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Business Employment Dynamics

Richard L. Clayton and James R. Spletzer

4.1 Introduction

One of the most watched economic indicators in the United States is the monthly change in nonfarm payroll employment released by the Bureau of Labor Statistics (BLS). This statistic measures the net change in the number of jobs from one month to the next. But when we think about how employment grows or declines, we realize that some establishments have opened, some establishments have expanded, some establishments have contracted, and some establishments have closed. In this chapter, we describe the new gross job gains and gross job loss statistics from the BLS Business Employment Dynamics program. These statistics not only measure the large gross job flows that underlie the substantially smaller net employment changes, but also enhance our understanding of producer dynamics across various stages of the business cycle.

The development of the BLS Business Employment Dynamics data was motivated in large part by research in the academic community. The creation of longitudinal establishment datasets at the U.S. Census Bureau during the past several decades led to influential publications by Dunne, Roberts, and Samuelson (1988, 1989a, 1989b), Davis and Haltiwanger (1990, 1992), and Davis, Haltiwanger, and Schuh (1996). From this literature, we have learned that there is a large amount of establishment-level employment volatility not evident at the aggregate level, and the gross job flow

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statistics have fascinating business cycle properties. Yet despite all that we have learned about the labor market from this literature, the empirical analysis in these works was restricted to data from the manufacturing sector, and the call for more comprehensive and more timely data always resonates. The second generation of analysis using longitudinal microdata from the States' Unemployment Insurance Systems illustrates how gross job flows in manufacturing are not representative of the entire U.S. economy (see Anderson and Meyer 1994; Foote 1998; Burgess, Lane, and Stevens 2000; and Spletzer 2000). The research resulting from the creation of these longitudinal establishment data sets has not only stimulated the review and updating of existing labor market theories, but has also stimulated the U.S. statistical agencies to develop their administrative data sets in such a way so as to produce longitudinal job flow statistics.

This chapter begins with a definition of gross job gains and gross job losses, followed by a description of the source data used by the BLS to generate these statistics. Because the quality of longitudinal statistics computed from administrative cross-sectional microdata depends crucially on the longitudinal linkage algorithm, we pay particular attention in this chapter to describing our record linkage methodology. We then present highlights from the new BLS Business Employment Dynamics data series; these data show that in the first quarter of 2005, the number of gross job gains from opening and expanding establishments was 7.6 million, and the number of gross job losses from closing and contracting establishments was 7.3 million. The new BLS Business Employment Dynamics data also show that the 2001 recession was characterized by a temporary spike in gross job losses accompanied by a substantial and persistent decline in gross job gains.

In this chapter we introduce a new seasonally adjusted time series of the distribution of quarterly gross job flows. This new time series is motivated by several interesting questions about gross job flows over the business cycle. For example, did the temporary spike in gross job losses during the 2001 recession occur at a few establishments with large declines, or at many establishments with small declines? And did the substantial fall in gross job gains during the 2001 recession occur at a few establishments cutting back significantly on hiring, or many establishments not adding a few new positions? Our new time series shows that the relatively few establishments with large gross job gains and large gross job losses were the drivers of the 2001 recession.

4.2 The Business Employment Dynamics Program at BLS

4.2.1 Concepts and Definitions

The employment statistics that are published by the Bureau of Labor Statistics are invaluable for policymakers, researchers, and the business community. The BLS report on the monthly net change in employment

affects stock market movements and interest rate decisions considerably. Yet this single macroeconomic statistic is the net result of the millions of decisions by millions of business establishments in the U.S. economy changing their employment levels. Each decision reflects the business-specific economic conditions that face managers every day: supply, demand, labor availability, market share goals, investments in research and development, and so on. While the aggregate net employment change statistic identifies the overall growth or decline of the labor market, it does not summarize the underlying heterogeneity of the many establishments opening and expanding, or the many establishments contracting or closing.

The definitions of gross job gains and gross job losses are easily derived from the definition of net employment growth. Notationally, let $E_{e,t}$ denote the employment of establishment e in quarter t. Net employment growth in quarter t is defined as the change in aggregate employment from one quarter to the next:

$$(1) \quad \text{Net Employment Growth } (t) = \sum_{\substack{all \\ establishments}} E_{e,t} - \sum_{\substack{all \\ establishments}} E_{e,t-1}.$$

Noting that establishments can be classified based upon their employment dynamics from one quarter to the next, this equation for net employment growth can be manipulated as:

$$\begin{aligned}
(2) \quad \text{Net Employment Growth } (t) &= \sum_{\substack{all \\ establishments}} E_{e,t} - \sum_{\substack{all \\ establishments}} E_{e,t-1} \\
&= \sum_{\substack{all \\ establishments}} (E_{e,t} - E_{e,t-1}) \\
&= \sum_{\substack{establishments \\ increasing \\ employment}} (E_{e,t} - E_{e,t-1}) \\
&\quad + \sum_{\substack{establishments \\ decreasing \\ employment}} (E_{e,t} - E_{e,t-1}) \\
&\quad + \sum_{\substack{establishments \\ with\ no\ change \\ in\ employment}} (E_{e,t} - E_{e,t-1}) \\
&= \sum_{\substack{opening \\ establishments}} (E_{e,t} - 0) + \sum_{\substack{expanding \\ establishments}} (E_{e,t} - E_{e,t-1}) \\
&\quad + \sum_{\substack{contracting \\ establishments}} (E_{e,t} - E_{e,t-1}) \\
&\quad + \sum_{\substack{closing \\ establishments}} (0 - E_{e,t-1}).
\end{aligned}$$

Note that the quarterly employment change for the set of establishments that do not change their level of employment from one quarter to the next is zero, and this term drops out of the final version of equation (2). In the Business Employment Dynamics data, there are 3.2 million establishments with positive employment that do not change their employment between the fourth quarter of 2004 and the first quarter of 2005.

