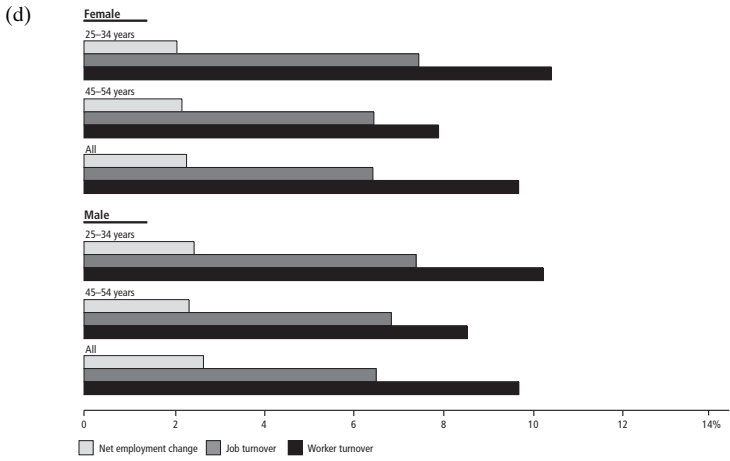
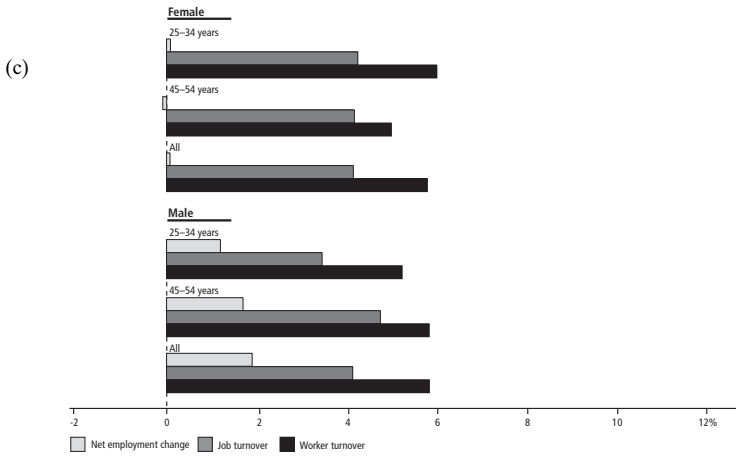


FIGURE 2.1. Net employment change, job turnover, and worker turnover. (a) Financial services. (b) Retail food. (c) Semiconductors. (d) Software. (e) Trucking.

- Most job loss is highly concentrated: more than two-thirds of all lost jobs occur at businesses that shrink more than ten percent, and more than one-fifth of workers whose jobs were destroyed worked at businesses that shut down. This explains one of the reasons for the newspaper headlines that trumpet job loss: because job loss is much more concentrated, it's also much more visible.

The overwhelming impression from these studies is not only that there are enormous rates of worker and job reallocation, but that this reallocation is



not uniform: particular industries, specific types of firms, and specific types of workers are disproportionately affected by turbulence.

### **The Birth and Death of Firms**

More than one in five jobs that are lost in the U.S. are lost because firms close their doors.<sup>3</sup> Death, like taxes, seems to be inevitable—the average life span of even highly visible, well-established firms, such as Fortune 500 companies, is less than 50 years. However, it comes at different times for firms in different industries, of different sizes, and at different parts of the economic cycle. Young firms are more vulnerable, and thus jobs at young firms are more vulnerable. For the most part, firms are relatively small at birth and then, if successful, exhibit rapid growth in the first several years after entry. Like firm deaths, the patterns of firm births are different across industries and the cycle.

There are striking *differences across industries*. The annual shutdown rate in the trucking industry rose as high as 25 percent, while in the software industry it was below 10 percent in several years (although exit rates for software firms grew rapidly in the late 1990s). The reason for such differences range from deregulation with industry restructuring to changes in domestic or foreign competition.

This brings up an important issue. Although most firms consist of one establishment, about half of workers work for multiestablishment firms with more than 500 workers (about 0.2 percent of the total number of firms). As a result, establishments can shut down either because a parent firm shuts down or because the parent firm downsizes and closes selected establishments. Similarly, new establishments can be born either because an existing firm opens new locations or a totally new firm opens. *Mergers and acquisitions* are also important ways in which firms can enter or exit an industry.<sup>4</sup>

How important are mergers and acquisitions? They represent a substantial part of industry restructuring: about 5 percent of GDP and 48 percent of nonresidential gross investment in 1995.<sup>5</sup> This is spread fairly evenly across most industries, with between 2 and 8 percent of continuing establishments belonging to a different firm over a five-year horizon.

The deregulation of the trucking industry provides a good example of how mergers and acquisitions can change the economic landscape. Federal Express developed from being just an overnight express carrier into

a general LTL (less than load) carrier and logistics provider by purchasing another, bankrupt, company named Caliber (which in turn was the heir to an original spinoff organization called Roadway Regionals, which in turn included, among others, Menlo Logistics, Viking, and Roadway Package Service [RPS]). There is no question that this wave of mergers and acquisitions was stimulated by regulatory change. Until 1994, when Congress mandated the deregulation of intrastate truck transportation, many states, especially key large states such as California, Texas, Michigan, and Pennsylvania, retained regulation for intrastate trucking and protected local cartage within those states. After 1994, new and small nonunion carriers took advantage of new opportunities and grew rapidly. In addition, individual owner-operators now could easily apply for and receive forty-eight-state authority, and today about 300,000 drivers own their own trucks. Indeed, as unionized trucking jobs disappeared, many experienced drivers bought their own trucks and attempted to compete in this market by undercutting the rates of existing carriers, and further cut-throat competition ensued. These low-cost operators showed up as an increased number of firm births, and, since they had a greater tendency to operate below cost and go under regularly, also showed up as a greater number of firm deaths. And, in this industry, employment only grew slightly (about 4 percent in more than a decade in the states for which we have data).

The impact of mergers and acquisitions is also clear in the financial services industry. To take one example: in 1998 Citicorp anticipated the Gramm-Leach-Bliley Act by merging with Travelers Group, itself the result of acquisitions and mergers of such businesses as the investment banks Salomon Inc., Smith Barney, and Drexel Burnham Lambert, the insurance company Travelers Life and Annuity, the property and casualty divisions of Aetna, and the retail brokerage and asset management operations of Shearson Lehman. By 2004, it had credit card customers in every state and its expansive branch banking network served retail customers in twenty-two states. First Union and Bank One are also excellent examples. Both of these grew spectacularly over the 1980s and 1990s, mostly as a result of acquisitions. Both overdid it. Bank One (out of Columbus, Ohio) ended up struggling and being bought by JPMorgan Chase & Co. ([http://money.cnn.com/2004/01/14/news/deals/jpmorgan\\_bankone/](http://money.cnn.com/2004/01/14/news/deals/jpmorgan_bankone/)). JPMorgan itself is an investment bank that previously bought Chase, a commercial bank, which had in turn been through a number of commercial bank mergers. First Union (out of Charlotte, North Carolina) also overshot and

floundered, particularly after its purchase of CoreStates. It merged with Wachovia (also out of North Carolina) in 2001 in what was touted as a merger of equals.

The retail food industry provides a classic example of the impact of competitive forces on both births and deaths within an industry. Wal-Mart's encroachment into food retailing has posed a significant challenge to traditional grocery firms. The National Grocers Association has found that close to 80 percent of supermarket managers identified the supercenter format used by Wal-Mart as the major threat to traditional grocery chains. Indeed, Wal-Mart has become the leading firm in the grocery industry, and it continues to garner market share as it builds new stores and expands its product selection. From a base of only ten supercenters in 1993, Wal-Mart expanded to over 1,400 supercenters by the start of 2005. Company plans indicate that it intends to open two hundred new stores every year for the next five years.

Mergers and acquisitions have also been crucially important in retail food: between 1997 and 2000, the four largest food retailers' share rose from 18 to 27 percent of total grocery store sales in the U.S. The number of mergers and acquisitions peaked in the late 1990s as some chains chose to grow through acquisitions, while others (Wal-Mart in particular) continued to open new stores. The Giant Food story, where Giant was taken over by Stop and Go while MOM expands, is part of the retail food landscape. What has been the net effect on jobs? An increase of about 7 percent in just over a decade in the states in which we have data.

Other factors that contribute to high death rates include the forces of *globalization*. In the semiconductor industry, for example, the competitive positions of firms and countries have undergone dramatic changes since 1980, when IBM introduced its first personal computer. Then, in the mid to late 1980s, Japanese firms used their comparative advantage in manufacturing to grab the lion's share of the market for the memory chips (DRAM). But the 1990s saw the resurgence of U.S. firms, led by Intel, based on improved production methods and product innovation as well as the dominance of the personal computer, or PC.<sup>6</sup> The 1990s also witnessed the rise of Taiwanese foundries, which manufacture chips designed by other companies, and which spurred the growth of new fabless design companies, especially in the U.S. Widespread adoption of the Internet and introduction of wireless devices challenged the central role of the PC and allowed chip producers from Europe and Asia to gain ground. Further upheaval is expected with the entry of China to the global industry.<sup>7</sup> In 2002, U.S. firms accounted for about 50 percent of the global market, but the

number of companies had dropped from 993 in 1997 to 898 (and the number of establishments had gone from 1097 to 1032).<sup>8</sup>

The software industry is another industry that has been affected by globalization. As a leading researchers in the area, Ashish Arora and Alfonso Gambardella note:

One rather unexpected phenomenon of the 1990s has been the spectacular growth of the software industry in some non-G7 economies. The first element of surprise is that these are not countries where one would expect to see the growth of what is commonly thought of as a high-tech. The second element is that what the 1990s have shown is not just growth of the industry, but a remarkable growth. In India, for example, software production was virtually non-existent in the early 1980s. Today software employs more than 450,000 employees, sustaining annual growth rates of 30–40% in revenues and employment over more than 10 years. Although less remarkable than India, countries like Ireland and Israel have also had double digit growth. . . . To put these figures in perspective, employment in the U.S. software industry was slightly above 1 million, with sales of around \$200 billion.<sup>9</sup>

The number of software establishments has also declined going from 12,090 in 1997 to 9,899 in 2002.<sup>10</sup>

Obviously, *firm size is an important factor*. While even the biggest firms (like AT&T) can die, big firms are much more likely to survive than are small ones because big firms have better access to credit and often have more established markets. Not surprisingly, birth rates are higher for small businesses, because firms are more likely to be born with a small number of employees than a large number. Economy-wide, firms with more than one hundred workers have half the death rate of firms with fewer than twenty workers.<sup>11</sup>

Finally, *timing matters*. The business cycle forces many firms, particularly the least successful ones, out of business, as the volatile jumps in figure 2.2 show. Some industries, such as trucking and software, are particularly cyclically sensitive while others, such as retail food, are less sensitive. The software industry is a classic example. The IT boom spawned an enormous number of new software companies. Indeed, by 1997, there were more firms that had been born in the past five years than had lived longer than five years. In financial services, the bear market in the early 2000s caused a lot of the least productive firms to leave.

“The bear market separated the wheat from the chaff—a lot of marginal brokers left the business,” says Ron Cordes, chairman of AssetMark Investment



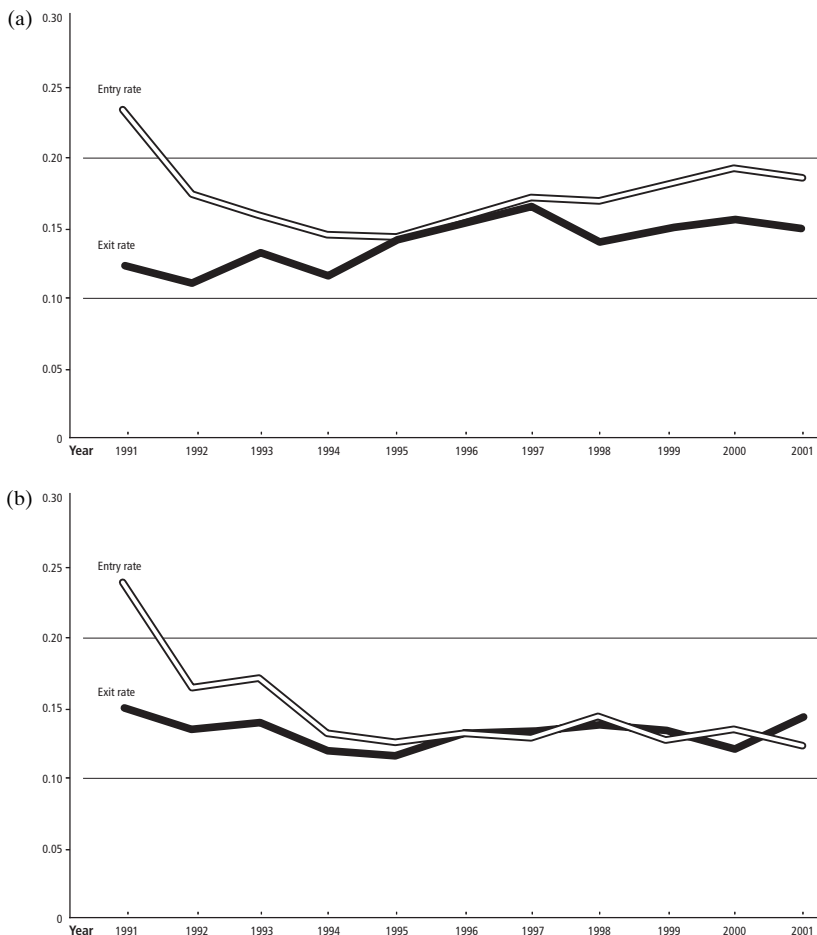
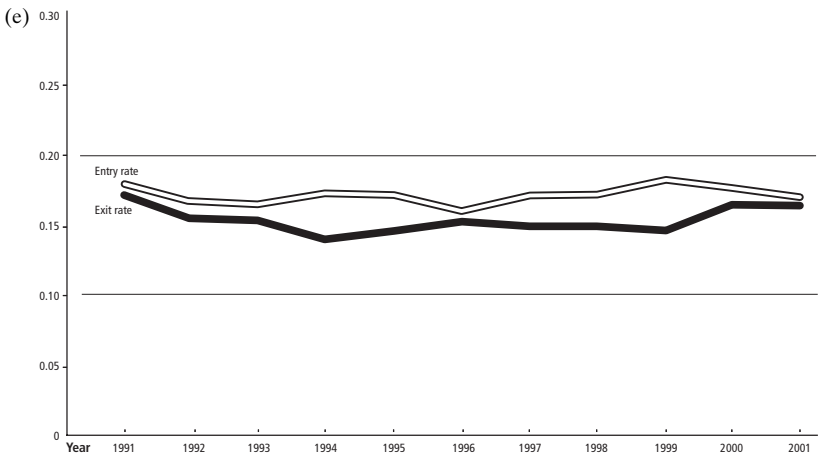
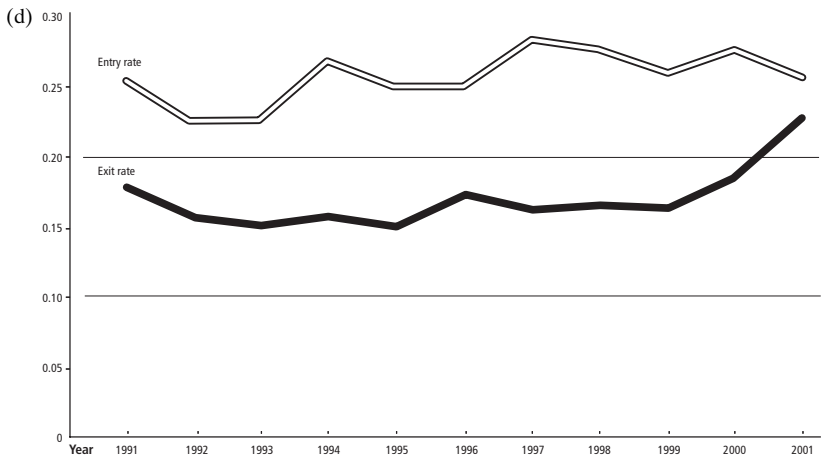
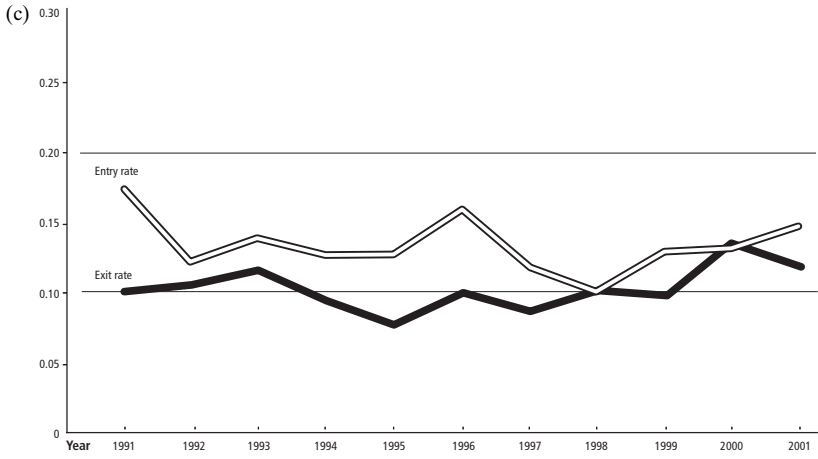


FIGURE 2.2. Entry and exit rates of establishments. (a) Financial services. (b) Retail food. (c) Semiconductors. (d) Software. (e) Trucking.

Services, a San Mateo (Calif.) firm that helps commission brokers make the transition to independent, fee-based financial advisers. And Wall Street's credibility is still smarting in the aftermath of New York State Attorney General Eliot Spitzer taking firms to task for issuing biased reports. That scandal deprived stockbrokers of their chief sales tool.<sup>12</sup>

So a number of basic facts have been established. First, firm entry and exit rates are very different across industries, firm sizes, and parts of the



business cycle, so workers in different firms and different time periods will have very different experiences. In particular, workers who work for smaller and younger firms are much more likely to see their firm exit than workers who work for older and larger firms. Second, although firm entry and exit are common across industries, the primary impetus is different in each. Deregulation has had particularly important effects on firm entry and exit in two industries—trucking and financial services—while heightened domestic competition has been important in the retail food industry, and globalization in the semiconductor and software industries. Finally, although mergers and acquisition activity does not account for a large number of firm births and deaths, it is important economically, particularly in financial services and retail food.

### **The Bottom Line**

Economic turbulence is substantial and pervasive. Job loss, like Mark McClellan's, is part of the constant restructuring of economic activity that is hidden by aggregate statistics.

Some workers are more vulnerable than others. Younger workers are more likely to leave or be hired than older workers. Workers who work in low-skill industries (like trucking and retail food) are more likely to experience turnover than workers in high-skill industries (like semiconductors and parts of financial services). Worker turnover rates are much higher than job turnover rates, and job turnover is higher in small and young businesses.

The impact of closings like Kaiser Aluminum is substantial. Firm deaths are not only an important contributor to job losses, but the rates of firm births and deaths are very different across industries, firm sizes, and parts of the business cycle. Case study research and the large differences across industries suggest that factors such as deregulation, industry restructuring, and globalization are important driving forces in contributing to firm entry and exit. The next chapter examines this part of the economic turbulence story in more detail.

# The Industries

## Introduction

The last chapter closed by saying that factors such as deregulation, industry restructuring, and globalization are important sources of economic turbulence. But getting simple measures of these forces is impossible. Government statistical offices do not produce indices of any of these events. Indeed, when the National Academy of Public Administration (NAPA) was charged in 2005 to examine what data could be used to examine offshoring, a common outcome of globalization, it noted on its website:

The migration of U.S. jobs off-shore and its impact on America's workforce and economy is neither a new, nor unstudied or unfamiliar, issue. From an economy-wide perspective, this issue has been at the center of frequent national debates about the benefits and costs of economic growth and trade expansion. However, the debates have not produced consensus on the magnitude and significance of the net migration of U.S. jobs off-shore or its impact on U.S. workers and the economy.

The Bureau of Labor Statistics (BLS) and others have undertaken efforts to expand the range of data, but these collections remain fragmentary and hampered by a clear understanding of what needs to be measured.<sup>1</sup>

The approach taken in this book is more holistic. No attempt is made to measure such complex events. The five industries that are under the microscope—financial services, semiconductors, software, retail food, and trucking—have all been buffeted by globalization, deregulation, and increased competition. Since these industries span the economic spectrum from manufacturing to service, from low technology to high technology,

and from low skill to high skill, what they have experienced should shed light on the experiences of the economy as a whole. As Gail Pesyna, a program officer for the Sloan Foundation who has thought a great deal about the importance of industry studies points out,

When one is trying to understand a complex phenomenon—like a workplace, a firm, an industry, or an economy—a good place to start, scientifically speaking, may be with the solid, scientific practices of direct observation and primary data collection. We believe academic research ought to start here in order to study “in-depth” the key questions . . . posed. In other words, to start by observing, talking to, and collecting data from real people in workplaces. Then one can combine that with data on firms within a specific industry, and perhaps aggregate upwards. And then . . . one might begin to look at the differences across industries, or combine this with big, statistical analyses, to get something really interesting.<sup>2</sup>

The next section does just what Pesyna suggests. It takes the work of experts in each industry, who have spent their careers talking directly to businesses, and sketches out an overview of the workforce of the five industries. It then describes the events that have buffeted each of them.

## **The Five Industries: An Overview**

### *The Workforce*

The diversity of the U.S. workforce is mirrored in these five industries. The semiconductor and software industries pay high weekly wages, typically \$900 in 2002, and men are 70 percent of their workers (see figure 3.1). By contrast, retail food stores pay low weekly wages, typically \$300 in 2002, and hire men and women in about equal proportions. Financial services and trucking pay moderate weekly wages, typically \$550 to \$600 in 2002, but the financial service workforce comprises over 60 percent women, while the trucking workforce is over 80 percent male.

The level of union representation also varies. Collective bargaining plays an important role in the retail food and trucking industries. Even in these two industries, however, the proportion of workers belonging to a union has declined precipitously over the past twenty years, so that no more than 20 percent of workers were represented collectively in either industry by 2002. Unions represent very few workers in financial services, software, or semiconductors.

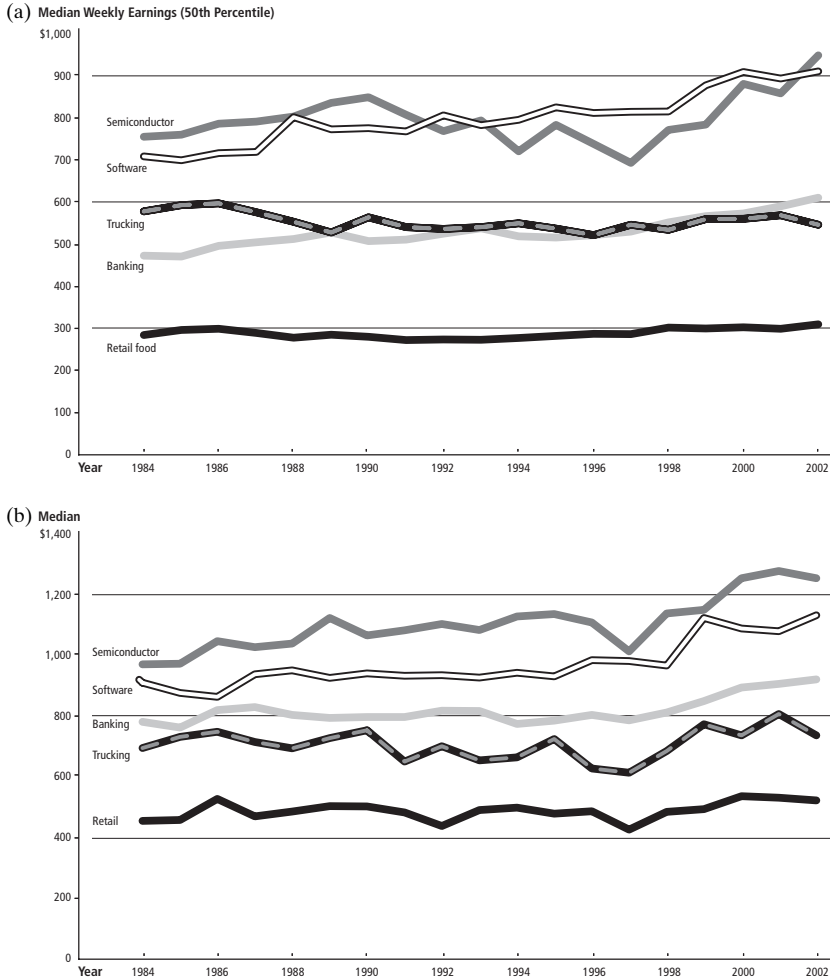


FIGURE 3.1. Median weekly real earnings. (a) All workers. (b) College-educated workers.

Even the most casual observer knows that the education of U.S. workers has risen dramatically over the past two decades, and the returns to education have also increased. The same is true in these five industries. College graduates saw their real weekly earnings rise since the late 1990s, although earnings for high-educated workers grew faster in semiconductors, software, and financial services than in trucking or retail food.

Pay differentials vary across the five industries for the same reasons they vary nationally. One reason is that the education of the workforce

varies. Among workers with a high school diploma or less, truckers earn as much as workers in semiconductors and software, and earnings in financial services are catching up. Another reason is that firms in different industries have different pay scales for similarly educated workers. Less educated workers in retail food earn substantially less than in the other four industries, although they typically also work fewer hours (around thirty-five hours per week, compared with forty or more in other industries). College-educated workers earn more in high-tech than in low-tech industries.

### *Economic Shocks*

Economic shocks like technological change and deregulation have affected jobs and employment for centuries. The poster child industry during the nineteenth-century English Industrial Revolution was the cotton industry, and Luddites smashed cotton machines because they were afraid that machines and new laws were taking away their jobs. Financial services is the poster child industry for the changes in the 1980s and 1990s, dubbed the Second Industrial Revolution.<sup>3</sup> As the entry on “deregulation” in Wikipedia notes:

Deregulation was a major trend in the United States in the last quarter of the twentieth century. A number of major deregulation initiatives were passed. Some of these were withdrawn quickly (but not quickly enough to avoid major problems), including the deregulation of savings and loans. American savings banks, which were permitted to lend unfettered, had their depositors' funds insured by the federal government, creating a moral hazard. The California electricity crisis was precipitated by price manipulations by companies such as Enron after energy industry deregulation in 1996. Other legislation has been considered more widely successful, including deregulation of transport, and the gas market.<sup>4</sup>

As was pointed out in chapter 2, deregulation is crucial to understanding recent change in the financial services industry, and is typified by two key pieces of legislation. The Interstate Banking and Branching Efficiency Act of 1994 (also known as the Riegle-Neal Act) completed the deregulatory process of extending branch banking across state lines. Five years later, the Financial Services Modernization Act of 1999 (also known as the Gramm-Leach-Bliley Act) formally repealed restrictions imposed by the 1933 Glass-Steagall Act. Glass-Steagall, a remnant of the New Deal era,

had been under siege for years. Its provisions formally barred banks, brokerages, and insurance companies from entering each others' industries and separated investment banking from its commercial counterpart. Throughout the 1990s, financial services firms increasingly sought economies of scale and scope as well as cross-market opportunities, which challenged Glass-Steagall limits. The Gramm-Leach-Bliley Act rewrote statutes to accommodate changes in the industry.

The impact of the deregulation on the industry has been profound. The high-water mark for the number of FDIC-insured commercial banks was reached in 1984, when there were 14,496 banks in the U.S. By 1992 this number had dwindled to 11,466, and by 2002 the U.S. had only 7,887 banks. The decline in the number of banks has occurred even as the number of bank branches has grown substantially (from 51,935 in 1992 to 66,185 in 2002). Especially precipitous has been the drop in small institutions: the number of single-unit banks dropped by half between 1992 and 2002 (from 4,647 to 2,319).<sup>5</sup> Consolidation among the subindustries of financial services, such as insurance and investment banking, particularly among large firms, has also accelerated. The economic turbulence that this activity created, however, had little impact on net employment, which actually posted substantial increases.

The massive technological change in the financial services industry was also part and parcel of deregulation. In retail financial services, for example, the proliferation of automatic teller machines (ATMs) and telephone-, home-, and PC-based banking, provide alternative channels for customers, while new back-office technologies have dramatically decreased the costs of handling individual accounts and transactions. The financial services industry accounts for a disproportionately large share of IT investment in the economy.<sup>6</sup>

The *trucking* industry is a low-wage, old economy industry that has also been substantially affected by the impact of deregulation. It is not a large industry: 113,237 establishments employing 1,826,000 workers,<sup>7</sup> although it is obviously critical for the efficient functioning of the economy. Over the past twenty-five years, economic regulations have been lifted, and competition has intensified. Before deregulation, the industry consisted primarily of regulated common carriers that were certified by the Interstate Commerce Commission (ICC) to haul specific commodities between specific city pairs and of contract carriers that were permitted to haul under contract for up to eight shippers. Following the deregulation that began administratively in 1977 and was written into law in the Motor Carrier Act of



1980, markets were separated by freight shipment characteristics into truckload (TL) markets and less-than-truckload (LTL) markets, which by the middle of the 1980s no longer competed with one another.<sup>8</sup> The changes in the market as a result of both active merger and acquisition activity and the adoption of information technology are well illustrated in the following communication from Michael Belzer, a Sloan industry trucking expert:

The American Freightways purchase by FedEx might have been the most brilliant move in trucking in a generation. American Freightways, out of the tiny poor Ozark town of Harrison, Arkansas, may be the most sophisticated IT company in trucking. At least, that is what they looked like to us six years ago when we spent two days there surveying their operation. They had a computer operation that was so sophisticated they could track each shipment's movements at all times and virtually prevent misloads, which is a major cost factor in LTL. This allowed them to exploit one of the most complex paradoxes of modern industry: they could use fantastic up-skilling high-road IT management to de-skill on the manual labor side. AF was feared by all the smaller LTL carriers of the old school as AF moved east and relentlessly cut costs and improved service using IT. The master stroke purchase by FedEx put them in another league.<sup>9</sup>

The software and semiconductor industries, two industries that are often mentioned in the same breath as globalization, are foci of the NAPA study as well as of a 2005 GAO report.<sup>10</sup> The *semiconductor* industry is one of the industries in which the U.S. achieved dominance in the 1980s, and in which even now the U.S. accounts for 50 percent of the global market of \$150 billion (with just one company, Intel, accounting for 15 percent).

Firms in this industry develop and produce semiconductors (chips), the electronic devices that provide functionality to computers and an ever-widening array of products. However, the rise of Asian foundries that only do the manufacturing of semiconductors facilitated the rise of Silicon Valley startups that only do the design of chips (fabless companies). The semiconductor industry is a good example of how economic turbulence has led to industry restructuring with improved and lower-cost products.<sup>11</sup>

The *software* industry is another New Economy high-wage industry that has experienced rapid growth and industry restructuring and been enormously affected by globalization. It is hard to overstate how rapidly the industry has grown. Sales in the software industry, which includes programming services, software products, and professional services, skyrocketed from \$155 billion in 1995 to \$357 billion in 2001.<sup>12</sup> Employment in

the software industry increased nearly fivefold between 1984 and 2002, and doubled in the period since 1992.<sup>13</sup>

At the same time, the nature of the industry has changed rapidly. Vast increases in computing power mean that new software is far more sophisticated, specialized, and powerful because of the huge increases in the processing and storage capabilities of computer hardware. Production of software products has changed as programs are broken down into modules created by independent programmers and as standards for debugging, along with debugging tools, developed. Partly as a result of these changes, software production has also moved out of company IT departments, which developed firm-specific software, into firms specializing in software products, called independent service providers.

Insights about the impact of changing domestic competition and technological change on low-wage, old economy and mature industries can be gleaned from examining the *retail food* industry.<sup>14</sup> At the beginning of the 1980s, the industry consisted primarily of traditional food stores, such as supermarkets, grocery stores, bakeries, meat markets, and convenience stores. Increasingly, the competitive structure of the industry has been transformed with competition from restaurants and from supercenters and “power retailers,” such as Wal-Mart, now the largest food retailer in the U.S.<sup>15</sup> This threat has led to increasing consolidation in the market share of the leading retailers with significant impacts on pricing and competitive behavior. Of course, the major technological change that shoppers are familiar with is scanning technology, which has not only transformed the way in which the industry does business, but potentially presages the way in which RFIDs (radio frequency IDs) may change businesses in the future. But retail food stores also adopted supply chain management, with electronic data interchange (EDI) technology and experimented with self-checkout systems, electronic shelf tags, vendor-managed inventory, and frequent shopper/loyalty card programs.

## **A More Detailed Look at Industry and Workforce Change**

### *Financial Services*

The financial services industry<sup>16</sup> now accounts for almost 10 percent of gross domestic product (its sales have grown rapidly from 6.4 percent of the U.S. GDP in 1992 to 8.6 percent in 2001).

The labor force has become much more educated over the past twenty

years. In part, the displacement of lower-educated workers reflected technological changes that reduced the number of workers required to fill positions such as tellers, clerks, and transactions processors, which were the jobs traditionally held by women. Technological changes, however, do not explain the entire shift in the educational composition of the financial services workforce. The absolute number of tellers employed in financial services, for example, has declined very little, and not nearly as rapidly as BLS projected. Rather, the educational requirements for particular jobs have been upgraded. Many banks now seek tellers and other customer service representatives with more education, even college degrees, and expect them to incorporate sales work and other kinds of advanced customer service into their jobs. The industry has gradually become a workplace for higher-skilled workers, as the proportion of workers in higher-educated, and higher-paying, occupations has increased, while the proportion in lower-paying positions has decreased. The low wages of the less-skilled workers reflect, at least in part, the weak and poorly coordinated industrial relations system in banking. Union membership density in the banking industry, for example, is less than 1 percent.<sup>17</sup>

Concurrent with these earnings trends has been the destruction of long-standing internal labor markets and career ladders in the industry. 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.

### *Trucking*

Competitive pressures have been considerable in the trucking industry. New, nonunion truckload carriers pay low wages, provide little or no health insurance, and almost never contribute to drivers' pension plans. As a result, new carriers managed to avoid taking on the "legacy costs" that were beginning to overwhelm the old-line carriers. As the industry deregulated, older, unionized firms exited in record numbers, firm death was rampant, and the birth of new nonunion firms changed the complexion of the industry quickly. Indeed, most of the carriers that had existed since the days of

horse-drawn teaming were out of business by the end of the first decade of deregulation.<sup>18</sup> In 2002, only car-haul remains as a largely unionized specialized market (much of this due to the unusual skills and equipment required, as well as to the value of the freight hauled).

The industry structure changed further after 1995, when intrastate trucking was deregulated. These changes intensified the competitive effects wrought by deregulatory policies some two decades previously. Until 1994, when Congress mandated the deregulation of intrastate truck transportation, many states (especially key large states such as California, Texas, Michigan, and Pennsylvania) retained regulation for intrastate trucking, protecting local cartage within those states. Once competition began to intensify in the wake of the legislation in 1995, union wages and benefits became increasingly untenable in regional LTL and in local cartage. At the same time, new and small nonunion LTL carriers took advantage of new opportunities and grew rapidly.

The labor market structure in the trucking industry is very different from those in the other industries. Differences by education or across other worker characteristics are much less important in trucking than in the other industries, since formal education above a high school degree is not required for truck driving and the industry workforce has few women or minorities. Truck drivers earn most of their income based on mileage rates, which are similar within a company but differ across companies and are influenced by union collective bargaining and the industry segment. Drivers hauling high-revenue freight (such as LTL and small package freight) earn higher returns and are often unionized. Drivers hauling low-revenue freight, such as intermodal containers, gravel and other raw materials, and produce, have the lowest earnings. Some firms, often those that are unionized, choose a high-productivity, high-cost approach with higher-quality freight carried by better-trained and better-paid drivers. Other firms, most of which are nonunionized, take a low-productivity, low-cost approach and are plagued by high turnover.

The labor force, while low wage, is very different from most, because of the flexible nature of the work. The average 1998 earnings for truck drivers (including local markets and those operating relatively smaller trucks) was \$7.01 per hour, and those working more than the sixty-hour legal limit average earned only \$6.20 for each hour worked.<sup>19</sup> Opportunities for promotion within a trucking company are limited, and longer tenure usually results in favorable schedules or routes at best. The most common path to better earnings and working conditions is to land a job at a union company,

although this strategy has become less viable with the decrease in union jobs.

### *Semiconductors*

The semiconductor industry's history since the early 1970s is a story of steady disintegration of the supply chain as specialized sub-industries, such as those for manufacturing equipment (\$25 billion) and design software (\$4 billion) have emerged. To understand the changing industry structure in semiconductors, it is useful to review the three distinct stages of semiconductor production: design, wafer fabrication, and assembly. The first stage to arise as a distinct industry was the backend assembly of the fragile wafers into sturdy packages that can be inserted into equipment. U.S. companies began moving their labor-intensive assembly operations to lower-cost locations as early as the late 1960s. Local firms, especially in Asia, took over many of these operations on a contract basis and now dominate the assembly industry, which today has only a small presence in the U.S.

Chip design emerged as a separate industry during the 1980s. Fabless companies design chips and then contract for fabrication by other chip companies. Chip design has also been part of the ongoing debate about off-shore outsourcing. The fabless design industry, accounting for over 10 percent of chip revenues, got a big boost with the appearance in the 1990s of independent wafer fabrication companies (foundries), which do not design and sell chips of their own. Chip designers no longer feared sending designs to a possible competitor for fabrication. The foundry model was pioneered in Taiwan, which is still home to the largest share of the \$12 billion foundry industry. The U.S., where the chip industry was born, remains home to about a third of fabrication capacity.<sup>20</sup>

The impact on the American labor force of the automation of chip manufacturing coupled with the outsourcing of manufacturing to Asian foundries was that employment became even more dominated by highly skilled engineers. The proportion of the workforce that had graduated college rose from 42 percent of the workforce in 1985 to 57 percent in 2002, and that proportion experienced a 20 percent increase in their earnings over the period. At the same time, workers with high school diplomas (or less) declined from 33 percent to 18 percent of the workforce and watched their earnings gradually deteriorate and then improve so that earnings in 2002 were at the late-1980s level.

With the rise of the fabless/foundry model, the industry came to include

small competitive firms alongside large multinational integrated corporations. This diverse group of firms uses employment systems that range from what might be considered as close to a competitive spot market as is possible to traditional internal labor markets. Fabless startups often have competitive, short-term employment relationships that are project-related, and tend to offer high-risk, high-return compensation packages. Multinational corporations offer more secure long-term employment relationships with structured career ladders. Even these secure employment relationships weakened in U.S. companies throughout the 1990s as some older companies experienced hard times early in the decade and as the mobility of engineers increased with the lure of huge profits from stock options if their startups became publicly traded or acquired during the boom late in the decade.