The definitions for gross job gains and gross job losses fall immediately out of the previous equation. *Gross job gains* are the sum of all employment increases at opening and expanding establishments:

$$(3) \quad \text{Gross Job Gains } (t) = \sum_{\substack{\text{opening} \\ \text{establishments}}} (E_{e,t} - 0) + \sum_{\substack{\text{expanding} \\ \text{establishments}}} (E_{e,t} - E_{e,t-1}).$$

Gross job losses are the sum of all employment losses at contracting and closing establishments:

$$(4) \quad \text{Gross Job Losses } (t) = \sum_{\substack{\text{contracting} \\ \text{establishments}}} (E_{e,t} - E_{e,t-1}) + \sum_{\substack{\text{closing} \\ \text{establishments}}} (0 - E_{e,t-1}).$$

An *expanding* establishment is defined as a continuous unit that increases its employment from a positive level in the previous quarter to a higher level in the current quarter, and a *contracting* establishment is a continuous unit that decreases its employment from the previous quarter to a lower positive level in the current quarter. An *opening* establishment is one that has positive employment in the current quarter, and either had zero employment or was not in the database the previous quarter. A *closing* establishment is one that had positive employment in the previous quarter, and has either zero employment or is not in the database the current quarter.

Because it is not possible to define business deaths on a contemporaneous basis, the definitions of establishment openings and closings used in the BLS Business Employment Dynamics program are conceptually different than the more familiar definitions of establishment births and deaths. In the State Unemployment Insurance (UI) systems, businesses are allowed to and often do report zero employment for several quarters after they have effectively closed. This undoubtedly occurs when a business owner temporarily shuts down but anticipates starting up the business again when economic conditions improve. By reporting zero employment and wages on the quarterly contributions form, the business owner can keep their UI account active. This results in many observed business closings, but which of these closings will start up again and which will die will not be observed for several more quarters.

It is important to note that gross job gains and gross job loss statistics measure the sum of establishment-level net employment changes, and do not measure the flow of workers into and out of the establishment. For ex-

ample, if an establishment increases employment from fifty workers to sixty workers, these ten additional jobs are classified as gross job gains. This addition of ten jobs during the quarter might have occurred with the addition of ten new hires, or by the net of twenty new hires and ten separations. Counts of hires and separations are published monthly by the Job Openings and Labor Turnover Survey (JOLTS) program at the BLS. Both Clark (2004) and Faberman (chapter 2, this volume) present a thorough description of the conceptual foundations and the empirical estimates from the JOLTS program.

4.2.2 Source Data

The quarterly BLS Business Employment Dynamics data series is constructed from microdata originating from the Quarterly Census of Employment and Wages (QCEW), also known as the ES-202 program. A complete description of the underlying source data and the data flows can be found in the longer conference version of this chapter (Clayton and Spletzer 2005) and in the April 2004 *Monthly Labor Review* (Spletzer et al. 2004); the following is a bare-bones description of the source data.

All employers subject to state Unemployment Insurance (UI) laws are required to submit quarterly contribution reports detailing their monthly employment and quarterly wages to the State Employment Security Agencies. The raw UI data require substantial edit and review. In addition, the BLS directs the states to conduct two supplemental surveys that are necessary to yield accurate data at the local level. The first is the Annual Refiling Survey (ARS), where nearly two million businesses each year are contacted to obtain or update business name, addresses, industry codes, and related contact information. The second is the Multiple Worksite Report (MWR), which collects employment and wages for each establishment in multiunit firms within the state. The MWR covers about 110,000 businesses (1.4 percent of all businesses, 16 percent of all establishments, and 39 percent of employment) each quarter, allowing the accurate distribution of employment and wages to the correct county and industry. Without these two additions to the UI data, the resulting QCEW economic information would not be accurate at the industry level or at the MSA, county, or city level. In addition, state QCEW staffs review and reconcile complex cases including mergers and acquisitions where correctly determining and linking predecessors and successors is critical to the accuracy of the QCEW and the Business Employment Dynamics data.

After the microdata are augmented and thoroughly edited by the State Labor Market Information staff, the states submit these data and other business identification information to the Bureau of Labor Statistics as part of the federal-state cooperative QCEW program. The data gathered in the QCEW program are a comprehensive and accurate source of employment and wages, and provide a virtual census (98 percent) of employees on

nonfarm payrolls. In the first quarter of 2005, the QCEW statistics show an employment level of 129.8 million, with 8.5 million establishments in the U.S. economy. The BLS publishes the Business Employment Dynamics data approximately seven-and-a-half months after the end of the quarter.

4.2.3 Longitudinal Linkages

The quarterly gross job gains and gross job loss statistics created in the BLS Business Employment Dynamics program are tabulated by linking establishments across quarters; establishments are then classified as opening, expanding, contracting, closing, or not changing their employment level. The accuracy of the Business Employment Dynamics statistics depends on two primary factors: the quality of the establishment-level microdata being reported by businesses to the states, and the record linkage methodology used by the BLS to link establishments across quarters.

Following establishments across time using administrative UI microdata is a complex and challenging exercise. Creating the Business Employment Dynamics data series requires a thorough understanding of how businesses operate and how they file their UI tax forms. The manner in which businesses report administrative changes and ownership changes can result in establishments changing UI identifiers even though no economic changes occurred. Failing to identify and link such noneconomic changes would result in an overstatement of establishment openings and closings, and thus an overstatement of gross job gains and gross job losses. The BLS has developed a multistep process to accurately link business establishment microdata over time. This linkage process consists of four steps: two distinct administrative matches, a probability-based weighted match, and an analyst intervention match. The linkage process is based on the unique establishment identifier maintained by the states. This identifier is composed of two pieces: the UI number and the reporting unit number. The UI number refers to the taxpaying entity within the state. The reporting unit number refers to establishments within the firm. Although the reporting unit number is not used in the administration of the UI system, it is assigned by the state using information collected from the Multiple Worksite Reports.

The first step in the Business Employment Dynamics record linkage methodology is to link establishments that maintain the same establishment identifier across quarters. This step identifies almost all of the establishments linked as continuous across quarters. This is followed by a match using predecessor and successor information. Predecessors and successors refer to establishments that are continuous across quarters, yet the establishment identifier changes as a result of a change in ownership or a change in the reporting configuration of a multi-establishment company. The vast majority of predecessor and successor linkages are businesses buying another business (the assumption of liability for UI taxes must be reported to

the state); other predecessor and successor linkages are identified by the State Labor Market Information Staff. The third step in the linkage process, conducted by the BLS, is a probability-based weighted match process. This probability-based weighted match uses information such as establishment name, street address, and telephone number to link—as continuous—a closing establishment in the previous quarter with an opening establishment in the current quarter. The theoretical foundation for the BLS record linkage methodology is based on the work of Ivan P. Felligi and Alan B. Sunter, and is more fully explained in Robertson et al. (1997). The final step in the matching process is an analyst review and possible manual linkage of selected large unmatched records. Although this analyst review and manual linkage is very resource intensive, it is crucial for the quality of the detailed industry and geography statistics.

The BLS has undertaken many detailed reviews and analyses of the quality of its longitudinal linkage algorithm, and continues to conduct research to explore the sources and consequences of any additional valid establishment links. Furthermore, as part of the annual cooperative agreement between BLS and the states, the BLS is now requiring that the states examine and attempt to explain any unlinked records with employment above a certain threshold; this review of opening and closing records by state analysts before it is transmitted to the BLS will certainly increase the quality of the Business Employment Dynamics data.

4.3 The Business Employment Dynamics Data

The basic products from the new BLS Business Employment Dynamics program are statistics measuring quarterly gross job gains and gross job losses. The gross job gains can be decomposed into the gains from both expansions and openings, and the gross job losses can be decomposed into the losses from both contractions and closings. The Business Employment Dynamics program also publishes the establishment counts underlying the employment gains and losses. All these statistics are available from the BLS website (http://www.bls.gov/bdm) as both levels and percents, and seasonally adjusted or unadjusted. The time series of historical statistics starts in the third quarter of 1992. The following summary of the data is a shortened version of what can be found in the longer conference version of this chapter (Clayton and Spletzer 2005) and in the April 2004 *Monthly Labor Review* (Spletzer et al. 2004).

4.3.1 Point-in-Time Results

The seasonally adjusted gross job gains and gross job loss statistics for the first quarter of 2005 are presented in table 4.1 (data for the first quarter of 2005 were the most recent available data when we submitted this article for publication in January 2006). We see that the economy gained 325,000

Table 4.1 **Gross job gains and job losses, March 2005[a]**

Net Change, Employment	325
Gross Job Gains	
Total	7,635
Expanding Establishments	6,171
Opening Establishments	1,464
Gross Job Losses	
Total	7,310
Contracting Establishments	5,852
Closing Establishments	1,458

[a]Seasonally adjusted quarterly data, in thousands.

net new jobs (seasonally adjusted) between December 2004 and March 2005. This growth in employment is the net result of two components: the gross job gains of 7.635 million jobs and the gross job losses of 7.310 million jobs. The gross job gains and gross job loss statistics are substantially larger than the net employment change.

Gross job gains come from both expanding and opening establishments. In table 4.1, we see that employment in expanding establishments grew by 6.171 million jobs and employment in opening establishments grew by 1.464 million jobs. These statistics indicate that expanding establishments account for 81 percent of quarterly gross job gains, whereas opening establishments account for 19 percent of quarterly gross job gains. With regard to gross job losses, employment in contracting establishments declined by 5.852 million jobs, and closing establishments accounted for the loss of 1.458 million jobs. Contracting establishments account for 80 percent of quarterly gross job losses, whereas closing establishments account for 20 percent of quarterly gross job losses. Expanding and contracting establishments account for most jobs gained and most jobs lost when measured on a quarterly frequency.

An important component of the Business Employment Dynamics data series is the establishment counts underlying the gross job gains and gross job losses. These establishment counts for the first quarter of 2005, on a seasonally adjusted basis, are reported in table 4.2. There were 1.506 million expanding establishments and 1.504 million contracting establishments during the first quarter of 2005. There were 345,000 establishments opening during the quarter, and 347,000 establishments closing during the quarter. The difference between the number of opening and closing establishments (–2,000) is the net change in the number of active establishments during the quarter.

By revealing the tremendous amount of churning underlying the net growth rates, the Business Employment Dynamics data enhance the labor market statistics currently available from the Bureau of Labor Statistics.

Table 4.2 **Number of establishments, by direction of employment change, March 2005[a]**

Net Change, Establishments	–2
Establishments Gaining Jobs	
Total	1,851
Expanding Establishments	1,506
Opening Establishments	345
Establishments Losing Jobs	
Total	1,851
Contracting Establishments	1,504
Closing Establishments	347

[a]Seasonally adjusted quarterly data, in thousands.

The traditional measure of net employment change produced by the BLS indicates that employment grew by 325,000 jobs during the first quarter of 2005 (seasonally adjusted). The gross job gains and gross job loss statistics indicate that this net employment loss is the result of 6.171 million jobs added at 1.506 million expanding establishments, 1.464 million jobs added at 345,000 opening establishments, 5.852 million jobs lost at 1.504 million contracting establishments, and 1.458 million jobs lost at 347,000 closing establishments. These gross job flows that underlie the net employment growth statistic demonstrate that there are a sizable number of jobs and establishments that appear and disappear in the short time frame of three months. These statistics are calculated without additional data collection efforts or additional respondent burden.

4.3.2 Time-Series Results—Business Cycle Analysis

The business cycle, to a large degree, is defined by the growth of employment (or lack thereof). The new BLS Business Employment Dynamics data will enable researchers to analyze the extent to which economic recessions and expansions are characterized by changes in business expansions and openings, by changes in business contractions and closings, or by a combination of the two. The seasonally adjusted time series of quarterly net employment growth is shown in figure 4.1. The recent recession, which was dated by the National Bureau of Economic Research (NBER) as occurring between March 2001 to November 2001, is clearly evident in this chart. Prior to the recession, between the third quarter of 1992 and the fourth quarter of 2000, net employment growth had been positive every quarter, averaging 637,000 net new jobs per quarter. But during the recession, as seen in figure 4.1, net employment growth was negative for all quarters of 2001, with a low of 1.380 million net jobs lost in the third quarter of 2001.