The restructuring did not come without cost—the website [www.job-hunt.org](http://www.job-hunt.org) notes:

During the Digital Equipment Corporation (“DEC”) layoffs of the early and mid-1990’s, over 80,000 people lost their jobs world-wide. Thousands who were “right-sized” out of a job found a very tough job market. In New Hampshire and Massachusetts (near DEC’s headquarters), they faced many employers who would not consider hiring them because of their DEC experience. The result in several instances was personal tragedy: homes were lost, marriages broke up, and at least three people are known to have committed suicide with one murder-suicide combination adding an additional victim to the total tragedy.<sup>21</sup>

### *Software Production*

Initially, *software* production was dominated by hardware producers and firms that were the end users. Before the late 1960s, most software companies were small and reliant on government contracts and system development work from hardware companies. Further, they tended to focus on development of high-level languages such as FORTRAN or COBOL and on development tools, such as debugging and automatic test data generation. The late 1960s, however, saw the advent of the independent software industry. This, in turn, ushered in the contemporary era of the software industry, which can be dated to the early 1980s.<sup>22</sup>

The diversity of industries that use software in the U.S. has made it difficult for computer manufacturers to pursue vertical market strategies. Most hardware vendors have retreated from software production or re-

duced their reliance on it. For example, IBM strongly emphasizes its advantageous collaboration with independent software vendors (ISVs).<sup>23</sup> Furthermore, recent entrants into computer production are minor participants in software production, owing to the large number of ISVs. The prior existence of enormous numbers of small contract programming companies directly led to the current large number of ISVs, as well as the fact that increasingly, software programs can be broken down into modules that can be created by independent programmers. In addition, there are standards for debugging, and software tools used to do debugging, that are more generally applied across programs, and thus used by the independent software providers. Among computer producers, ISV participation has fostered greater product diversity and faster sales growth than producers would have realized from their own in-house production of hardware and software. Moreover, for end users of software, the ISV use also presents an important cost-reducing alternative to internal production of software. These changes are reflected in the rapid growth of software vendors such as Oracle, PeopleSoft, and SAP.

Technological change and globalization have also played an important role in the evolution of the industry. Since the 1980s, the emergence of personal computers with a CRT and a graphical user interface (GUI) made it easier for end users who were not primarily programmers to satisfy some of their own programming needs. The further development of CASE tools, which check for programming errors, meant that many of the lower-skilled programming tasks that software engineers would have assigned to programmers could now be automated. Over time, the nature of programming has changed, so that programs are written in modules, rather than as completely intertwined in-house products. As all of these changes improved the design methodology, programming could be more easily specified and contracted out or outsourced overseas. As measured by imports of IT services, outsourcing overseas grew from \$300 million in 1995 to \$1.2 billion in 2000.<sup>24</sup> However, while growth in outsourcing may be dramatic, it remains small relative to the size of the U.S. economy at only 0.3 percent of domestic output.

The labor force in the industry has two main professions—programmers, who write or modify programs according to specifications given to them, and software engineers, who develop software architecture, devise algorithms, and analyze and solve programming problems. Offshore contracting, the introduction of advanced object-oriented programming languages, “embedded” programming skills among end users, and automation

of code writing have all reduced the demand for simple programming tasks. While the growth in demand for computer programmers has been modest (from 400,000 in 1983 to 600,000 in 1997, then dropping to 499,000 by 2002 before rebounding to 563,000 in 2003), the demand for software engineers, systems analysts, and computer scientists has grown dramatically (from 350,000 in 1983 to a peak of 1.9 million in 2000, then dropping slightly since then).<sup>25</sup> With product cycles as short as six months and frequent job changes, certification is seen as a valuable way to demonstrate technical and professional knowledge. The number of certifications available to IT workers doubled from 200 to 400 between 1997 and 2000.<sup>26</sup>

Large numbers of programmers and software engineers are employed on a temporary or contract basis, because companies demand expertise with new programming languages or with specialized areas of application. Although data do not permit us to measure the full extent of this contracting, some 21,000 out of 675,000 software engineers were self-employed in 2002. In the same year, 18,000 out of 499,000 computer programmers were self-employed.<sup>27</sup> Both of these are relatively high shares among white-collar occupations. A substantial amount of programming has also been contracted to be performed outside the U.S. Between 2001 and 2004, off-shore programming jobs may have nearly tripled, from 27,000 to an estimated 80,000.<sup>28</sup>

### *Retail Food*

This is an important industry: 224,300 food stores in the U.S. sold nearly \$450 billion worth of food and nonfood products in 2002. Though food retailing had traditionally been a highly competitive industry with thin operating margins, the 1990s featured dramatic changes in the landscape of food retailing that further heightened competition. During this period, an increasing number of retailers from outside the traditional food industry began to compete with supermarkets to sell both food and nonfood items. Such “power retailers” included mass merchandisers (Wal-Mart, Kmart, and Target, for example), warehouse club stores (such as Costco, Sam’s Club, and BJ’s Wholesalers), and other retailers such as drug stores (e.g., CVS, Eckerd, and Walgreen’s) and dollar stores. In fact, Wal-Mart is now the largest food retailer in the U.S. This has been accompanied by relatively slow growth in sales at supermarkets—about 1 percent per year after adjusting for inflation—as the share of food sales accounted for by mass merchandisers, warehouse clubs, and other nontraditional food retailers more



than doubled from 9 percent in 1994 to 19 percent in 2002.<sup>29</sup> Traditional food stores are also facing more competition from another source: restaurants and other food service companies. Many grocery stores altered their size, format, and product line to respond to these forces. Individual food stores have grown larger; expanded their offerings of ready-to-eat, organic, and natural food products; offered more nonfood items and services; lengthened hours of operation; and adopted various technological innovations to streamline both back-end and frontline operations.

The 1990s also featured consolidation in retail food. Market shares held by leading food retailers rose markedly: between 1997 and 2000, the four largest food retailers' share rose from 18 to 27 percent of total grocery store sales in the U.S. The number of mergers and acquisitions peaked in the late 1990s as some chains chose to grow through acquisitions, while others (Wal-Mart in particular) continued to open new stores. Two of the largest events in retail food consolidation occurred in 1998, a year that saw the joining Albertsons and American Stores, including the Lucky's brand, as well as top-ranked Kroger's purchase of Fred Meyer. Table 3.1 illustrates the quite rapid switching of market leadership, together with the entry and dominance of Wal-Mart. Foreign ownership of food retailers also increased over this period, with recent figures indicating that foreign-owned companies, such as Ahold, account for about 15 percent of grocery store sales.<sup>30</sup> What is clear is that the traditional retail food sector will continue to face intense competitive pressures due both to changing consumer preferences and to the expansion of other retailers into food sales.

Substantial technological change has occurred in the industry, but it is

TABLE 3.1 **Top North American food retailers, based on sales.**

	1992	1998	2001	2003
1	Kroger	Kroger	Wal-Mart	Wal-Mart
2	American Stores	Albertsons	Kroger	Kroger
3	Safeway	Wal-Mart	Albertsons	Costco
4	Winn-Dixie	Safeway	Safeway	Albertsons
5	Albertsons	Ahold USA	Costco	Safeway
6	A&P	Supervalu	Sam's Club	Sam's Club
7	Food Lion	Fleming Cos.	Ahold USA	Ahold USA
8	Publix	Winn-Dixie	Supervalu	Supervalu
9	Ahold USA	Publix	Fleming	Publix
10	Vons	Loblaws	Delhaize	Loblaws

Sources: Food Institute, *Food Industry Review*, various editions. Note that the earlier years did not include warehouse club and mass merchandiser sales when ranking.

generally not “skill-biased” toward higher-skilled workers. Indeed, much of the technology adopted in the industry, while contributing to the productivity of lower-skilled workers and improving overall efficiency, have not directly increased demand for higher-skilled workers. Nonetheless, retail food businesses increasingly use information technology in supply chain management, with growing adoption of EDI (electronic data interchange) technology. Food retailers also are experimenting with additional in-store technologies, such as self-checkout systems and electronic shelf tags. Rates of technology adoption tend to be higher among stores in self-distributing groups, which operate their own warehouses and distribution networks than in stores supplied by independent wholesalers.

The workforce in the industry is similar to that in the retail industry more broadly, in that there is a flat or bottom-heavy job hierarchy, with large numbers of clerks, cashiers, and stockers, and relatively few managers. The job structure became even more bottom heavy as executive, administrative, and managerial jobs declined 30 percent between 1983 and 1993.<sup>31</sup> This bottom-heavy job structure combined with a prevalence of part-time workers helps explain the low average wages in the retail food industry. Average weekly earnings in the industry were only \$365 in 1984, and increased only slightly to \$384 in 2002.

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.<sup>32</sup> Anecdotal stories abound of store managers and executives who have worked their way up, but the actual level of upward mobility is constrained by the small number of managerial positions and by lack of training opportunities. One study of supermarkets found that while department heads are often hired from within, store managers are not.<sup>33</sup> Over the past several 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.<sup>34</sup>

## **The Bottom Line**

Globalization, technological change, and deregulation have different effects on different industries, and so using broad-brush aggregates to describe the impact is misleading. This chapter has used case study evidence

to describe the changes occurring in each industry over time and suggested that these five industries are a microcosm of the broader economy.

The next chapters quantify and examine how economic turbulence impacts the performance of firms, the jobs available to workers, and the distribution of income across households.

# Firms, Their Workers, and Their Survival

## Introduction

When Calvin Coolidge declared that the business of America is business, he was absolutely right. Firms are the basic building blocks of the economy: they create—and destroy—jobs, wealth, and income. He could equally well have said the business of America is workers. Bricks, mortar, and machines might have been the keys to business success a hundred years ago, but even then, Henry Ford famously (and successfully) paid workers five dollars a day and got a high-quality workforce and with it a profitable business.

So what explains why some firms, like Costco, follow the Henry Ford model and others, like Wal-Mart, don't? Clearly each firm, and each industry, is different. Each firm chooses a different business model with very different levels of workforce quality and worker turnover rates. Some employers, like Wal-Mart, compete by paying low wages and having low prices. Others, like Costco, compete by attracting, retaining, and motivating good workers at all skill levels.

Firms that get it wrong, like Winn-Dixie, are more likely to fail. There are enormous differences in productivity in firms, even firms within the same industry, and research shows that this is closely related to failure rates.<sup>1</sup> Paradoxically, failure, like greed, can be good. Failing businesses have created a surge in productivity for the retail trade industry, for example, precisely because low-productivity firms, like Winn-Dixie, have shut down and been replaced by new high-productivity firms, like Whole Foods.

Business success has many parents. This chapter examines the link between three of them—*worker turnover*, *workforce quality*, and *worker pay*—and success as measured by *firm performance*. It will show that more productive firms pay above-average wages to their workers, have a higher-quality workforce and lower turnover, and have more skilled workers, although these relationships vary substantially across industries. It confirms that less productive firms are less likely to survive. It also shows that, even after controlling for the level of productivity and other factors, higher-turnover firms are less likely to survive and firms that maintain high-quality workforces are *less* likely to fail in some industries and *more* likely to fail in others. Single-unit, small, and local establishments are especially hurt by high workforce turnover, while establishments with a national reach are especially hurt by low workforce quality.

### **Different Paths to Firm Success and Failure**

Management consulting firms have multiple specialties—such as marketing, finance, and asset management—but almost all of them offer a specialty in people management. Firms can, and do, choose human resources management (HRM) practices that fit their market strategy. Those that choose a strategy of hiring high-quality workers by paying higher wages will see reduced turnover and increased productivity. Others choose to pay lower wages and experience high turnover. The former strategy will increase profitability if wage increases are less than productivity increases; otherwise the latter strategy makes sense.

Managers have often told researchers that they feel compelled to choose low-wage HRM strategies because of competitive pressures to keep costs down. For example, Larry Hunter's work in the financial services industry has found that some firms choose an approach that deskills and segments the workforce as a "low road" response to risk and complexity.<sup>2</sup> And the pressures resulting from industry restructuring have led firms in other industries to choose low-road paths to economic success. Responses by firms in industries as diverse as manufacturing, telecommunications, hospitality, and health care, interviewed by researchers studying low-wage work, led researchers to conclude, "Most employers have responded to increased economic pressure by reducing costs. For a great many of them, cost-cutting has focused on the wage bill."<sup>3</sup>

But other businesses go the opposite route. *Fortune Magazine* annually

reports on the hundred best places to work, and some businesses go to extraordinary lengths to pay workers well and reduce turnover. Just as some firms in the financial services industry follow a low road to success, the Principal Financial Group has been regularly named one of the Fortune 100 best places to work. They provide employees with flexible medical plans, flexible leave programs for caregivers, and “no meeting” Fridays.<sup>4</sup> In another one of the industries studied in this book, the software company AGI has been recognized as one of the leading small- to medium-sized companies to work for by offering a family-friendly work atmosphere with daily breakfasts and lunches served to employees and an on-site laundry. The CEO, Paul Graziani, justifies the generous perks with the high productivity increases the firm has enjoyed with these policies.<sup>5</sup> Similarly, the semiconductor giant Intel has been promoting flexible work schedules and a comprehensive work/life program in its efforts to attract and retain the best workers.<sup>6</sup> Intel is also well known for its stock options, bonuses, and retirement programs designed to reduce employee turnover. And four retail food stores make it into the Fortune “best list,” with Wegman’s starring at number one.

There are high-road employers even in industries that are not featured in the Fortune 100 list. In the trucking industry, where employee turnover is extremely high, Schneider Trucking has health management as well as other employee assistance programs and has developed innovative ways to communicate with drivers spread out across the country. Benefits coordinators regularly talk to employees while they are on the road or visit their families in their absence, and benefits information is available on the Internet for drivers to access while on the road.<sup>7</sup>

Whatever the path, it is clear that businesses deliberately choose their HRM practices and do so to find the practices that makes them successful. The latter goal is clearly stated by James Sinegal, the founder of the Costco warehouse store chain, who “waves away any grand plan to save the American dream. ‘I am not a social engineer,’ Sinegal says. And, he doesn’t have to be. His most convincing rationale for treating workers well is also the simplest: ‘It works.’”<sup>8</sup>

Which HRM practices will prove to be profitable? One size does not fit all, and even a good strategy can fail if it’s not well implemented. But HRM practices have to include three key, and related, elements: worker pay, workforce quality, and workforce turnover. Each of these is inextricably linked with firm performance and survival.

*Worker pay.* Each firm has to decide whether higher wages will motivate

workers to be more productive. Paying workers according to skills and performance, rather than by a rigid pay schedule, is likely to help attract the most able workers and motivate employees. Businesses that attract, retain, and motivate the best workers will in turn have higher productivity. But when all is said and done, HRM practices will be profitable, and lead to better chances of survival, only if the gains from productivity outweigh the costs from higher wages.

*Workforce quality.* Each manager has to decide how important it is to have a high-quality workforce. Bill Gates hires the best and the brightest at Microsoft because their work has been critical to its success. Not only is this true, but his management style is such that he is more productive himself when he can interact with high-quality workers, and high-quality workers are in turn more productive by interacting with him. This type of synergy, which often occurs between managerial ability and worker ability, can lead to a positive correlation between workforce quality and survival.<sup>9</sup> Again, however, this strategy is profitable and successful only if the productivity gains outweigh the costs.

*Workforce turnover.* All managers know that some worker turnover is healthy. But levels of turnover that are too high can be devastating if firm- and industry-specific knowledge is lost or the wrong people leave.<sup>10</sup> One characteristic of a good manager often emphasized in the literature is the ability to attract and retain good workers.<sup>11</sup>

Although it is tempting to put firm HRM practices in different boxes, some caveats apply. Not only do different firms follow different paths, but sometimes they even follow both at the same time. A popular view is that Wal-Mart is the classic case of a very successful firm that has followed a low-wage, high-turnover strategy. As a PBS documentary noted:

Whereas Wal-Mart employees start at the same salary as unionized employees in similar lines of work, they make 25 percent less than their unionized counterparts after two years at the job. The rapid turnover—70 percent of employees leave within the first year—is attributed to a lack of recognition and inadequate pay, according to a survey Wal-Mart conducted.<sup>12</sup>

Yet Wal-Mart's success is due to a much more complex approach. First, they combine advanced technologies such as innovative inventory management practices with sophisticated and efficient proprietary software that manages the flow of goods to their stores. This requires high-skilled high-wage workers for developing and monitoring the technology. Second,

this advanced technology enables them to hire low-wage, low-skilled workers at the cash register.

And regardless of the HRM practices adopted, strategic decisions can make the difference in whether a firm survives. Good business leaders make good decisions in their responses to changes in economic conditions, in their choices of goods and services to produce, and in their choices of business location, as well as in their HRM practices.

Keeping both of these caveats in mind, the following sections explore the relationship between firm performance, workforce quality, and worker turnover and begin with some basic facts about economic turbulence and firms.

## **Basic Facts about Economic Turbulence and Firms**

### *Performance, Survival, Entry, and Exit*

Wikipedia calls a firm “a loose legal term for a company.” The way most people do business with a firm is with one of its physical manifestations: one of its establishments. So, for example, Citibank’s local branch is an establishment, while Citibank itself is the firm. Most U.S. firms have only one establishment, but the large, multiestablishment firms are most important in terms of creating income, jobs and wealth. This chapter mostly focuses on outcomes for individual establishments, both because industry classifications are establishment based and because it is more straightforward to measure a number of key outcomes. However, the data permit linking establishments to their parent firms, so one part of the chapter examines the role of large, national chains like Citibank or Wal-Mart.

Measuring firm and establishment performance is a challenge, both because there are so many dimensions that could be used—like profits, sales, value added, growth—and because they can be very difficult to measure. Revenue generated per worker is one of the most straightforward measures, and that is what is used in this chapter.

The enormous difference in performance (revenue per worker, our measure of productivity) across establishments, even establishments within the same industry, is an important fact uncovered by looking at the data Figure 4.1 highlights this.<sup>13</sup> In each of the five industries, one standard deviation difference in productivity is around 70 percent. In other words, an establishment at the threshold of the top 15 percent of firms is 140 percent more productive than a firm at the threshold of the bottom 15 percent; and



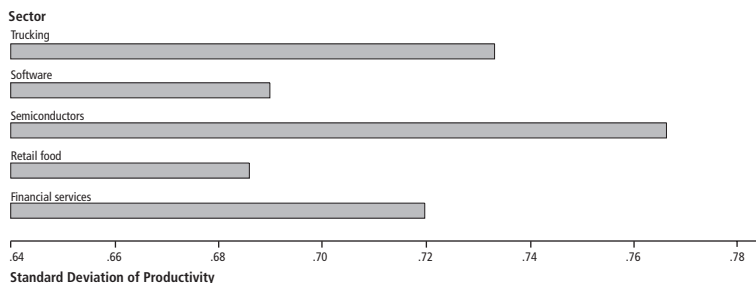


FIGURE 4.1. Dispersion of productivity across establishments within industries.

an establishment at the threshold of the top 2 percent of firms is 280 percent more productive than an establishment at the threshold of the bottom 2 percent.

The obvious question is how the most poorly performing establishments can survive. The answer is that the poor performers by and large don't survive. But less productive firms stay around for several reasons. One reason is that it takes time for firms to decide whether it is worth restructuring poorly performing establishments or to shut them down. Another reason is that a less productive establishment may be located in a geographic region or product market where competition is not intense. Finally, some poorly performing establishments are simply very young, and still going through the trial-and-error process of finding their right path.

Another fascinating fact uncovered after examining histories for establishments in each of the five industries is just how much establishment entry and exit occur. Figure 4.2 shows this over a five-year period.<sup>14</sup> Almost four in ten establishments exit, and about one in three are new in a five-year period. At one end, the less dynamic semiconductor industry had only about one in four of its establishments exit; at the other end, the very dynamic software industry had over half of its establishments born over a five-year period.

It is important to note, though, that the process of establishment survival or failure is likely to be more complex than the simple statistics presented in figure 4.2.

An establishment may exit because its parent firm shuts down or because its parent firm downsizes and closes selected establishments. This distinction is important since even successful firms may find it profitable to close an establishment in one location and open it up in another location. Citibank, like most other financial institutions, does this routinely. Simi-

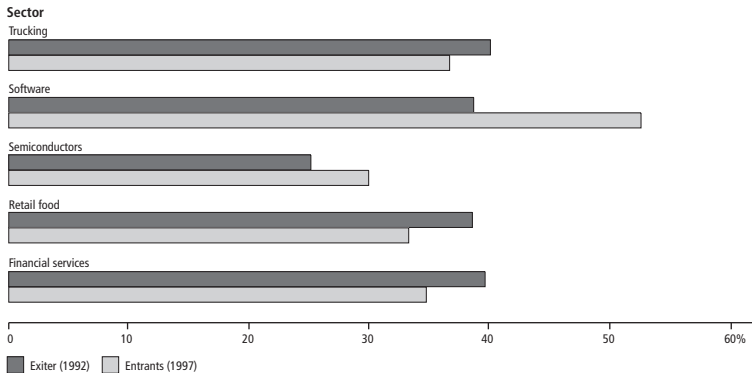


FIGURE 4.2. Entry and exit rates for establishments by industry.

larly, a newly formed establishment may be associated with an existing firm opening new locations or it may be a totally new firm. The retail trade sector is a good example of this: there are many new startup establishments, but much of this entry belongs to national chains like Wal-Mart, Costco, and the ubiquitous Starbucks expanding into new markets.

Even if an establishment physically continues, it may have changed ownership as a result of a merger or acquisition. Great department stores like Marshall Field's and Dillard's, which were owned by May, are taken over by Federated and will become Bloomingdale's or Macy's. Similarly, branch banks that were once First Union become Wachovia. Much (but certainly not all especially in the retail sector) establishment entry and exit is associated with the entry and exit of firms, as most firms have only one establishment. This is not the case, however, for the financial services industry, where particularly intense restructuring and downsizing meant that large numbers of establishments entered and exited, even though many of the parent firms remained in operation. There is a relatively moderate pace of merger and acquisition activity in most industries, with 2 to 8 percent of continuing establishments experiencing a change in ownership over a five-year period. The highest acquisition activity is in financial services (8 percent of continuing establishments) and semiconductors (6 percent).

### *Entry, Exit, and Performance*

Thomas Alva Edison famously said, "I have not failed. I've just found 10,000 ways that won't work." Basic economic principles help explain the complex

relationship between performance, entry, and exit. Businesses enter, try different paths, if successful they survive and grow, if not successful, they contract and exit.<sup>15</sup> Accordingly, the economy is constantly replenishing itself with low-productivity exiting businesses being replaced by more productive entering and expanding businesses. For example, in the software industry, entering businesses are, over a five-year horizon, more than 25 percent more productive than the exiting businesses that they replace. This productivity difference between entering and exiting businesses is large by itself and also large compared to the 9 percent productivity gains of continuing businesses over this same five-year period. Taking the difference between the entry and exit difference and the growth rate of productivity for continuing businesses provides an index of the extra productivity grown in the industry coming from entry and exit. In software, this difference-in-difference productivity gap is 16 percent.<sup>16</sup> This pattern implies that *average productivity in the software industry rises substantially as low-productivity exiting firms are replaced by higher-productivity entering firms.*

The entry and exit of establishments raise productivity in four of the five industries, but other factors also play an important role. For example, the substantial increase in overall productivity in semiconductors is associated with productivity increases for continuing businesses and with highly productive entrants replacing much less productive exiting establishments. Continuing businesses over a five-year horizon in the 1990s in semiconductors increased productivity by almost 80 percent. The productivity gap between entering and exiting semiconductor businesses is 116 percent, which is 36 percent higher than the growth in productivity for continuing businesses. This enormous productivity gap reflects the restructuring of the industry, as entrants tend to be fabless startups and leavers tend to belong to integrated companies. The fabless startups that survive have much higher revenue per worker than departing semiconductor establishments.

The major anomaly in this story is the financial services industry, where continuing establishments exhibit substantial productivity declines and entering establishments are less productive than the exiting establishments they are displacing. Exiting establishments have higher measured revenue per worker than continuing establishments; either revenue per worker is not an accurate measure of productivity in financial services or it is poorly measured. Poor measurement may stem from the difficulty of linking the stream of revenue for a financial services firm to a specific establishment. In banking, for example, an establishment is a bank branch, and linking the revenue stream for the bank to a particular establishment is less than straightforward.

Using the data to examine the effect of both firm restructuring (closing and opening establishments) and mergers and acquisitions (ownership changes for existing establishments) shows for most industries that:<sup>17</sup>

- *Firm restructuring is productivity enhancing*; that is, exiting establishments that also entail the exit of the firm are typically the least productive, and entering establishments of continuing firms are more productive than entering establishments of new firms. This pattern of highly productive entering establishments for continuing firms is especially pronounced in retail trade, where the productivity gap between entering establishments for large, national chains and exiting small, single-unit establishment firms is especially large. In short, the displacement of small mom-and-pop stores by the big-box national chain stores has contributed substantially to productivity growth in the retail trade industry.
- *Ownership change is concentrated in more productive establishments*; that is, continuing establishments are more productive both before and after ownership change than establishments that did not change ownership. There is relatively little evidence that the ownership change increases productivity except for establishments in the semiconductor industry. Instead, it is the more productive establishments that change owners.

In general, *industry productivity dynamics are closely linked to firm entry and exit and restructuring*. At the very core of all of this dynamics are firms trying to find the right path. The remainder of the chapter explores how the choices about the workforce and workforce practices contribute to this search for the right path by firms.

### *Worker Turnover, Workforce Quality, Earnings, and Productivity*

Firms across the five industries have very different workforce quality, pay, and worker turnover patterns.<sup>18</sup> Two measures of *workforce quality* are used: a comprehensive measure called “human capital,” which reflects the value that the market places on all worker skills (particularly educational attainment, plus problem-solving skills, people skills, social networks, and luck) including experience; and a more narrowly defined measure called “individual skills,” which is the human capital measure excluding the contribution of experience.<sup>19</sup> These two measures permit the separation of experience from education and other personal attributes. Table 4.1 documents the proportion of workers in each industry who are above the national median level for each measure.

Software and, to a lesser degree, semiconductor companies have high

TABLE 4.1 **Productivity, workforce quality, churning, earnings, and size by industry.**

Sector	Year	Revenue/ worker (\$)	Churning rate (%)	Human capital (%)	Person effect (%)	Employment (number)	Payroll/ worker (\$)
Financial services	1992	143,814	16.8	48.3	57.1	18.9	24,433
	1997	117,857	15.9	61.6	63.1	18.2	23,397
Retail food	1992	138,176	28.7	31.2	46.7	16.1	9,343
	1997	140,355	24.3	40.6	50.3	16.6	9,068
Semiconductors	1992	141,306	13.2	56.6	48.4	82.4	26,873
	1997	555,483	13.2	65.7	53.9	84.5	28,188
Software	1992	116,952	20.2	72.3	74.1	19.0	35,220
	1997	139,924	17.1	79.0	77.0	23.0	38,671
Trucking	1992	97,891	26.9	54.5	39.3	13.9	17,547
	1997	99,313	21.3	67.4	46.0	14.1	17,307

proportions of high-skill workers with both individual skills and experience, and skills in software are better compensated than in semiconductors. By contrast, firms in the retail food industry have high proportions of workers with both low individual skills and little experience. Meanwhile, workers in the trucking industry have surprisingly high levels of experience and low levels of individual skills. The reverse phenomenon is evident in financial services. All of the industries exhibit substantial increases in both measures of workforce quality over the 1990s.

As noted earlier and as seen in table 4.1, average *earnings* are highest in software followed by semiconductors and financial services, then by trucking and finally by retail food. Workers in software generally earn about four times what workers in retail food earn. If workers were roughly paid the value of their marginal products, as predicted by simple economic theory, the rank ordering of industries by revenue per worker should be the same as the rank ordering of industries by payroll per worker, but this is not the case.

The relationship between productivity and workforce quality, churning, and earnings is striking. As seen in figure 4.3, businesses with higher-quality workforces are more productive, as expected.<sup>20</sup> Businesses that are more productive pay higher wages. Businesses with higher churning rates are less productive, which suggests that high levels of turnover might be costly and inefficient for firms. There is also a positive correlation between average pay and workforce quality, between average pay and employer size, and between workforce quality and employer size.<sup>21</sup>

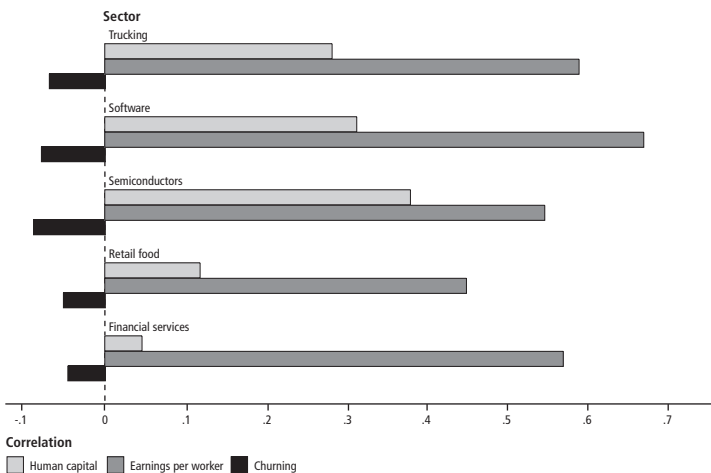


FIGURE 4.3. Correlation of productivity with human capital, earnings per worker, and churning.

## Workforce Quality, Churning, and Firm Survival

The next step is to investigate empirically how human resource practices affect firm survival.

### *Entry, Exit, and Workforce Quality and Turnover*

It's trite to say that in a service economy, the company is only as good as its workers. Yet clearly firms like Starbucks and Nordstrom have survived and prospered precisely because their human resource practice is to hire good workers and minimize turnover. The converse can also happen. One of the authors worked in one of the most popular fish and chip shops in Palmerston North, New Zealand (called Jolly Wally's Fish and Chips) when she was a high school student. The manageress trained the "girls," held the secret of the batter recipe, and ran the shop extremely well. But when a new owner bought the business and didn't treat the manageress well, she moved recipe, "girls," skills, and all to another fish and chip shop several blocks away. The first business didn't survive the high turnover and the loss of its high-quality workforce!

How does workforce quality and turnover affect patterns of exit and survival more generally? Figure 4.4a shows that workforce skill is very different across entering, exiting, and continuing establishments. Looking over a five year period in the 1990s, exiting businesses have a lower quality workforce than do surviving businesses, with the difference ranging from about 4 percentage points in semiconductors (not significant) to 19 percentage points in trucking. Entrants in semiconductors have higher-quality workforces, while entrants in retail food and trucking have lower-quality workforces than incumbents. In retail food and trucking, the human capital advantage of incumbents reflects differences in workers' experience rather than individual skill.

Churning rates display a pattern similar to human capital, as illustrated in figure 4.4b. Exiting businesses have turnover rates that are between 4 and 15 percentage points higher than the turnover rate for continuing businesses, and between 2 and 5 percentage points higher than that for entering businesses (except in financial services, where turnover is 2 percentage points *lower* in exiting firms). Continuing businesses have 5 to 10 percentage points lower turnover rates than do entering businesses. The differences in churning rates between entering and exiting establishments on the one hand and continuers on the other hand are especially large in the software and trucking industries.

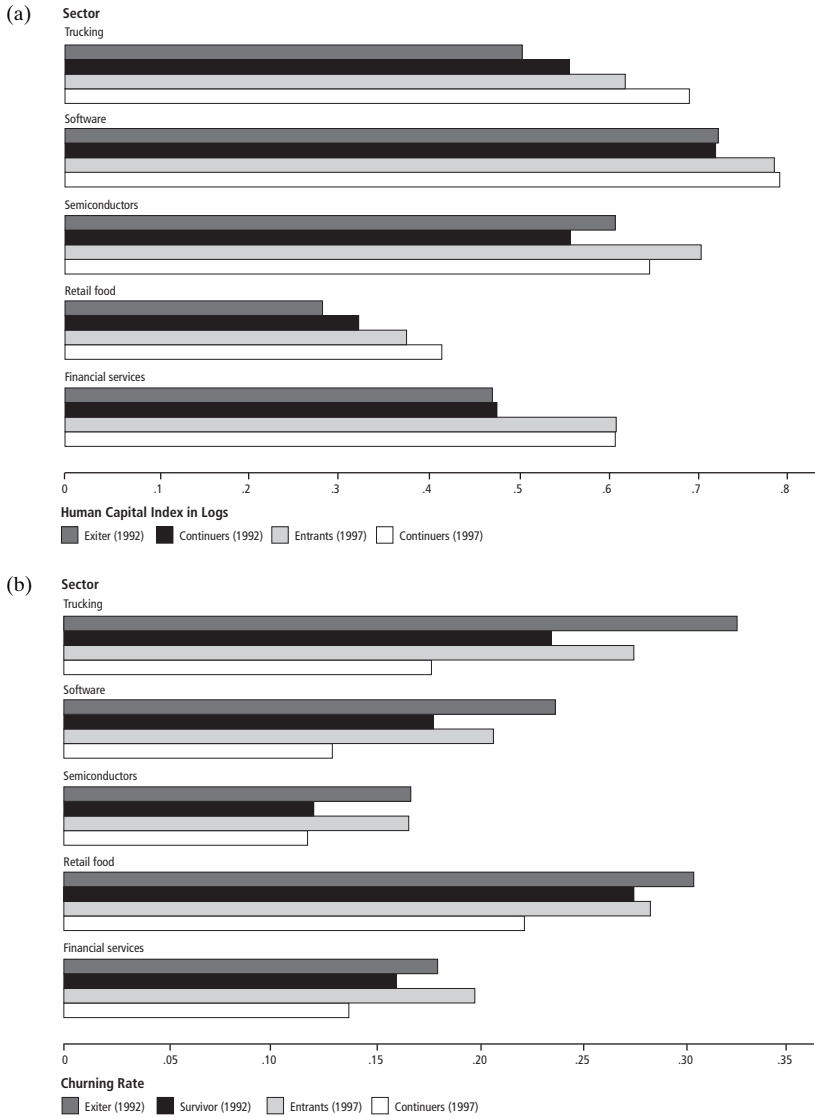


FIGURE 4.4. Differences across continuing, entering, and exiting establishments. (a) Human capital. (b) Churning.



Establishments that survive are more likely to have lower churning rates, to have higher workforce quality, and to be more productive than firms that do not. In general, establishments that exit are less productive and have higher turnover and lower workforce quality than firms that enter. The next section examines the separate effect of each of these factors on survival.

## **Market Selection: The Role of Firm and Workforce Characteristics**

How do firm characteristics and workforce quality and churning interact to affect firm performance and survival? A good approach to answering this question is to examine the relationships for interesting subsectors of the industries, securities brokers within the financial services industry and integrated versus fabless establishments in the semiconductor industry; and for interesting characteristics of firm's product markets.

### *Quantifying the Impact of Firm and Workforce Characteristics on Survival*

The impact of churning and workforce quality on establishment survival is summarized in figure 4.5, which shows quite dramatically that *even controlling for productivity and other establishment characteristics, workforce quality and worker churning significantly affect establishment survival*. In particular, higher-churning businesses are more likely to exit, and the impact of churning is significant across all industries. The magnitude of this effect is large: a 10 percentage point increase in the churning rate increases the likelihood of failure 5 percentage points in the semiconductor industry.<sup>22</sup> These results clearly suggest that high churning businesses are low profit businesses that are more likely to exit. The control factors yield other sensible patterns: larger establishments are less likely to exit and, except for firms in financial services, high-productivity businesses are less likely to exit.<sup>23</sup>

Of course, causality is unclear, since workers anticipating business failure may leave before the business fails, and this may drive up the turnover rate prior to a business exit. A few factors should mitigate such concerns about the interpretation of these findings. For one, the measure of workforce churning that is used abstracts from the net growth rate of firms, so it does not simply capture the downsizing that may occur prior to exit. Second, there is considerable persistence in churning patterns across busi-

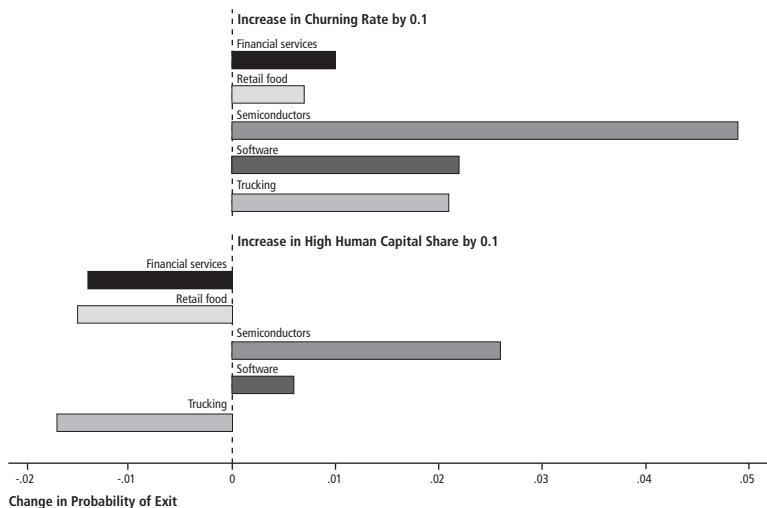


FIGURE 4.5. Impact of human capital and churning on the probability of establishment exit.

nesses. Some businesses have persistently low average churning rates relative to other companies even within the same narrowly defined industry. One interpretation is that these companies are actively engaging in workforce practices that lower the churning rate in the manner discussed in the introduction to this chapter.

The impact of workforce quality on firm performance and survival is less clear-cut, since the high-tech industries behave differently than do older industries. Establishments with high levels of human capital in financial services, retail food, and trucking are less likely to fail. In semiconductors, establishments with high levels of human capital are more likely to fail. This seemingly odd pattern most likely reflects the entry and exit of fables startup companies, which hire mostly design and other engineers and so have a higher average human capital than integrated companies, which hire a wide array of workers. These fables startups are small and risky given the fast pace of product innovation in the industry. In software, an industry also characterized by the rapid entry and exit of startup companies with high-skill labor, the effect is positive but not significant. Software entrants have a smaller support and administrative staff than established companies. Thus, it is not surprising that human capital plays a different role in the probability of exiting in high-tech industries than in the other industries.

The inverse relationship between human capital and the probability of exit for the traditional industries points to the importance of a high-quality workforce in long-run firm performance. Interestingly, when the same relationship is estimated including only individual skills as the measure of workforce quality (and excluding the effect of experience), the effect of a higher-quality workforce is to reduce the probability of exit significantly for four of the five industries. In semiconductors, the effect is insignificant, but still positive. Thus, the education and experience component of human capital works differently in software and semiconductors than in other industries. Young, highly skilled workers who know the latest technology are especially valuable in software and semiconductors, and so in these industries it is especially important to distinguish between experience and other dimensions of skills.

The basic message here is that businesses with higher-quality workforces and lower churning are more likely survive. This message does not imply that one size fits all or that these factors are perfect predictors of success or failure. Recall that in the retail food industry, Wal-Mart has succeeded with a low workforce quality and high worker churning strategy while Costco has succeeded with a strategy consistent with these findings. This leads to an obvious question: what is it about Wal-Mart's business plan that permits it to succeed with its low workforce quality and high turnover practices? This analysis suggests that the reason for Wal-Mart's success is that it is at the cutting edge of inventory and distribution management using advanced technology. It may be these other dimensions that permit Wal-Mart to succeed even though its human resource practices would be strong predictors of failure for the average company.

### **A Deeper Look within Industries**

So far, it is clear that firm performance, as measured by the entry of new establishments, exit of old establishments, and growth of continuing establishments, is closely connected to workforce churning and, to a lesser extent, to workforce quality. In general, businesses with high productivity, low worker churning, and high worker quality are more likely to survive.