The seasonally adjusted gross job gains and gross job loss statistics are

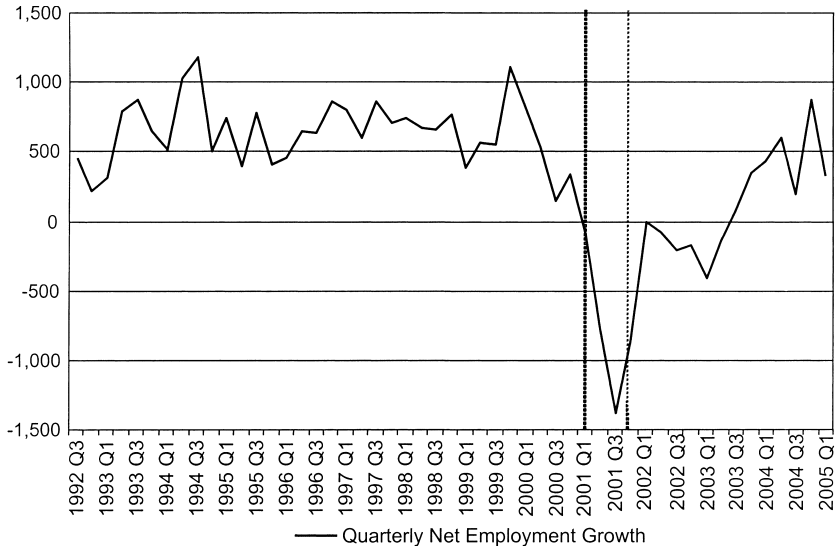

Fig. 4.1 Quarterly net employment growth (seasonally adjusted, in thousands)

plotted in figure 4.2. The difference between the gross job gains and the gross job losses in figure 4.2 is the familiar net employment change depicted in figure 4.1. The most recent business cycle is evident in figure 4.2. Between 1992 and 1999, both the gross job gains and the gross job loss series were climbing at relatively constant rates. The gross job gains started to decline in early 2000, and then dropped substantially in 2001. After a peak of 9.144 million gross job gains in the fourth quarter of 1999, the gross job gains fell to 7.749 million jobs in the third quarter of 2001. The gross job losses continued to increase through 2001, rising from 8.354 million gross jobs lost in the fourth quarter of 2000 to a high of 9.129 million gross jobs lost in the third quarter of 2001. Thus, the declining net employment growth during the first three quarters of 2001 can be attributed to both falling gross job gains and rising gross job losses.

As the official NBER-dated recession ended in late 2001, the gross job losses significantly declined and by early 2002 had returned to a level comparable to its prerecessionary level in early 2000. The same cannot be said for the gross job gains. Following the recession, the gross job gains statistic has remained in the range of 7.4 to 8.1 million jobs gained each quarter, which is substantially lower than its prerecessionary levels (the gross job gains in calendar year 2000 averaged 8.8 million jobs per quarter). The gross job gains started to increase in late 2003. There has been positive net employment growth since the third quarter of 2003, as this recent increase in gross job gains has been accompanied by a gross job loss series that steadily declined through 2003 and remained relatively constant through 2004.

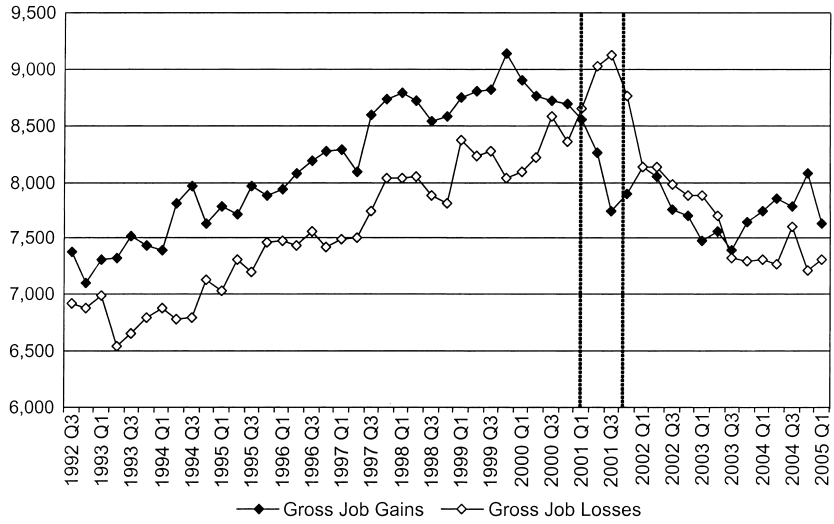

Fig. 4.2 Quarterly gross job gains and losses (seasonally adjusted, in thousands)

The seasonally adjusted time series of gross job gains at expanding and opening establishments—and the gross job losses at contracting and closing establishments—are presented in figure 4.3. Immediately obvious is the prior-stated observation that, for any given quarter, expanding and contracting establishments account for roughly 80 percent of gross jobs gained and gross jobs lost, respectively, when measured on a quarterly frequency. Also obvious in figure 4.3 is that the business cycle is most evident in the expansionary and contractionary establishments. The difference between the gross job gains due to expansions and the gross job losses due to contractions mirrors the overall difference between the gross job gains and the gross job losses. The difference between the gross job gains due to openings and the gross job losses due to closings does exhibit some business cycle properties, but this difference is quite small relative to the difference between expansions and contractions.