However, this broad look at industry-wide dynamics sheds little light on how these factors actually play out within each industry, where different economic and political forces are at work. Four detailed characteristics in specific industries are now examined in depth in order to understand better the complex interactions between workforce quality and turnover and firm performance and survival. First, in the financial services sub-industry of securi-

ties brokers a better *measure of revenue* and firm performance is used to shed light on firm dynamics. Second, the performance dynamics of *design-only fabless companies* in the semiconductor industry are compared to those of companies with fabrication facilities. Third, the performance of retail food or trucking establishments in *national firms* is examined and compared to that of regional and local firms. Finally, the impact of *establishment and market size* on firm performance in the software industry is analyzed in detail.

### *Securities Brokers*

How does the measurement of firm performance affect the analysis of the financial services industry? Measuring revenue and firm performance in financial services, and especially in banking, is problematic. However, revenue numbers are more reliable and sensible indicators of value added in the narrowly defined securities brokers industry (SIC 6211), since brokers are largely providing a transaction service. This sub-industry within financial services provides a view into how firm performance and firm survival may be related in financial services.

Overall, the patterns are very different for securities brokers than for the remainder of the financial services industry, and in particular, patterns that are more consistent with our findings for the other industries. Overall productivity growth for securities brokers was positive in the 1990s. Not only did productivity increase substantially for industry incumbents, but also entering establishments are much more productive than exiting establishments. These sensible patterns for security brokers suggest that the anomalous findings for the overall financial services industry are likely due to the difficulties of measuring and interpreting revenue per worker for many financial services establishments.

### *Fabrication vs. Fabless Semiconductor Establishments*

Earlier results indicated that productivity and human capital in the semiconductor industry have grown remarkably. To what extent does this reflect the restructuring of the semiconductor industry in the 1990s with the rise of fabless semiconductor companies in the U.S. and the growth of foundries in Asia? Clearly, the fabless startups have workers with high human capital, especially individual skills, and are also small and risky. It is likely that the characteristics and dynamics of the industry have changed substantially, since startups look quite different from large, established integrated establishments (with fabs).

Most entrants in the domestic industry in the 1990s have been fabless establishments, and case study analysis by the Sloan Semiconductor Industry Center suggests that integrated establishments have at least three hundred employees.<sup>24</sup> The number of fabless establishments increased dramatically relative to integrated establishments in the 1990s, but fabless establishments still account for a relatively small share of total industry employment and sales. The fabless establishments are indeed much smaller and more human capital intensive and have higher revenue per worker than integrated establishments. Fabless establishments that entered in the 1990s are especially high-productivity and high-human-capital establishments. Continuing fabless establishments did not exhibit much skill upgrading (they were high skill in the first place). Fabless establishments that exit are likely not to have been able to sell their designs, and so are low productivity, but not especially low skill.

#### *National vs. Regional vs. Local vs. Single-Unit Establishment Firms*

The retail food and trucking industries have also been restructuring, albeit in a very different way from semiconductors. The firm organization of these industries has been revamped with the rise of national superstore chains in retail food and the bifurcation between national trucking and smaller locally oriented trucking companies. In retail trade, the rise of box stores from national chains like Wal-Mart and Costco as well as national chains for everything from coffee shops (e.g., Starbucks) and restaurants (e.g., Applebee's and Olive Garden) is ubiquitous. In trucking, large national firms like J.B. Hunt are increasingly running the trucks that are on the interstates doing the long hauling.

Establishments in retail food and trucking have different characteristics and dynamics depending on whether they are part of a large national firm with many establishments across many states, or a regional or local firm. To investigate these differences, establishments are classified into one of four groups:

- single unit (firm is one establishment)
- local (establishment is part of a multi-unit establishment firm that operates in only one state)
- regional (establishment is part of a multi-unit establishment firm that operates in two to five states)
- national (establishment is part of a multi-unit establishment firm that operates in six or more states).

Most establishments in the retail food and trucking industries are single units, but national establishments account for a disproportionate share of sales. Two-thirds of retail food stores are single units, but these establishments account for only one-third of employment and one-quarter of sales. The share of sales accounted for by establishments from large national chains grew rapidly over the 1990s.

In retail food, national and regional establishments are more productive, are larger, pay higher wages, are more human capital intensive, and are much more likely to survive. Establishments from large national chains increased their productivity advantage both by entry and exit, with an entrant having higher productivity than an exiting establishment, and by smaller productivity losses for continuing national establishments compared to regional. Skill upgrading occurred in all types of establishments, but skill upgrading is especially marked among single-unit establishment firms. Perhaps the only mom-and-pop stores that survived given the intense competition from the large, national chains are those that upgraded the skills of the workers.

Both regional and national establishments exhibit greater churning than local and single-unit establishment firms. Among national establishments, those with especially high churning exited. More human-capital-intensive national establishments are more likely to exit, which may reflect a shift in the composition of national establishments from grocery store chains to superstores over this period of time.

In trucking, national establishments stand out as being larger, more skill intensive, more productive, and lower churning compared to regional and local. However, establishments from national firms lost some of their productivity advantage over the 1990s in the trucking industry as the entry and exit dynamics worked in the wrong direction—the productivity of entering establishments is below the productivity of exiting establishments. All types of establishments exhibited increases in workforce skill and decreases in churning.

### *Small vs. Large Software Establishments*

The software industry has become bifurcated into companies serving two types of markets: those with small, custom-designed software products and those with very large prepackaged software products. To explore the differences across small and large software establishments, establishments are classified into small (twenty or fewer workers) and large (more than 20 workers), since the national average establishment size in software is

twenty workers. In the 1990s, large software producers accounted for about 20 percent of the establishments and more than 80 percent of the sales. Large software producers have higher revenue per worker, pay higher wages, are more skill intensive, and have slightly lower churning compared to small producers. These differences between large and small establishments stayed roughly constant over the 1990s except the productivity gap widened, with greater productivity gains for continuing large establishments.

The data also show that productivity has a positive impact on the probability of surviving for large establishments, while churning has an especially large adverse impact for small establishments. These results are consistent with the large packaged producers needing high volume to survive and the small custom producers using designated teams to respond to customer needs and service.

## **The Bottom Line**

*Firm performance is tightly linked with workforce quality and churning.* Measures of productivity, workforce quality, and turnover are highly correlated across businesses in each of our five industries. High-productivity businesses have a higher proportion of workers with high human capital, including education, individual attributes, and experience. It is not a coincidence that Wegman's, rated number one in the Fortune 100 best places to work, is identified by the *Progressive Grocer* as one of the strongest regional grocery chains.

*Firm survival is a function of all of these factors: businesses with high productivity, low churning, and high human capital are more likely to survive.* The patterns of these results vary substantially across the five industries. For example, churning is especially important in semiconductors and retail foods while, interestingly, workforce quality is especially important in the trucking and retail food industries.<sup>25</sup> In other words, Ford's five-dollars-a-day model is as instructive today as it was a hundred years ago.

*Understanding the detailed characteristics and evolution of each industry helped us to interpret the patterns across industries.* Some of the anomalous patterns for the semiconductor industry, for example, seem to be driven by the rise in fabless startups. Software startups with niche products look quite different than their older high-volume counterparts. In retail food and trucking, large disparities exist between the characteristics and dy-

namics of establishments that are part of national chains as opposed to small, local establishments. Industry knowledge is critical for understanding how firms operate and the outcomes for both the firm and its workers.

Heeding the advice of H. L. Mencken, that complex problems have simple, easy-to-understand, and wrong answers, this chapter has spelled out in detail the complex interrelationship between an establishment's workforce, performance, and survival, and, in turn, industry growth. The next obvious question is: what is the impact of establishment performance on individual workers? This question is addressed in the next two chapters.



## Firm Turbulence and Job Ladders

### Introduction

Are good jobs disappearing? Lou Dobbs in his *Exporting America* (2004) thinks so: in his view too many U.S. companies are sending American jobs overseas and choosing to employ cheap overseas labor.<sup>1</sup> Chinese and Indian software engineers work for Microsoft in Beijing and Bangalore; Intel assembles most of its chips abroad; call centers for American consumers are located in India and the Philippines. Some companies are even more extreme. SeaCode Inc. is one of them: its owners did not even go overseas to employ foreigners. They planned to hire six hundred foreign software engineers to work on a cruise ship three miles off the California coast so that they could avoid paying U.S. wage rates and obeying California labor laws while still having a location close to headquarters and workers in the same time zone.<sup>2</sup>

The America of Horatio Alger seems to be vanishing. Domestic and foreign competition are eroding the number of jobs with high pay and good growth potential. As a *Business Week* article pointed out in 2003:

There has been much talk recently of the “Wal-Martization” of America, a reference to the giant retailer’s fervent attempts to keep its costs—and therefore its prices—at rock-bottom levels. But for years, even during the 1990s boom, much of Corporate America had already embraced Wal-Mart-like stratagems to control labor costs, such as hiring temps and part-timers, fighting unions, dismantling internal career ladders, and outsourcing to lower-paying contractors at home and abroad.<sup>3</sup>

Whatever the causes, there are always news stories about the economic vulnerability of even high-educated people in competitive industries. They

often start with anecdotes about people like Sandra (“Candy”) Robinson, a software engineer with a BS in electrical engineering, MS in computer science, an MBA, and twenty-three years of experience, who was earning \$89,000 when, in January 2001, her company merged with Citigroup and she was laid off. Candy has been out of work ever since. In over two years, she has had only three interviews and no job offers.<sup>4</sup>

But there is a flip side to the picture. For every story about people like Candy, there are other stories about workers who stay with one firm and succeed. Carol Primdahl represents such a story. She received a BS in mechanical engineering and then joined Texas Instruments in 1986. From 1987 through 1993, Carol worked in one of TI’s Houston semiconductor manufacturing plants (fabs). In 1995, she was promoted to quality manager at a fab in Dallas. She received an MBA from SMU while working at TI, and has held three other positions within the company.<sup>5</sup>

Which of these sides of the picture is true? The fear described in the *Business Week* article, by Lou Dobbs, and by stories like Candy Robinson’s is that complex events like globalization, deregulation, and technological change demolish jobs and the good job ladders, like Carol’s, that Americans are used to. The promise implicit in Carol’s story is that competition on a global scale will help create strong job ladders like the one she has scaled.

So how much truth is there to the basic fear haunting Americans that “good jobs” have been lost? Defining a “good job” is not easy. Most would agree that TI’s Carol Primdahl has a good job because she works in a firm with long-term job ladders that provide career development. Most would also agree that Candy Robinson’s job was not so good: her job ladder abruptly ended. But this begs the question: how can a job ladder be defined? In this chapter, three core characteristics are used: job tenure, initial earnings, and earnings growth.<sup>6</sup>

These three characteristics define literally millions of job ladders in millions of firms for tens of millions of workers. In order to tell this chapter’s story of the impact of economic turbulence on typical job ladders, those ladders had to be characterized, and then the impact of firm size, growth rates, and turnover had to be measured. Finally, because employment, earnings, and earnings growth are systematically different for workers who differ by gender, age, and skill, the impact had to be measured for different types of workers. Then, and only then, was it possible to describe how economic turbulence—firm expansion and contraction coupled with worker turnover—contribute to job ladders’ differences and begin to explain the difference between Candy’s and Carol’s experiences.

How can these events like globalization, deregulation, and foreign competition be measured and quantified? *The truth is that they can't be.* The best that can be said is that after interviewing key players and studying particular industries, experts have judged that these factors are important to different degrees in different industries. What *can* be measured are the outcomes: how much firms in different industries are expanding and contracting, hiring, and shedding workers, and offering different types of job ladders.

The rest of the chapter spells out some of the ways in which economic turbulence affects job ladders. Some common themes will become clear as you read the next sections.

- *A firm's growth and turnover rates can provide some clues to whether the firm offers "good jobs."* High worker turnover at a firm indicates lower-quality job ladders. Large firms and growing firms provide some of the best job ladders. Conversely, small firms and shrinking firms tend to provide the fewest and the worst job ladders. However, small growing firms often provide excellent job ladders, especially in semiconductors, financial services, and trucking.
- *Even when a company offers good job ladders, only a select group of workers may be able to move "up" onto these ladders.* Many high-turnover firms seem to follow an "up or out" strategy. In all industries except semiconductors, male workers who are able to keep their jobs in high-turnover firms end up earning more than similar workers in low-turnover firms. The fact that firm turnover and the growth in a worker's earnings go hand in hand suggests that some firms follow a strategy for advancing the careers for only a selected group of workers rather than all workers.
- *Men experience better job ladders than women, who are less likely to have good jobs than are men.* In each of the five industries, women's job ladders had lower initial earnings and earnings growth than do men's, even when the women and men have the same education. However, economic turbulence has a similar impact on the job ladders for both men and women.

## **A Potted History of Job Ladders in Each Industry**

How did job ladders evolve, and what are the forces changing them? The answers are different for each industry.

Large semiconductor firms used to be known for establishing job ladders that encouraged the development of worker skills and commitment.

Even in the 1980s, when intense global competition and an ever increasing pace of technological change forced chip companies to be more market driven and performance based, they streamlined operations and downsized through “voluntary early retirement” programs. For example, in 1983, IBM offered workers at five locations a voluntary early retirement program, where workers with twenty-five or more years’ experience could receive a bonus of two years’ pay over four years. IBM offered voluntary retirement programs again in 1986 and 1989.<sup>7</sup> These programs did not always work as the companies hoped, since often the better workers would opt to leave, and the workers who stayed were often those without good job opportunities elsewhere.

It wasn’t until the deep recession in the early 1990s that IBM, DEC, and Motorola, once known for their employment security, finally announced layoffs.<sup>8</sup> The new approach to downsizing included voluntary programs for targeted workers, and if workers did not accept the termination program, they could become subject to layoff. These programs were not seen as voluntary by the workers, although the programs with severance pay were substantially better than being laid off without severance pay. In 1991 and 1992, IBM selected workers eligible for termination that included a bonus of up to a year’s salary. Over 40,000 workers were “transitioned” out. Downsizing continued through 1993, and by 1994 actual layoffs were occurring at IBM.<sup>9</sup>

Similar downsizing occurred throughout the semiconductor industry. DEC, the second largest computer company in the late 1980s with over 100,000 employees, began layoffs in the early 1990s. Over 80,000 workers were laid off worldwide during the 1990s, before DEC was acquired by Compaq in 1998.<sup>10</sup> After Compaq was acquired by HP, 14,500 layoffs were announced in 2005.<sup>11</sup>

Then, with the dot.com bust in the early 2000s, massive rounds of layoffs by semiconductor companies occurred again. By the end of 2001, Motorola had laid off nearly 42,900 workers from its 2000 peak of 150,000 employees.<sup>12</sup> The volatile swings in demand meant that the idea of lifetime employment in the semiconductor industry was a thing of the past, although selected workers could still find excellent job ladders with long careers.

The software industry is characterized by two distinct types of firms with different HRM practices. Industry giants, like Microsoft and Oracle, have captured large market shares in specific product markets and produce and revise well-established products. Because they need to hire and retain high-skilled loyal workers who can maintain and expand their software

offerings, these firms develop extended job ladders and provide strong incentives for good workers to stay.

Job ladders are very different in those waves of software startups looking to create the next “killer application.” These firms occupy market niches that are on the cutting edge of new product development. Product turnover is high, and the startups are small and highly volatile. They are likely to adopt a “star” approach: hire star workers who are especially skilled at a specific application or sales and are highly mobile. If the new product is successful, the firm takes off. If not, the firm contracts and either the product line or the firm itself disappears.<sup>13</sup>

The two different types of strategies have coexisted for a long time. A 1999 *Business Week* story highlighted the pressures on Microsoft:

After 24 years as a talent magnet, Microsoft is grappling with a brain drain. Even though the software behemoth has one of the lowest turnover rates in the computer industry, some experts believe the loss of key people at all levels in the organization could threaten Microsoft’s ability to stay on top of the computer world. For years, company executives have preached that smart employees are their most crucial asset. “This loss of talent is a serious problem, if not the most serious problem Microsoft is facing,” says a programmer who left Microsoft this past spring.<sup>14</sup>

Human resource practices have been changing in the retail food industry since the entry of nontraditional food retailers, such as mass merchandisers and warehouse club stores like Wal-Mart and Costco, during the 1990s. Although promotion from within the store or chain was once a very common practice, store managers are now increasingly hired from outside the store and even outside the industry. 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.”<sup>15</sup> Industry restructuring has led to the development of two-tier wage structures, with most new hires facing lower pay and fewer job advancement opportunities.

The trucking industry has been shaped by unionization, and the Teamsters Union once was almost synonymous with trucking. Unions had significant clout in all corners of the industry. After deregulation began, however, intense competition led to a substantial decline in union density in many markets. Older unionized firms exited in record numbers, and the new nonunion firms changed the complexion of the industry quickly. New

nonunion carriers paid low wages with little or no health insurance and no pension plans. The recession of the early 1980s, and the resulting loose labor market, put pressure on both carriers and workers to haul freight for less.

Different practices do exist within the industry, however. For example, J.B. Hunt, one of the nation's three largest truckload (TL) carriers, began a bold experiment in paying for experience when it raised driver wages by 38 percent in 1997, partly in response to a documented 96 percent turnover rate. The resulting improvements in worker quality and retention rates improved both productivity and profits for the company. J.B. Hunt touts its pay and benefits on its Web site:

At J.B. Hunt, we're committed to providing drivers with the best job in the truckload industry. To demonstrate this commitment, we took a bold leap several years ago and invested in our drivers by giving them a 33% wage increase and the potential to earn up to 41 cents per mile. Since then, industry wages have remained stagnant; and we're baffled that many drivers are still content to earn the equivalent of minimum wage while our drivers receive top dollar!

The job itself doesn't change much from company to company; any carrier will give you a truck, some miles, and a day off once in a while. But your questions remain: What's the condition of the equipment? How much will I earn? Will the miles be there? We excel in each of these categories, and we have one question of our own: Why would you pick up the same freight from the same docks as our drivers and allow yourself to be paid less, year after year? Let us assure you that we will have our fair share of America's freight, and we will get you the miles.

In these times, you can't afford to leave your family in financial uncertainty. We'll give you a paycheck you can count on every week—and remove the worry about whether your check will cash and whether your company will even still be in business. Our stability is something you can rely on, year after year. And we want you to enjoy long-term satisfaction—not just for one year or two, but for ten years, fifteen, or however many years you drive. A 100% conventional OTR fleet, earning two days off for seven on the road, and our permanently assigned equipment option were all put in place to ensure driver satisfaction.<sup>16</sup>

Despite the success of this strategy, the changes made by J.B. Hunt remain the exception rather than the rule in the trucking industry.

The financial services industry also changed its HRM practices as it underwent deregulation and consolidation as big companies bought up

small ones. First Union and Bank One are excellent examples. Both of these grew spectacularly over the 1980s and 1990s, mostly as a result of acquisitions. Both overdid it. Bank One ended up struggling, and being bought by JPMorgan Chase & Co.<sup>17</sup> JPMorgan itself is an investment bank which previously bought Chase, a commercial bank that had already been through a series of mergers.

Chase, Citicorp, and Merrill Lynch made big employment cuts in the late 1990s, but usually layoffs are more incremental. Financial services tend to have high enough turnover that employment can be reduced through attrition. For example, First Union restructured its retail division in the second half of the 1990s, but it was able to cut employment through attrition and performance-based cuts rather than layoffs.

Workers with relatively little education had long had opportunities in financial services firms, especially local banks and insurance agencies, to gain skills and advance over time to well-paying positions. But this has become increasingly rare over the past twenty years. Many of the old job ladders in financial services companies have been destroyed amid increasing segmentation of jobs with different educational requirements.<sup>18</sup> For example, large retail banks transitioned to a sales orientation, and their turnover increased both voluntary and forced separations of workers with low sales performance. Turnover remained higher even after the transition because the banks no longer have a civil service mentality. The whole industry begins to look more like investment banking and brokerage houses.

In sum, job ladders in firms have changed in very different ways in response to the economic turbulence sweeping their industries. But there's no question that there is wide variation in HRM practices and firm characteristics among firms within an industry, as well as across industries. The thirty-two companies in our five industries that were featured in Fortune's listing of the "100 Best Companies to Work For" (2005) display a wide range of characteristics—by size (small to large), by employment growth (negative to highly positive), and by voluntary turnover (from 3 percent to 32 percent).<sup>19</sup> Eleven large growing companies and seven small growing companies, which tend to offer the best job ladders, made the list, but so did seven companies that decreased employment over the year. Perhaps most surprising was the variation in voluntary turnover at these good employers, who exhibited both low (3 percent to 6 percent) and high (13 percent to 32 percent) voluntary turnover in software, financial services, and retail food. Only semiconductors did not have any best companies with high turnover; its three best companies all had voluntary turnover no greater than 5 percent.

Sloan Industry Center researchers have certainly found that different firms treat workers differently. Some companies create and reward loyalty. They provide their workers with career development up long job ladders that begin with high initial earnings and provide earnings growth that reflects skill development. As a result, workers provided access to these job ladders tend to stay. Companies like TI Semiconductors, PeopleSoft, USAA Insurance, Wegmans Food Markets, and Roadway Express develop reputations for being good employers. The next section examines whether such firms are the exception or the rule in their industries.

### **Measuring Job Ladders**

Job ladders can best be measured with initial earnings, earnings growth, and tenure, or the length of time a worker is employed at a firm. But because firms offer different types of job ladders by education and the jobs available also vary by age and gender, this means that there are literally hundreds of job ladders in each of the industries. As a result, it was a major task to identify typical patterns for each group. Fortunately, 70–80 percent of the workforce are between 25 and 54 years old, and so it is possible to separate most workers into two age groups: a “younger” group (aged 25–34 years old) and into a “middle-aged” group (aged 35–54 years old).<sup>20</sup> Because job ladders vary by gender and education, separate categories are created for those groups as well—the education categories being comprised of “low,” roughly high school and less; “medium,” some college; and “high,” college graduate and above.

It was also a major challenge to capture the impact of economic turbulence, like firm employment growth and worker turnover, on each career ladder. The firms are straightforwardly categorized as growing or shrinking; and also by whether they have high or low turnover rates.<sup>21</sup> Growing firms are obviously having jobs reallocated to them from shrinking firms, while high-turnover firms are disproportionately contributing to worker turnover. Firms are also categorized as large or small because the effect of volatility differs by firm size.<sup>22</sup>

The impact on job ladders of both job reallocation across firms as they grow and shrink plus worker turnover within firms was modeled for each of the five industries with twelve categories of workers and eight types of firms (see appendix C for details). In fact, a job ladder and career path calculator was created that describes the impact of each factor on initial earnings, job growth, and final earnings, and this is accessible for all 480 job lad-



ders on this book's Web site, [www.economicsturbulence.com](http://www.economicsturbulence.com) (you can also calculate your favorite career paths in each industry). Of course, there are too many to be summarized in this chapter, so the following sections explore some basic facts about the most prevalent job ladders and describes common patterns.

### **Some Facts about Jobs and Firms**

Short jobs lasting less than three years are common, and not just in trucking and retail food. Six in ten ongoing jobs for workers aged 25 to 55 years old have lasted less than three years (and even less time in software). American workers are extremely mobile across employers and industries. Although this probably reflects personal decisions to change jobs as well as the company's decision to fire workers, the data do not distinguish between the two. But this worker mobility means that there are lots of opportunities for the first step on the ladder. New hires account for one out of every three jobs in software, retail foods, and financial services, but only one out of every six jobs in semiconductors and trucking.

Long jobs lasting more than five years are less common than short jobs, but long jobs are more common in some industries than others. Even in large growing firms with low turnover, which are known for providing good jobs in their industries, the proportion of workers who keep their jobs for five years or more varies enormously across industries.<sup>23</sup> Surprisingly, the low-wage industries of retail food and trucking are the most likely to have long jobs, where 40 percent of workers have jobs that have lasted at least five years. In the three high-skilled sectors, only one in four workers in the semiconductor industry, only one in five workers in financial services, and a mere one in seven workers in the software industry have jobs that have lasted five years or more.

Not surprisingly, most jobs are in firms where the growth is. Jobs are provided predominantly by growing firms and by large firms.<sup>24</sup> *Growing firms* provided 65 percent to 70 percent of jobs in all five industries in 2001. *Large firms* provided the majority of jobs, from 55 percent in software to 85 percent in semiconductors, except in trucking, where 55 percent of jobs are in small firms. So even though Lou Dobbs lists as many firms as he can find that are outsourcing jobs, much of the impact on the labor market can be gleaned simply by examining what the largest and fastest-growing firms are doing.

But in some industries, stable jobs are hard to find. *Growing firms with low turnover*, the most stable firm type, provide over half (50 percent to 58 percent) of jobs in financial services and semiconductors, but only 38 percent of software jobs, and only 25 to 30 percent of jobs in trucking and retail food. And the proportion of jobs that are in *high turnover* firms, which are likely to be quite unstable, varies dramatically by industry. Over 40 percent of jobs are in high-turnover firms in retail food, compared with only 10 percent of jobs in semiconductor. The trucking industry has a variety of different firm types. *Surprisingly, small growing firms with high turnover* are the largest provider of jobs in trucking and account for 25 percent of jobs. Two-thirds of jobs at these firms last fewer than three years. So although J.B. Hunt may have high visibility and show up in many anecdotes about the trucking industry, the data show that many trucking companies are small companies unknown to the general public.

### **What Happens to Jobs in Shrinking Firms?**

Much of the fear of the loss of good jobs stems from a fear that when firms shrink as a result of competition, workers like Mark McClellan will lose their jobs. But firms can have different strategies. Some firms follow a LIFO strategy (last in, first out), while others follow a FIFO (first in, first out) strategy.

In fact, firms in different industries differ. Case study evidence indicates that in semiconductor companies, experienced (and higher-paid) engineers are replaced by younger engineers with newer skills—a FIFO strategy. This is confirmed by data. Large shrinking semiconductor firms have even fewer long jobs than do large expanding firms. By contrast, shrinking software firms do not reduce their proportion of long jobs, suggesting that, unlike shrinking semiconductor firms, shrinking software companies do not replace experienced workers with new hires. A LIFO approach is common for most firms in financial services and trucking: shrinking firms have more long jobs than do expanding firms, although in retail food, shrinking firms have the same high percentage of long jobs as growing firms.

Why do firms in different industries follow different approaches? Part of it may be cost: higher-wage industries may downsize by replacing experienced workers with lower-cost new hires at an accelerated pace, while shrinking firms in low-wage industries may adjust by simply reducing the number of new hires unless prevented by union contracts. Another possi-

bility is that experienced, better-educated workers in high-tech industries have more options, and so are able to leave, while their counterparts in the low-wage industries have fewer places to go, although the next chapter will show that this scenario is probably not common. Workers who change jobs typically end up with lower incomes than the workers who keep their jobs. Candy Robinson's experience is quite common: even good education and job experience could not guarantee her a good job when she was laid off.

## Job Ladders and Workers

The best way to explore the different types of job ladders offered by firms is through graphs, so this section shows some *typical earnings paths* for jobs that have lasted at least five years for each worker and firm type in each industry.<sup>25</sup> What does examining these hundreds of job ladders show?

*Growing firms offer better job ladders than do shrinking firms, both to low-educated workers and high-educated workers.* Figure 5.1 is a classic example: it shows the typical job ladders faced by middle-aged men in the semiconductor industry. Job ladders for low-educated men are heavily affected by whether they work in a growing or a shrinking firm. Those who land jobs in the growing firms typically start out \$5,000 more than low-educated men in shrinking firms and maintain their earnings advantage

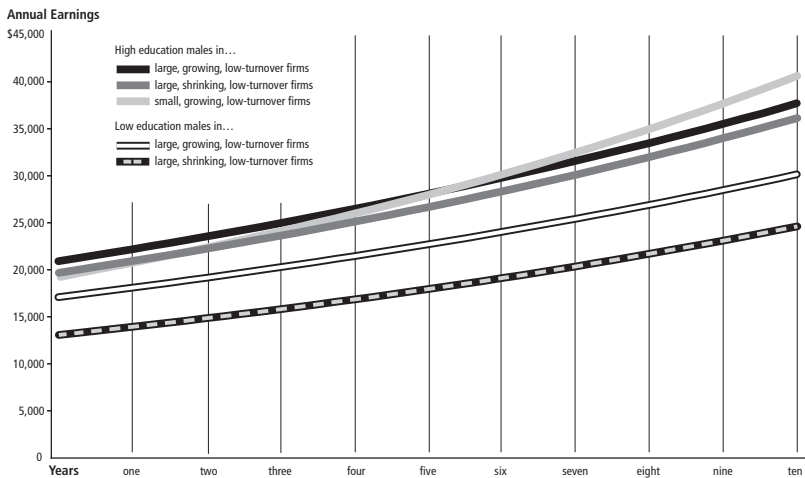


FIGURE 5.1. Job ladders for middle-aged workers in the semiconductor industry.

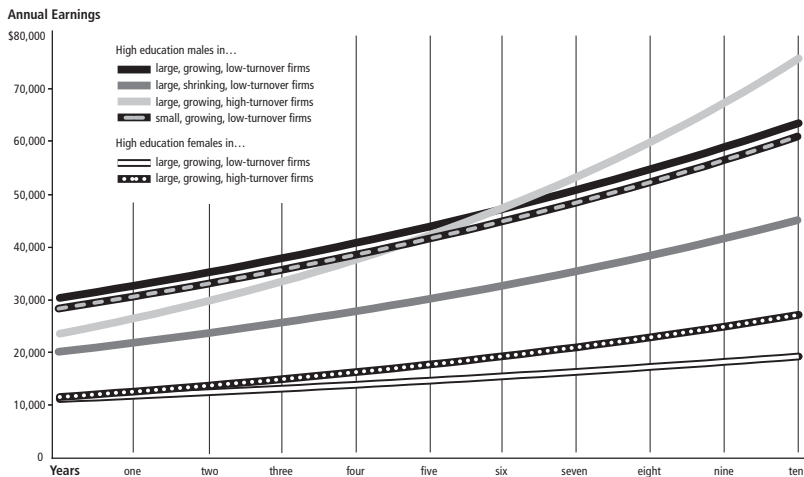


FIGURE 5.2. Job ladders for middle-aged workers in the financial services industry.

over time. The same pattern holds for high-educated men, although the gap is quite a bit less: about \$2,000.

*Large firms usually offer better job ladders than small firms*, although this is not true in the rapidly changing semiconductor industry. *Small low-turnover firms* in this industry, which are likely to be early-stage design companies, mainly hire highly trained technical personnel and offer relatively good job ladders for the college educated. As figure 5.1 shows, these firms offer better job ladders than large growing firms. Although initial earnings are lower, earnings growth is high, and by the end of a decade, the earnings of engineers at these successful startups have passed those of engineers at large growing firms.

*High-turnover firms tend to have inferior job ladders*, but this is not always the case. In financial services, job ladders for high-educated middle-aged men are better than in high-turnover than in low-turnover (large, growing) firms (see figure 5.2). The men start with lower initial earnings in the high-turnover firms, but they have higher earnings growth and after five years pass the men in the low-turnover firms. However, many of the men in the high-turnover firms are unlikely to keep their jobs long enough to catch up and pass their peers in the low-turnover firms. Women in financial services find that the same is true for them: women in high-turnover growing firms end up with considerably higher earnings at the end of a decade compared to their peers in low-turnover (large, growing) firms.

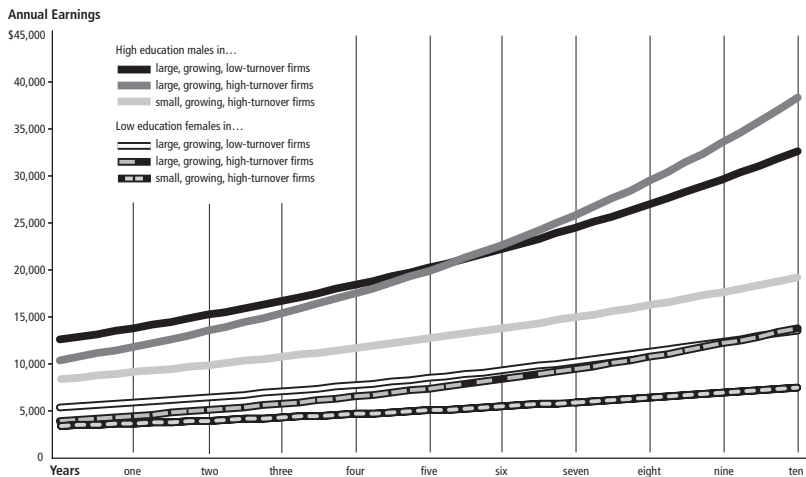


FIGURE 5.3. Job ladders for middle-aged workers in the retail food industry.

The other job ladders in figure 5.2 reinforce the observation that large firms pay more than small (growing) firms, although the difference shown for high-educated middle-aged men is small. They also reinforce the observation that the difference between job ladders in growing and shrinking (large, low-turnover) firms is much greater for these men. In this industry, men who work in growing firms start off with \$10,000 more in earnings and end up ten years later with almost \$20,000 more.

*The most startling difference in these job ladders is between women and men.* Even among long-tenured high-educated, middle-aged workers, women earn considerably less than men in financial services, and fare much worse than in the other industries. In large growing firms, men start out earning over twice what women make, and at the end of a decade the men are typically making up to three times what the women make in this white-collar industry once thought a good place for women to work.

*In some industries, where a worker works matters even more than the worker's education level.* Job ladders in the low-wage retail food industry are a classic example of this (see figure 5.3). The data on both high-educated male and low-educated female (middle-aged) workers in large and small (growing high-turnover) firms show that large firms pay slightly higher initial earnings and have higher earnings growth. At the end of a decade, workers in large firms earn over 80 percent more than comparable workers at small firms. The earnings differences by firm size are so dramatic

that low-educated workers (both males and females) in large firms, if they are able to keep their jobs, eventually earn more than their high-educated peers at small firms (not shown). The bottom line is that a bagger who moves up to stocker in a large store will end up making much more than the worker who does a variety of jobs in a small store.

However, initial earnings are important to workers in retail food, since turnover is high and many workers see it as a way to earn money while they go to school or take care of families. *Large growing low-turnover* firms, which are often unionized and provide between 5 and 10 percent of the jobs in this industry (depending upon education and gender), pay initial earnings that are at least 20 percent higher than other types of firms (shown here for high-educated men and low-educated women). Their high-turnover counterparts provide higher earnings growth, but it takes five years for the high-educated men to catch up and almost ten years for the low-educated women to catch up with their peers in the low-turnover firms.

What is the overall picture of the job ladders provided by different kinds of firms to different types of workers? Table 5.1 summarizes this by showing average initial earnings (first row) and average earnings growth (second row) for the two most prevalent education groups for middle-aged men and women. In order to compare the earnings across firms in an industry, row three reports earnings at the end of ten years as a proportion of the earnings of men in the highest education group shown in a growing, large, low-turnover firm.

Starting earnings vary dramatically by type of firm. A typical male worker who is high-educated and gets a job in a growing, large low-turnover financial services firm, for example, will start out at about \$30,236 and experience an average earnings growth of 7 percent. A similar worker who gets a job in a firm that is shrinking, but still large and still low turnover, will get only \$19,817. And at the end of ten years, that worker will only end up with 70 percent of the earnings that his counterpart had. Earnings also vary by gender. The job ladder is substantially worse for his high-educated female counterpart. She would start at \$11,081, her income would grow by about 5.5 percent, and she would end up with earnings that are 30 percent of the male's.

How does this vary across industries? The same set of comparisons in retail food shows that a typical high-educated male worker in retail food who gets a job in a growing, large low-turnover firm, would start out at about \$12,483—only 41 percent of the starting pay of his counterpart in

TABLE 5.1 Job ladders, workers age 35-54.

	Males						Females					
	+ Growth		+ Growth		- Growth		+ Growth		+ Growth		- Growth	
	Large Low T/O	High T/O	Small Low T/O	High T/O	Large Low T/O	Large High T/O	Large Low T/O	Small Low T/O	Small High T/O	Large Low T/O	Small High T/O	Large Low T/O
<i>Financial Services</i>												
Medium Education	\$19,436 0.081	\$15,765 0.118	\$17,688 0.087	\$18,101 0.109	\$14,602 0.085	\$8,780 0.062	\$8,038 0.086	\$6,655 0.070	\$7,256 0.090	\$7,835 0.065		
High Education	\$30,236 0.074	\$23,447 0.117	\$28,012 0.077	\$24,119 0.106	\$19,817 0.082	\$11,081 0.055	\$11,479 0.086	\$8,955 0.060	\$9,830 0.086	\$9,937 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 0.108	\$7,143 0.141	\$4,468 0.088	\$5,628 0.092	\$8,028 0.123	\$5,243 0.095	\$3,880 0.126	\$3,655 0.060	\$3,437 0.079	\$3,488 0.116		
High Education	\$12,483 0.096	\$10,339 0.131	\$8,059 0.073	\$8,452 0.082	\$10,230 0.089	\$7,971 0.083	\$5,482 0.116	\$4,542 0.044	\$4,845 0.069	\$5,450 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 0.054	\$13,427 0.063	\$14,068 0.068	\$15,517 0.076	\$16,330 0.061	\$11,808 0.039	\$9,600 0.021	\$7,712 0.048	\$8,050 0.085	\$8,630 0.036		
High Education	\$20,904 0.059	\$19,391 0.040	\$19,102 0.075	\$18,676 0.086	\$19,530 0.061	\$12,765 0.044	\$11,264 -0.002	\$9,694 0.054	\$8,973 0.064	\$9,369 0.036		
	1.00	0.77	1.07	0.86	0.95	0.53	0.29	0.44	0.45	0.36		

*Software*

Low Education	\$16,316 0.078	\$18,174 0.104	\$15,372 0.083	\$15,524 0.099	\$17,074 0.077	\$10,397 0.054	\$12,232 0.082	\$9,348 0.069	\$10,001 0.093	\$11,265 0.061
High Education	\$22,551 0.086	\$22,895 0.087	\$19,898 0.074	\$22,402 0.084	\$19,748 0.075	\$15,204 0.062	\$14,587 0.065	\$13,434 0.061	\$12,205 0.078	\$14,584 0.059
	1.00	1.03	0.79	0.97	0.78	0.53	0.53	0.46	0.50	0.49

*Trucking*

Low Education	\$11,519 0.036	\$9,140 0.077	\$9,214 0.057	\$8,798 0.080	\$10,815 0.063	\$7,212 0.032	\$6,040 0.072	\$5,717 0.078	\$5,765 0.090	\$7,700 0.086
Medium Education	\$11,946 0.051	\$9,876 0.073	\$11,001 0.058	\$9,669 0.075	\$11,279 0.075	\$9,204 0.047	\$7,931 0.068	\$7,210 0.079	\$8,390 0.086	\$9,005 0.099
	1.00	1.03	0.99	1.02	1.21	0.74	0.79	0.80	0.99	1.22

Cells contain mean initial earnings, net annualized earnings growth rate across the simulated career path, and simulated final earnings level as a proportion of the final earnings of the corresponding highest-educated male worker shown in a growing, large, low-turnover firm. Benchmark levels of earnings at end of period are financial services, \$63,377; retail food, \$32,556; semiconductors, \$37,699; software, \$53,082; and trucking, \$19,901.



financial services. But his earnings grow much faster—9.6 percent compared to 7.4 percent in financial services. A high-educated male worker in a retail food firm that is shrinking, but still large and still low turnover, would start at \$10,230, and, at the end of ten years, would end up with only 77 percent of the earnings of a comparable worker in a growing firm. Earnings also vary by gender. The job ladder is still worse for a high-educated female in a growing, large low-turnover retail food firm, but the gap is not nearly as pronounced. She would start at \$7,911, her income would grow by about 8 percent, and she would end up with earnings that are 56 percent of the male's.

In sum, this table reinforces the results shown earlier for specific job ladders. The five most important findings are:

*Job ladders are usually worse in shrinking firms, since they initially pay workers less.* This is clear when the first column is compared with the fifth and the sixth column with the tenth. Workers of both sexes and all education levels who work in shrinking firms are paid lower initial earnings—and in some industries, including men in financial services and women in retail food and semiconductors, substantially less—than similar workers in growing firms. The main exception is low-educated workers in software. The only mitigating factor is that earnings growth sometimes offsets the differences in initial earnings so that earnings in growing and shrinking firms are nearly the same at the end of ten years: a good example is women in financial services and low-educated men in retail food. The one industry that stands out initially as an exception is trucking, since initial earnings are slightly higher in growing than shrinking firms, but at the end of ten years, workers in shrinking firms are making 20 to 80 percent more than workers in growing firms.

*Large, high-turnover firms usually pay less initially than large low-turnover firms. Workers who keep their jobs in large high-turnover firms are rewarded with greater earnings growth.* This insight is clear from comparing the first column with the second and the sixth with the seventh. Women don't benefit as much as men from working in large high-turnover industries. At the end of ten years men's earnings are much higher in high-turnover firms compared to low-turnover firms (except in semiconductors, where earnings for both men and women are lower in high-turnover firms).

*Small high-turnover firms provide better job ladders than small low-turnover firms* (compare columns three and four, and eight and nine). At the end of ten years, both women and men who keep their jobs in small high-turnover firms are earning more than those at the small low-turnover

firms. This evidence suggests that firms with high turnover are providing good job ladders to select workers who benefit from career development in that firm.

*Large firms generally provide better job ladders than small firms, except in the trucking and semiconductor industries.* A comparison of columns one and three, two and four, six and eight, and seven and nine indicates that job ladders are typically superior in large firms than small for both males and females. Firm size is especially important in the retail food industry. In semiconductors, small growing firms, which tend to be early-stage design companies, provide higher earnings growth than large growing firms.

*Women's job ladders in all five industries are worse than men's.* They earn less money initially, and their earnings grow more slowly. However, the effects of economic turbulence do not appear to be gender specific: economic turbulence has a similar impact on the job ladders for both sexes across industries.

## Summing It All Up

The popular press is right: there are “good” jobs and “bad” jobs. Where workers land a job—which firm, as well as which industry—has a powerful influence on a worker’s earnings, in terms of both initial levels and growth rates. But anecdotes aside, good jobs have not disappeared. This chapter, which examined the job ladders offered by hundreds of thousands of firms to millions of workers, identified which types of companies provide the best (and worst) job ladders. It found that firms still exist that could create the next Horatio Alger story. In contrast to the fears raised by Lou Dobbs and *Business Week*, good job ladders exist, particularly in large growing firms. And although large growing firms are the largest supplier of long-term job ladders, small growing firms also provide excellent job ladders in semiconductors, financial services, and trucking.

High-educated male semiconductor workers find the best job ladders in growing firms with low turnover; high-educated women find the best job ladders only in large growing semiconductor firms with low turnover. A woman shouldn’t expect to find good job ladders in financial services. Their best jobs are in software, especially for high-educated women, where large growing firms provide the best job ladders for all high-educated software workers.

The best place to go for a worker in the trucking industry is, surprisingly,

a shrinking company, although these are obviously jobs that are hard to find. A worker looking for a good job in retail food should look for a job with a large growing firm. A man in the financial services industry can find the best job ladders in financial services if he lands and keeps a job with a growing low-turnover firm (large or small).

Although good jobs do exist, they may not be available to all workers. Human resource practices vary. Some firms can adopt human resource practices in which new hires have to compete for job ladders within the firm. This “up-or-out” situation, where selected workers advance and workers not promoted are terminated or encouraged to find another job, is predominantly found in *expanding* firms. Other human resource practices are established so that experienced workers compete to “survive” or keep their jobs, and may even have to compete not to be replaced by less expensive new hires. This is particularly observable in *shrinking* firms and firms in the semiconductor, financial services, and software industries. Many workers in the software industry in particular experience short jobs lasting less than three years that appear to reflect market wages.

The job ladders found in the low-wage trucking and retail food industries are consistent with three other types of human resource practices: the traditional unionized firm with rule-based job ladders (although two tiers may exist), the nonunion firm that may offer some workers access to job ladders, and nonunion firms that offer competitive market wages. In food services, both the unionized firm and nonunion firm with limited job ladders also rely on market-based temporary and part-time jobs.

The consequences of economic turbulence on job ladders cannot be denied, as Candy Robinson learned—working for a firm that is shrinking, or taken over by another firm, often means that a job ladder can disappear. The impact of this on workers’ long-term career paths is the subject of the next chapter.

# Turbulence and Worker Career Paths

## Introduction

Everyone knows that career paths—the lifetime pattern of employment and earnings—vary dramatically from one person to the next. Probably the most famous worker in America is Dilbert, stuck in a lousy job while taming his tie and shooting off one-liners. The career path of his creator, Scott Adams, grew out of Dilbert’s experience: Adams quit his job as an engineer at Pacific Bell and went on to fame and fortune (although he still gets to shoot off rebellious one-liners). In contrast, the career path that frightens people is Mark McClellan’s, mentioned in chapter 2, which ended in job loss and seemed to be the end of a middle-class lifestyle.

Anyone who has watched TV shows like the *Apprentice* knows that sometimes a person’s career path depends on what they do (together with the boss’s reaction). The words “you’re fired” have become immortalized. But anyone who has read books like G. J. Meyer’s very popular *Executive Blues* (1995) knows that a career path can also depend on economic turbulence beyond individual control:

I think I can tell you how it will happen, if it’s going to happen to you. The first thing they’ll do, when they’ve made their preparations, is to get you out of your office and into some other room with some geek from Human Resources . . . from the moment you pass through his door the HR geek will appear to be in visible pain and eager for you to see it. He wants you to understand that he too is a human being, a nice guy if also a geek, and that his mother didn’t raise him for this kind of thing. Anyhow, when the geek has delivered his message and demonstrated the depths of his humanity, he’ll get up out of his chair and come around from behind his desk. You’ll be drawn up after him by some mysterious force

resembling magnetism—you don't know how it's happening, but all of a sudden you're on your feet and moving—and together the two of you will glide out the door and down the hall to some smaller office that you probably never noticed before, where somebody you've never seen (the outplacement counselor) is waiting to tell you not to worry, everything is going to be fine.<sup>1</sup>

Does it matter? Will everything be fine? As you'd expect, if workers choose to leave, they typically leave for a better job; if they're forced to leave, because the firm is laying people off, shutting down, or simply replacing them, there may be spells without work and they may have lower earnings in their next jobs. In other words, the impact of job loss on workers often depends on who makes the decision to leave—the worker or the firm. But economists argue that even when the firm makes the decision, the results are not necessarily bad. Chapter 4 showed that when jobs are destroyed, new jobs in more productive firms are created, and although firms fire, they also hire. In fact, in theory, *job change can in itself be productive*. There are four reasons for this.

First, it takes time for workers and firms to learn about each other, and it can be good to learn and leave. This is particularly true for highly skilled jobs such as semiconductor or software engineers. Workers need to work at a firm for a time to see if the job will work out. If it doesn't, then leaving the job is a good thing: there's little doubt that Scott Adams was better off leaving Pacific Bell, and Pacific Bell was better off with him gone. The same dynamic is at play even in less-skilled jobs. In truck driving, assembly line work, or retail sales, it is only after some time on the job that workers and their employers learn if they are cut out for each other. If the match is not going to work out, then both sides are often better off if the worker moves on. That's precisely what Donald Trump did on *The Apprentice*. He observed the workers over time, and if they didn't meet his standards, they were fired.

Second, workers can learn different skills from different jobs. Having experience in a semiconductor company with a manufacturing plant is useful to a design engineer when he moves on to a fabless design company. So the skills acquired from different jobs can be useful to employers. In the following example, Silicon Image, a fabless startup that has gone public, obviously found this important:

Robert Bagheri, executive vice president of operations, brings to Silicon Image more than 21 years of experience in manufacturing operations, quality and engineering. Prior to joining Silicon Image in February 2003, Bagheri spent six

years as vice president of engineering, operations, quality and reliability at SiRF Technology Inc., a privately held company. While at SiRF, he was responsible for several manufacturing and engineering operations disciplines as well as quality and reliability functions, strategic business direction, long-range planning, vendor selection, contract/terms/pricing negotiations, material/logistics, technology and foundry selection. Earlier, he served as director of product and test engineering operations at S3 Incorporated, where he helped grow the business to a \$500 million run rate. Prior to S3, Bagheri held various product engineering and management positions at Zoran, IMP, Microchip Technology and Monolithic Memories Inc. Bagheri holds a bachelor's degree in electrical engineering from Cleveland Institute of Technology.<sup>2</sup>

Third, job change can give less educated workers a chance to move from a low-paying dead-end job to one with a good job ladders. Different companies offer different types of job ladders, and workers will often queue to get jobs with employers who provide good job ladders. Over time workers may gain access to higher-paying firms by patiently waiting for openings to appear.

But most importantly for this book, job change can occur simply because less productive firms shrink or shut down and other firms grow or are born. In November 2005, GM laid off 30,000 workers because it couldn't sell its cars, just as Mark McClellan's aluminum plant shut down four years earlier. Yet, if workers who leave shrinking firms end up in expanding firms and gain better earnings and earnings growth as a result, the job change would eventually have been productive.

Theory aside, what is the evidence on when it is a good career move to change jobs, and when it is better to stick with a job? The answers have not been clear, precisely because there has been so little information available. One set of studies shows that some workers are worse off when they change jobs. Laid-off workers in the California semiconductor industry who moved to other industries ended up with earnings losses. Those who returned to the semiconductor industry received earnings increases similar to those not laid off.<sup>3</sup> Other research on laid-off workers in Pennsylvania found that on average, male workers who were displaced from jobs that they had held a long time lost about \$200,000 in earnings over a five-year period.<sup>4</sup> Different demographic groups of workers have different levels of vulnerability. Job loss hurts the least educated workers the most: they are less likely to find new jobs, more likely to find part-time work, and more likely to experience earnings loss than workers with more education.<sup>5</sup>

Another set of studies shows that workers gain. For young males, changing jobs is often a way to move to a higher earnings trajectory.<sup>6</sup> This makes sense, since younger workers are much more able to shop for the best jobs, much as shoppers find shopping for a new car or house is productive or valuable. Low-wage workers also gain, because their jobs are heavily concentrated in just a few low-wage industries. The best way out of their low-wage trap is to change both jobs and industries. The same studies have found very strong differences across demographic groups: for white males and Latino males job change is critical to a transition out of low earnings, primarily because they were more likely to land jobs in better firms.<sup>7</sup>

The information in this chapter provides more answers than have previously been possible. Looking at millions of worker histories provides new insights into the impact of turbulence on a worker's ability to piece together jobs across firms into a career path. It is now possible to examine the movement and stability of millions of workers over more than ten years, describe their career paths, and begin to answer these questions. Not only that, it shows the earnings that the typical worker can expect from different career paths over time.

### **What Is a Career Path?**

As Mae West once said, "I've been rich and I've been poor . . . Believe me, rich is better." Her career path, just like any career path, is the sum of all the jobs she had over her lifetime. Another way of saying this is that it consists of all the job ladders the worker has experienced plus periods without working. For some workers who have only one employer, the career path is simply the firm's job ladder for that worker. Most workers have more than one job, and documenting the worker's career path as she or he pieces together job ladders across employers as well as periods without employment is a very complex task.

Career paths need to be calculated both for different types of firms and different types of workers. The job ladders that make up a career path vary by what is going on at the firm: a firm's growth or shrinkage and turnover rate are important information in describing career paths as well. Since volatility is more noticeable in a small firm than a large, the size of the firm is also important.<sup>8</sup> Similarly, career paths vary by type of worker, since female and male, young and old, high- and low-educated workers face different opportunities in the labor market. The career paths described in this

chapter are for the most common age group: prime-aged workers.<sup>9</sup> Prime-aged workers are divided into two categories: younger (25–34 years old) and middle-aged (35–54 years old). For our research, workers are classified into twelve categories: the two age groups, two genders, and three education levels.<sup>10</sup>

One of the first tasks is to determine how many jobs workers hold over the ten-year period (remember, Robert Bagheri held at least seven jobs in his twenty-one year career). The facts show that most career paths could be classified into one of three types:<sup>11</sup>

- loyalist: worker has only one job in the five industries over the ten-year period;
- job switcher: two jobs over the period (with at least one in the five industries);  
and
- jobhopper: three jobs over the period (with at least one in the five industries).

The second task is to piece together the career path from worker job ladders and periods without employment. Each worker's job ladder (initial earnings and earnings growth for the number of years the worker held the job) was estimated for each job and this was then used to create the career ladder. The career ladders were then tracked across different types of firms in each industry. Even though the data have been summarized, there are still 180 groups of career paths for the twelve categories of workers with three types of job histories (loyalist, job switchers, and jobhoppers) in our five industries.

The important question of whether job loss is initiated by the worker ("I quit") or by the firm ("You're fired") cannot be answered directly by the type of data used in this book. Even when data on this is collected, firms and workers have different perceptions. In addition, fieldwork suggests that when growing firms force out professional employees, this may not be viewed as voluntary by the worker.<sup>12</sup> However, the data do give some clues as to whether job separations are voluntary or involuntary. For example, job separations in rapidly shrinking firms are more likely to be involuntary than are job separations in rapidly growing firms and industries.

Of course, it is impossible to describe the 180 basic career paths in a single chapter, although the book's Web site ([www.economicsturbulence.com](http://www.economicsturbulence.com)) has a career path calculator that can be used to do just that. The next sections focus on the "typical" effects of turbulence and discuss the patterns that are most prevalent. (See appendix C.)



## How Does Economic Turbulence Affect Career Paths?

What are the most common career paths? How important is economic turbulence? Which paths provide the best outcomes?

Most workers' career paths involve changing jobs. Loyalists rarely account for more than 40 percent, and sometimes as few as 25 percent, of workers in a demographic group. Surprisingly, the low-wage retail food and trucking industries are much more likely to have workers who are loyalists, as is the financial services industry, than the high-tech semiconductor and software industries, where workers are much more likely to be mobile: the most common career path in semiconductors is the job switcher; in software, the jobhopper. Hence, the fear that a job change will occur is grounded in reality.

The summary of millions of data points show that economic turbulence has a big impact on workers' career paths, which vary across industries.

*On average, workers who change jobs earn less than workers who don't.* Loyalists experience the best career paths in all five industries. However, it is hard to tell whether they get good jobs because they're loyalists, or they become loyalists because they have good jobs.<sup>13</sup>

*Workers who start the period in inferior jobs are generally able to improve their career paths through job change.* Workers who initially get a bad job draw can usually gain from changing to another job, although they endure periods without any job.

Some patterns for job changers are very evident. Usually workers improved their career ladders by switching into a job in one of the five industries. The most typical pattern for prime-aged workers in semiconductor, software, trucking, and medium-educated men in financial services<sup>14</sup> is to begin the period in a job *outside* the industry with relatively low earnings and earnings growth. They then switch *into* one of the four industries with a better job with higher initial earnings and higher earnings growth. While these workers do better by switching jobs (and industries) than by staying in their original jobs, they do not catch up to the earnings of the loyalists in the new industry.

The pattern is very different for all job changers in retail food and for women and high-educated men in financial services; these workers eventually do better by switching to a job outside the industry. The typical pattern for these workers is to begin the period with an inferior job with low earnings and earnings growth in the industry, and then to switch *out* of the industry, sometimes even initially earning lower pay at the new job. Even-

tually in their second or third job in another industry they find a better job with good earnings.

In most patterns, job switchers do better on their first job change than do jobhoppers, who must change jobs again to find a comparably good job, and so the job switchers end up with better earnings than jobhoppers at the end of the period.

What does all this mean? Although the “best” career paths are for workers who find a good job and stay with it, workers who must take less well-paying jobs initially can usually find a better job and improve their career ladders over time. The data do not spell out to what extent finding a good job early in one’s career reflects the worker’s skills and job market knowledge or just plain luck in landing a job with a good employer. For others, the good news is that they probably can find a better job if they keep looking.

Table 6.1 provides the details for middle-aged workers. Like table 5.1 it shows initial earnings (first row) and earnings growth (second row) for the two most prevalent education groups for middle-aged men and women. In order to compare the earnings across firms in an industry, row three reports earnings at the end of ten years as a proportion of the earnings of high-educated loyalist males in the financial services industry (the highest-paid group).

*Loyalists have the best career paths, followed by job switchers.* Loyalists experience the best career paths in all five industries because they start off with the highest initial earnings, experience good earnings growth, and end the period with the highest earnings. Take, for example, workers in the financial services industry. The typical high-educated male loyalist starts by earning \$31,524, and his earnings grow at a rate of about .082 log points or 8.5 percent annual compound rate). By contrast, his counterpart who switches jobs twice (jobhopper) starts at \$15,133 (which suggests the job change is probably related to the lower starting wage), and his earnings growth rate is only .020 log points. At the end of the ten-year period, his earnings are only 26 percent of those of his loyalist counterpart. The picture is similar for workers in the semiconductor industry. Although the typical high-educated loyalist male starts at a slightly higher earnings level, \$32,714, he enjoys a lower earnings growth rate of .059 log points and ends up with earnings only 83 percent of the earnings of his counterpart in financial services.

TABLE 6.1 Career paths, workers age 35–54.

	Males			Females		
	Loyalist	Two jobs	Jobhopper	Loyalist	Two jobs	Jobhopper
<i>Financial services</i>						
Medium-education	\$16,874 0.085 0.56	\$10,494 0.073 0.31	\$8,906 0.069 0.25	\$7,456 0.065 0.20	\$5,861 0.009 0.09	\$5,743 0.022 0.10
High-education	\$31,524 0.082 1.00	\$30,492 0.034 0.60	\$15,133 0.020 0.26	\$11,538 0.061 0.30	\$8,522 -0.020 0.10	\$7,861 -0.002 0.11
<i>Retail food</i>						
Low-education	\$4,555 0.083 0.15	\$4,157 0.065 0.11*	\$4,189 0.049 0.10	\$3,037 0.111 0.13	\$2,765 0.064 0.07	\$2,707 0.050 0.06
High-education	\$9,002 0.089 0.31	\$6,883 0.035 0.14	\$6,559 0.051 0.15	\$4,761 0.082 0.15	\$3,945 0.047 0.09	\$3,809 0.033 0.07
<i>Semiconductors</i>						
Medium-education	\$29,523 0.054 0.71	\$13,641 0.056 0.33	\$11,295 0.058 0.28	\$11,863 0.039 0.25	\$7,387 0.030 0.14	\$6,631 0.041 0.14
High-education	\$32,714 0.059 0.83	\$20,755 0.048 0.47	\$16,498 0.047 0.37	\$13,590 0.044 0.30	\$9,186 0.028 0.17	\$8,430 0.030 0.16
<i>Software</i>						
Low-education	\$18,966 0.077 0.57	\$15,226 0.081 0.48	\$11,682 0.081 0.37	\$10,778 0.041 0.23	\$7,610 0.068 0.21	\$6,851 0.073 0.20
High-education	\$26,342 0.086 0.87	\$22,743 0.071 0.65	\$19,228 0.065 0.52	\$16,456 0.059 0.42	\$12,358 0.057 0.31	\$11,020 0.052 0.26
<i>Trucking</i>						
Low-education	\$7,840 0.080 0.24	\$6,299 0.046 0.14	\$6,203 0.024 0.11	\$5,323 0.118 0.24	\$4,093 0.094 0.15	\$3,902 0.078 0.12
Medium-education	\$9,341 0.075 0.28	\$7,439 0.031 0.14	\$7,175 0.012 0.11	\$7,086 0.086 0.23	\$4,991 0.076 0.15	\$5,232 0.062 0.14

Cells contain mean initial earnings, annualized earnings growth rate (in log points) across the simulated career path, and simulated final earnings level as a proportion of the final earnings of the corresponding final earnings of a financial services male high-educated loyalist (\$71,242).

\*Simulated final job was stretched beyond modal job tenure duration.

## **How Do Career Paths Vary by Industry and Worker Characteristics?**

*Although loyalists have the best career paths within their industry, their career paths vary enormously across industries.* The best career path found in the five industries is for high-educated male loyalists in financial services. As shown in table 6.1, these men average \$71,242 (\$31,542 compounded at 8.5 percent) at the end of ten years in financial services, followed closely by their counterparts in software, who earn 87 percent as much, and in semiconductors, with 83 percent. The best career paths for high-educated male job changers are those that end up in the software industry. The worst career paths for high-educated men are in trucking, where they earn one-fourth to one-half of their peers in financial services, depending on the number of job changes.

The best career paths for high-educated women are in software, whether or not they are loyalists or change jobs. They end up with between 42 percent and 26 percent of the earnings of loyalist males in financial services. High-educated women have their worst career ladders in retail foods, where they earn only slightly more than low-educated women after ten years, whether or not they change jobs. High-educated male loyalists also find their worst career ladders in retail foods, although they do not fare as badly as the women.

Low-educated workers, both men and women, find their worst career paths in retail foods and their best career paths in software, whether or not they change jobs. However, very few jobs are available to low-educated women in software, and jobs open to them in our five industries are mainly in retail foods.

*Women's initial earnings are much lower than men's, and their career paths are worse.* What is vividly demonstrated in table 6.1 is that not only do men make more than women starting out, but men's career paths are generally better than women's in terms of both initial earnings and earnings growth across all industries. Even high-educated women in the software industry who stay loyal to the firm end up with only 42 percent of their male counterpart in financial services, while similar males earn 87 percent. The only industry in which this is not true is the trucking industry, where low-educated women's few job opportunities allow them to catch up to male earnings over time. In financial services, women fare especially poorly compared to men. Women job switchers typically move out of financial service jobs into inferior jobs and must work their way back up to a good job outside the financial services industry.

The age of a worker is also important (this is not reported in table 6.1). The career paths of middle-aged workers are characterized by higher initial earnings and lower earnings growth than the paths of their younger counterparts. The notable exception is software, where the earnings growth of younger workers is extraordinarily high and their earnings exceed the earnings of middle-aged workers at the end of the period. Younger workers experience very high returns to experience, but these returns diminish over time.

Finally, better education usually leads to better career paths, regardless of the industry. Medium-educated male loyalists in financial services earn 56 percent of the end-of-decade earnings of high-educated loyalists; their medium-educated female counterparts earn two-thirds of what their high-educated female counterparts do at the end of ten years. The gap is smaller in the low-wage industries, however. In trucking, the typical low-educated male loyalist ends up with earnings that are at 24 percent of the benchmark; medium-educated male loyalists reach 28 percent of the benchmark. The differences are negligible across education levels for job switchers and jobhoppers. The same is true in the retail food industry. However, less educated workers have higher earnings growth than high-educated workers in retail food, trucking, and financial services. These relationships partially reflect the lower initial earnings of the less educated workers but may also reflect their learning on the job.

### **How Important Is Economic Turbulence?**

Figure 6.1 vividly illustrates the fact that *loyalists have better career ladders than job switchers and jobhoppers*. This shows the typical career paths for middle-aged high-educated men in the financial services industry, which provides some of the best jobs for these men.

The top line shows the typical career path for a loyalist, who works for only one financial services firm over the decade. He begins his job with annual earnings around \$30,000, and experiences excellent earnings growth. At the end of ten years, he is earning around \$70,000. The job switcher, shown by the middle line, starts out in a job in financial services with earnings the same as the loyalist, but he is in an inferior job with very little earnings growth. Either he is working for a firm that doesn't provide career development or he wasn't selected by his firm to move up a job ladder with increasing skills and responsibilities. After being in this dead-end job for

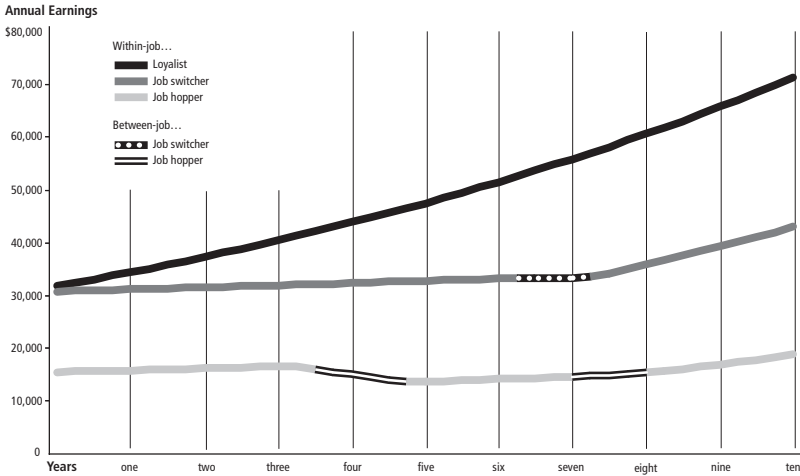


FIGURE 6.1. Career paths for middle-aged, male, high-educated workers in the financial services industry.

over six years, he either quits or is fired and goes without a job for over a year before finally landing a good job in financial services with strong earnings growth. The jobhopper's career path, considerably worse than the others, is shown by the bottom line. He begins at a job in financial services with annual earnings of about \$15,000 and with low earnings growth. After working in this job for three and a half years, he goes through a period of one and a half years without a job. Finally, he takes a job outside financial services with lower earnings (around \$12,000) and low earnings growth. This job lasts two years, and then he is without a job for a little over a year, before landing a job that offers good earnings growth. Clearly these three typical career paths in financial services indicate very different job experiences for men with similar education and age. The loyalist is a success; the jobhopper struggles.

The key findings that *job changers tend to improve their jobs by changing employers*, and *job switchers experience better job changes than do jobhoppers* is also illustrated by figure 6.1. Not all job changes are equal; some job switching results only in one low earning job being replaced by another; this is the experience for many jobhoppers in their first job change. The jobhopper has lower initial earnings than the job switcher, and the jobhopper must change jobs twice before landing a job with strong earnings growth. The job switcher's second job has strong earnings growth. At the

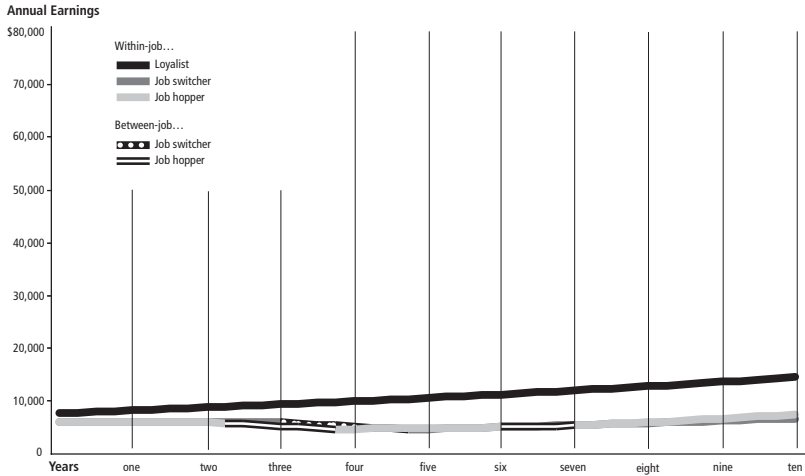


FIGURE 6.2. Career paths for young, female, medium-educated workers in the financial services industry.

end of ten years, the job switcher is earning over \$40,000; the jobhopper is earning under \$20,000.

The substantial differences that gender, age, and education make in workers' career paths are illustrated in figure 6.2, which shows the career paths for younger medium-educated women in financial services. Their careers are vastly inferior to the careers of their older, better educated male colleagues (figure 6.1), since their labor market outcomes suffer from their being female, younger, and less educated. The female loyalists do not experience much earnings growth, and job switchers do no better than jobhoppers (with only their first job in financial services). However, we saw earlier that even *high-educated middle-aged women* fare poorly compared to their male peers in financial services. At the end of ten years, the high-educated female loyalist is earning only one-third as much as the male loyalist; the female job switcher makes one-sixth as much as the male switcher; and the female jobhopper makes two-fifths as much as the male hopper (not shown). Women have lower earnings growth, which reflects returns to job experience, than men. This is true even for female loyalists, who do not leave the labor force for family reasons, which is often the reason given for their lower earnings growth. Earnings growth for females loyalists is only 75 to 80 percent of the earnings growth for male loyalists in financial services.

*The substantial differences across industries* is illustrated by comparing the paths for middle-aged high-educated men in three figures: figures 6.1

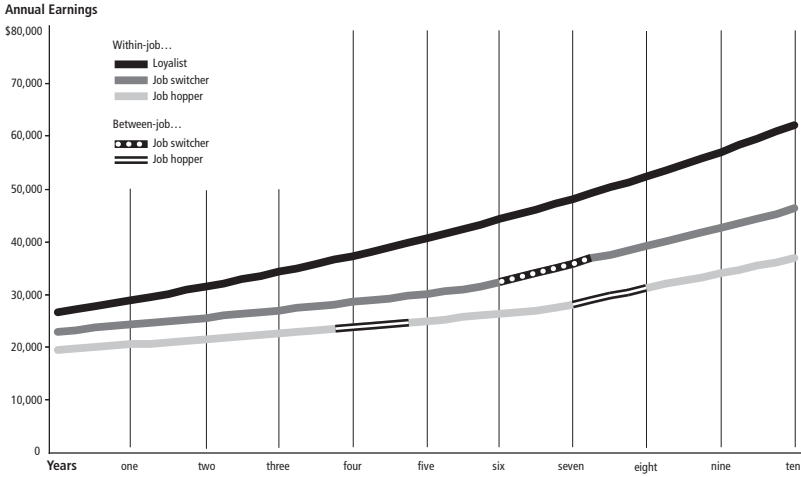


FIGURE 6.3. Career paths for middle-aged, male, high-educated workers in the software industry.

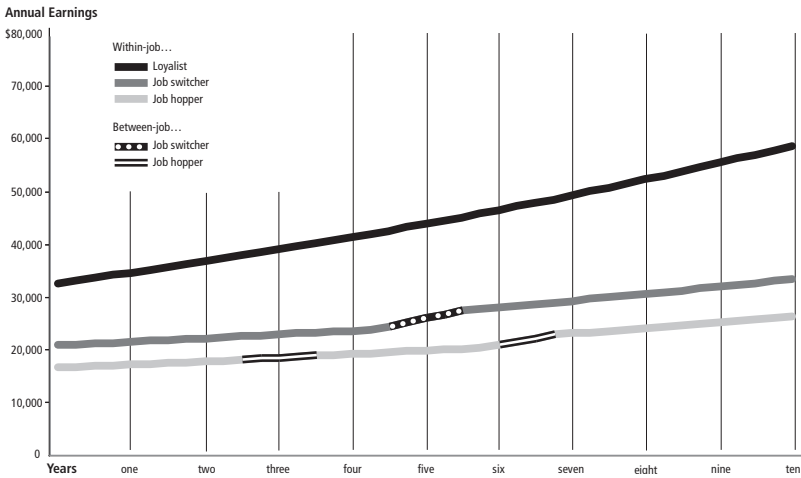


FIGURE 6.4. Career paths for middle-aged, male, high-educated workers in the semiconductor industry.

(financial services), 6.3 (software), and 6.4 (semiconductors). Although these industries are heavy users of technology and high-skilled workers, it is clear that their high-educated workers experience different career paths. Although the male loyalist career paths in software, semiconductor, and financial services are similar, changing jobs is far more lucrative in software than in financial services or semiconductors. Switching into both software



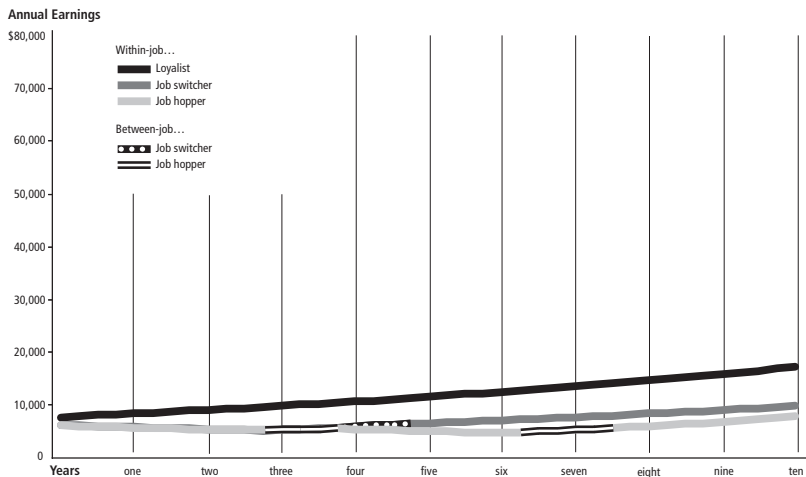


FIGURE 6.5. Career paths for middle-aged, male, low-educated workers in the trucking industry.

and semiconductors after working outside the industry provides a better job with higher initial earnings and earnings growth. The sooner the switch is made, the better the job changers' career path.

Although workers can improve their career ladders over time as they find better jobs, many are working in low-wage and dead-end jobs, and changing jobs is usually a challenging process. *Some jobs even have negative earnings growth.* In trucking, middle-aged low-educated men have negative earnings growth in jobs outside trucking before landing a job in trucking with higher earnings that reflects increases in both wages and hours (see figure 6.5). Although annual earnings are still quite low for male truckers, trucking provides higher incomes for them than do jobs in alternative industries. *Job changing takes time.* In all the figures shown, job changers experience a long period of a year to a year and a half between jobs.<sup>15</sup>

Let us look now at more examples of how workers fare in each industry to understand how this broad set of results actually affects workers' lives.

### The Importance of Industry Differences: Stories from the Industries

A repeated theme in this book has been that broad-brush descriptions of the economy are too simple: industry analyses are critical to understanding

economic turbulence. In keeping with this, this section delves into the different career paths offered in the different industries.<sup>16</sup>

There are two distinct types of career paths in the *financial services industry*: those of the loyalists; and of the job changers, who begin with a job in financial services followed by another job in financial services (job switchers) or two jobs outside the industry (jobhoppers). Although those who change jobs have lower initial earnings and earnings growth in their financial services job than loyalists, the job change process is not a smooth one. For middle-aged women, changing jobs involves a period without employment and a 16 to 22 percent decline in earnings. The middle-aged high-educated male jobhopper also suffers an earnings loss with job change. Both these men and these women eventually find jobs with good earnings growth, but they never enjoy the earnings of those who stay in the industry.

Workers who manage to *find and keep* a good financial services job do very well over the ten-year span. This job path is more common for men than women, who, at substantial cost, are more likely to leave the industry.

Part of this may reflect the technological and strategic changes that have taken place in the financial services industry. As Larry Hunter and his coauthors, Sloan industry experts in financial services, pointed out:

New technologies profoundly changed the ways in which banks conducted their business and interacted with their customers . . . The evolution of competition and of work organization, in turn, will carry further implications for jobs and earnings . . . In these two banks [that were studied] the introduction of new technologies accompanied explicit changes in education requirements and other kinds of skills . . .

The new emphasis on sales at the expense of service, the increased variability in pay, and the licensure requirements led many incumbents to leave the job, and heightened the importance of external recruiting in establishing skill requirements.<sup>17</sup>

Hunter's research showed that, particularly in large banks, the transition from service-oriented bureaucracies to more aggressive, sales-oriented cultures was rocky for many workers, and some workers did better than others in the new sales environment. Men were more likely than women to find a way to change jobs to improve their position in the new environment. To take one example from Hunter's work, "Ted," an experienced middle-aged worker at a major bank, was asked to broaden his job by taking on sales of a wider range of financial services. Instead, he left the bank

and took a position at a smaller regional bank in which he could continue to focus on his specialty area, small business lending. “Andrew” was typical of younger workers, Hunter found, since he took a job at a large bank that provided sales training and licensure support, and he hoped to move on to more a more lucrative sales position in another company.<sup>18</sup>

In contrast, “Jennifer,” a successful midlevel branch manager, found her career development stalled in a large bank that had begun to emphasize sales heavily. She finally took a job as a branch manager at a smaller local bank and her earnings suffered. Other women, like “Erma,” retired early. Erma, a branch service manager, was a longtime employee and adored by customers and her coworkers. But she had problems with her legs and could not be on her feet enough to perform the tasks that her new sales duties required.<sup>19</sup>

This suggests that some workers (like Erma) who do not perform well in a sales-oriented culture are likely to leave banking. But many don’t leave, and like Jennifer find jobs in banking that place less emphasis on sales performance. Unfortunately, these jobs no longer pay very well. Steady advancement through a bureaucracy is less common, and higher earnings are more likely to result from strong sales performance.<sup>20</sup>

Like those in financial services, workers in *semiconductors* also have two distinct career paths for loyalists and job changers. The job changers in semiconductors, however, typically start off with much lower initial earnings in a job *outside* the semiconductor industry and then experience substantial earnings growth (20 to 30 percent for younger and 10 to 20 percent for middle-aged workers) by taking a semiconductor job. Job switchers are on a better career path than jobhoppers, since the job switchers begin with higher pay outside the industry and land a semiconductor job sooner than jobhoppers. Although job changers usually experience higher earnings growth over the decade than loyalists, it is not enough to offset their much lower initial earnings, and so loyalists end the period with substantially higher earnings.

Even though mobility increased among semiconductor companies in the late 1990s, long-term employment still exists for many workers, especially those whose careers are developing well. The management of National Semiconductor, one of the biggest analog companies with almost \$2 billion in revenue, vividly illustrates this. Of a team of thirteen senior managers, the majority have been with the company more than twenty years, and several for almost thirty.

Often scientists move into semiconductors to better-paying jobs. In a case study by one of the authors, “Anne,” a materials scientist with a Ph.D.,

improved her pay by switching to a semiconductor company from a more traditional manufacturing company, although she was on-call more in her new job. Electrical engineers tend to switch jobs within the industry to broaden their experiences on new technology and enhance their career development. The introduction to this chapter featured the career path of Robert Bagheri, age forty-nine, who held six jobs before heading operations at Silicon Image. Just in the time spent drafting this book, Robert had taken a new executive position at another semiconductor company.

Younger engineers in Silicon Valley emphasized in interviews how important job change was for continued learning and career development. As “Mark” told one of the authors, “I am more loyal to my professional network than to my company, since that is how I will get my next job.” In order to gain experience in chip manufacturing, a chip designer, “Philip,” went to work for a large company with a fab, and then he worked at two startups. “Each job has provided me with a new set of skills and has been important in increasing my responsibilities,” Philip said.<sup>21</sup>

The *software industry* also exhibits the two distinct career paths observed in semiconductors. Loyalists experience higher initial earnings and the same earnings growth as job changers over time. Overall, job changers experience substantial earnings growth (18 to 26 percent for younger workers and 11 to 20 percent for middle-aged high-educated workers) by landing a software job. Those switching jobs only once usually have higher initial earnings and lower earnings growth than jobhoppers, yet the job switchers end up with earnings that are 20 to 40 percent more than the jobhoppers’ earnings.