4.3.3 Additional Research Results

In addition to the basic results just described, the BLS has also released several other data products from the Business Employment Dynamics program. Statistics for major industry sectors were released in May 2004, statistics by firm size class were released in December 2005 (Butani et al. [2006], discuss and empirically analyze the interesting methodological issues underlying longitudinal size class statistics), and statistics by state were released in August 2007. There have also been several recent research papers using the longitudinal establishment microdata from the Business Employment Dynamics program—Pinkston and Spletzer (2004) present

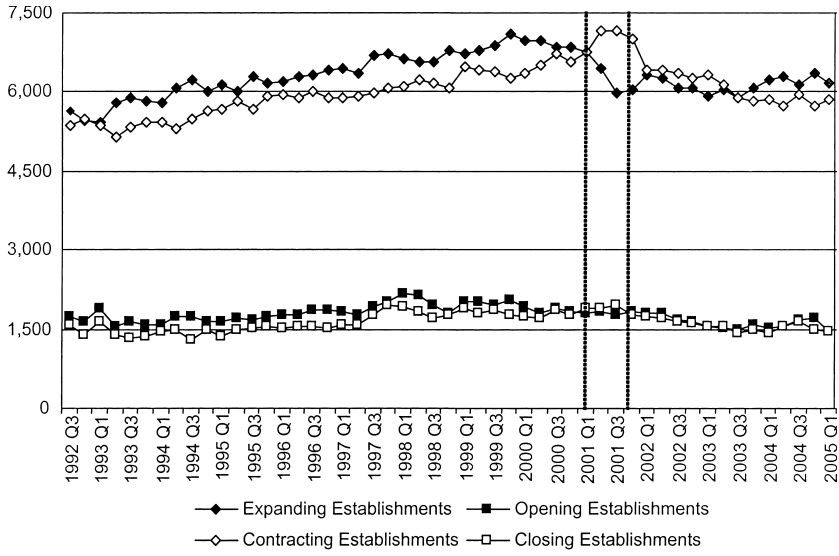

Fig. 4.3 Quarterly gross job gains and losses (seasonally adjusted, in thousands)

annual tabulations of gross job gains and gross job losses, Knaup (2005) and Knaup and Piazza (2007) present survival statistics of business births, Sadeghi (2008) computes establishment birth and death statistics, Butani, Werking, and Kapani (2005) analyze how net employment growth differs in single-establishment employers versus multi-establishment firms, Clayton and Mousa (2004) describe linking the Business Employment Dynamics data with state wage records, Hyson and Spletzer (2002) analyze the employment and wage dynamics associated with mass layoffs, Brown and Spletzer (2005) analyze the employment and wage dynamics of businesses involved in offshoring, and Faberman (2004) creates quarterly gross job gains and gross job loss statistics for the 1990 to 1991 recession.

4.3.4 Comparison to Other Data

We have been asked many times how the Business Employment Dynamics data compares to gross job flow statistics from other datasets. This is a difficult question to answer precisely due to differences in time periods, differences in industry sectors, differences in reporting frequency, and differences in definitions. We are aware of two research papers that have attempted to compare the Business Employment Dynamics data to the manufacturing statistics in the heavily cited work of Davis, Haltiwanger, and Schuh (1996). Pinkston and Spletzer (2004) compute annual gross job gains and losses statistics for the manufacturing sector, and conclude that the Business Employment Dynamics statistics are broadly similar to those of Davis, Haltiwanger, and Schuh. Faberman (2004) plots the quarterly

Business Employment Dynamics manufacturing statistics on the same chart as the 1972 to 1993 quarterly statistics from Davis, Haltiwanger, and Schuh, and concludes that the data are relatively comparable.

There is also interest in how the Business Employment Dynamics data compare to the data from the Job Openings and Labor Turnover Survey (JOLTS). The JOLTS data are from a sample of approximately 16,000 U.S. business establishments collected by the BLS. The JOLTS program publishes monthly data on hires, separations (quits, layoffs and discharges, and other separations), and job openings. These data are meant to serve as demand-side indicators of labor shortages at the national level. Further information about the JOLTS and some research using the JOLTS can be found in Clark and Hyson (2001), Clark (2004), Faberman (chapter 2, this volume), and Nagypál (chapter 3, this volume).

Several previous authors have compared the JOLTS hires and separations data to the gross job gains and gross job losses data from the Business Employment Dynamics. Davis, Faberman, and Haltiwanger (2006) characterize the relationship of hires, separations, quits, and layoffs to the employer-level gross job gains and gross job loss statistics. In table 4.1 of their article, Davis, Faberman, and Haltiwanger report average job and worker flow rates for the U.S. economy measured at various frequencies using the JOLTS and the Business Employment Dynamics data. Boon et al. (2008) compare the concepts and the data from the JOLTS, the Business Employment Dynamics, and the CPS gross flows. In charts 7 and 8 of their article, Boon et al. compare the time series movements of the JOLTS and the Business Employment Dynamics data.

4.4 The Distribution of Gross Job Gains and Gross Job Losses

4.4.1 Concepts and Definitions

The Business Employment Dynamics data have given us several interesting facts about producer dynamics during and immediately following the 2001 recession. As seen in figure 4.2 of this chapter, the recent business cycle is characterized by a large temporary spike in gross job losses accompanied by a substantial and persistent decline in gross job gains. In this section of the chapter, we present seasonally adjusted time series of the distribution of gross job gains and gross job losses underlying the BLS Business Employment Dynamics statistics. Distribution statistics will allow us to analyze (a) whether the temporary spike in gross job losses occurred at a few establishments with large declines, or at many establishments with small declines, and (b) whether the decline in gross job gains occurred at a few establishments cutting back significantly on hiring or at many establishments not adding a few new positions.