Long-timers are hard to find in the software industry. For example, Oracle, which advertises itself as the world’s largest enterprise software company, has a senior management team of four. Other than Larry Ellison, who founded the company in 1977, none joined the company earlier than 1999. The brief biography of the president of Oracle Corporation is particularly illustrative of the mobility not only within the software industry, but also into (and out of) the industry:

Safra Catz is President of Oracle Corporation, reporting to Larry Ellison, Oracle’s CEO. Ms. Catz has been a member of Oracle’s Board of Directors since October 2001, serves on Oracle’s Executive Management Committee, and is responsible for global operations. Ms. Catz served as Executive Vice President between November 1999 and January 2004 and as Senior Vice President between April 1999 and October 1999.

Prior to joining Oracle, Ms. Catz was at Donaldson, Lufkin & Jenrette, a

global investment bank that has since merged with Credit Suisse First Boston, where she was a Managing Director from February 1997 to March 1999, and a Senior Vice President from January 1994 until February 1997. Ms. Catz held various investment banking positions from 1986 until January 1994.<sup>22</sup>

Similar career development through jobhopping is just as evident for young software workers as for young workers in the semiconductor industry.

The *trucking industry* 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 percent) in one job with a trucking company; and job changers have lower initial earnings in a job outside trucking, and then experience a large earnings gain (11 to 19 percent) by taking a trucking job.<sup>23</sup> At 8 to 18 percent, earnings growth rates in trucking jobs are substantially higher than in workers' earlier jobs outside trucking, so the sooner the worker enters trucking, the better his career path will be. One possible reason for this is that most of these workers do not have a high school degree, and so obtaining a commercial driver's license, which opens up employment in trucking, represents a significant improvement in job options.

Trucking career paths reflect the variation in HRM practices across firms. As Michael Belzer and Stanley Sedo, Sloan experts in the trucking industry have noted:

Opportunities for advancement within a company are limited in trucking. While longer tenure may result in favorable schedules or routes, these are marginal improvements, at best. The most common route to better earnings and working conditions is to change companies altogether. However, even this strategy has become increasingly limited with the decrease in the number of available union jobs over time. The lack of returns to tenure in trucking is a primary cause of the high turnover rates in the trucking industry. It is not unusual for firms to have turnover rates in excess of 100% per year.<sup>24</sup>

An article on trucking in *USA Today* gives a snapshot of some of the jobs:<sup>25</sup>

Kathy Shepard is an example of how becoming a trucker improved her career path. She had been laid off from her job in the billing department at a trucking firm. Kathy received her trucking license and was hired less than two weeks later by UPS, where she is making the entry wage of \$14.70 an

hour, or 34% more than at her last job. At the time she was interviewed for the article, her pay was due to go up to over \$30,000 a year.

Carrie Green went into trucking to improve her career path and also to be with her boyfriend Kevin James, a long-time trucker, who said, “You have to like it to be in it.” Carrie became a driver four years ago, after she was laid off from Kodak. Now Carrie and Kevin drive together coast-to-coast with their dogs.

Some career paths have upward mobility within trucking, as demonstrated by a vignette about Tracey Edwards in the same article. He went from a driver to a trainer to a recruiter. Each increase in responsibility also brought higher pay.

Although paid much less, workers in the *retail food industry* are similar to workers in financial services in the pattern of their two distinct career paths: the loyalist career path and the job changer path. Loyalists in retail food have relatively high initial earnings and experience good annual earnings growth (5 to 13 percent) in one job.<sup>26</sup> The earnings gap between loyalists and job changers grows over the decade. Job changers begin with an inferior job in the retail food industry followed by one or two jobs outside the industry. For younger workers, switching to a job outside retail food increases their earnings growth. Middle-aged job changers typically experience an earnings loss when they take jobs outside retail food. As in financial services, job changers eventually experience good earnings growth in their second or third jobs outside retail foods, but they never enjoy the earnings of those who stay in the industry.

Beth Wagner is an example of a woman who improved her career path by landing a job in retail foods at Costco and becoming a long-time worker:

Workers seem enthusiastic. Beth Wagner, 36, used to manage a Rite Aid drug-store, where she made \$24,000 a year and paid nearly \$4,000 a year for health coverage. She quit five years ago to work at Costco, taking a cut in pay. She started at \$10.50 an hour—\$22,000 a year—but now makes \$18 an hour as a receiving clerk. With annual bonuses, her income is about \$40,000. “I want to retire here,” she said. “I love it here.”<sup>27</sup>

## **The Bottom Line**

Two popular perceptions—that *workers gain big rewards for jobhopping* and that *workers’ loyalty to a company pays off*—are both accurate. These

apparently contradictory views are actually complementary, and both describe certain segments of the labor market and arise out of different firm strategies. Loyalists tend to be rewarded for staying with one firm (although Dilbert is clearly an exception), but, echoing the results in the last chapter, in many firms workers must jobhop before they get access to a long job ladder that offers career development (like Scott Adams). This is also true for workers who start off in firms offering inferior jobs with relatively low initial earnings and low earnings growth—they must change employers to get a better job. However, the number of jobs that are necessary prior to landing on a good job ladder vary across workers, and their earnings trajectories do not make up for the period when the workers were working on inferior job ladders or were unemployed. Loyalists begin and stay ahead of the job changers.

Despite Mark McClellan's fears, the popular perception of disappearance of good jobs is not valid. The data suggest that the odds are in his favor, although it may take twelve to eighteen months of search. *Many workers are able to continually improve their career paths by finding better job opportunities with another firm.*

The popular perception that low-wage workers are *churning from bad job to bad job* is not accurate, at least in the five industries and thousands of career paths under the microscope. Such a pattern is not dominant—even in retail food, where many workers leave the industry for better jobs, or in trucking, where a worker's alternative job is worse.

Interventionist policy makers might well use this set of facts to argue that since some workers do not do well in making job transitions, unemployment insurance should have an important role in providing income support for workers during periods of job transition. In addition, interventionists might use the information here to argue for job placement assistance for transitioning workers. Indeed, the evidence in this chapter shows that although workers' career paths are very different, depending on their industry and their current employer, workers who have missed out on obtaining better job ladders can eventually obtain better jobs.

Interventionists might also argue for both micro and macro policy reform to address the consequences of job mobility. The fact that loyalists systematically do better than movers across all industries, even within a group of workers with similar age, sex, and education, raises the obvious question: *are loyalists more capable with special (unobserved) skills or talents compared to job changers, or are loyalists simply lucky to land a job with a company that shares market rents or provides skill development?* If

loyalists are more capable, then the onus is on job changers, who must improve their skills before they can land a good job. Interventionist policy makers might then argue that micro policy can potentially help workers with their skill development. If, alternatively, loyalists are those who are lucky to land a coveted good job, and firms are rationing good jobs (i.e., there are many more qualified workers than good jobs), the consequence is that job changers must queue for their chance. Then interventionists would argue for macro policy to expand national employment, so that the number of good jobs increases, which would help more workers land a good job.

Finally, although the reasons need to be examined with further research, it is clear that *most workers were looking for a better job at the beginning of the period, and improved their career paths by changing jobs*. The fear associated with the very visible cost of economic turbulence borne by job losers must be offset by the less visible benefits, uncovered in this chapter, gained by workers who land new (and often better) jobs.



# Economic Turbulence and Middle-Income Jobs

## Introduction

“A giant sucking sound” was the way Ross Perot described the effect of globalization on middle-income American jobs. The story of the vanishing well-paid job has been a theme of newspaper and magazine articles ever since the series run by the *Washington Post* that said:

The jobs have had one thing in common: For people with a high school diploma and perhaps a bit of college, they can be a ticket to a modest home, health insurance, decent retirement and maybe some savings for the kids’ tuition. Such jobs were a big reason America’s middle class flourished in the second half of the 20th century . . . Now what those jobs share is vulnerability. The people who fill them have become replaceable by machines, workers overseas or temporary employees at home who lack benefits . . . Is this just another rocky stretch of the U.S. economy that, if left alone, will foster new industries generating millions of as-yet-unimagined jobs, as it has during other times of upheaval? Or is the workforce hollowing out permanently, with those in the middle forced to slide down to low-paying jobs without benefits if they can’t get the education, credentials and experience to climb up to the high-paying professions?<sup>1</sup>

These concerns make sense. While forces of technological change, globalization, and deregulation shaped the economic turbulence described in the previous chapters and may lead to greater productivity, this is hardly reassuring to workers who face the loss of current jobs and suffer uncertainty about the earnings in their future jobs. Tellingly, however, the same

*Washington Post* article says, “The government doesn’t specifically track how many jobs . . . have gone away.”

This chapter begins to fill the information gap about lost jobs by answering a number of questions.

- What has happened to the number and type of jobs within each industry through boom and bust?
- Have “good jobs” been replaced by worse jobs as high-paying firms shrink and low-paying firms grow, or is the reverse true?
- Who bears the brunt of economic turbulence—low-income, middle-income, or high-income workers?
- What has happened to the skill level of the workforce?
- Do new jobs pay more than old?

Because all of these effects are interrelated, the chapter also sorts out the separate contributions of each. In doing this, three ancillary points are important. First, *generalizations about changes in what has happened to the numbers and types of jobs are misleading*. Reading through the chapter, it will become clear that although each of the five industries has more jobs for all workers now than a decade ago, and these jobs tend to be higher skilled and higher paying, the positive changes have been greatest in the fastest-growing industries, software and financial services. And, although earnings have increased for low-, middle-, and high-income workers in each industry, the reallocation of jobs has come at a cost to some workers, especially lower-skilled workers who have been displaced.

The second point is that *the people who hold jobs now are often not the same people who held jobs more than a decade ago*. Although this is not surprising given such high rates of worker turnover, the change in who is working is not even across the earnings distribution. Fewer than one in ten of the lowest-income workers who started off in an industry at the beginning of the period is still working more than a decade later, while at least one in five (and sometimes one in two) of the highest-income workers is still employed. Indeed, a small part of the increase in earnings for the low- and middle-income workforce reflects the fact that new entrants have more valuable skills than the workers they replace.<sup>2</sup>

The third thing to keep in mind is that *simple explanations of the impact of changes are misleading*. Many, albeit offsetting, forces affect worker earnings. Firm entry and exit, changes in firm size, and changes in workforce experience all operate in complex and different ways.

## Economic Turbulence and Middle-Income Jobs

Economic turbulence affects the quality and quantity of middle-income jobs in four ways. One way is through changes in the types of workers who are hired in an industry. Another is firm entry and exit: for example, firms paying “good” wages can vanish, to be replaced by firms that pay less. Another is that firms can change size: for example, low-paying firms can expand and offer more lower-quality jobs, while high-paying firms can contract and reduce the number of good jobs. Finally, a worker can be re-assigned within the firm, to a job with a different title and a different level of responsibility. This chapter, like most broad-based analyses, can look only at the first three of the four. In what follows, a job is a match between an employer and an employee, rather than a specific position within a firm.

Academics disagree about the importance of each of the first three underlying forces. A number of researchers have pointed to the importance of workforce change, particularly the aging of the workforce and changing worker skills.<sup>3</sup> Another set of researchers emphasizes the growth and decline of firms and industries, particularly the loss of manufacturing jobs resulting from globalization.<sup>4</sup> One of the most careful analyses to date notes:

Across industries, we find that plant survival and growth are disproportionately lower in industries with higher exposure to imports from low-wage countries. Within industries, the higher the exposure to low-wage countries, the bigger is the relative performance difference between capital-intensive plants and labor-intensive plants in terms of survival and growth. Finally, . . . some U.S. manufacturing plants adjust their product mix in response to competition from low-wage countries. Plants facing higher shares of imports from low-wage countries are more likely to switch industries. When plants do switch, they jump towards industries that are on average less exposed to low-wage countries and are more capital and skill intensive.<sup>5</sup>

The overall impact of such changes on low-income workers over the long term is not known, although studies of the low-wage labor market show that where low-wage workers work has a major impact on their earnings and their long-term opportunities.<sup>6</sup>

Firm managers also tell researchers that there is a variety of forces at work. Three industries have substantially changed the types of workers hired. In *semiconductors*, with rapid technological change and automation,

the employment of engineers relative to operators increased over the 1990s. In financial services, the proportion of individuals employed in higher-paying occupations has increased while the share of those in lower-paying positions has decreased gradually. And in software, more educated young workers, often with little experience, have been hired.

Meanwhile in almost every industry, new firms have emerged with very different ways of doing business. In the early 1990s, large firms with manufacturing plants dominated employment in the semiconductor industry, but during the 1990s, a significant portion of chip manufacturing moved overseas and small design-only fabless firms sprang up. There are large differences across trucking firms in what they are doing—some ship higher-quality freight with higher-skilled, higher-paid, and often unionized drivers, and others do the opposite. In general, nonunion carriers have replaced unionized carriers, which pay higher mileage rates to their drivers. In retail food, similar patterns emerged through the process of some unionized firms exiting or at least not growing while nonunion firms entered as well as grew. In financial services, restructuring and strategies to segment customers, combined with new human resource management practices, have affected pay within the industry. And the software industry has experienced explosive growth; as many large hardware firms have outsourced the production of software programs to small independent providers of software products or programming services, new products have been emerging rapidly and meanwhile the earnings premium paid to higher-skilled software workers grew.

## **Basic Facts about Jobs and Earnings**

### *Setting a Baseline*

In order to describe the impact of economic turbulence on lower, middle, and higher income jobs, boundaries need to be set for each category. Although any boundaries are arbitrary, many researchers use the bottom 25 percent of jobs to describe bottom or low-income jobs and the top 25 percent of jobs to describe top or high-income jobs, with the middle 50 percent described as middle-income jobs. Because the focus of the book is on what has happened *within* each industry, each threshold is defined separately for each industry.

Of course, there are many different earnings measures that have been used in the past, including hourly, weekly, and annual earnings. Since the fo-

cus in this chapter is on the earnings that workers get from their jobs and workers can hold multiple jobs in a year, two very different earnings measures are used here. The first is a narrow measure, which is based on jobs with *dominant employers*. A worker's dominant employer is the firm that contributes the most to his or her earnings in each year. In this case, the earnings measure used is *annualized earnings*, which is an estimate of potential earnings if workers keep their jobs year round without any unemployment or nonwork periods.<sup>7</sup> The second measure used is broader, as it is based on *any* job in a given Sloan industry. In this case, the earnings measure used is *actual annual earnings*, which is simply the sum of quarterly earnings during a given year.<sup>8</sup>

Together, these measures represent the spectrum of the impact of economic turbulence on earnings and jobs. The annualized earnings measure captures less volatility than does actual earnings, because the latter includes the earnings of part-time workers who enter and leave the labor market as they go to school, take care of family, or are unemployed, as well as the earnings from secondary jobs.

Both measures are used precisely because there are important differences in jobs and earnings structures across industries. For example, the retail food industry has many temporary and part-time jobs, but has relatively *few dominant jobs*. In 2003, only 39 percent of all jobs in retail foods were dominant jobs, and only 50 percent of all jobs in trucking were dominant jobs. In contrast, 64 percent of all jobs in software, 78 percent of all jobs in semiconductors, and 89 percent of all jobs in financial services are derived from dominant employers.

### *What Are the Facts?*

The key facts are summarized in table 7.1, which shows what has happened to the growth in the number of jobs and to the earnings thresholds for workers in the bottom, middle, and top income categories.

*What has happened to the number and type of jobs within each industry through boom and bust?* Every industry has more jobs at the end of the period than at the beginning. The growth in the number of dominant jobs ranges from 130 percent in software, 26 percent in semiconductors and 19 percent in financial services to a much weaker 4 percent in trucking and 7 percent in retail food. Much of the job growth has been in the higher-paying industries. For example, in the fastest-growing industry, software, the median worker made more than three times as much in 2003 (over

TABLE 7.1 Earnings levels for all workers across industries (1999 dollars).

DOMINANT JOBS				
Year	Job growth 1992–2003	75th percentile	Median	25th percentile
Financial services				
2003	19%	\$62,479	\$37,509	\$24,559
1992		\$47,780	\$30,684	\$20,900
Retail food				
2003	7%	\$33,144	\$21,396	\$13,806
1992		\$33,635	\$21,042	\$13,079
Semiconductors				
2003	26%	\$98,589	\$66,595	\$42,208
1992		\$66,350	\$44,242	\$30,206
Software				
2003	130%	\$96,281	\$68,665	\$45,028
1992		\$74,851	\$52,082	\$35,586
Trucking				
2003	4%	\$44,504	\$34,247	\$24,318
1992		\$45,033	\$33,188	\$22,137
ALL JOBS				
Year	Job growth 1992–2003	75th percentile	Median	25th percentile
Financial services				
2003	13%	\$50,343	\$28,748	\$14,842
1992		\$38,896	\$23,444	\$12,245
Retail food				
2003	13%	\$24,708	\$13,163	\$6,324
1992		\$23,622	\$12,376	\$5,961
Semiconductors				
2003	19%	\$92,988	\$59,770	\$33,535
1992		\$61,386	\$39,384	\$24,304
Software				
2003	111%	\$86,016	\$54,464	\$27,738
1992		\$65,469	\$41,753	\$22,980
Trucking				
2003	–6%	\$37,545	\$23,656	\$11,248
1992		\$35,626	\$20,727	\$9,641

\$68,000) as the median worker in one of the slowest-growing industries, retail food, who made \$21,396.

In almost all industries, the growth of full-time year-round, or dominant, jobs exceeds the growth of all jobs. In the trucking industry, for example, the number of total jobs actually shrank (by 6 percent), even as the number of dominant jobs grew by 4 percent. One exception is retail food, where all jobs growth is substantially higher than the growth for dominant jobs. This is not surprising, since more than half of all of the jobs in retail food are not dominant jobs but instead reflect secondary or part-time jobs.

*Have “good jobs” been replaced by worse jobs as high-paying firms shrink and low-paying firms grow; or is the reverse true?* In the fastest-growing industries, the rising tide raised all boats. The top, middle, and bottom earnings thresholds rose. In software, all boats rose by roughly the same amount: the bottom earnings threshold increased by 27 percent (from \$35,586 to \$45,028), median earnings increased by 32 percent (from \$52,082 to \$68,665), and the top threshold increased by 29 percent (from \$74,851 to \$96,281). Although earnings growth occurs for all groups of workers in both the financial services and the semiconductor industries, the earning growth for workers at the top far outpaced the growth for workers at the bottom. The pattern is similar when we use the measure of all jobs earnings, but of course the annual earnings are much lower. In software, for example, the low-income threshold when all jobs are used as the basis is approximately \$27,738 (compared to the \$45,028 for dominant jobs), and the top threshold is \$86,016 (compared with the \$96,281 threshold for dominant jobs). In all of the industries, the secondary or part-time jobs should not be viewed as inherently bad jobs. Since these jobs are not the primary job, the number of hours is inherently limited and this may account for the substantially lower earnings.

In the two slowest-growing and lowest-paying industries, retail food and trucking, only low-income workers experienced substantial earnings growth—the earnings threshold rose by a scant 6 percent in retail food (from \$13,079 to \$13,806) and by 10 percent in trucking (from \$22,137 to \$24,318). Earnings grew by 2 percent for the median retail food worker and by 3 percent for the median trucking worker over the ten-year period. And the earnings threshold for top-income workers actually declined by 1 percent in both industries. The news is less bleak in percentage terms when the earnings thresholds are calculated for all jobs in these two industries, although, of course, earnings levels are substantially lower. Middle earnings for all jobs in retail food were only around \$13,163 in 2003, compared to middle earnings for dominant jobs of \$21,396.

As was discussed in chapter 2, very different workers are employed by these disparate industries. For example, retail food workers are considerably younger than workers in other industries and are more likely to work part-time. Both retail food and financial services employ more female workers (47 and 63 percent, respectively) than the other three industries. The two highest-paying industries, software and semiconductors, have more male and older workers, but the low-paying trucking industry has a workforce that is 84 percent male.

In order to compare apples to apples, the same set of statistics is calculated for the jobs and earnings for male workers aged thirty to fifty. This includes workers like Mark McClellan, described in chapter 2, who had lost his well-paid management job and found his boat “sinking fast.” This calculation shows that Mark’s story is not true for the average worker of his age, which is a reminder that averages can be misleading. The number of jobs held by thirty- to fifty-year-old male workers *increased* in each industry, and shot up by 160 percent in software and 54 percent in semiconductors. Even though the job growth rate is much slower in the low-paid industries over this period, the growth rate for thirty- to fifty-year-old males exceeded the average.

It is true that earnings for workers of Mark’s age did not keep pace with the rise for the workforce as a whole. Indeed, for workers in the trucking and retail food industries, earnings for middle-aged men actually declined or stagnated.

*Who is working at this firm today vs. who was working at this firm yesterday?* Only one in three workers in financial services, one in four workers in retail food, and one in six workers in software who started off in the industry in 1992 is still in the same industry more than a decade later.<sup>9</sup> And even fewer are still with the same firm—for example, only one in fourteen workers in the software industry were with the same firm in 2003, although the rates are around one in six or seven in the other industries.

What happened to workers in low-income, middle-income, and top-income jobs? Many fewer low-income workers remain in their jobs, or in their industries, than high-income workers. The differences in retention patterns across industries and between low- and high-income workers are striking.<sup>10</sup> In the low-skill industries, retail food and trucking, about one in seven of the low-income workforce is with the same industry, and about one in fourteen with the same firm, after more than a decade. More than one in five low-income workers in financial services stay in that high-skill industry, and one in ten with their firm; the figures are similar in the semiconductor industry. Software is the most turbulent—fewer than one in



seven low-income workers are still in the same industry more than a decade later, and fewer than one in sixteen with the same firm.

Although these low retention rates for workers at the bottom end of the earnings distribution are to be expected, there are also large differences across industries for workers at the top end. Only one in five high-income software workers is still in the software industry twelve years later, and only one in ten is in the same firm. The same is true in the semiconductor industry; one in four high-income workers are with the same industry and one in eight in the same firm over the same period. This compares with retention rates of about one in three for high-income workers in the retail food, trucking, and financial services industries.

In sum, jobs at the bottom end of the earnings distribution and in low-skilled industries are much less likely to be stable than jobs at the top end and in high-skilled industries. However, *a particularly intriguing finding is that the two industries, software and semiconductors, that have been most affected by globalization and rapid technological change are also the two industries that have the lowest retention rates for workers in the top income category.* Presumably there is both opportunity and incentive to move in many cases (although the IT bust may have meant there were more lost opportunities than incentives).

The other important implication is the flexibility that firms have in changing their workforce. The increase in demand for goods and services in the software, financial services, and semiconductor industries has been accompanied by an expansion in employment, and firms clearly used this expansion to increase the skills of their workforce by hiring more skilled workers. Yet even in the two industries where employment declined (trucking) or stayed the same (retail food), firms have very high short-term turnover rates and the capacity to replace workers who are not as good a match to the firm, due to skills or other factors, as workers quit or are laid off.

*What has happened to the skill level of the workforce?* The short answer is that the skill level of low- and middle-income workers has increased over time. This is particularly true in the three high-skilled, expanding industries: the greater skill level of new hires relative to workers who left the industry raised the average skill level of workers in the bottom- and middle-income jobs. However, with the exception of the semiconductor industry, new high-income workers were slightly less skilled than the ones who left (see figure 7.1). The answer is quite different in the two low-skill industries. The skill level of the retail food workforce actually declined slightly, while in the trucking industry, the skill distribution became more compressed

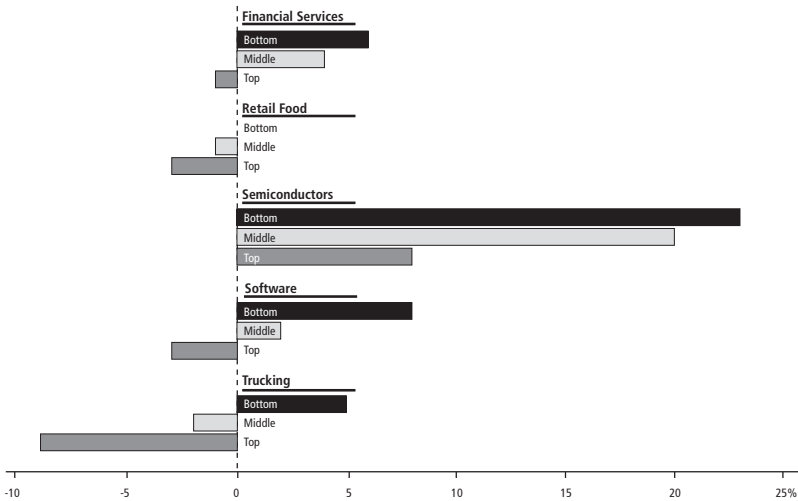


FIGURE 7.1. Skill differences between new and exiting workers.

due to an improvement in the skill levels of workers in the bottom quartile and a decline in the skills of workers in the top quartile

Broadly speaking, the increased earnings for workers in the high-skilled software, financial services, and semiconductor industries at least partially reflects the fact that entrants have higher earnings and higher skill levels than do the workers who leave. The differences between skill levels and earnings of entering and exiting workers are especially high for low- and middle-income workers in the semiconductor industry, where noticeable upskilling occurred. By and large, however, new high-income workers are less skilled than the workers they replace. Similarly, the lack of growth of earnings for workers in the low-skilled retail food industry is at least partly attributable to the fact that there is little difference in the skills of entering and exiting workers.

What is driving these patterns of workforce change? The labor force is becoming more skilled over time as younger generations who are entering the labor force are more educated than the older generations who are exiting. The increased educational attainment of the labor force across generations is a factor that many have suggested is critical for understanding the growth in productivity and earnings in the United States. In this context, this translates into substantial upskilling within low- and middle-income jobs.

*Do new jobs pay more than old (or, what has happened to “good” jobs)?*

The fear of loss of middle-class jobs reflects concern about the decline in jobs at firms that pay “good wages.” As *Business Week* puts it:

What happens if all those displaced white-collar workers can't find greener pastures? Sure, tech specialists, payroll administrators, and Wall Street analysts will land new jobs. But will they be able to make the same money as before? It's possible that lower salaries for skilled work will outweigh the gains in corporate efficiency.

If the worries prove valid, that could reshape the globalization debate. Until now, the adverse impact of free trade has been confined largely to blue-collar workers. But if more politically powerful middle-class Americans take a hit as white-collar jobs move offshore, opposition to free trade could broaden.<sup>11</sup>

How is it possible to know whether new jobs at new or growing firms pay more than old jobs? An important finding from chapter 4 was that, all else being equal, new firms are more productive than exiting firms and generally pay more. But do they pay more to all workers, to low-income workers, or to high-income workers? The best way to answer this question is to compare the premium paid by entering firms with that paid by exiting firms. This is done by first calculating the pay premium paid by each firm, ranking each firm by that premium (and weighting by the amount of employment in that firm), then categorizing the firms into the bottom quarter, the middle half, and the top quarter, and finally comparing the pay premium paid by the firms.

This exercise, the results of which are summarized in figure 7.2, answers the question. *In two of the three high-skill industries, new firms — at every point of the earnings distribution — pay more than old.* In financial services, entering firms at the bottom quartile pay about 5 percent more to workers than did exiting firms; entering firms at the median and the top quartile pay about 10 percent more than did exiting firms. In the software industry, firms entering in the bottom quartile pay almost 10 percent more than the firms they replace; the median entering firm paid almost 15 percent more than the median exiting firm, and the firms in the top quartile of entrants paid about 20 percent more than exiting firms.

The opposite is the case in the two low-skilled industries, where pay premia declined in the top-paying firms. But those firms that entered at the bottom end in the trucking industry paid more than did the firms that exited, as did entering firms in the middle and those at the bottom of the distribution in retail food.

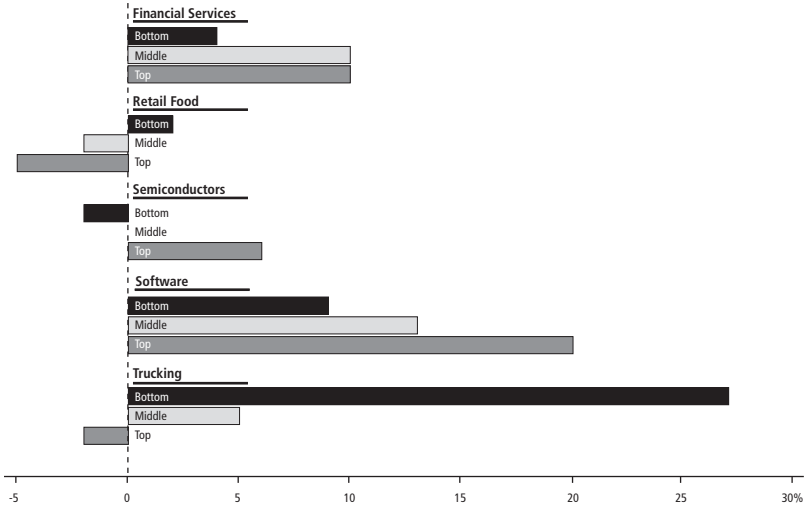


FIGURE 7.2. Pay differences between new and exiting firms.

Why do entering firms pay higher premia than exiting firms? This is an open question but there are a number of intriguing possible explanations. One of the explanations is closely related to the findings in chapter 4. Entering firms are more productive than exiting firms. There is evidence that suggests that firms share their success with their workers; thus, the more productive entering firms share some of that higher productivity with their workers.

### Sorting It Out: The Separate Contribution of Worker and Job Reallocation

There have been substantial changes in both the types of *workers* and in the types of *firms* over time, so sorting out the contribution of each of these changes is important. But the sorting-out process is complicated by the fact that over time the way in which workers sort into different firms—their match to firms—may change. If, for example, at the beginning of the 1990's, high-skilled workers were likely to work for high-paying firms, and low-skilled workers were more likely to work for low-skilled firms, and over time the sorting process reversed, there would be quite complex effects on worker earnings.

This section separates out the effect of each of these changes on high-, middle-, and low-income jobs as follows.<sup>12</sup>

- *Worker reallocation* affects the earnings distribution through
  - workforce change: exiting workers with one set of skills can be replaced by entering workers with another set; or
  - change in skill: the skills of continuing workers can increase through increased experience.
- *Job reallocation* affects the earnings distribution through
  - firm entry and exit: firms that enter and exit can have different pay premia; or
  - changing match: changes in the allocation of workers across firms with different pay premia in each industry can result from differential rates of job creation and destruction across firms.

### *The Results*

*What was the impact of turbulence on the types of jobs in the workforce?* This can best be seen by benchmarking earnings in the initial year: 1992. By definition, 25 percent of the workforce was in the low-income category, 25 percent in the high-income category, with the rest in the middle-income category. In what follows, we answer the question by examining whether each force acted to increase or decrease the proportion of workers in the low-, middle-, and high-income categories. The thresholds used here are time invariant and industry specific. So for this purpose the interpretation is how turbulence has impacted the distribution of low-, medium-, and high-income jobs in each industry.<sup>13</sup> The first panel of figure 7.3 shows how the proportions of low-income workers have changed in each industry over more than a decade; the second panel, the middle-income category; and the third panel, the high-income category.

In each panel, the first set of bars summarizes the total change. The first panel, for low-income jobs, confirms that there are proportionately *fewer low-income jobs*: there is a much lower proportion of workers in that category in each industry than there was in 1992. In the semiconductor industry, the proportion has dropped by over 10 percent; in software and financial services the percentage has dropped by almost the same amount. The proportion has dropped by 2.5 percent even in the low-wage retail food industry. The second panel demonstrates that there are *more middle-income workers in retail food and trucking and fewer in semiconductors, software,*

*and financial services.* And the third panel reveals that there are *more high-income workers in the three high-skilled industries.* In semiconductors, the proportion above the 1992 high-income threshold had grown by more than 25 percent; in software, the high-income proportion has grown by almost 20 percent.

The five subsequent sets of bars describe the separate (marginal) impact of all the other contributing factors. Thus, the second set (workforce change) shows how the proportion of low-income workers is affected by new workers replacing exiting workers. The third set (change in skill) shows the impact of changes in the experience, or age, of the workforce; the next set, the impact of firm entry and exit; and the next set, the impact of the changing match between workers and firms.

What is the impact of workforce change? The second set of bars in each panel shows quite dramatically that there is almost none. If there been no worker entry and exit (i.e., had the workforce been the same during the entire period and all other factors been held constant), the earnings distribution in each industry would have changed very little. This pattern might seem a bit surprising given the earlier finding that the entrants to the labor force have more skill than the exiters—apparently the increasing skill led to increases in earnings within each of the three income earnings categories rather than to shifts among the categories.

What are the effects of skill changes? The next set of bars shows the impact of changing skill (primarily due to the aging of the workers) on the earnings distribution. Changes in skill acted to *reduce the proportion of workers below the low-income threshold and push substantially more workers above the high-income threshold.* This is true for each industry, but is particularly striking in the semiconductor industry.

The closing of Kaiser Aluminum is what pushed Mark McClellan out of the ranks of the middle class. What do the data tell us about the effects of firm entry and exit. For each industry, new firms' higher pay compared to the pay of the exiting firms has reduced the proportion of low-income workers—particularly in trucking—and increased the proportion of middle-income workers. There is little impact at the top end of the distribution. Two findings are remarkable. One is that, despite the stories in the popular press, the *entry and exit of firms acts to increase the size of the middle class*, not decrease it. This pattern is consistent with chapter 4, which showed that more productive firms tended to enter and less productive ones tended to exit and suggests that greater firm productivity is shared with workers. The other remarkable finding is that the impact is not con-

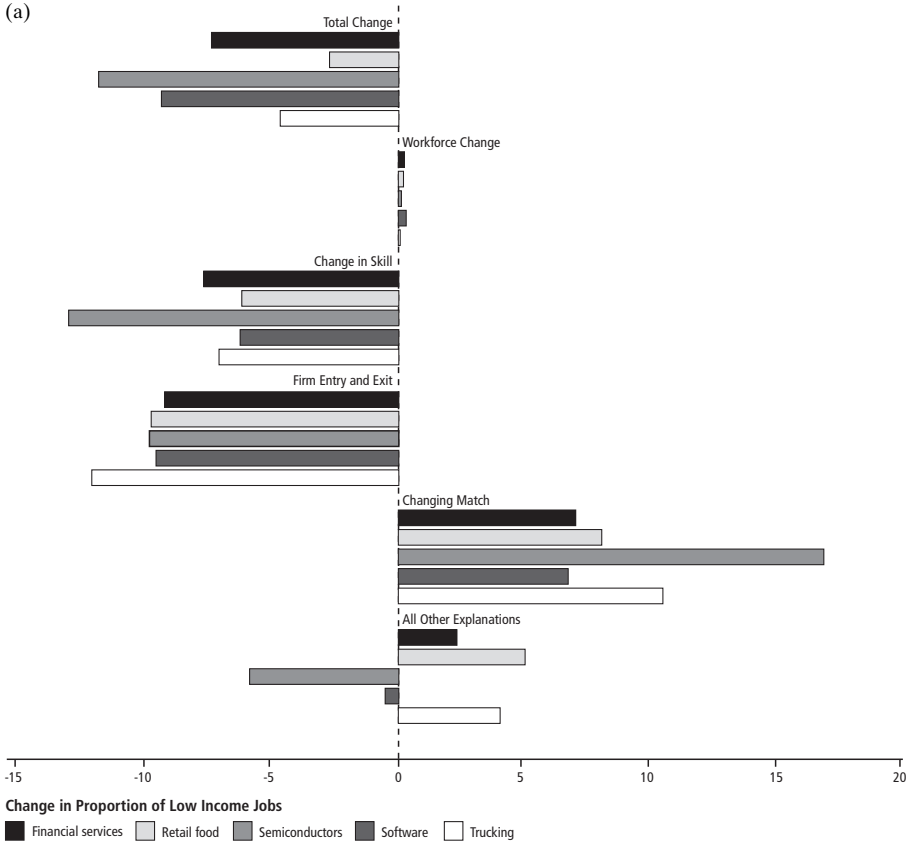
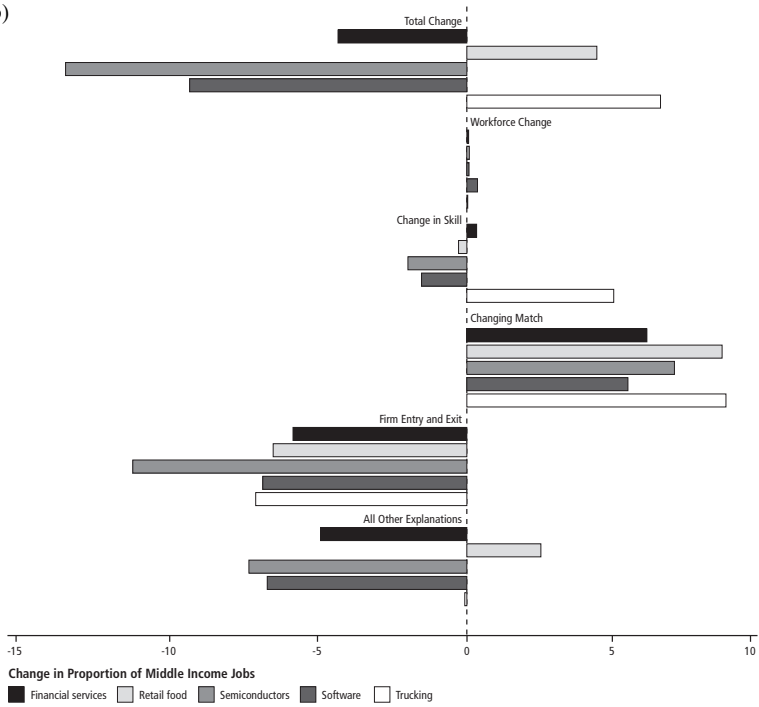


FIGURE 7.3. Sources of Change. (a) Low-income jobs. (b) Middle-income jobs. (c) High-income jobs.

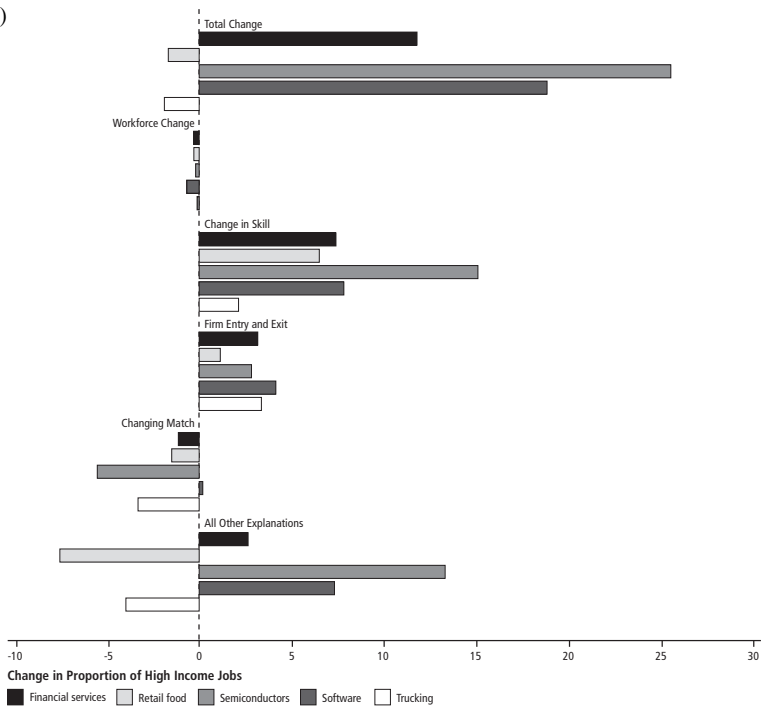
financed to high-skilled industries. Indeed, the greatest impact of firm entry and exit on middle-income workers is in retail food and trucking, the two low-skilled industries.

What is the impact of job reallocation as firms grow and shrink? The reallocation of workers among continuing firms goes to the heart of the impact of firm expansion (job creation) versus firm contraction (job destruction) for continuing businesses. Surprisingly, it is job reallocation among continuing businesses that has had a big negative impact on middle-income workers and has increased the proportion of low-income workers, particularly in the semiconductor industry. Compared to shrinking firms, growing firms account for growth in low-income jobs. Part of this story may be that among incumbents the rapidly growing firms are often the young busi-

(b)



(c)





nesses who have found the right path for their product or location. Such rapidly expanding firms might be firms that pay lower premia than large, mature incumbent firms. So in order to reconcile the opposite effects of entry and exit and job reallocation of continuing businesses, it is important to emphasize the different reference groups. For entry and exit, what matters is the pay premia for entering businesses relative to exiting businesses. For job reallocation, what matters is the pay premia for growing vs. shrinking (or at least firms that are not growing).

If the impacts of firm entry and exit and the expansion and shrinking of continuing firms are combined the effect is to increase the proportion of middle-income workers in the two low-skilled industries, retail food and trucking; to have almost no impact on financial services; and to decrease the the proportion of middle-income workers in both semiconductors and software. The combined impact is to increase substantially the proportion of high-income jobs in software and financial services, but to decrease that proportion in semiconductors.

These findings suggest that low-wage workers have been adversely affected by reallocation of jobs from high- to low-paying firms, while the opposite is true for high-wage workers, except in semiconductors. Overall, the positive effects for high-income workers are outweighed by the negative effects for low-income workers.

The last set of bars shows the impact of the residual—that is, of all explanations not accounted for by the wage decomposition, as well as possible measurement errors.<sup>14</sup>

## **The Bottom Line**

This chapter has explored the impact of economic turbulence on low-, middle-, and high-income jobs over more than a decade.

*The popular perception that jobs are vanishing is not correct.* There are more jobs in each of the five industries than at the start of the period.

*The increase in jobs is not an increase in “bad” jobs.* The proportion of low-income workers declined in all five industries. The decline is larger in semiconductors, software, and financial services, and small in retail food and trucking.

*The proportion of high-income jobs increased substantially,* contrary to fears about the impact of globalization on high-skilled workers. The percentage of high-income workers increased substantially in software, financial services, and especially semiconductors. However, in the retail food

and trucking industries, there are *fewer* high-income workers at the end of the period.

*A rising tide has lifted all boats in the high-skilled, high-tech industries.* Workers in financial services, semiconductors, and software have seen increases in earnings across the board. By contrast, the retail food and trucking industries have experienced an increase in the middle group with fewer workers in the top and bottom groups.

What were the main factors driving these changes? We found that while there were differences across industries, some factors stood out. In particular, even in industries in which the aggregate earnings distribution changed very little over the decade, there are large and offsetting changes in the underlying four components.

*Worker entry and exit* has had very little impact on changes in the earnings distributions. The evidence shows that there has been upskilling via worker entry and exit but this has had little impact on the distribution of earnings across broad earnings categories. In financial services and software, the increase in age (and experience) of continuing workers increased earnings across the board.

In contrast, *firm entry and exit* tended to reduce dramatically the percentage of low-income workers. This is largely offset by the *firms growing and shrinking*, which tended to increase the proportion of low-income workers as growing firms paid higher wages than shrinking firms.

The offsetting effects from these different factors make it difficult to make broad generalizations about the impact of economic turbulence on the distribution of earnings. What is clear is that the tremendous churning of jobs and workers, combined with the large differences in pay premia across firms, has a large impact on the earnings of an individual worker.

So the newspaper stories are right: it is not only important to find out why some firms have different pay premia for similar workers, but also to find out whether high premia will vanish in the future. The fate of an individual worker like Mark McClellan is a great example. He, like all workers, should anticipate that his skills and talent for hard work would be rewarded. And what this chapter shows is that, for most workers, this has been the case. But all workers should know that precisely because different firms pay different amounts, positive or negative outcomes for the firms that they find themselves employed with can and will have a large impact on their earnings and employment outcomes. So the fate of Mark McClellan was as much tied to the fate of his employer, Kaiser Aluminum, as to his own skills and talent.

West Virginia's governor, Joe Manchin III, is on the record as saying,

“Wherever there is one job on the verge of being lost, I will fight to save it. Wherever there is one company looking to grow in West Virginia, I will fight to make that growth a reality.” The bottom line from this chapter is that policy makers are right to be concerned about gaining and losing “good” jobs. Tight connections between the fate of the workers and the fate of their employers are unavoidable, and some workers have been hurt by the loss of “good” jobs. But despite all the different forces of globalization, competition, deregulation, and turbulence faced by firms and workers in each of the five industries, the bottom line from this chapter is that the net result has been to increase the number of jobs and increase earnings across the board.

## Conclusions and Implications for Policy

The Chinese proverb advised being a dog rather than a man in chaotic times. The seven chapters that preceded this one don't provide any evidence on the value of being a dog, but do suggest that, for most, being a man is not so bad. The chaotic change that leads firms to grow and shrink, and workers to change jobs, eventually lead to a more productive and stronger economy.

Of course, economic turbulence affects some much worse than others. Some observers, such as Larry Elliott, the economics editor of the *Guardian*, are particularly skeptical about the value of flexibility:

[T]here's the result of the French referendum on the European constitution, seen as thick-headed luddites railing vainly against the modern world. What the French needed to realise, the argument went, was that there was no alternative to the reforms that would make the country more flexible, more competitive, more dynamic. Just the sort of reforms that allowed Gate Gourmet to sack hundreds of its staff at Heathrow after the sort of ultimatum that used to be handed out by Victorian mill owners. An alternative way of looking at the French "non" is that our neighbours translate "flexibility" as "you're fired".<sup>1</sup>

The difference in focus between French and Anglo-American policy makers is indeed stark. French policy makers have consistently responded to their public's concern about unemployment with strict rules that constrain laying off workers while allowing the growth of an informal labor market for immigrants. The strict rules in France about whether and how firms can lay off workers is in strong contrast to the rules in both the United

States and the United Kingdom. Advocates of the French system argue that it preserves “good jobs” for citizens; advocates of the Anglo-American system argue that it creates a productive economy that provides openings for jobs that can be pathways to success.

This book sheds light on this debate by describing the labor market interactions of millions of workers and firms. The chapters in the book describe the components of economic turbulence in five industries that in many ways represent archetypes for other U.S. industries, and then examine the impact of turbulence on firms, workers, and the mix of high-, middle-, and low-income jobs.

The industries studied are characterized by pervasive change and economic turbulence. Workers enter and leave the labor market; they are reallocated across firms; firms expand and contract; and firms start up and die. The value added of this book is that it examines the *interactions of all of these factors simultaneously*. As a result, the book documents, for the first time, the many different ways in which worker and firm outcomes interact.

A strong tie exists between economic turbulence and firm outcomes. Even within these five industries, different firms have different ways of organizing themselves and their workforce practices. There is neither a magic bullet nor only one successful organizational structure: different firms even in the same industry have alternative paths to success. However, these different approaches have consequences, and some patterns emerge. For example, firms with excessively high turnover and low-skilled workforces are less likely to survive. But the economic turbulence associated with different choices has some long-run economic benefits. That is, economic turbulence results in stronger industries, as more productive firms tend to replace less productive ones. Recall the example from the trucking industry in chapter 3: American Freightways was feared by the smaller LTL carriers as it moved east and relentlessly cut costs and improved service through sophisticated use of IT.

Although there are costs to workers like Mark McClellan who are caught up in the adjustment process, most workers handle economic turbulence well. Over time, their job changes result in improved jobs, although job change often involves a period without work. Workers who initially find a good job with a firm—for whatever reason—typically do better than workers who change jobs. When workers do lose these good jobs because of firm downsizing, they may end up in an inferior job. Those workers who start out on bad job ladders with low earnings and low earnings growth usually are able to land on better job ladders by changing jobs.

And finally, although many factors contribute to changes in the mix of high-, middle-, and low-income jobs in the five industries, what happens to firms—their entry and exit plus their growing and shrinking—primarily determines the mix of jobs. This is because different firms pay different wages to workers with similar skills, and so changes in the number of jobs offered by different firms change the mix of earnings across jobs.

Broad-brush economy-wide descriptions, while tempting, can be extremely misleading. The analysis of the five industries in this book makes it clear it is important to use a bottom-up approach on an industry-by-industry basis. While some results appeared to hold consistently across the industries, most outcomes and their interpretation needed to be guided by an understanding of the particular industry context.

This chapter provides a summary of the key contributions of the book as well as a discussion the possible policy lessons.

## **Key Contributions**

### *Basic Facts*

The footprint of economic turbulence is large and pervasive. More than 20 percent of workers either begin or end a job each quarter, and up to one-half of this churning of workers reflects the churning of jobs among firms as they grow and shrink. Additional job churning occurs as firms enter and leave an industry. Over a five-year horizon, in all five industries at least 25 percent of establishments exit and at least 30 percent are recent entrants.

The amount of turbulence varies by worker, firm, and industry characteristics. Low-skilled younger female workers in low-tech industries are much more likely to have turbulent careers than their high-skilled older male coworkers. Similarly, entry and exit rates are much higher for young, small firms than for larger established businesses. However, firm size is an example where analysis must be grounded in an industry-specific context. In the semiconductor industry, for example, firm size is often a proxy for whether the company has manufacturing facilities; firm size reflects different product markets in software; and firm size in retail food and trucking reflects different organizational structures as well as different product markets.

Case study researchers have found substantial variations in firms' human resource management (HRM) practices, both among and within industries. In particular, firms appear to make systematic choices in their

worker mix and job ladders that simultaneously determine the turnover and earnings of their workers. The fact that large and persistent differences exist across firms in their patterns of worker turnover, workforce skill, and job ladders is very consistent with these findings. In retail food, for example, Costco has followed a strategy of paying workers well and working with a union because it works, while Wal-Mart has followed a completely different strategy—which works for Wal-Mart.

### *Economic Turbulence and Firms*

Firm survival changes with worker skills and turnover. Even after taking productivity, size and a variety of other factors into account, workforce skills and churning affect the likelihood of businesses surviving. As always, however, broad generalizations need to be tempered by industry-specific knowledge, since one size does not fit all. In particular, the two very high-human capital industries—software and semiconductors—are exactly those where human capital does not matter for firm survival. In the case of both industries, firms must be distinguished by their business models in order to predict survival: small software and semiconductor companies are often risky startups that hire only high-educated programmers and engineers.

### *Impact on Workers*

The analysis of literally millions of worker histories and hundreds of career paths for workers and job ladders for firms leads to the reassuring finding that although turbulence imposes short-run costs, in the long-run job change leads to improved jobs for most workers. The evidence does not support the popular notion that “*low-wage workers churn from bad job to bad job*”—not even in retail food, where many workers leave the industry for better jobs, or in trucking, where a worker’s alternative job is usually worse. The apparently contradictory views, “*big rewards exist for jobhopping*” and “*loyalty pays off*,” are actually complementary. Some workers, such as loyalists like Carol Primdahl, the engineer with TI, are rewarded for staying with one firm; but in many firms these workers compete to gain access to a long job ladder that offers career development. Workers who do not gain access to these long job ladders, for whatever reason, do better by changing employers. These workers, who start off with relatively low initial earnings and low earnings growth, often in a different industry, must

change jobs to get a better job. The evidence suggests that workers vary in how many jobs it takes before they land on a good job ladder with career development, and their earnings trajectories cannot make up for the period when they were working on inferior job ladders or were unemployed.

The type of firm makes a difference in both job ladders and career paths. Workers generally find the best job ladders in growing large low-turnover businesses. Small growing high-turnover companies also provide good job ladders, except in retail food. Worker turnover and firm job ladders do not have a straightforward relationship. Turnover generally goes with lower initial earnings in large firms but with higher initial earnings in small firms. High-turnover firms generally have higher earnings growth than do low-turnover firms. Altogether, after ten years of job tenure, earnings are higher at high-turnover firms than at low-turnover firms for the workers who kept their jobs (except semiconductors, where the opposite relationship holds). Although this finding is a concern, it is counterbalanced by the fact that initial earnings are more important than earnings growth in high-turnover firms where few workers stay long and by the evidence that high-turnover businesses are less likely to survive.

### *High-, Low-, and Middle-Income Jobs*

Although a major concern has been that “good jobs” (meaning high-paying jobs) have been lost as a result of economic turbulence, this is not the case. Analysis of the earnings and skill levels of workers, together with the wage premium paid by new, continuing, and exiting firms over more than a decade, provides a new perspective on the impact of turbulence on jobs and workers. The general idea that low-wage workers have suffered as a result of economic change does not hold up. Although there is high worker turnover at the bottom end of the earnings distribution, low-wage workers have typically gained ground. These changes are particularly large in software and to some extent in trucking and semiconductors, while in retail food the improvement is much more modest. The generally held notion that there are more high-wage workers in the high-wage industries does hold. However, there is not a monolithic cross-industry pattern of changes in the earnings distribution. Indeed, inequality increased in the three high-skilled industries and decreased or was unchanged in the two low-skilled industries.

Changes in the types of jobs that workers hold are quite complex, and



reflect substantial changes in offsetting factors. This complexity reflects the fact that different firms pay different premia to similarly skilled workers, and thus the changing mix of firms has important implications for the changing mix of high-, middle-, and low-income jobs.

## Policy Lessons

These results have important implications for policy in at least five areas. Future research using both matched employer-employee data and industry-level analyses can help improve policy decisions in each of these areas.

### *1. Information about economic dynamics helps inform policymaking.*

Although job destruction and job loss are much more visible than job gains and worker hires, the public and their leaders need to be aware that both are occurring at the same time. Statistical indicators that summarize the economic turbulence and its impact on firms and workers should be produced by the U.S. statistical agencies and made broadly available on a timely basis. Specific measures that are useful include measures of worker churning, job churning, and firm churning at both national and local levels and broken out by worker (e.g., gender, age, education, and experience) and firm (e.g., industry and size) characteristics. Moreover, directly connecting measures of churning to the outcomes for workers and firms allows insights such as the earnings and productivity at new vs. exiting firms. Leaders at the federal, state, and local levels, as well as the business community and workers, would all benefit from timely information summarizing the patterns of economic turbulence and the ongoing changes in their respective industries and communities.

### *2. High turnover rates and low workforce skill adversely impact firm survival.*

Although different firms do choose different management practices, and while there are alternative paths to survival, some ways are more successful than others. A basic message to the business community is that human resource practices appear to be critically important for firm success. Businesses with especially high worker turnover and especially low workforce skill perform more poorly and are less likely to survive, even after controlling for a number of other factors. The finding on worker turnover is robust across all five industries, although the finding on workforce skill does not hold for the high-tech, high-skilled industries—software and semiconductors—because of the many small startups in those industries

employ mostly high-skilled programmers and engineers. Some of those high-tech startups have very high payoffs but many fail. Most workers caught up in the economic turbulence from the high turnover of startups appear to handle it well, as career paths in these industries exhibit positive income changes from changing firms.

An interventionist policy might include active engagement in improving the skills of the workforce, since this will enhance both workers and firms. An open question is whether the government has any role in supporting the ability of businesses to implement successful HRM practices, since this also improves the outcomes for workers and firms.<sup>2</sup>

*3. Most workers eventually find successful career paths—but some do not.*

Although one of the perceived costs of economic turbulence is the disappearance of the good jobs provided by large growing firms, the ability of most workers to improve their career paths by finding better job opportunities with another firm is impressive. One word of caution here is that the analysis in this book has not focused on the career paths of workers with very long spells of unemployment, or those who are not able to look for work. In the U.S., long-duration spells of unemployment are relatively rare, but experiencing long unemployment is inevitably a costly and difficult process for the workers involved.

The ubiquitous and ongoing economic turbulence that workers face, combined with the fact that job change usually involves a period without a job, suggests that if interventionist government policies are to be implemented to help workers, they should take this turbulence into account. For example, government policies that aid in training and helping workers search for jobs might well be designed with the knowledge that there is a good chance that the new job a worker finds may not last. Also workers have different experiences in finding another job after firms shut down. For example, semiconductor engineer Robert Bagheri was able to continue his career development after experiencing a plant closure as a young worker, while Mark McClellan, the aluminum company manager, was unable to quickly find another job after experiencing a plant closure as a middle-aged worker.

The findings in this book suggest that workers who find “the right job” do well, so workers should ultimately be looking for a good long-term job. However, the high pace of turbulence and the finding that many workers move up via this turbulence is consistent with the view that training and job search assistance should not be geared towards finding the right job per se

but rather should provide the worker with skills and with information that facilitates adapting to the ongoing changes as the worker seeks a long-term career job.

The payoff from turbulence for both workers and firms in the long run suggests that policies, like the French approach, that directly or indirectly stifle change and mobility are not likely to be successful over time in a dynamic economy. However, the information provided in this book would provide justification for those who believe that it is necessary to provide some assistance and insurance to buffer the adverse impact of economic turbulence. It would certainly be consistent with one of the current policies in place in the U.S.: namely, the unemployment insurance system, which provides temporary income benefits to those who have suffered an involuntary job loss. Of course, the evidence would also reinforce the views of many who argue that the challenge for the unemployment insurance system and related support programs is to provide the appropriate amount of insurance for the risks induced by economic turbulence without distorting the incentives for job change.

*4. The dynamics of the distribution of high-, middle-, and low-income jobs reflects complex processes.*

Economic turbulence acts in complex and sometimes offsetting ways to change the number and distribution of high-, middle-, and low-income jobs. The finding that the dispersion of earnings is reduced as new firms offer higher pay premia than exiting firms is one interesting aspect of this complexity. This finding, coupled with the analysis of firm job ladders, supports the popular view that it is not only who you are but where you work that determines your earnings. Those designing and evaluating policies to aid low-income workers, whether job search, training, or welfare-to-work policies, should use data like those presented in this book in considering how the policies impact the types of firms that employ low-income workers. Future research in this area should focus on understanding the factors behind firm pay premia and how the distribution of firms by pay premia has been changing over time by firm and worker characteristics.

*5. Industry analysis is critical for interpreting micro-data.*

This book has clearly demonstrated the importance of industry-specific knowledge in interpreting large-scale micro-data in order to develop correct and useful understanding and policy. Business and government leaders should beware of glib generalizations, because understanding the impact of economic turbulence on the workplace is difficult when organizational structure, technological change, regulations, and economic forces

vary tremendously across industries. For example, a worker at a small, high-turnover retail establishment has a very different career path than a worker at a small, high-turnover software establishment. In-depth studies of what's happening within detailed industries, extended to more industries than the five included here, combined with large national data sets, are necessary to understand what is happening in the economy.

The research presented in this book should constitute only a first step along the road that integrates industry-level research with data at the statistical agencies to help workers and their business and government leaders understand and improve economic outcomes.



## Appendix A: The Data

This book has explained the importance of the dynamic interaction between workers and firms in contributing to American economic growth. Firms are constantly redefining and reinventing themselves, and workers are constantly shuffled from less productive to more productive firms. The resulting challenge to U.S. statistical agencies has been to provide information that describes this rapidly changing environment to policy makers. The ideal data set—which would contain information on workers, firms, and the dynamic interaction between the two—has never hitherto been available. This book is the first to exploit data from a new program at the U.S. Census Bureau that not only captures the interaction of workers and firms, but also incorporates new measures of job and worker dynamics as well as workforce quality.

The rich empirical micro data set we use is complemented by the industry expertise of academics affiliated with the Sloan Industry Centers. The aim of these centers is to create an academic community that understands industries and to encourage a direct approach to the companies and people of each industry for data and observations. A core principle of the industry centers is that observation-based work by well-informed academics will, in the long run, lead to practical contributions to the industries studied. The industry centers have developed tremendous expertise in the innermost workings of their industries through such observation-based work.<sup>1</sup>

The Centers that are participating in this work have extensive knowledge of their industries. The Sloan Industry Center on the retail food industry, for example, has used a supermarket panel of grocery stores to research the effect of management and training practices on the wage distribution, career ladders, and skill levels in the retail food sector; the Sloan–UC Berkeley Competitive Semiconductor Manufacturing Program

has collected data on thirty-nine semiconductor fabrication plants in the U.S., Asia, and Europe during the 1990s through a series of two-day site visits; the Sloan Trucking Industry Program has collected and analyzed data on both firms and workers between 1997 and 1999 to understand the link between firm performance strategies and driver outcomes; the Software Program is just beginning to look at key skill issues in its new center.

This appendix describes the basics of the data set, focusing in particular on its unique components. We then turn to describing the construction of the key measures of economic turbulence, workforce turnover, and firm entry and exit. We conclude by illustrating the main measurement challenges in evaluating worker and firm outcomes, describing in detail both the advantages and limitations of our new data in depicting the dynamic interaction between workers and firms.

### **The Source of the Information in the Book**

The data that we use here capture the interaction between firms and workers over time for (almost) the universe of workers and (almost) the universe of firms. How is this done? The Census Bureau already collects data on households and businesses with products including aggregate (e.g., national, industry, state, county) statistics on a large variety of variables including output, employment, income, earnings, capital expenditures, and poverty. In addition, the Census Bureau produces separate analytical micro data sets on households and businesses. The Longitudinal Employer-Household Dynamics (LEHD) program at the Census Bureau brings the household and business data together at the micro level using universe state level wage record data to create a comprehensive and unique resource for new analysis (see figure A.1). The key characteristic of these data is that they describe both sides of the labor market—both the demand side and the supply side. This feature is necessary for understanding the interaction of the employment and earnings outcomes of workers and the productivity and survival outcomes of firms. This is the first comprehensive data set that permits such analysis for U.S. workers and firms.<sup>2</sup>

#### *Data Details*

The key integration record in this case is unemployment insurance (UI) wage record. Every state in the U.S. collects quarterly employment and

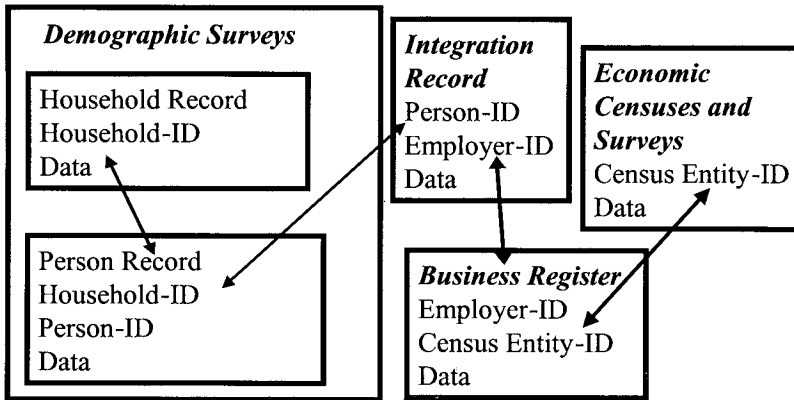


FIGURE A.1. The Longitudinal Employer-Household Dynamics program.

earnings information through its state employment security agency to manage its unemployment compensation program, enabling us to construct a quarterly longitudinal data set on employers. The employer's four-digit Standard Industrial Classification code is then added from another administrative file. Virtually all business employment is covered.

The advantages of UI wage record databases are numerous. The data are frequent, longitudinal, and potentially universal. The sample size is generous and reporting is more accurate than survey-based data. Longitudinal earnings and employer files can be constructed for individuals at quarterly intervals. The key advantage of having virtually universal data is that we can track movements of individuals to different employers and the consequences of these movements on earnings. It is also possible to construct longitudinal data sets using the employer as the unit of analysis.

Perhaps the main drawback to the UI wage records data is the lack of even the most basic demographic information on workers. The integration with Census Bureau data overcomes this in two ways. First, the micro data can be linked to administrative data at the Census Bureau containing information such as date of birth, place of birth, and gender for almost all the workers in the data set. Second, as will be discussed in the next section, staff at the LEHD program at the Census Bureau have exploited the longitudinal and universal nature of the data set to estimate both worker and firm fixed effects as new measures of workforce quality.

The information in the UI wage records is also quite limited with regard to characteristics of the employer. The Census Business Register has



limited information on total employment, payroll, industry classification, sales, and geographic location on each business. However, because the UI data contain information about all the workers in each business, it is possible to create detailed information about the demographic characteristics of the workforce at each business, together with information on the demographic characteristics of worker and job flows into and out of the business. In addition, detailed information on firm inputs, outputs, and performance is available in the economic census years—primarily 1992 and 1997.

The work in this book uses data from six geographically dispersed states with a wide variety of industries and workforces<sup>3</sup>—California, Florida, Illinois, North Carolina, Pennsylvania, and Texas—which are home to just under 40 percent of the U.S. workforce. The data that we use begin in the early 1990s (for three of the states) and ends in 2003.

A major advantage of the data set is its sheer size: the data include 854,593,228 observations on some 57,823,057 individuals and 2,913,197 businesses.

### *Definitions*

The very turbulence of economic activity that is the focus of this book creates substantial definitional challenges. Most obviously, the constant flow of workers into and out of jobs and industries makes it difficult to impose a static concept like “works in the software industry” or “works in retail food” on an inherently dynamic process. However, because our interest in part is in the impact of firm and industry changes on workers, we impose a requirement that the employer and the employee should be substantively attached to each other.

To be more specific, we use a concept of the “dominant employer” or the “dominant job.” The definition of a dominant employer is the employer from which a worker has generated the most earnings in a given period. The job of a worker associated with her dominant employer is the dominant job. Depending on the research questions, we use either a quarter or a year as our time period. We require that a worker’s “dominant employer” be in the relevant sector.<sup>4</sup> In addition, we focus on workers who have real quarterly earnings of at least \$250.

Similarly, because we do not observe hours worked in the data but instead only observe quarters worked, quarterly earnings reported in UI data may not be a good earnings measure when we examine earnings inequality or calculate earnings growth over time. In some cases, earnings

may be three-month earnings and, in other cases, they may be one-month earnings. To overcome this problem, we have constructed “full-quarter” earnings for a quarterly measure and “annualized” earnings for an annual measure.

First, the worker is considered full-quarter employed in quarter  $t$  if positive earnings are reported in quarters  $t - 1$ ,  $t$ , and  $t + 1$ . Then her earnings in quarter  $t$  is considered “full-quarter” earning. We still do not know whether she worked full-time or part-time during quarter  $t$ . However, she is more likely to have worked all three months during that quarter regardless of her full-time status. Therefore, this measure is more comparable across workers than the simple quarterly earnings measure.

Continuous employment during quarter  $t$  means having an employment history with positive earnings for either  $t - 1$  and  $t$  or  $t$  and  $t + 1$ . Employment spells that are neither full quarter nor continuous are designated discontinuous. If the individual was full-quarter employed for at least one quarter at the dominant employer, the annualized earning measure is computed as four times average full-quarter earnings at that employer (cumulative full-quarter earnings divided by the number of full quarters worked). This accounts for 84% of the person-year-state observations in our eventual analysis sample. Otherwise, if the individual was continuously employed for at least one quarter at the dominant employer, the annualized earnings are average earnings in all continuous quarters of employment at the dominant employer multiplied by 8 (i.e., 4 quarters divided by expected employment duration during the continuous quarters of 0.5). This accounts for 11% of all observations. For the remaining 5%, annualized earnings are average earnings in each quarter multiplied by 12 (i.e., 4 quarters divided by an expected employment duration during discontinuous quarters of 0.33). This “annualized” earnings measure is, for each worker, the full-time full-year earnings equivalent and is used as the dependent variable in the decomposition of each individual’s “wage” into person effect, firm effect, and an experience component.<sup>5</sup>

A major advantage of our data over survey-based data is that our ability to link directly to firm identifiers makes it possible to identify accurately the industries within which people work. However, it is worth noting that the blurring of employment definitions is mirrored in the blurring of industry definitions. For example, the shift towards fabless semiconductor establishments as the primary form of semiconductor establishment in the U.S. over the 1990s has raised a variety of questions about where such establishments are and should be classified. Table A.1 identifies the four-digit

TABLE A.1 Sector SIC definitions.

Sector	1987 SICs
Financial services	6021, 6022, 6029, 6035, 6036, 6061, 6062, 6081, 6099, 6111, 6141, 6153, 6159, 6162, 6163, 6712, 6211, 6221, 6231, 6282, 6289, 6311, 6321, 6324, 6331, 6351, 6361, 6371, 6399, 6411
Retail food	5399, 54, 5541
Semiconductors	3674, 3559
Software	7371, 7372, 7373
Trucking	4212, 4213, 4214

industries that we use for this analysis, but the concern about possible mis-measurement of industry boundaries is a topic that we discuss in chapter 4.

Finally, although we generically speak about “businesses” or “employers,” the unit of observation is typically the establishment—the physical location at which output is produced. However, our data permit the linking of establishments with parent firms, and many of our firm-specific exercises exploit this information. In chapter 4, for example, we distinguish between entering establishments that are new firms and entering establishments for existing firms. In terms of basic measures such as revenue, employment, payroll, firm linkages, and survival, the primary sources of information are the Economic Censuses and the Business Register. However, it is worth bearing in mind that the workforce quality and workforce turnover measures described below are developed from the matched employer-employee data sets from the LEHD program. These data are indexed by business identifiers that can differ from those on the Census Business Register for some businesses. We integrate these measures at the establishment-level with our Census-based measures by matching LEHD data to Census data at the federal Employer Identification Number (EIN), county, and two-digit SIC level of aggregation. For most businesses, this match is at the establishment level. When the match is at higher level of aggregation (e.g., for a firm that has multiple establishments in the same county and same industry), we aggregate the establishment-level detail from the LEHD data and link to the Economic Censuses. Underlying this linkage is the assumption that the workforce quality and workforce churning are the same across establishments in the EIN, county, two-digit industry cell.

## The Use of New Measures

### *Describing Economic Turbulence*

The turbulence that we want to describe takes two forms: the reallocation of jobs from one set of businesses to another, and the reallocation of workers across a fixed set of jobs. The driving force behind job reallocation is often precisely the types of economic shocks that were described in chapters 2 and 3, including changes in cross-industry demand (away from one sector and towards another) or changes in the competitive structure of the industry and deregulation. The result is typically that less productive firms contract and die (job destruction) and more productive firms enter the market or expand (job creation). Meanwhile, the reallocation of workers across job slots is likely to change in response to technological change and changing human resource practices.

The measures that we use reflect these concepts. Job creation is defined as the employment gains (including those from firm births) from one point in time to another, and job destruction is defined as the employment losses (including those from firm deaths) from one point in time to another.<sup>6</sup> Job reallocation is the sum of job creation and destruction and as such is a summary measure of all job flows for a period of time. Worker reallocation, or churning, is a measure of excess worker reallocation over and above job reallocation.<sup>7</sup> This measure at the business level is given by the sum of the accession and separation rates (net of job reallocation at the establishment level) and captures the component of worker turnover that is in excess of that needed to accommodate any net changes in the number of workers in the business. Whether it represents any excess in an efficiency sense is an open theoretical question and part of our investigation.

The magnitude of these flows is huge. As is evident from table A.2, which provides a sample of the quarterly worker and job flows for one local area in one quarter, even when net job change is negligible—about 0.15 percent of employment in the first column—job creation can be substantial—about 6.5 percent. Separation rates are also astoundingly high, at almost 22 percent of base employment. This picture of enormous job and worker flows is even more stunning when we examine the patterns for younger workers. Small changes in net employment for twenty-two- to twenty-four-year-old males mask 16 percent job creation rates and 40 percent separation rates, as seen in the second column. As seen in the third column, net job losses for the same demographic group in accommodation and retail food masks a separation rate of some 50 percent.

TABLE A.2 **Quarterly workforce indicators: Philadelphia, Pennsylvania 2003:3.**

	All workers		Males 22–24	
	All industries	All industries	All industries	Accommodation and retail food
Total employment	1,802,845	49,669		5,600
Net job change	2,910	734		–245
Job creation	117,340	7,967		869
Separations	391,772	19,693		2,851

Source: QWI Online (<http://lehd.dsd.census.gov/led/datatools/qwiapp.html>).

### *Describing Workforce Quality*

No study of the American workforce would be complete without a discussion of workforce quality. Yet standard econometric measures of workforce quality—typically only years of education or experience—are inadequate because they fail to capture differences in school quality, region, and program of study.<sup>8</sup> It has been pointed out that quantifying unobserved skill differences—like problem solving skills, people skills, or other unobserved ability—is necessary to describe the changing sets of skills necessary in a rapidly evolving, exceedingly complex, and increasingly service-oriented economy.<sup>9</sup> The development of the new skill measures at the LEHD program has begun to address some of these concerns. These individual-level measures, which can be derived only from universal longitudinal data on employers and employees, capture the market value of the portable component of skill by separating out the sources of earnings variation into the contribution of firm characteristics (where one works) and the contribution of worker characteristics (skill measures). For the latter, we further decompose our skill measures into the contribution of the “person effect,” which is the time-invariant portable component of a person’s wage (capturing time-invariant characteristics like ability and education), and the experience component, which represents the skills and education acquired in the workforce. The development of these measures has added extraordinary power to economists’ ability to explain the workings of the labor market. The tools that were used before, which were often based only upon worker surveys, typically could explain only about 30 percent of earnings variation. These new tools—based on the new data on employers and employees—are able to explain about 90 percent of earnings variation.

We use these components of earning in two different ways. In chapter 4, we use proportions of workers within establishments whose human capital measures are higher than the economy-wide median level. In that case, we care only about the ordinal ranking of individual workers' human capital measures. On the other hand, in chapter 6, human capital measures are treated in cardinal fashion so that the magnitude of difference in human capital matters.

Table A.3 provides some preliminary evidence on why these new measures are so powerful. The table decomposes industry wage premia—i.e., the percentage by which the wage in a given industry is higher than the average wage—into the two main sources: workforce human capital and firm wage-setting policies. The first set of rows analyze the highest-paying industries. Clearly the highest-paying industry—security, commodity, and brokers and services—is high paying both because it has high-quality workers and because firms within the industry pay a premium to those workers. Specifically, according to the table, security, commodity, and broker and service workers have earnings that are 82 percent higher than the

TABLE A.3 Sources of Industry Earnings Differentials.

SIC	Name	Industry wage premium	Premium attributable to workforce human capital	Premium attributable to firm wage-setting policy
Highest-paying industries				
62	Security, commodity, and brokers and services	82%	34%	37%
67	Holding and other investments	70%	34%	27%
48	Communication	63%	7%	52%
49	Electric, gas, and sanitary services	54%	0%	55%
81	Legal services	54%	18%	31%
Lowest-paying industries				
58	Eating and drinking places	-45%	-12%	-38%
1	Agriculture-crops	-35%	-10%	-31%
72	Personal services	-33%	-12%	-24%
79	Amusement and recreation services	-32%	-8%	-28%
70	Hotel and lodging services	-32%	-17%	-19%
54	Food stores	-30%	1%	-30%

Source: John M. Abowd, "Unlocking the information in integrated social data," *New Zealand Economic Papers* 36 (June 2002): 9-31.

average market wage. Using our decomposition of earnings, we attribute 34 of the 82 percent to the worker characteristics, 37 of the 82 percent to firm's paying higher wages on average, and the remaining 11 percent to unobserved factors. However, another high-paying industry—electricity, gas, and sanitary services—has high wages entirely because firms in the industry pay its workers much higher than average. The workers themselves are of roughly the same quality as the rest of the workforce. This is the firm wage premium referred to in the book. Similar results emerge when we analyze low-wage industries in the second set of panels. Eating and drinking establishments, for example, both hire workers of lower than average quality and pay them less. However, firms in another very low-wage industry—food stores—actually hire workers of above average quality, but pay them less.

In addition to the decomposition of earnings into person effects, experience effects, and firm effects, we also exploit additional information about the workers. As previously mentioned, we measure gender and age for the universe of workers. For subsets of workers that are also included in specific surveys (e.g., the CPS, SIPP, or the decennial census), we also gather a rich array of additional worker characteristics, including occupation and education. While it is not the focus of much of the analysis in this book, in some cases we exploit specific samples where we are able to directly observe occupation and education. In other cases, we take advantage of analyses performed by LEHD staff to generate imputations of key characteristics like education based upon statistical imputation models estimated from subsamples where we have direct measures of those characteristics.

## **Measuring Firm Outcomes**

Administrative data sources provide only limited information on firms. The main survey-based data we use to examine businesses more in depth in this book are the 1992 and 1997 Economic Censuses, which are in turn linked to the Longitudinal Employer Household Dynamics (LEHD) databases. Variables available from Economic Censuses include revenue, employment, payroll, establishment identifiers, and firm identifiers.

These data permit us to measure some economic outcomes for firms particularly well, such as the entry and exit of establishments and the organization of establishments into firms, as well as revenue, employment,

job flows, worker flows, earnings, and workforce composition. For firm performance, the measurement of entry and exit dynamics is important, as a key indicator of performance is survival.

However, our measures of productivity (as in much of the micro and aggregate literature) are crude at best. For what we denote productivity in what follows, we measure gross output per worker, where gross output is measured as gross revenue deflated with a detailed industry deflator. This crude measure of labor productivity is closely related to the measures of gross output per unit of labor that are published by the Bureau of Labor Statistics (indeed, the BLS typically uses gross revenue data from the Census Bureau as the primary source data for gross output) and is used extensively in the literature. For some industries, gross output per worker is not a bad proxy for productivity. For example, for the manufacturing sector, a variety of studies have shown that labor productivity measured in this manner is highly correlated with carefully measured multifactor productivity (with careful treatment of the measurement of output and inputs including physical capital, labor, and materials). However, for non-goods-producing industries, gross output per worker measures of productivity are sometimes problematic. Recent studies have shown that in some service industries, measures of labor productivity based upon gross output per worker at the aggregate level have yielded implausible negative productivity growth in the 1990s.<sup>10</sup> The problems with gross output per worker are especially severe in those industries where the product or service is difficult to measure. A related problem is that in some sectors it is especially difficult to allocate the output of a firm to individual establishments. In our case, these problems are particularly severe in the financial services sector. In what follows, we explore the limitations of our measures for this and other industries.