Recall from equation (2) earlier in this chapter that the net employment

growth in any given quarter can be written as the sum of gross job gains from establishments increasing employment and the sum of gross job losses from establishments decreasing employment:

$$\text{(2) Net Employment Growth } (t) = \sum_{\substack{\text{establishments} \\ \text{increasing} \\ \text{employment}}} (E_{e,t} - E_{e,t-1}) + \sum_{\substack{\text{establishments} \\ \text{decreasing} \\ \text{employment}}} (E_{e,t} - E_{e,t-1}).$$

This equation can be rewritten as:

$$\text{(5)} \qquad \text{Net Employment Growth } (t) = \sum_{x=1}^{\infty} \sum_{\substack{\text{establishments} \\ \text{increasing} \\ \text{employment} \\ \text{by } x \text{ jobs}}} (E_{e,t} - E_{e,t-1}) + \sum_{x=1}^{\infty} \sum_{\substack{\text{establishments} \\ \text{decreasing} \\ \text{employment} \\ \text{by } x \text{ jobs}}} (E_{e,t} - E_{e,t-1}).$$

In equation (5) we have decomposed both gross job gains and gross job losses into an empirical distribution defined by the number of jobs gained or lost. For practical purposes, it is infeasible to calculate and report statistics for every possible level of net employment change x in equation (5). We have calculated gross job gains and gross job losses for establishments gaining or losing {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11–14, 15–19, 20–24, 25–29, 30–39, 40–49, 50–74, 75–99, 100+} jobs. However, for the graphical analysis we wish to present, 19 series is too many, and we have aggregated further. We have chosen to present statistics for the following intervals of gross job gains and gross job losses: {1–3, 4–19, 20+}. In the fourth quarter of 2004, 16 percent of employment is in establishments that do not change their employment level, 33 percent of employment is in establishments that change their employment level by 1 to 3 jobs, 30 percent of employment is in establishments that change their employment level by 4 to 19 jobs, and 21 percent of employment is in establishments that change their employment level by 20 or more jobs. We have looked extensively at other possible aggregations and have determined that the main conclusions we present in this section are not sensitive to the particular aggregation we have chosen.

To be precise, we have decomposed gross job gains in quarter t as:

$$\text{(6)} \quad \sum_{\substack{\text{establishments} \\ \text{increasing} \\ \text{employment}}} (E_{e,t} - E_{e,t-1}) = \sum_{\substack{\text{establishments} \\ \text{increasing} \\ \text{employment} \\ \text{by 1–3 jobs}}} (E_{e,t} - E_{e,t-1}) + \sum_{\substack{\text{establishments} \\ \text{increasing} \\ \text{employment} \\ \text{by 4–19 jobs}}} (E_{e,t} - E_{e,t-1}) + \sum_{\substack{\text{establishments} \\ \text{increasing} \\ \text{employment} \\ \text{by 20+ jobs}}} (E_{e,t} - E_{e,t-1}).$$

Similarly, we have decomposed gross job losses in quarter t as:

$$(7)\quad \sum_{\substack{\text{establishments}\\ \text{decreasing}\\ \text{employment}}} (E_{e,t} - E_{e,t-1}) = \sum_{\substack{\text{establishments}\\ \text{decreasing}\\ \text{employment}\\ \text{by 1–3 jobs}}} (E_{e,t} - E_{e,t-1}) + \sum_{\substack{\text{establishments}\\ \text{decreasing}\\ \text{employment}\\ \text{by 4–19 jobs}}} (E_{e,t} - E_{e,t-1}) + \sum_{\substack{\text{establishments}\\ \text{decreasing}\\ \text{employment}\\ \text{by 20+ jobs}}} (E_{e,t} - E_{e,t-1}).$$

The issue of whether to present our distribution statistics in levels or in rates deserves mention. Much of the existing literature has used rates; for example, figure 2.2 of Davis, Haltiwanger, and Schuh (1996) reports the distribution of job creation rates and job destruction rates for intervals spanning 5 percentage points. We have chosen to use levels because we are concerned about the interpretation of rates for small establishments. Based upon analysis of the QCEW microdata, most establishments in the United States are small: 61 percent of establishments have less than five employees, and 88 percent of establishments have less than twenty employees. The comparable statistics for the employment distribution are as follows: 7 percent of employment is in establishments with less than five employees, and 26 percent of employment is in establishments with less than twenty employees. When calculating percentages using average employment in the denominator, as is standard, a small establishment with less than five employees that grows or declines by one job has a percentage change (in absolute value) of between 22 and 200 percent, whereas a large establishment with more than 500 employees that grows or declines by one job has a percentage change (in absolute value) of less than 0.2 percent. Because we are interested in decomposing the time series variation of net employment growth based upon the distribution of establishment-level changes, the use of levels as expressed in equation (5) strikes us as most appropriate for our first pass through the microdata. Research that calculates rates rather than levels, and that conditions on the size of the establishment to make rates comparable across establishments, is in progress.

4.4.2 Empirical Results

In the top panel of figure 4.4, we present the establishment counts for establishments gaining or losing 1 to 3 jobs, 4 to 19 jobs, and 20 or more jobs. The bottom panel of figure 4.4 reports the net number of establishments gaining 1 to 3 jobs, 4 to 19 jobs, and 20 or more jobs, where the net is calculated as the number of establishments gaining minus the number of establishments losing a given amount of jobs. In the fourth quarter of 2004, there were 1.456 million establishments (seasonally adjusted) that gained 1 to 3 jobs, and 1.400 million establishments that lost 1 to 3 jobs. This indicates that 56 thousand more establishments were gaining 1 to 3 jobs than