To gain some perspective on the measurement challenges for our industries in terms of measuring productivity, figure A.2 depicts the BLS output per hour index for key four-digit industries that are part of the five somewhat broader sectors that are the focus of this study. A log scale for the vertical axis is used because of the dramatic increases in the productivity index for the semiconductor industry. The latter is largely driven by the tremendous decreases in the price index of semiconductors measures that take into account the enormous efficiency/quality improvements in semiconductors (via hedonic price indices). At the other end of the scale, the official BLS indices suggest little or even declining productivity for food stores, commercial banks, and trucking. As noted above, it is not uncom-



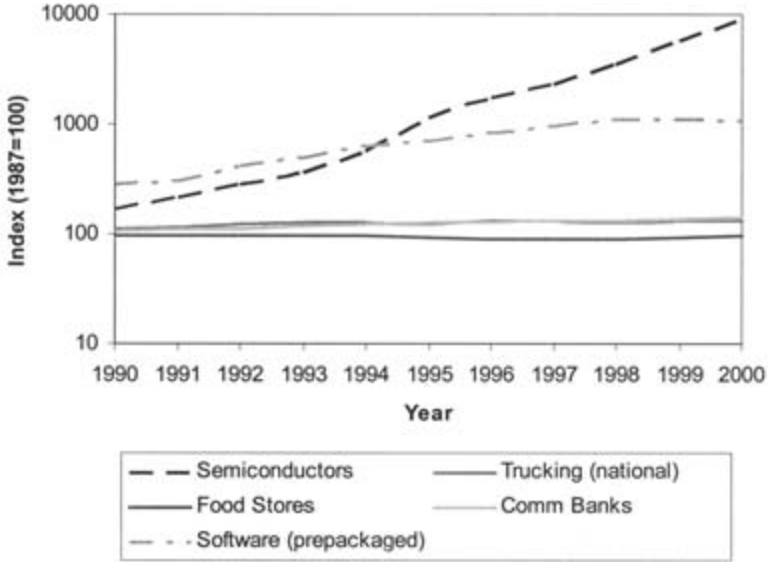


FIGURE A.2. BLS output per hour indices.

mon to find only modest or even declining productivity for many non-goods-producing industries in the 1990s. An open question is the extent to which this poor productivity performance is real as opposed to merely a reflection of mismeasurement. This question is particularly difficult to answer in sectors such as financial services, where output is a particularly slippery concept.<sup>11</sup>

Another related problem is that our revenue measure is gross revenue. While for some industries we can measure value added at the firm level for a sample of firms (especially for manufacturing industries), we focus our attention on gross revenues since this measure is readily available for all businesses. Given our focus on the impact of entry and exit of firms and establishments, this is important, as value-added measures are often not available for small and young businesses. Value added per worker would be the preferred concept, but a number of studies have shown that value added per worker is highly correlated with gross output per worker across firms *within* the same industry. An obvious limitation is that gross output per worker measures in levels (as opposed to growth rates) are not comparable across industries. This limitation is particularly pertinent for the retail food industry. In retail food we measure gross revenue per worker, not taking into account the cost of the goods sold (as we do not measure gross

margins at the micro level). Much of the gross revenue in retail food (and in retail more generally) is accounted for by the cost of goods sold. As such, we find that gross revenue per worker is very high relative to gross revenue per worker in the software and semiconductor industries, which is quite misleading. For the most part, we focus on the growth of revenue per worker or we only consider variation within industries so that this problem with measurement levels across industries is not relevant.

A firm outcome that we measure quite accurately is survival. The longitudinal links in our files permit measuring the survival of establishments and firms very accurately. In our analysis, we explore the determinants of survival for both firms and establishments. Moreover, our links across establishments into composite firms are very accurate as well, so we can explore the relationship between ownership change of an establishment and the characteristics of the workers of the business.

## **Summary**

The data used in the analyses reported in this book are newly developed longitudinal matched employer-employee data for the U.S. The data permit measuring and studying the interaction of firms and workers and examination of the implications of this interaction for a rich set of outcomes. For firms, we can measure performance via measures of both productivity and survival. We can also measure their human resource practices in a variety of ways, including the composition of their workforces by age, gender, and human capital. Further, we can evaluate the structure of wages within each firm and study patterns of job and worker turnover. For workers, we can measure employment and earnings outcomes in a comprehensive, longitudinal manner. Thus, we can piece together individual workers' job ladders and career paths as well as associated changes in earnings. In addition, we can fully characterize the distribution of earnings across workers taking into account both the characteristics of workers and the characteristics of firms.



# Appendix B: Chapter 4 Background

This appendix contains supplementary material for chapter 4.

TABLE B.1 Marginal effects on probability of exit.

	Financial services	Retail food	Semiconductors	Software	Trucking
Single-unit dummy	<b>-0.131</b> (0.011)	<b>0.039</b> (0.008)	-0.093 (0.059)	<b>-0.098</b> (0.025)	<b>-0.112</b> (0.020)
Size	<b>-0.078</b> (0.003)	<b>-0.072</b> (0.005)	-0.019 (0.016)	-0.017 (0.010)	<b>-0.049</b> (0.008)
Revenue/worker	<b>0.066</b> (0.005)	<b>-0.110</b> (0.006)	-0.015 (0.036)	<b>-0.038</b> (0.019)	<b>-0.067</b> (0.011)
Churning	<b>0.100</b> (0.032)	<b>0.069</b> (0.019)	<b>0.494</b> (0.175)	<b>0.219</b> (0.064)	<b>0.206</b> (0.033)
Human capital	<b>-0.135</b> (0.027)	<b>-0.151</b> (0.023)	<b>0.261</b> (0.105)	0.064 (0.066)	<b>-0.170</b> (0.036)
<i>N</i>	23,160	15,682	428	2,044	4,318

Estimation is based on probit with stay/exit as dependent variable. Standard errors are in parentheses. Boldface numbers are statistically significant. Controls: four-digit SIC.

TABLE B.2 Productivity differences and probability of exit (securities brokers).

Establishment	Revenue/ worker	Estab/firm (year)	Revenue/ worker		Probability of exit
Exiter (1992)	<b>-0.405</b> (0.040)	Exiter/exiter (1992)	<b>-0.442</b> (0.052)	Single-unit dummy	0.017 (0.039)
		Exiter/survivor (1992)	<b>-0.294</b> (0.052)	Size	<b>-0.092</b> (0.011)
Survivor (1992)	<b>-0.266</b> (0.033)	Survivor/different (1992)	-0.008 (0.071)	Revenue/ worker	-0.012 (0.023)
		Survivor/same (1992)	<b>-0.260</b> (0.035)	Churning	<b>0.170</b> (0.042)
Entrants (1997)	<b>-0.254</b> (0.034)	Entrants/entrants (1997)	<b>-0.139</b> (0.040)	Person effect	<b>0.442</b> (0.099)
		Entrants/continuer (1997)	<b>-0.339</b> (0.046)		
Continuers (1997)	0.000 (—)	Continuer/different (1997)	<b>0.303</b> (0.071)		
		Continuer/same (1997)	0.000 (—)		
$R^2$	0.030	$R^2$	0.042		
$N$	4,097	$N$	4,097	$N$	1,734

Standard errors are in parentheses. Boldface numbers are statistically significant. Controls: four-digit SIC.

TABLE B.3 Marginal effects on probability of exit in semiconductors.

		Group
Single-unit dummy		-0.102 (0.061)
Size	Fabless	0.015 (0.035)
	Fabbed	-0.024 (0.018)
Revenue/worker	Fabless	0.028 (0.045)
	Fabbed	0.007 (0.038)
Churning	Fabless	0.344 (0.260)
	Fabbed	0.414 (0.214)
Person effect	Fabless	-0.158 (0.224)
	Fabbed	0.090 (0.135)
<i>N</i>		428

Estimation is based on probit with stay/exit as dependent variable. Standard errors are in parentheses. Controls: four-digit SIC.

TABLE B.4 Marginal effects on probability of exit.

	Group	Retail food	Trucking
Single-unit dummy		<b>-0.375</b> (0.030)	<b>-0.274</b> (0.086)
Size	Single unit	<b>-0.056</b> (0.008)	<b>-0.049</b> (0.010)
	MU local	<b>-0.111</b> (0.009)	<b>-0.122</b> (0.027)
	MU regional	<b>-0.043</b> (0.012)	-0.013 (0.027)
	MU national	<b>-0.090</b> (0.009)	<b>-0.043</b> (0.017)
Revenue/worker	Single unit	<b>-0.081</b> (0.007)	<b>-0.074</b> (0.011)
	MU local	<b>-0.122</b> (0.009)	<b>-0.093</b> (0.026)
	MU regional	<b>-0.150</b> (0.011)	<b>-0.110</b> (0.026)
	MU national	<b>-0.183</b> (0.009)	<b>-0.079</b> (0.020)
Churning	Single unit	<b>0.197</b> (0.023)	<b>0.252</b> (0.035)
	MU local	0.000 (0.047)	<b>0.472</b> (0.197)
	MU regional	-0.094 (0.079)	0.009 (0.172)
	MU national	-0.085 (0.053)	0.082 (0.145)
Person effect	Single unit	<b>-0.084</b> (0.025)	<b>-0.144</b> (0.042)
	MU local	<b>-0.203</b> (0.054)	-0.087 (0.192)
	MU regional	<b>-0.219</b> (0.099)	-0.210 (0.157)
	MU national	<b>0.223</b> (0.074)	<b>-0.399</b> (0.111)
<i>N</i>		15,700	4,319

Estimation is based on probit with stay/exit as dependent variable. Standard errors are in parentheses. Boldface numbers are statistically significant. Controls: four-digit SIC.

TABLE B.5 Marginal effects on probability of exit in software.

		Size
Single-unit dummy		<b>-0.094</b> (0.025)
Size	Small	-0.027 (0.025)
	Large	-0.019 (0.019)
Revenue/worker	Small	-0.029 (0.020)
	Large	<b>-0.052</b> (0.026)
Churning	Small	<b>0.304</b> (0.078)
	Large	0.020 (0.112)
Person effect	Small	-0.065 (0.073)
	Large	0.125 (0.116)
N		2,045

Estimation is based on probit with stay/exit as dependent variable. Standard errors are in parentheses. Boldface numbers are statistically significant. Controls: four-digit SIC.





# Appendix C: Chapters 5 and 6

## Background

### **Measuring Firm Job Ladders and Worker Career Paths: Summary**

Structuring an analysis of worker earnings and employment outcomes creates obvious measurement challenges—precisely because the movements of the workforce are so dynamic. In brief, we simulate prototypical career paths in the five industries over the period 1992 through 2001. We focus on two groups of prime-aged workers: younger prime-aged (25–34 years old) and middle-aged prime-aged (35–54 years old), in order to avoid data problems associated with many younger and older workers not being in the sample for many quarters. This category includes 70 to 80 percent of all workers. This restriction obviously has differential impacts in different industries—particularly retail food. We divide each age group into three education groups, roughly approximating high school and less (“low”), some college (“medium”), and college graduate and above (“high”), and also have separate groups for females and males. We categorize employers by characterizing whether workers’ jobs are in firms with the most typical firm characteristics (size, excess turnover, and growing or shrinking).

One challenge that we face in piecing together career paths is left- and right-censoring. In 1992, many job spells had already been ongoing and in 2001 many are still ongoing. To overcome this challenge, many of our results for career paths are based upon spells that begin after 1992. Moreover, the estimates of the earnings-tenure profiles in the analysis that we present in chapters 5 and 6 are based upon underlying regression models with many controls including controls for right-censoring.

## Measuring Firm Job Ladders and Worker Career Paths: Details

The career path and job ladder simulations are based primarily upon the results of within-job and between-job wage growth regressions for each of the five industries, 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 ten-year earnings growth trajectories for each.

### *WJWG and BJWG Regressions*

The data for the WJWG and BJWG regressions are drawn from the LEHD program data of matched employer-employee records based on UI wage records of California, Illinois, and Maryland. 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 earnings 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 the employee did not have full-quarter earnings at another dominant employer in the interim. The annualized log earnings change from the starting quarter to the ending quarter of employment, deviated from the national mean earnings growth during the period, defines the job spell's within-job earnings growth.<sup>1</sup> Job spell length is divided into four tenure groups: less than one year, one or more years but less than three years, three or more years but less than five years, and five or more years. Spells are also classified as left, right, and uncensored. We also include the following on each job observation:

- worker characteristics:
  - gender;
  - age in 1995 (in four groups: 18–24, 25–34, 35–54, 55–65); and

- education in 1995 (low, with no college education; medium, with some college, but without a bachelor's degree; and high, with at least a bachelor's degree; education categories vary across the Sloan industries).
- employer characteristics:
  - in or out of Sloan industry (see below);
  - mean employer size over the job spell ( $\leq 100$  employees,  $> 100$  employees);
  - mean employer churning over the job spell ( $\leq 20\%$  or  $> 20\%$ ), defined as:

$$\frac{(Accessions + Separations - |\Delta Employment|)}{Average\_Employment(t, t - 1)}; \text{ and}$$

- net employment growth over the job spell ( $< 0$ ,  $\geq 0$ ).

Employers are defined at the SEIN (state employer identification number) level, which is the establishment for single-unit establishment firms. For multi-unit establishment 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, 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 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”; it will be reversed in the trucking sample. In each sample and for each of the five sectors, we regress the WJWG measure on worker characteristics including gender, age, education, and job tenure as well as appropriate censoring variables and employer characteristics.

The BJWG is similarly estimated. The unit of observation for the BJWG regression is a spell between two full-quarter jobs before and after a job switch. 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 do not consider the length of the nonemployment spell, but include the employer characteristics of both the old job and the new job.<sup>2</sup>

### *Regression Specifications*

Two specifications were estimated for each group of workers (defined by industry and employer characteristics) to characterize within-job wage growth and between-job wage growth.

WJWG: by industry, firm characteristics (size, turnover, employment growth), and in/outside industries.

$$WJWG_{in} = \text{sex}_i + \text{censor}_{in} + \text{age}_i + \text{education}_i + \text{tenure}_{in} + \varepsilon_{in}$$

BJWG: by industry, firm characteristics (size, turnover, employment growth) and in/outside industries of old and new jobs.

$$BJWG_{in} = \text{sex}_i + \text{censor}_{in} + \text{age}_i + \text{education}_i + \varepsilon_{in}$$

### *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, “two-time movers” who hold two jobs, and “three-time movers” 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 outside of the industry (e.g., the modal young, high-educated male three-time movers 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 nonemployment spells between each job. This procedure thus defines, for each industry-worker 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 wage 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 forty 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 forty quarters. First, each job was assigned the median duration for the specified tenure group (e.g., eighteen months for a job in the one- to three-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 forty 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 forty quarters, the job in the highest-tenure group was extended to the required duration. Career paths where such an extension was required were:

*trucking*: loyalists and two-time movers low-educated young women

*retail food*: loyalists and two-time movers low-educated young women

two-time movers medium-educated young women

two-time movers low-educated older men

*software*: loyalists and two-time movers in all younger groups, except high-educated men (loyalists only)

*semiconductors*: none

*financial services*: none

### *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). Ongoing jobs are jobs that are right-censored in 2001; completed jobs are all uncensored jobs during the sample. Cells containing fewer than fifty observations comprise fewer than 5 percent of jobs for the gender/age/education group, or contain fewer than 0.5 percent of the total 5+-year jobs for the industry, are not considered in the analysis unless otherwise specified.



## Appendix D: Chapter 7 Background

Chapter 7 describes the implications of economic turbulence on the distribution of earnings within industries, with a particular focus on the impact of turbulence on middle-class jobs. In this appendix, we describe the definitions of variables used in the chapter and the methodology for decomposing the sources of changes in the earnings distribution.

### Definitions

As discussed in chapter 2 and in appendix A, administrative data are immensely useful to the extent that they are longitudinal, accurate, and nearly universal. However, they have several limitations, one of which relates to the measure of earnings we have in the data set. Indeed, an important characteristic of the administrative data we use is that earnings refer to quarterly earnings, and we have no information on either wage rates or hours and weeks worked. Thus, there are a large number of ways the LEHD data may be used to characterize the distribution of annual earnings and of the level of workforce quality in each industry. Several concepts are useful in understanding the final measures of earnings that we use.

#### *Dominant Employer*

The data set can be used to calculate summary statistics of the earnings and skill distributions for workers in each sector and each year. However, since some workers have multiple jobs in a year, we use their dominant employer to identify which sector they work in. A worker's dominant employer is the SEIN (state employer identification number—this is the state UI adminis-



trative unit) that contributes the most to the worker's earnings in each year. Thus, each worker employed during a year has one (and only one) dominant employer per year.

### *Full-Time Workers*

We use data from Current Population Survey in combination with LEHD state data to impute whether or not a worker is employed full-time in each year at his main job (analogous to the dominant employer concept used in LEHD state data). We use CPS variables to perform this imputation using a logit model, and the dependent variable was taken from the CPS question of whether or not the respondent was employed full-time at the main employer last year.

Three characteristics of the findings suggest that this imputation was quite successful. First, the standard errors on the coefficients were very small. Second, for individuals found in both the CPS and the LEHD state data, the imputation results were very similar to the observed outcomes. Third, for all individuals, the predicted probabilities of working full-time were clustered into two groups such that predicted probabilities for all members of one group were extremely high and the predicted outcomes for the second group were extremely low. More discussion of this imputation can be found in John M. Abowd, Paul Lengermann, and Kevin McKinney, "The measurement of human capital in the U.S. economy" (Working paper, March 2003, Cornell University; [http://instruct1.cit.cornell.edu/~jma7/abowd\\_lengermann\\_mckinney\\_20030402.pdf](http://instruct1.cit.cornell.edu/~jma7/abowd_lengermann_mckinney_20030402.pdf), accessed February 26, 2006), hereafter ALM.

## **Methodology**

### *Measuring Earnings*

Because we do not observe hours worked in the data but instead only observe quarters worked, we constructed the "annualized" earnings measure, which is, for each worker, the full-time full-year earnings equivalent. This variable is adjusted for discontinuities in labor market attachment during the year and is used as the dependent variable in the decomposition of the individual's "wage" into person effect, firm effect, and an experience component.

First, we define full-quarter employment in quarter  $t$  as an employment history with positive earnings for quarters  $t - 1$ ,  $t$ , and  $t + 1$ . Continuous employment during quarter  $t$  means an employment history with positive earnings for either  $t - 1$  and  $t$  or  $t$  and  $t + 1$ . Employment spells that are neither full quarter nor continuous are designated discontinuous. If the individual was full-quarter employed for at least one quarter at the dominant employer, the annualized wage is computed as four times average full-quarter earnings at that employer (total full-quarter earnings divided by the number of full quarters worked). This accounts for 84 percent of the person-year-state observations in our eventual analysis sample. Otherwise, if the individual was continuously employed for at least one quarter at the dominant employer, the annualized wage is average earnings in all continuous quarters of employment at the dominant employer multiplied by eight (i.e., four quarters divided by an expected employment duration during the continuous quarters of 0.5). This accounts for 11 percent of all observations.

For the remaining 5 percent, annualized wages are average earnings in each quarter multiplied by 12 (i.e., four quarters divided by an expected employment duration during discontinuous quarters of 0.33). For additional details, see ALM.

### *Measuring Skill*

The details of the skill measures are contained in ALM. In the reported statistics, there are three measures reported: overall skill, the person effect, and the experience effect. Note the overall skill measure is the sum of the person effect, the experience effect, and a reference constant (see in particular equation (25) in ALM). Also note that by construction, the grand mean of the person effect is zero, which means that some workers (groups) have negative person effects. All components are from a log specification, so differences across workers (groups) are interpretable in terms of log differences.

When computing the worker and firm fixed effects, only dominant job spells held by workers who are between eighteen and seventy years old and who are imputed to work full-time at that job are used. Thus, only workers who have been imputed to work full-time in at least one job will have a valid person effect. However, once calculated, these measures may be applied to any job spell (dominant or other, full-time or other) held by the worker.

*Defining groups of workers*

The data sets include year- and sector-specific earnings and skill distributions summary statistics for all workers with a dominant employer in that sector, who are imputed to work full-time in that year, and who have real earnings of at least \$250 in at least one quarter of the year.

This sample decision makes a difference in some industries. In semiconductors, for example, 82 percent of all dominant jobs held at any point in the year are held by full-time workers who are working at the end of quarter one. This fraction is substantially higher than in retail food, where only 55 percent of dominant jobs are held by full-time workers employed at the end of quarter one. The shares for trucking, financial services, and software all lie between these two extremes.

As noted above, only workers who are imputed to work full-time at least once in the period of time covered by the LEHD data have values for the skill measures. Thus, these worker and job counts will almost always be smaller than worker and job counts for the earnings measures. Recalling that all skill counts are conditional on a worker having worked full-time at least once, it is not surprising that the current full-time and point-in-time restrictions have a smaller impact on the count of dominant jobs for the skill measures than we observe for the earnings measures. This is true in all sectors. For retail food, the share of dominant jobs held by full-time workers working at the end of quarter one is now 78 percent, given that the worker is observed to work full-time at least once. The share in semiconductors, however, essentially remains unchanged by this condition.

Regardless of whether we consider the count of jobs with an earnings measure or the count of jobs held by workers with skill measures, the fraction by which the job count increases when we include all jobs as opposed to dominant jobs only is identical in each sector.

A comparison of these counts across sectors provides information on the relative amount of job changing and multiple jobholding in each sector relative to other sectors. Surprisingly, the amount of variation across sectors in this fraction is not large. The count of all jobs is between 127 percent of dominant jobs (in semiconductors) and 140 percent of dominant jobs (in trucking).

Finally, recall that the count of dominant jobs for the skill measures is smaller than the count of dominant jobs for earnings measures because only workers who have worked full-time at least once have skill measures. However, regardless of the difference in magnitude between the two

counts, the fraction by which the job count increases when we include all jobs is identical. This suggests that within each sector, workers who have worked full-time at least once are perhaps neither more nor less likely to change jobs or to hold multiple jobs.

### *Describing the Earnings Distribution*

Rather than report percentiles of the actual distributions of these earnings and skill measures, we report percentiles of the “smoothed” distributions using a kernel density estimator. We use these smoothed distributions both because the smoothed distributions may correct for noise/measurement error and for disclosure purposes. Tests indicate that the characteristics of the actual and the smoothed distributions are quite similar.

The methodology for decomposing the sources in the earnings distribution is provided in Andersson et al. (2006).<sup>1</sup>



# Notes

## Chapter One

1. Marc Fisher, "Giant looks more and more like a dinosaur," *Washington Post*, May 5, 2005, B1.
2. Associated Press, state and local wire, May 2, 2005, dateline Frederick, Maryland.
3. Lynda V. Mapes, "Good business: Two local companies are proving it pays to do well by workers," *Seattle Times*, January 16, 2005, domestic news section. p. 14.
4. Ibid.
5. Dave Simanoff, "Tampa among 3 cities vying for call center," *Tampa Tribune*, May 5, 2005.
6. Crayton Harrison, "Austin economy still wired to semiconductor industry," *Dallas Morning News*, September 22, 2004.

## Chapter Two

1. Timothy Egan, "No degree, and no way back to the middle," *New York Times*, May 24, 2005, A15.
2. Employment here represents the average of reference period employment in the firm and previous period employment in the firm. In the economics literature, worker turnover is sometimes defined as the sum of accessions and separations to reflect the overall number of transitions, and job turnover is likewise defined as the sum of job creation and destruction to reflect the overall number of changes in opportunities. Our definitions are obviously closely related. These alternatives bound the number of workers impacted by the worker and job turnover respectively. Note that in some of the succeeding chapters, we also define excess worker turnover at the firm level as the sum of accessions and separations at the firm minus the absolute value of net change at the firm. This "excess" measure thus captures the extra churn-

ing of workers at the firm over and above that necessary to accommodate net changes at the firm. For further discussion, see Steven J. Davis and John Haltiwanger, “Gross job flows,” in *Handbook of Labor Economics*, ed. Orley Ashenfelter and David Card (Amsterdam: North-Holland, 1999), and Steven J. Davis, John Haltiwanger, and Scott Schuh, *Job Creation and Job Destruction* (Cambridge: MIT Press, 1996).

3. Any discussion of the birth and death of firms should recognize that there is a difference between an establishment, which is a single physical location at which business is conducted or services or industrial operations are performed, and a firm, which includes all establishments under the same operational control. In 2001 there were about 5.7 million firms and just over 7 million establishments in the U.S. In our discussion of specific results we try to be careful about this distinction but for expositional reasons we often use the term “firm” to refer to either firms or establishments.

4. In what follows note that changes in ownership associated with mergers and acquisitions do not inherently imply the entry and exit of establishments.

5. Gregor Andrade, Mark Mitchell, and Erik Stafford, “New evidence and perspectives on mergers,” *Journal of Economic Perspectives*, 15, no. 2 (2001): 103–20.

6. Jeffrey T. Macher, David C. Mowery, and David A. Hodges, “Back to dominance? U.S. resurgence in the global semiconductor industry,” *California Management Review* 41, no. 1 (1998): 107–36.

7. Greg Linden, Clair Brown, and Melissa Appleyard, “The net world order’s influence on global leadership in the semiconductor industry,” in *Locating Global Advantage: Industry Dynamics in the International Economy*, ed. Martin Kenney and Richard Florida (Stanford: Stanford University Press, 2004).

8. Semiconductor and Related Device Manufacturing 2002, Economic Census, U.S. Bureau of the Census, Table 1.

9. Ashish Arora and Alfonso Gambardella, “The globalization of the software industry: Perspectives and opportunities for developed and developing countries,” NBER Working Paper no. 10538, National Bureau of Economic Research, 2004, 1.

10. Software Publishers 2002, Economic Census, U.S. Bureau of the Census, Table 2.

11. Although much has been written about the job-creating prowess of small businesses, one of the authors has argued elsewhere that this rests on misleading interpretations of the data, since many previous studies of the job creation process rely upon data that are not suitable for drawing inferences about the relationship between employer size and job creation. That same work notes that small plants and firms account for most newly created and newly destroyed manufacturing jobs and that survival rates for new and existing manufacturing jobs increase sharply with employer size. See Steven J. Davis, John Haltiwanger, and Scott Schuh, *Job Creation and Destruction* (Cambridge: MIT Press, 1996), chap. 4.

12. Amey Stone, “Death of a stock salesman,” *Business Week Online*, April 7,

2005 ([http://www.businessweek.com/bwdaily/dnflash/apr2005/nf2005046\\_9224\\_db016.htm](http://www.businessweek.com/bwdaily/dnflash/apr2005/nf2005046_9224_db016.htm)).

### Chapter Three

1. NAPA, [http://www.napawash.org/pc\\_management\\_studies/ongoing\\_offshoring.html](http://www.napawash.org/pc_management_studies/ongoing_offshoring.html), posted February 7, 2005. The approach taken by NAPA is to describe what data are available and make recommendations for more data collection. The GAO and Sloan's Offshore Working Group have also issued reports on the data needed to analyze the impact of offshoring on U.S. jobs and economy.

2. Gail Pesyna, SBE/CISE workshop, March 15, 2005 (<http://vis.sdsc.edu/sbe/reports/SBE-CISE-FINAL.pdf>).

3. Michael C. Jensen, "The modern Industrial Revolution: Exit and the failure of internal control systems," *Journal of Finance* 48 (1993): 831–80.

4. See <http://en.wikipedia.org/wiki/Deregulation>.

5. Data taken from FDIC and available at [http://www2.fdic.gov/hsob/HSOBRpt.asp?state=1&rptType=1&Rpt\\_Num=1](http://www2.fdic.gov/hsob/HSOBRpt.asp?state=1&rptType=1&Rpt_Num=1).

6. Lorin M. Hitt, Frances X. Frei, and Patrick T. Harker, "How financial firms decide on technology," in *Brookings-Wharton Papers on Financial Services 1999*, ed. Robert E. Litan and Anthony M. Santomero (Washington: Brookings Institution Press), 93–136.

7. These figures underestimate the contribution of truck transportation to the overall economy, since they include only the employees of the so-called for-hire firms within the industry. The figures exclude trucking operations that occur within other industries, such as manufacturing and retail, as well as self-employed owner-operators.

8. Michael H. Belzer, "Collective bargaining in the motor carrier industry," *Contemporary Collective Bargaining in the Private Industry*, ed. Paula B. Voos (Madison, WI: Industrial Relations Research Association, 1994), 259–302.

9. Personal communication from Michael H. Belzer, August 15, 2005.

10. General Accounting Office, Offshoring of Services: An Overview of the Issues, November 2005, Report GAO-06-5, U.S. Government Accountability Office (<http://www.gao.gov/htext/do65.html>).

11. Clair Brown and Greg Linden, "Offshoring in the semiconductor industry: A historical perspective," in *Offshoring White Collar Work*, ed. Susan Collins and Lael Brainard (Washington: Brookings Institution, 2005), 279–333.

12. Douglas S. Meade, Stainlaw J. Rzeznik, and Darlene C. Robinson-Smith, "Business investment by industry in the U.S. economy for 1997," Bureau of Economic Analysis U.S. Census Department, Industry Economics Division, November 2003 (<http://www.bea.gov/bea/ARTICLES/2003/11November/1103%20Investment.pdf>).



13. In some ways, this understates the size of the industry, because virtually every company involved in information technology, from hardware producers to end users, writes software. Measurement of the industry's activity via sale of software services and packaged software does not include the investment in software-creating activities within organizations. The magnitude of these activities is indicated by the fact that more programmers are employed outside the business service (which includes software) industry than within this industry. In 2002, according to the Bureau of Labor Statistics, only 81,000 computer programmers and software engineers worked in the software publishing industry, out of over one million total computer programmers and software engineers (<http://www.bls.gov/oco/cg/cgs051.htm>).

14. Some definitions of the retail food industry include the food service industry, e.g., restaurants. In this study, the food service industry is not included in the retail food industry.

15. A supercenter is defined by the Food Institute as a large food/drug store combined with a mass merchandiser under one roof, where food items account for less than 40 percent of the selling area.

16. The industry consists of three main subindustries: banks and savings and loans, securities and commodities firms, and insurance companies.

17. For a discussion of industry change, and a matched pair case study, see Larry W. Hunter, "Transforming retail banking: Inclusion and segmentation in service work," in *Employment Practices and Business Strategy*, ed. Peter Cappelli (New York: Oxford University Press, 1999), 153–92, and Larry W. Hunter, Annette Bernhardt, Katherine L. Hughes, and Eva Skuratowicz, "It's not just the ATMs: Firm strategies, work restructuring, and workers' earnings in retail banking," *Industrial and Labor Relations Review* 54 (2001): 402–24.

18. Norman A. Weintraub, "ICC regulated motor carriers of general freight under NMFA that terminated general freight operations from July 1, 1980 to October 31, 1992," IBT Economics Department Report (Washington: International Brotherhood of Teamsters, 1992).

19. Michael H. Belzer, Kenneth L. Campbell, Stephen V. Burks, Dale Ballou, George Fulton, Donald Grimes, and Kristen Monaco, *Hours of Service Impact Assessment* (Ann Arbor: University of Michigan Transportation Research Institute and Federal Highway Administration, Office of Motor Carriers and Highway Safety, 1999).

20. Robert C. Leachman and Chien H. Leachman, "Globalization of semiconductor manufacturing," *Locating Global Advantage: Industry Dynamics in the International Economy*, ed. Martin Kenney and Richard Florida (Stanford: Stanford University Press, 2004), 203–31.

21. <http://www.job-hunt.org/about.html>.

22. Albert Endres, "A synopsis of software engineering history: The industrial perspective" (Position Papers for Dagstuhl Seminar 9635 on History of Software

Engineering, 1996); Edward Steinmueller, “The U.S. software industry: An analysis and interpretive history,” in *The International Computer Software Industry*, ed. David C. Mowery (Oxford and New York: Oxford University Press, 1995), 15–52.

23. For an example, see <http://www.developer.ibm.com/tech/isvadvantage.html>.

24. Data drawn Digital Economy 2000, Economics and Statistics Administration, Office of Policy Development, U.S. Department of Commerce Bureau of Economic Analysis, June 2000 (<http://permanent.access.gpo.gov/lps53674/2000/digital.pdf>, 55–60).

25. U.S. Department of Labor, Bureau of Labor Statistics, *Occupational Outlook Handbook*, 2004.

26. [http://www.computer.org/certification/cert\\_for\\_you.htm](http://www.computer.org/certification/cert_for_you.htm).

27. U.S. Department of Labor, Bureau of Labor Statistics, *Occupational Outlook Handbook*, 2003.

28. Stephen Baker and Manjeet Kripalani, “Software,” *Business Week Online*, March 1, 2004 ([http://www.businessweek.com/magazine/content/04\\_09/b3872001\\_mz001.htm](http://www.businessweek.com/magazine/content/04_09/b3872001_mz001.htm)).

29. Food Institute, *Food Industry Review 2003* (Elmwood Park, NH: American Institute of Food Distribution, 2003).

30. Phil R. Kaufman, “Food retailing,” U.S. Food Marketing System, 2002, AER-811, U.S. Economic Research Service, U.S. Department of Agriculture (<http://www.ers.usda.gov/publications/aer811/aer811e.pdf>).

31. Gerald R. Moody, “Information technology and economic performance of the grocery store industry,” Economics and Statistics Administration, Office of Policy Development, U.S. Department of Commerce, ESA/OPD 97–1, 1997 (<http://ssrn.com/abstract=37747>).

32. Avner Ben-Ner, Fanmin Kong, and Stacie Bosley, *Workplace Organization and Human Resource Practices: The Retail Food Industry* (St. Paul: University of Minnesota, Retail Food Industry Center, 2000).

33. J. P. Walsh, *Supermarkets Transformed* (New Brunswick: Rutgers University Press, 1993).

34. Katherine L. Hughes, “Supermarket employment: Good jobs at good wages?” IEE Working Paper no. 11, April 1999 (<http://www.tc.columbia.edu/centers/iee/PAPERS/workpap11.pdf>).

## Chapter Four

1. The results in this chapter draw very heavily on Benjamin A. Campbell, Hyo-wook Chiang, John Haltiwanger, Larry W. Hunter, Ron Jarmin, Nicole Nestoriak, Tim Park, and Kristin Sandusky, *Firm Performance, Workforce Quality, and Workforce Churning*, working paper, U.S. Bureau of the Census, Suitland, MD, 2005 (<http://www.economictrubulence.com/data/papers/wp-firmperf.pdf>). The details of

measurement and the statistical analysis underlying much of the discussion can be found in this paper. Some of the key tables from this analysis are provided in appendix B. The results in this chapter are based upon data for 1992 and 1997 using data from the Economic Censuses and unemployment insurance (UI) wage record data for California, Illinois, and Maryland.

2. Others choose a “high road” path and are competitive with the “low road” firms. Frances X. Frei, Patrick T. Harker, and Larry W. Hunter, “Retail banking,” in *U.S. Industry in 2000: Studies in Competitive Performance* (Washington: National Academy Press, 1999), 179–214.

3. Eileen Appelbaum, Annette Bernhardt, and Richard J. Murnane, “Low-Wage America: An Overview,” in *Low-Wage America: How Employers Are Reshaping Opportunity in the Workplace*, ed. Eileen Appelbaum, Annette Bernhardt, and Richard J. Murnane (New York: Russell Sage Press, 2003), 10.

4. “The Principal Financial Group: simply (one of) the best,” January 7, 2004 (<http://www.principal.com/about/news/fortune010704.htm>).

5. “50 best small and medium companies to work for in America named at SHRM annual conference,” June 28, 2004 (<http://www.scienceblog.com/community/older/archives/K/2/pub2387.html>).

6. Jill Elswick, “Having it their way: Intel’s benefit plan emphasizes choice and flexibility,” *Employee Benefit News*, March 1, 2003.

7. Karen Lee, “Trucking firm takes benefit portability to new heights,” *Employee Benefit News*, July 1, 2000.

8. Lynda V. Mapes, “Good business: Two local companies are proving it pays to do well by workers,” *Seattle Times*, January 31, 2005.

9. Some evidence in favor of this idea using LEHD data is provided in John M. Abowd, John Haltiwanger, Ron Jarmin, Julia Lane, Paul Lengermann, Kristin McCue, Kevin McKinney, and Kristin Sandusky, “The relation among human capital, productivity, and market value,” in *Measuring Capital in the New Economy*, ed. Carol Corrado, John Haltiwanger, and Don Sichel (Chicago: University of Chicago Press, 2005), 153–204.

10. See, e.g., John C. Haltiwanger, Julia I. Lane, and James R. Spletzer, “Wages, productivity, and the dynamic interaction of business and workers,” *Labour Economics* (in press).

11. Indeed, a series of papers show that the higher the average educational level of production workers or the greater the proportion of nonmanagerial workers who use computers, the higher the plant productivity. See, in particular, Casey Ichinowski, Kathryn Shaw, and Giovanna Prennushi, “The effects of human resource management practices on productivity: A study of steel finishing lines,” *American Economic Review* 87 (1997): 291–313 (reprinted in Edward Lazear and Robert McNabb, eds., *Personnel Economics* [Cheltenham, U.K.: Edward Elgar Press, 2004]), and Sandra E. Black and Lisa M. Lynch, “How to compete: The impact of workplace practices and information technology on productivity,” *Review of Economics and Statistics* 83 (2001): 434–45. See Timothy F. Bresnahan, Erik Brynjolfs-

son, and Lorin M. Hitt, “Information technology, workplace organization, and the demand for skilled labor: Firm-level evidence,” NBER Working Paper no. 7136, 1999, for related results.

12. PBS, “Store Wars: When Wal-Mart Comes to Town,” February 2, 2004 (<http://www.pbs.org/itvs/storewars/stores3.html>).

13. While this measure is quite simple, it has been shown in recent research that it is highly correlated with more sophisticated measures of firm performance such as measures of total factor productivity. See Lucia Foster, John Haltiwanger, and C. J. Krizan, “Aggregate productivity growth: Lessons from microeconomic evidence,” in *New Directions in Productivity Analysis*, ed. Edward Dean, Michael Harper, and Charles Hulten (Chicago: University of Chicago Press, 2001), 303–63.

14. We directly calculate the proportion of firms that existed in 1992, and survived until 1997 (survivors), as well as the proportion that did not survive (exitors). We can also calculate the proportion of firms in 1997 that entered the industry between 1992 and 1997 (entrants).

15. It is an open question as to whether entrants should be as productive as continuers. There are conflicting effects, some of which can make entrants more productive than incumbents and some that can make them less so. For example, new entrants can start their business with the best technology available (the vintage effect), incumbents have more time to learn from their previous production processes (the learning effect). If the vintage/learning effect dominates, then entrants/incumbents are more productive.

16. This productivity gap is calculated from a simple regression where the dependent variable is productivity and the right-hand-side variables are year effects and dummies for entering and exiting establishments.

17. Tables and figures underlying this summary of findings can be found in Campbell et al., *Firm Performance*.

18. In the statistical analysis underlying the discussion our measure of revenue per worker is real gross output per worker. The measure is gross revenue deflated with an industry deflator per worker. Real earnings per worker is measured by deflating payroll with the CPI and dividing by the number of workers at the business.

19. The overall human capital measure is the measure developed and discussed by Abowd, Lengermann, and McKinney, “The measurement of human capital in the U.S. economy.”

20. See Campbell et al., *Firm Performance*, for details on the statistical correlations discussed here.

21. Ibid.

22. The fables/integrated differences are important here since the new fableless entrants have higher turnover than the continuing integrated companies.

23. These results are from the estimation of a probit model relating factors that are associated with the exit of an establishment from one economic census to another (i.e., over a five-year horizon). In figure 4.5, we show the impact of a 10 percentage point (0.1) change in churning and human capital rate on the probability of

exit. The results from this probit estimation are reported in Campbell et al., *Firm Performance*. We also control for firm structure with a single-unit dummy. In most sectors, single-unit establishments are less likely to fail after controlling for size, productivity, churning, and workforce quality. This is consistent with the Holmes and Schmitz hypothesis that single-unit establishment firms may be, holding other factors constant, less willing to close since closing down the establishment implies closing down the firm while this is not the case for establishments belonging to a multi-unit establishment firm. Thomas J. Holmes and James A. Schmitz, Jr., “On the turnover of business firms and business managers,” *Journal of Political Economy* 103 (1995): 1005–38.

24. In order to do the analysis, any semiconductor establishment that entered after 1987 and upon entry had fewer than three hundred employees was classified as a fabless establishment, and all others were classified as integrated establishments.

25. Recall that there are some inherent measurement problems. In particular, measuring output and productivity in the financial services industry is problematic. However, revenue per worker has reasonable properties in selected sub-industries like securities brokers.

## Chapter Five

1. See <http://www.cnn.com/CNN/Programs/lou.dobbs.tonight/book.html>.
2. Mike Hiltzik, “Shipping out U.S. jobs—to a ship,” *Los Angeles Times*, May 2, 2005.
3. Aaron Bernstein, “Waking up from the American dream: Meritocracy and equal opportunity are fading fast,” *Business Week*, December 1, 2003.
4. See <http://www.spectrum.ieee.org/careers/careerstemplate.jsp?ArticleId=n070103>.
5. See <http://engr.smu.edu/students/lunch/bios/primdahl.html>.
6. The results in this chapter are based upon data for 1992–2003 using UI wage record data for California, Illinois, and Maryland.
7. See <http://www.allianceibm.org/news/jobactions.htm>.
8. Some of the observations about specific firms here likely reflect divisions of these large, complex firms beyond their production of semiconductors. Even so, the patterns discussed reflect the impact of globalization on high-technology products.
9. See <http://www.allianceibm.org/news/jobactions.htm>.
10. See [http://en.wikipedia.org/wiki/Digital\\_Equipment\\_Corporation](http://en.wikipedia.org/wiki/Digital_Equipment_Corporation); <http://www.job-hunt.org/about.html>.
11. See <http://www.networkworld.com/topics/layoffs.html>.
12. See <http://www.bizjournals.com/austin/stories/2001/12/17/daily22.html>.
13. This discussion borrows heavily from Fredrik Andersson, Matthew Freed-

man, John Haltiwanger, Julia Lane, and Kathryn Shaw, “Reaching for the stars: Who pays for talent in innovative industries?” (working paper, Stanford University, 2005).

14. Michael Moeller, “Outta here at Microsoft: The software giant is losing key talent to the Internet” ([http://www.businessweek.com/1999/99\\_48/b3657197.htm](http://www.businessweek.com/1999/99_48/b3657197.htm)).

15. Meg Major, “The people gap,” *Progressive Grocer*, November 1, 2003, 20, quoting Prof. Richard George, St. Joseph’s University, Philadelphia.

16. See [http://www.jbhunt.com/careers/drivingcareers/index\\_drcareer.html](http://www.jbhunt.com/careers/drivingcareers/index_drcareer.html).

17. See “\$58B bank deal set” ([http://money.cnn.com/2004/01/14/news/deals/jpmorgan\\_bankone/](http://money.cnn.com/2004/01/14/news/deals/jpmorgan_bankone/)).

18. Larry W. Hunter, “Transforming retail banking: Inclusion and segmentation in service work,” *Employment Practices and Business Strategy*, ed. Peter Cappelli (New York: Oxford University Press, 1999), 153–92.

19. From Fortune’s 2005 list of “100 Best Companies to Work For” ([http://money.cnn.com/2005/01/07/news/fortune500/best\\_companies/](http://money.cnn.com/2005/01/07/news/fortune500/best_companies/)). The company’s national characteristics cannot be directly compared to the firm characteristics in our sample, since job ladders are described at the establishment or workplace level. Fortune’s companies have a national full-time workforce of at least one thousand workers.

20. This has the additional advantage of avoiding the data problems associated with many younger and older workers not being in the sample for many quarters. We exclude workers under twenty-five years old, who are often involved with finishing school and working part-time, and seniors, who are often confronting retirement decisions. 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 they had at least one full-quarter-dominant employer in that particular Sloan industry between 1992 and 2001. Observations are at the job level that is defined by a match between an employer and an employee over certain time periods. An employer is identified by the SEIN (state employer identification number) level, which is establishment for single-unit but not necessarily for multi-unit establishment firms. 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. An employee is uniquely identified by the PIK (person identification number).

21. Turnover is the excess worker reallocation concept defined in chapter 2.

22. *Size*: large ( $\geq 100$  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  $t_2$ ,  $\text{sign}(\text{firm-size}(t_2) - \text{firm-size}(t_1))$ ). “Growing or shrinking” is measured by the job spell, so that a job is in a growing firm if employment at the firm increases (or remains the same) during the worker’s job there (as measured by employment at beginning and end of job observation). The distribution of job observations across net employment growth by industry is:

Growth	financial services	retail food	semiconductors	software	trucking
–	29.2%	31.9	33.7	32.8	35.3
o	12.6%	18.6	7.6	14.6	15.2
+	58.1%	49.5	58.7	52.6	49.4

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

23. Large growing firms with low turnover have 50% of jobs in semiconductors, almost 40% in financial services, 20% to 25% in software and retail food, and 12% in trucking.

24. Part of this is by construction, since for any sample of ongoing job spells, they are more likely to be observed in a larger firm (more workers by construction) and, conditional on size, a growing firm (i.e., an expanding firm will tend to have more workers). While these basic patterns are to be expected, it is useful to understand the magnitudes of these patterns and even more importantly the variation of these patterns across industries, employee characteristics, and other employer characteristics (e.g., turnover).

25. The full set of graphs is also available on the book's Web site.

## Chapter Six

1. G. J. Meyer, *Executive Blues: Down and Out in Corporate America* (New York: Franklin Square Press, 1995), 25.

2. See <http://www.siliconimage.com/aboutus/team.aspx>.

3. Paul Ong and Don Mar, "Post-layoff earnings among semiconductor workers," *Industrial and Labor Relations Review* 45 (1992): 366–79.

4. Louis S. Jacobson, Robert J. LaLonde, and Daniel G. Sullivan, "Earnings losses of displaced workers," *American Economic Review* 83 (1993): 685–709. The earnings loss of \$80,000 in their study has been converted to 2005 values.

5. Henry Farber, "Mobility and stability: The dynamics of job change in labor markets," in *The Handbook of Labor Economics*, vol. 3, ed. Orley Ashenfelter and David Card (Amsterdam: Elsevier Science, 1999), 2439–84.

6. Robert Topel and M. P. Ward, "Job mobility and the careers of young men," *Quarterly Journal of Economics* 107 (1992): 441–79.

7. Fredrik Andersson, Harry J. Holzer, and Julia Lane, *Moving Up or Moving On: Workers, Firms, and Advancement in the Low-Wage Labor Market* (New York: Russell Sage Press, 2005).

8. See chapter 5, notes 21 and 22, for definitions of terms.

9. 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. See chapter 5, note 20, for definitions of workers and jobs.

10. The results in this chapter are based upon data for 1992–2003 using UI wage record data for California, Illinois, and Maryland. Career paths for other workers are provided on our website: [economicturbulence.com](http://economicturbulence.com).

11. The proportion of all workers in the sample (not just prime-aged) holding 1–3 jobs is 71% in software, 74% in semiconductors, 76% in financial services, 78% in trucking, and 82% in retail food.

12. Kenneth J. McLaughlin, “A theory of quits and layoffs with efficient turnover,” *Journal of Political Economy* 99 (1991):1–29, points out that there is little operational distinction between voluntary and involuntary job change. Some of the disagreement between employers and employees in surveys reflects the different incentives the UI laws give to the two sides.

13. The careful reader comparing the results in this chapter to those in chapter 2 might be surprised by these findings as worker turnover rates are much higher in retail trade and trucking than in other industries. To reconcile these findings, it is important to emphasize that for worker turnover the unit of observation is a match, and short-duration matches count as much as long-duration matches in the definition of worker turnover. In contrast, the discussion here is about a worker’s career, and we are ranking predominant career patterns within the industry. Moreover, the career path comparisons made here control for gender, age, and education.

14. High-educated men in financial services tend to experience the same type of path as the women. However, high-educated male job switchers stay in the industry in finding their second, and better, job.

15. The measurement of these time intervals reflects the requirement that a worker is considered to be at a job once the worker has been at the job for a full quarter. Even taking this into account it is clear that one of the costs of jobhopping is that it takes time.

16. A full set of tables and figures for all career path and job ladder types for all industries can be found at [economicturbulence.com](http://economicturbulence.com).

17. Larry W. Hunter, Annette Bernhardt, Katherine L. Hughes, and Eva Skuratowicz, “It’s not just the ATMs: Technology, firm strategies, jobs, and earnings in retail banking,” *Industrial and Labor Relations Review* 54 (2001): 411.

18. From fieldwork conducted by Larry W. Hunter and Eva Skuratowicz as part of their research at the Sloan Financial Services Industry Center at the University of Pennsylvania.

19. Eva Skuratowicz and Larry W. Hunter, “Where do women’s jobs come from? Job resegregation in an American bank,” *Work and Occupations* 31, no. 1 (2004): 73–110.



20. Larry W. Hunter, “Transforming retail banking: Inclusion and segmentation in service work,” in *Employment Practices and Business Strategy*, ed. Peter Cappelli (New York: Oxford University Press, 1999), 153–92.

21. From fieldwork conducted by Clair Brown and Benjamin A. Campbell as part of their research at the Sloan Semiconductor Industry Center at University of California, Berkeley.

22. See <http://www.oracle.com/corporate/pressroom/html/scatz.html>.

23. Two characteristics of our data set are particularly relevant for the trucking industry. First, since most drivers are paid by the mile and enforcement of regulations concerning hours of service 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 forty quarters, and this is true whether the last job is right-censored or uncensored, i.e., if the worker is still observed in a job or has left the sample. A large proportion of workers in the trucking industry are owner-operators, who are classified as self-employed, and so their earnings are not reported by any firm, and therefore not observed in our sample. The simulated career paths in trucking are sensitive to right-censoring of the last job. However, 70 percent of all long trucking jobs (five years or longer) in the sample are ongoing in 2001; only 30 percent were completed earlier. 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.

24. Personal communication, August 2004.

25. Barbara Hagenbaugh, “Truckers needed to keep economy rolling,” *USA Today*, October 12, 2004.

26. The simulated career paths in retail food are sensitive to right-censoring of the last job. Almost 60 percent of long retail food jobs in the sample are ongoing in 2001. Although the completed jobs may have had higher initial earnings than the ongoing jobs, their earnings growth rates are all negative, which indicates that these workers were in troubled companies and had left (or been terminated).

27. Steven Greenhouse, “How Costco became the anti-Wal-Mart,” *New York Times*, July 17, 2005, BU1.

## Chapter Seven

1. Griff Witte, “As income gap widens, uncertainty spreads: More U.S. families struggle to stay on track,” *Washington Post*, September 20, 2004, A01.

2. Improved skills are not a factor in the increased earnings for high-income workers: the skill set of incoming workers is actually lower than the earnings of the workers they replace.

3. David Card and John E. DiNardo, “Skill-biased technological change and rising wage inequality: Some problems and puzzles,” *Journal of Labor Economics* 20, no. 4 (2002): 733–83.

4. Andrew B. Bernard and J. Bradford Jensen, “Understanding increasing and decreasing wage inequality” (unpublished paper, Yale University, 1998).

5. Andrew Bernard, Brad Jensen, and Peter Schott, “Survival of the best fit: Exposure to low wage countries and the (uneven) growth of U.S. manufacturing plants,” *Journal of International Economics* 68 (2006): 235.

6. Fredrik Andersson, Harry J. Holzer, and Julia Lane, *Moving Up or Moving On: Workers, Firms, and Advancement in the Low-Wage Labor Market* (New York: Russell Sage Press, 2005).

7. We include a worker’s real annualized earnings, defined as the average of full-quarter earnings in a given year from the dominant employer in that sector multiplied by four, where the dominant employer is defined as the employer contributing the most to the worker’s annual earnings, where the worker has been imputed to work full-time in that year. We impute a worker to have worked full-time in a year if we have identified her or him as likely to be working at the end of the first quarter of the year and he or she has real annualized earnings of at least \$1,000 for the year.

8. We include real annual earnings from all jobs that are in one of the five Sloan sectors and that are at least \$1,000 for the year.

9. These are within-state retention rates; thus, a worker who moves across state lines but stays in the same industry is not counted as staying in the same industry.

10. It is a little misleading to compare retention rates across industries, since larger industries, such as financial services, are, almost by definition, likely to retain higher proportions of their workforce. For this reason, firm retention rates are more comparable.

11. Pete Engardio, Aaron Bernstein, and Manjeet Kripalani with Frederik Balfour, Brian Grow, and Jay Greene. “The new global job shift,” *Business Week*, February 3, 2003, [http://www.businessweek.com/magazine/content/03\\_05/b3818001.htm](http://www.businessweek.com/magazine/content/03_05/b3818001.htm).

12. The details of the approach are described in appendix D. In the discussion that follows, the annualized earnings measure is used, and hence there is a one-to-one correspondence between a job and a worker. The terms “low-income worker” and “low-income job” are hence used almost interchangeably.

13. The studies on earnings inequality have found that much of the action in terms of changes over time is a within-industry phenomenon. Moreover, the primary value added of our data is that we can drill down deep inside of industries and look at the interaction of specific firms and workers. Between-industry changes in the distribution of jobs are relatively easy to measure and study from standard data sources.

14. Residual explanations seem to be especially important in accounting for the large increase of high-income workers in semiconductors and for the decrease of high-income workers in retail food.

## Chapter Eight

1. Larry Elliott, “Edwardian summer,” *Guardian*, August 18, 2005, <http://www.guardian.co.uk/comment/story/0,3604,1551325,00.html>.

2. The agricultural extension services in the twentieth century are largely viewed as a success. In the 1990s, the government did experiment with a form of manufacturing extension services via the MEP program to offer training to manufacturing businesses about best practices with more mixed success. Evaluating the success of such programs is, of course, quite difficult since such programs are typically not controlled experiments.

## Appendix A

1. See [www.sloan.org](http://www.sloan.org).

2. For more information on the data set, see <http://lehd.dsd.census.gov>.

3. The program currently partners with a total of 34 states, comprising 76 percent of the U.S. workforce.

4. A comprehensive discussion of the rationale for and consequences of this choice is provided in Fredrik Andersson, Harry J. Holzer, and Julia Lane, *Moving Up or Moving On: Workers, Firms, and Advancement in the Low-Wage Labor Market* (New York: Russell Sage Press, 2005), and John M. Abowd, Paul Lengermann, and Kevin McKinney, “The measurement of human capital in the U.S. economy” (Working paper, March 2003, Cornell University; [http://instruct1.cit.cornell.edu/~jma7/abowd\\_lengermann\\_mckinney\\_20030402.pdf](http://instruct1.cit.cornell.edu/~jma7/abowd_lengermann_mckinney_20030402.pdf)).

5. The annualized earnings measure that we use and the decomposition of this measure into these effects is based upon the methodology developed by Abowd, Lengermann, and McKinney, “The measurement of human capital.”

6. Steven J. Davis and John Haltiwanger, “Gross job flows,” *Handbook of Labor Economics*, ed. Orley Ashenfelter and David Card (Amsterdam: Elsevier, 1999), 2711–805.

7. Simon Burgess, Julia Lane, and David Stevens, “Job flows, worker flows, and churning,” *Journal of Labor Economics* 18, no. 3 (2000): 473–502.

8. Daniel Aaronson and Daniel Sullivan, “Growth in worker quality,” *Economic Perspectives*, no. 4 (2001): 53–74.

9. Casey Ichinowski, Kathryn Shaw, and Giovanna Prennushi, “The effects of human resource management practices on productivity: A study of steel finishing lines,” *American Economic Review* 87: 291–313 (reprinted in *Personnel Economics*, ed. Edward Lazear and Robert McNabb [Cheltenham, U.K.: Edward Elgar Press, 2004]).

10. See, e.g., Carol Corrado and Lawrence Slifman “Decomposition of productivity and costs,” *American Economic Review* 89 (1999): 328–32, and William Gul-

lickson and Michael J. Harper, “Bias in aggregate productivity trends revisited,” *Monthly Labor Review*, March 2002, 32–40.

11. As will become apparent below, our biggest problem with productivity measurement is also with financial services. We should note in this regard that BLS uses the gross revenue measures that we use for all of our sectors *except* for financial services (for the latter they attempt to measure the service flow from financial service providers). Even with their alternative approach, there are anomalous results for the financial services sector.

### Appendix C

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

2. WJWG and BJWG are both annualized measures. Suppose we want to calculate a wage growth rate from quarter  $s$  ( $E_s$ ) to quarter  $t$  ( $E_t$ ). Then the wage growth rate (whether it is WJWG or BJWG) is defined as

$$WG_{s,t} = \frac{[\log(E_t) - \log(E_s)]}{(t - s)/4}$$

The length of the nonemployment spell is incorporated in the denominator. The BJWG measure calculated in this fashion. Since we use earnings from “dominant” employers, the denominator of BJWG is always positive.

### Appendix D

1. Fredrik Andersson, Elizabeth Davis, Matthew L. Freedman, Julia I. Lane, Brian P. McCall, and L. Kristin Sandusky, “Decomposing the sources of earnings inequality within and across industries,” February 2006, mimeo, NORC/University of Chicago, <http://client.norc.org/jole/SOLEweb/Decomposing%20Sources%20of%20Earnings%20Inequality%202002-10-2006.pdf>.



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# Index

*Note: Italicized page numbers indicate figures and tables.*

- Abowd, John M., 156  
Adams, Scott, 79, 80  
age groups: career paths and, 82–83, 85, 86, 87–92, 93–94, 97; data on, 138, 150–51; economic turbulence and, 12–13, 14–15, 22, 121; job ladders and, 67, 70–71, 74–75; measures of, 169n20; number of jobs held across, 107  
AGI, 41  
American Freightways, 28, 120  
*Apprentice, The* (TV show), 79, 80  
Arora, Ashish, 19  
  
Bagheri, Robert, 80–81, 83, 95, 125  
Bank One, 17, 66  
banks: declining number of, 27; mergers and acquisitions of, 17–18, 45, 66; output per hour index of, 139–40  
Belzer, Michael, 28, 96  
Bethlehem Steel, 4  
Bloomingdale's, 45  
Bureau of Labor Statistics (BLS), 139–40, 164n13, 175n11  
*Business Week*, 60, 64, 77, 110  
  
career paths: definition and types of, 8–9, 82–83; differences by worker characteristics and industry, 87–88, 92–97; economic turbulence's impact on, 8–9, 84–86, 88–92, 97–99; measures of, 149–53; success in, 125–26; theories of, 79–82; type of firm and, 123. *See also* job ladders  
Catz, Safra, 95–96  
Chase Corporation, 66  
  
China: semiconductor industry in, 18; software industry in, 60  
churning: effect on earnings, 117; measures of, 52–53, 124; perceptions of, 98; productivity, workforce quality, and, 49; workforce quality, firm survival, and, 50–54, 58–59  
Citibank, 44  
Citicorp, 17, 66  
Citigroup, 61  
Compaq, 63  
Coolidge, Calvin, 39  
Cordes, Ron, 19–20  
Costco: career paths at, 97; earnings at, 39, 97; expansion of, 45; job ladders at, 64; as one of best places to work, 41; Wal-Mart compared with, 4, 54, 122  
cotton industry, 26  
creative destruction concept, 4, 135, 136  
Current Population Study, 156  
  
data: approach to, 23–24; definitions used, 132–34; on firm outcomes, 138–41; industry expertise and, 129–30; limits of, 11–12; measures used in, 12–13, 14–15, 135–38, 161–62n2; source of, 130–34  
deregulation: differential impacts of, 62; of energy industry, 26; of financial services industry, 2, 5, 22, 26–27, 65–66, 103; of trucking industry, 2, 5, 16–17, 22, 27–28, 30–31, 64–65  
Digital Equipment Corporation (DEC), 33, 63  
Dillard's, 45

- Dobbs, Lou, 1, 5, 60, 68, 77
- dot.com bust, 63
- downsizing, 63
- earnings: of all vs. college-educated workers, 25; annualized and dominant employer measures of, 104, 132–33, 155–56, 173n7; background data on, 155–59; career paths and, 84, 86, 87–92, 93–97; at entry vs. continuing or exiting establishments, 110–11, 116–18; HRM practices and, 39, 40–43; job ladders and, 65, 73, 74–75, 76, 126; low-, middle-, and high-income, compared, 103–11; measures of, 104, 132–33, 136–38, 156–57; overview of, 25–26; retention patterns and, 107–8; role of job and worker reallocation in, 111–16; at small vs. large firms, 72–73; unionization and, 73; workforce quality and turnover, productivity, and, 47–49
- economic shocks: cost reductions due to, 40–41; overview of, 26–29
- economic turbulence: basic facts about firms and, 3–6, 9, 10–11, 43–49, 121–24; context of, 1–3; definition and measurement of, 11–16, 135; differences across industries and age groups, 12–13, 14–15, 22; French vs. Anglo-American response to, 119–20; impact of, 6, 7–8; information needed on, 124; job availability and, 112–16; summary of, 22, 121–24. *See also* career paths; firms; job ladders; job quality; middle-income jobs; policy issues; workforce
- Edison, Thomas Alva, 45
- education: career paths and, 84–85, 86, 87, 88–92, 93, 96; data on, 138, 149, 150–51; earnings and, 25; job change as alternative to, 81; job ladders and, 66, 67, 70–76, 77; job skill levels and, 109; productivity and, 166–67n11; in software industry, 34–35; technological changes and, 29–30
- Edwards, Tracey, 97
- Ellison, Larry, 95–96, 119
- employer, dominant, defined, 104, 132–33, 155–56, 173n7. *See also* establishments; firms
- energy industry deregulation, 26
- establishments: definition of, 43, 134, 162n3; exit rates and single-unit, 167–68n23; national vs. regional and local, 56–57; performance differences across, 43–45; role of churning and workforce quality on survival of, 52–54; small vs. large, 57–58
- ethnicity and race, job change patterns and, 82
- Federal Express, 16–17, 28
- Federated department stores, 45
- financial services industry: business cycles and, 19–20; business practices in, 103; career paths in, 8, 84–85, 86, 87, 88–92, 93–94; changes in, 29–30; churning and human capital in, 51, 53; deregulation and restructuring in, 2, 5, 22, 26–27, 65–66, 103; earnings in, 30, 49, 73, 76, 105, 106, 110–11; earnings measures in, 104; establishment outcomes in, 20, 45; firm outcomes in, 20; firm performance and, 55; globalization's effects on, 4–5; job and worker turnover in, 14; job change patterns in, 93–94; job ladders in, 8, 30, 65–66, 71, 74, 77–78; job quality in, 9; job skill levels in, 109; LIFO strategy in, 69; low-, middle-, and high-income jobs in, 112–17; mergers and acquisitions in, 17–18, 45; number of dominant jobs in, 104–6; productivity across establishments in, 44, 46, 175n11; retention patterns in, 107–8; sector SIC definitions of, 134; short- vs. long-term jobs in, 68–69; subindustries of, 164n16; technological change's effects on, 5, 27, 93–94; workforce in, 24, 103, 107–8; workforce quality in, 48, 49. *See also* banks
- Financial Services Modernization Act (Gramm-Leach-Bliley Act, 1999), 17, 26–27
- firm outcomes (entry and exit rates): background data on, 143–47; different paths in, 40–43; earnings and, 110–11, 116–18; economic turbulence and, 3–6, 9, 10–11, 43–49, 121–24; for establishments across industries, 44, 45; factors in, 16–22; job change due to, 81; measures of, 138–41; middle-income jobs and, 102–3; productivity and, 45–47, 110–11, 167n5; proportion of low-, middle-, and high-income jobs and, 113–16; skills, turnover, and, 122, 124–25; workforce quality, churning, and, 50–52, 58–59. *See also* firm performance; productivity

- firm performance: differences in, 40–45; factors in, 7, 43–49, 54–58; measures of, 43, 55, 139–40; role of firm and workforce characteristics in, 52–54; workforce quality, churning, and, 50–52, 58–59. *See also* firm outcomes (entry and exit rates)
- firms: definition of, 43, 162n3; dynamic selection of, 4–5; as economic building blocks, 39–40; growing vs. shrinking, 69–71; market selection and, 52–54; measures of, 19, 169–70n22; types of, 111–16, 123, 149, 151. *See also* establishments; firm outcomes (entry and exit rates); firm performance; firm size; human resources management (HRM) practices
- firm size: career paths and, 82, 83; job ladders and, 70–71, 72, 74–75, 76–77; middle-income jobs and, 102–3; summary of effects, 121–22
- First Union, 17–18, 45, 66
- fish and chip shop, 50
- Ford, Henry, 39, 58
- foreign competition and ownership, 36, 62, 102. *See also* globalization; off-shoring; outsourcing
- Fortune Magazine*, 40–41, 66, 169n19
- France, labor rules in, 119–20
- Gambardella, Alfonso, 19
- GAO (General Accounting Office), 28, 163n1
- Gates, Bill, 42
- gender: amount of turbulence and, 121; career paths and, 82, 83, 84–85, 86, 87, 88–92, 93–97; data on, 138, 149, 150–51; job and worker turnover and, 14–15; job ladders and, 62, 67, 71, 72–77; number of jobs held by, 107
- General Accounting Office (GAO), 28, 163n1
- Giant Foods, 1–2, 18
- Glass-Steagall Act (1933), 26–27
- globalization: differential impacts of, 62; effects of, 5, 28–29, 34; firm outcomes and, 18–19; job losses due to, 102; middle-income jobs and, 100–101; retention patterns and, 108. *See also* off-shoring; outsourcing
- GM (General Motors), 81
- Gramm-Leach-Bliley Act (Financial Services Modernization Act, 1999), 17, 26–27
- Graziani, Paul, 41
- Green, Carrie, 97
- Hewlett Packard (HP), 63
- Holmes, Thomas J., 167–68n23
- human resources management (HRM) practices: differences in, 121–22; firing in, 79–80; job ladders and, 63–67; LIFO and FIFO strategies in, 69, 78; productivity and success linked to, 40–43; role of, 124–25
- Hunter, Larry, 40, 93–94
- IBM Corporation, 34, 63
- ICC (Interstate Commerce Commission), 27
- ice cream parlor, 10–11
- India, software industry in, 19, 60
- industries: approach to, 23–24, 120–21, 126–27; career path differences across, 8–9, 87–88, 92–97; changes in, 29–37; earnings levels compared across, 105; economic shocks and, 26–29; economic turbulence differences across, 12–13, 14–15, 22; firm performance and, 54–58; job losses/gains across, 102–3; workforce overview of, 24–26. *See also* financial services industry; retail food industry; semiconductor industry; software industry; trucking industry
- Intel, 41, 60
- Interstate Banking and Branching Efficiency Act (Riegle-Neal Act, 1994), 26–27
- Interstate Commerce Commission (ICC), 27
- Ireland, software industry in, 19
- Israel, software industry in, 19
- James, Kevin, 97
- Japan, semiconductor industry in, 18
- J.B. Hunt, 65, 69
- job change patterns: common perceptions of, 97–98; comparisons of, 93–97; differences in (loyalists, switchers, hoppers), 8, 83, 84, 85, 88–90, 122–24, 153; earnings distribution and, 117; measures of, 124; policy implications of, 98–99; positive effects of, 82, 120–21, 125–26; skills and learning in, 80–81, 95; unemployment periods in, 79, 81, 92, 93, 98, 125; worker vs. employer decisions in, 79–80, 83, 171n12. *See also* churning

- job ladders: access to, 122–23; comparisons of, 7–8, 30, 33, 37, 63–66, 70, 71, 72, 74, 75, 77–78, 122; definition and types of, 61–62, 81; earnings and, 65, 73, 74–75, 76, 126; economic turbulence's impact on, 7–8, 62, 66, 77–78; history of, 62–67; measures of, 67–68, 149–53; summary of, 77–78; type of firm and, 123; worker and firm differences linked to, 70–77. *See also* career paths
- job quality, 9. *See also* workforce quality
- job reallocation: cost of, 101; as creative destruction, 4; job ladders and, 67; measures of, 135; role of, 111–16
- jobs: changes in types of, 123–24; creation and destruction of, defined, 4, 135, 136; definition and proportion of low-, middle-, and high-income, 9, 102, 103–4, 105, 111–18, 121–24, 126; good, 60–62, 67, 77–78, 106–7, 109–11, 116–17; information gap about lost, 100–101; misperceptions about, 101, 116; number of, 1–2, 10, 16, 22, 83, 104–11, 124; short- vs. long-term, 68–69; in shrinking firms, 69–70. *See also* career paths; job change patterns; job ladders; job skills; job turnover; middle-income jobs; workforce
- job skills: differences in, 122; effects of changes in, 113–17; of entering vs. exiting workers, 101, 108–9; establishment longevity and, 50; firm outcomes and, 122, 124–25; improvement of, 57, 80–81, 95, 125–26; measures of, 136, 157
- job turnover: definition of, 12, 161–62n2; statistics on, 13, 14–15, 22
- JPMorgan Chase & Co., 17, 66
- Kaiser Aluminum, 10–11, 22, 113, 117
- Kodak, 97
- layoffs: French rules on, 119–20; recent, 33, 61, 63, 66, 81, 97
- Lengermann, Paul, 156
- Longitudinal Employer-Household Dynamics (LEHD) program, 130, 131, 134, 136, 138, 155, 156
- Luddites, 26, 119
- Macy's, 45
- Manchin, Joe, III, 117–18
- market selection, role of firm and workforce characteristics in, 52–54
- market strategies, HRM practices linked to, 40–43
- Marshall Field's, 45
- May department stores, 45
- McClellan, Mark, 10–11, 79, 98, 107, 113, 117, 120, 125
- McKinney, Kevin, 156
- McLaughlin, Kenneth J., 171n12
- Mencken, H. L., 59
- mergers and acquisitions: examples of, 17–18, 36, 45, 66; firm outcomes linked to, 16–18, 45; job ladders and, 30; layoffs due to, 61; productivity linked to, 47
- Merrill Lynch, 66
- Meyer, G. J., 79–80
- Microsoft, 42, 60, 63–64
- middle-income jobs: background data on, 155–59; definition of, 103–4, 105; earnings growth and, 104–11; economic turbulence and, 100–103, 116–18; fear of lost, 109–11, 123; firm outcomes and, 113–16; job and worker reallocation and, 111–16; job skills and, 108–9; questions about, 100–101
- MOM (My Organic Market), 1–2, 18
- Montgomery Ward, 4
- Motor Carrier Act (1980), 27–28
- Motorola, 63
- National Academy of Public Administration (NAPA), 23, 28, 163n1
- National Grocers Association, 18
- National Semiconductor, 94
- New York Times*, 10
- New Zealand, fish and chip shop in, 50
- Nordstrom's, 50
- off-shoring, 23, 35, 60, 163n1
- Oracle Corporation: growth of, 34; job ladders of, 63–64; management team of, 95–96
- outsourcing, 34, 60, 68
- Pacific Bell, 79, 80
- PanAm, 4
- PeopleSoft, 34, 67
- Perot, Ross, 100
- Pesyna, Gail, 24
- policy issues: concerns about gains/losses of

- good jobs and, 118; extension services and, 174n2; French vs. Anglo-American response to, 119–20; implications of economic turbulence for, 124–27; implications of job change patterns for, 98–99
- Primdahl, Carol, 61, 122
- Principal Financial Group, 41
- productivity: differences across establishments, 43–45; education and computer use linked to, 166–67n11; factors in, 40, 47; failure rates linked to, 39–40; firm outcomes and, 45–47, 58, 110–11, 167n15; HRM practices and, 40–43; job change and, 80–81; measures of, 139–40, 175n11; probability of exit and, 144–46; of securities brokers, 55; workforce quality, churning, earnings, and, 48; workforce quality, earnings, and, 49
- Progressive Grocer*, 58, 64
- restaurant and food service industry, 36, 78
- retail food industry: career paths in, 8, 84–85, 86, 87, 88, 97, 172n26; changes in, 2, 5, 29, 35–37, 103; churning and human capital in, 51, 53; competition in, 18, 29, 35–36; definition of, 164n14; differences across, 122; earnings in, 37, 49, 73, 76, 105, 106, 110–11; earnings measures in, 104; establishment outcomes in, 20, 45; firm outcomes in, 20, 146; firm size in, 121; gross revenue measures of, 140–141; job and worker turnover in, 14; job change patterns in, 97; job ladders in, 37, 64, 72, 74, 78; job quality in, 9; job skill levels in, 108–9; low-, middle-, and high-income jobs in, 112–17; mergers and acquisitions in, 18; national vs. regional and local establishments of, 56–57; number of dominant jobs in, 104–6; output per hour index of, 139–40; productivity across establishments in, 44; retention patterns in, 107–8; sector SIC definitions of, 134; short- vs. long-term jobs in, 68–69; top retailers in, 36; unionization and, 103; workforce of, 24, 107–8; workforce quality in, 48, 49, 50
- retail trade startups, 45
- retirement programs, 63
- Riegle-Neal Act (Interstate Banking and Branching Efficiency Act, 1994), 26–27
- Roadway Express, 67
- Robinson, Sandra (“Candy”), 61, 70
- Sam’s Club, 4
- SAP, 34
- Schmitz, James A., Jr., 167–68n23
- Schneider Trucking, 41
- Schumpeter, Joseph, 4
- SeaCode Inc., 60
- Seattle Times*, 4
- securities brokers, 55
- Sedo, Stanley, 96
- self-employment, 35
- semiconductor industry: career paths in, 8, 84, 85, 86, 91–92, 94–95; changes in, 2, 5, 32–33, 103; churning and human capital in, 51, 53, 54; earnings in, 32, 49, 105, 106, 111; earnings measures in, 104; establishment outcomes in, 5, 21, 44, 45; fabrication vs. fabless establishments in, 55–56; FIFO strategy in, 69; firm outcomes in, 21, 46, 122, 145; firm performance in, 7; firm size in, 121; globalization’s effects on, 5, 18–19, 28; job and worker turnover in, 15; job change patterns in, 94–95; job ladders in, 8, 33, 62–63, 70, 74, 77; job numbers in, 6; job quality in, 9; job reallocation in, 114, 116; job skill levels in, 108–9; layoffs in, 81; low-, middle-, and high-income jobs in, 112–17; number of dominant jobs in, 104–6; off-shore jobs in, 60; output per hour index of, 139–40; production stages in, 32; productivity in, 44, 46; retention patterns in, 107–8; sector SIC definitions of, 134; short- vs. long-term jobs in, 68–69; workforce in, 24, 102–3, 107–8; workforce quality in, 47–49, 50
- Shepard, Kathy, 96–97
- Silicon Image, 80–81, 95
- Sinegal, James, 41
- SiRF Technology Inc., 81
- Sloan Industry Centers, 56, 67, 129–30, 163n1
- small businesses, 162n11. *See also* startups
- software industry: business cycles and, 19; career paths in, 8, 84, 86, 87, 88, 91–92, 95–96; changes in, 33–35, 103; churning and human capital in, 51, 53, 54; earnings in, 49, 105, 106; earnings measures in, 104; establishment outcomes in, 5, 21, 44, 45; firm outcomes in, 16, 21, 46, 122, 147;



- software industry (*continued*)  
 firm size in, 57–58, 121; globalization's effects on, 5, 19, 28–29; job and worker turnover in, 15; job change patterns in, 95–96; job ladders in, 63–64, 75, 77; job quality in, 9; job skill levels in, 109; layoffs in, 61; LIFO strategy in, 69; low-, middle-, and high-income jobs in, 112–17; number of dominant jobs in, 104–6; off-shore jobs in, 60; output per hour index of, 139–40; productivity in, 44, 46; retention patterns in, 107–8; sector SIC definitions of, 134; short- vs. long-term jobs in, 68–69; startups in, 2, 64; workforce in, 24, 103, 107–8; workforce quality in, 47–49
- Starbucks, 45, 50
- startups, 2, 45, 64, 95, 103
- Stop and Go, 18
- supercenters, 56, 164n15. *See also* Costco; Wal-Mart
- Taiwan, semiconductor industry in, 18, 32
- Teamsters Union, 64
- technological changes: career paths and, 93–94; deregulation and, 27; effects of, 5, 29–30, 32–33, 34, 36–37; retention patterns and, 108
- Texas Instruments (TI), 61, 67, 122
- Travelers Group, 17
- trucking industry: career paths in, 8, 84, 86, 87, 88, 92, 96–97, 172n23; changes in, 30–32, 103; churning and human capital in, 51, 53; deregulation's effects on, 2, 5, 16–17, 22, 27–28, 30–31, 64–65, 75, 77–78; job ladders in, 7–8, 64–65, 75, 77–78; job quality in, 9; LIFO strategy in, 69; low-, middle-, and high-income jobs in, 112–17; mergers and acquisitions in, 16–17; national vs. regional and local establishments of, 56–57; number of dominant jobs in, 104–6; output per hour index of, 139–40; productivity in, 44; retention patterns in, 107–8; sector SIC definitions of, 134; short- vs. long-term jobs in, 68–69; workforce in, 24, 107–8; workforce quality in, 48, 49, 50
- Trump, Donald, 80
- turnover. *See* job turnover; workforce turnover
- unemployment, 79, 81, 92, 93, 98, 125
- unemployment insurance system, 126, 130–32
- unionization: changing business practices and, 103; earnings and, 73; in financial services, 30; job ladders and, 78; overview of, 24; in trucking industry, 17, 30–32, 64–65
- UPS (United Parcel Service), 96–97
- U.S. Census Bureau, 129, 130–32, 134, 138
- U.S. Congress, 17
- U.S. Department of Labor, 11
- USAA Insurance, 67
- USA Today*, 96–97
- Wachovia, 18, 45
- wages. *See* earnings
- Wagner, Beth, 97
- Wal-Mart: Costco compared with, 4, 54, 122; earnings at, 39; expansion of, 45; food retailing of, 18, 29, 35–36; HRM practices of, 42–43; job ladders at, 64
- Wal-Martization concept, 60
- Washington Post*, 100–101
- Wegmans Food Markets, 41, 58, 67
- West, Mae, 82
- Whole Foods, 39
- Winn-Dixie, 39
- worker reallocation: concept of, 3–4; measures of, 135; middle-income jobs and, 102–3; role of, 111–16
- workforce: changes in, 29–37, 100–103, 107–8, 111–16; dominant employer of, defined, 104, 132–33, 155–56, 173n7; dynamic selection of, 3–4; economic turbulence and, summarized, 122–23; full-time, defined, 156; groups of, defined, 157–58; market selection and, 52–54; overview of, 24–26. *See also* age groups; education; ethnicity and race; gender; worker reallocation; workforce quality; workforce turnover
- workforce quality: churning, firm survival, and, 50–52, 58–59; earnings, job ladders,

- and, 65; earnings, productivity, and, 47–49; firms' choices in, 42; measures of, 47, 48, 136–38
- workforce turnover: at Costco vs. Wal-Mart, 4; definition of, 12, 161–62n2; differences in, 122; earnings, productivity, and, 47–49; firm performance linked to, 40, 122;
- HRM practices and, 40–43; job ladders and, 62, 67, 71–72, 76–77; job turnover and, 14–15; measures of, 169–70n22, 171n13; short- vs. long-term jobs and, 68–69; shrinking firms and, 69–70; skills, firm survival, and, 124–25; statistics on, 11–12, 13, 14–15, 22; voluntary, 66