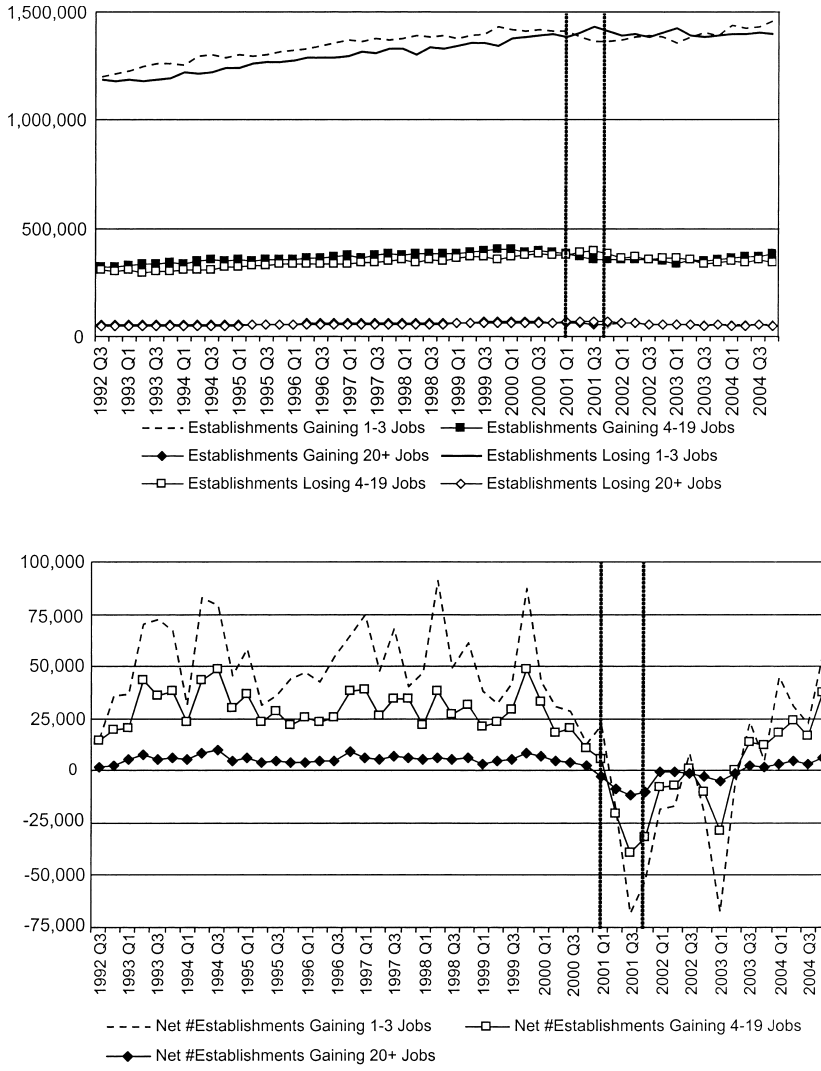

Fig. 4.4 Quarterly gross job gains and losses, establishment counts (seasonally adjusted)

were losing 1 to 3 jobs; this 56 thousand figure is plotted in the bottom panel of figure 4.4. There were 381 thousand establishments gaining 4 to 19 jobs, and 344 thousand establishments losing 4 to 19 jobs. There were 56 thousand establishments gaining 20 or more jobs, and 50 thousand establishments losing 20 or more jobs.

The establishment counts in figure 4.4 clearly show business cycle properties. Looking at the bottom panel of figure 4.4, the net number of establishments gaining 1 to 3 jobs falls from 87 thousand in the fourth quarter of

1999 to negative 69 thousand in the third quarter of 2001. The net number of establishments gaining 20 or more jobs also falls from 8 thousand in the fourth quarter of 1999 to negative 11 thousand in the third quarter of 2001.

The statistics in figure 4.5 show the employment gains and losses associated with the establishments gaining or losing 1 to 3 jobs, 4 to 19 jobs, and 20 or more jobs. The ordering of the series in figure 4.5 is opposite than in figure 4.4. In the top panel of figure 4.5, we see that the 1.5 million estab-

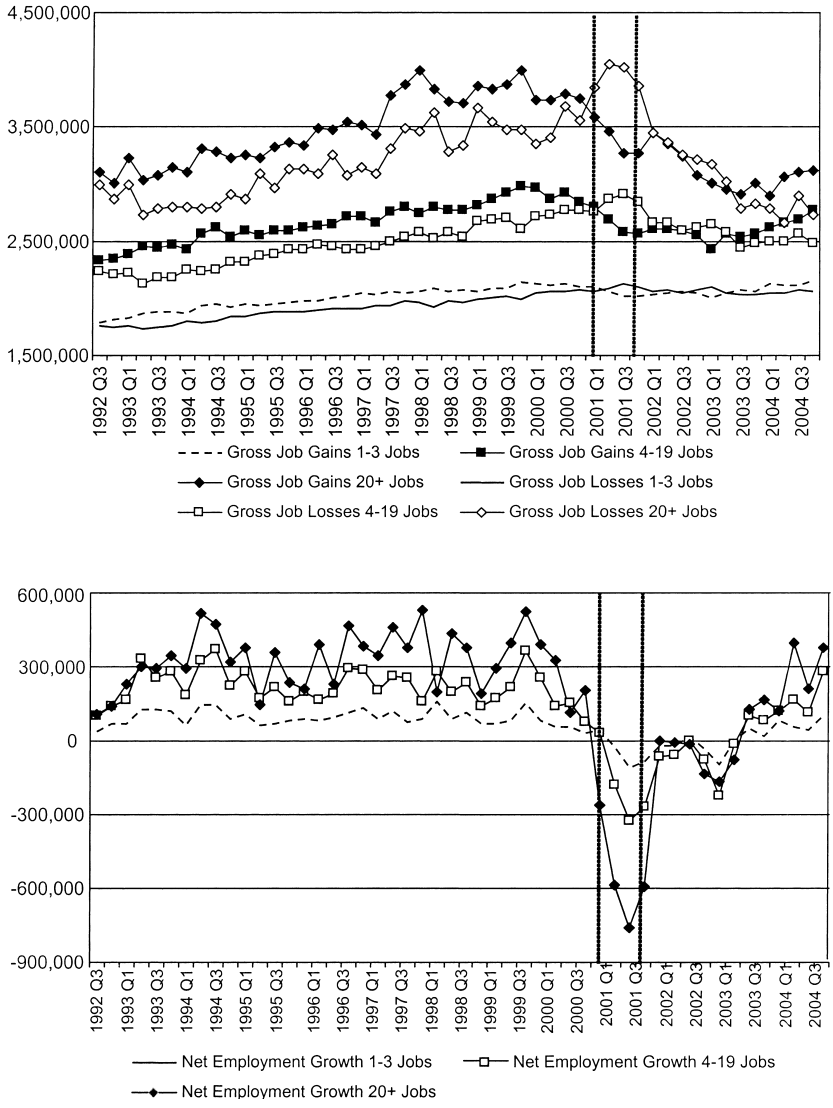

Fig. 4.5 Quarterly gross job gains and losses (seasonally adjusted)

lishments gaining 1 to 3 jobs contributed 2.2 million jobs to the gross job gains in the fourth quarter of 2004. The 381 thousand establishments growing by 4 to 19 jobs contributed 2.8 million jobs to the count of gross job gains in the fourth quarter of 2004 (the average growth of these job-gaining establishments is 7.3 jobs), and the 56 thousand establishments growing by 20 or more jobs added 3.1 million new jobs to the economy (an average growth of 56 jobs per establishment).

The key graph is in the bottom panel of figure 4.5. Between the third quarter of 1992 and the fourth quarter of 1999, establishments gaining or losing 1 to 3 jobs created an average of 99 thousand net new jobs per quarter. During this same time period, establishments gaining or losing 4 to 19 jobs created an average of 228 thousand net new jobs per quarter, and establishments gaining or losing 20 or more jobs created an average of 331 thousand jobs per quarter. These three statistics sum to the average net employment growth of 657 thousand per quarter during the 1990s (the three series in the bottom panel of figure 4.5 sum to the series graphed in figure 4.1).

The 2001 recession is clearly evident in both the top and bottom panels of figure 4.5. Establishments that were gaining or losing 1 to 3 jobs lost a net 110 thousand jobs during the third quarter of 2001, establishments that were gaining or losing 4 to 19 jobs lost a net of 325 thousand jobs in that quarter, and establishments that were gaining or losing 20 or more jobs lost a net of 758 thousand jobs in the third quarter of 2001. These statistics indicate that 64 percent of the net job losses in the most severe recessionary quarter are attributable to the relatively few establishments gaining or losing 20 or more jobs.

To return to the motivating question, this new seasonally adjusted time series of quarterly distribution statistics illustrates where the temporary spike in gross job losses occurred in the 2001 recession. The spike in gross job losses did not occur because many establishments had small declines in employment, but rather from a relatively few number of establishments with large declines. Similarly, the substantial and persistent fall in gross job gains during and following the 2001 recession did not occur because many establishments did not add a few positions, but rather this fall can be attributed to a relatively few number of establishments cutting back significantly on their hiring.

The analysis we have presented in this section is quite simple. There are many empirical extensions that could be done. As mentioned above in the discussion of levels versus rates, it would be interesting to know whether the establishments that are adding or losing twenty or more jobs are relatively small establishments with a large percentage change in employment, or whether they are large establishments with a relatively small percentage change in employment. Furthermore, the statistics we have presented are quarterly; annual distribution statistics would enable us to analyze whether the large (twenty or more) establishment-level gains or losses in a quarter are onetime changes within a year, or whether they are one incremental

step towards even larger gains or losses within the year. We hope that our presentation and simple analysis of distribution statistics that we have provided in this section will spur on additional empirical and theoretical work about producer dynamics and the causes and consequences of employment growth over the business cycle.

4.4.3 Sectoral Detail

The editors of this conference volume have asked us present some sectoral detail. The statistics in figure 4.6 show the distribution of employ-

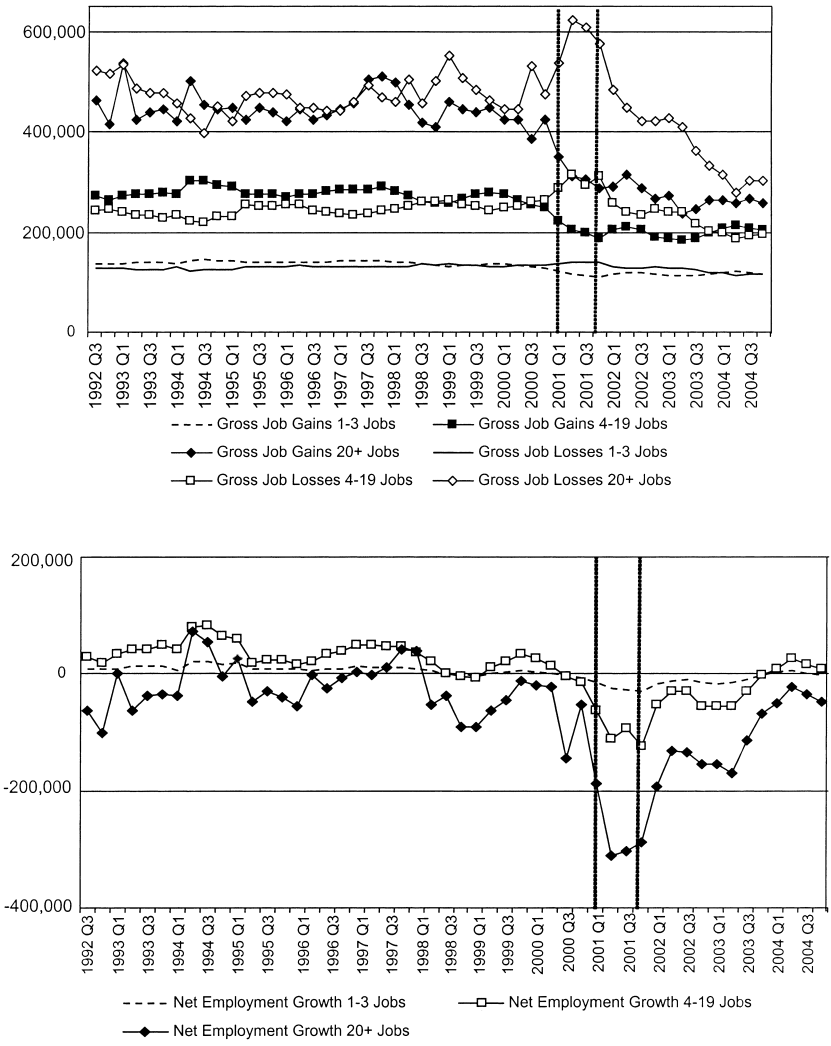

Fig. 4.6 Quarterly gross job gains and losses, manufacturing (seasonally adjusted)

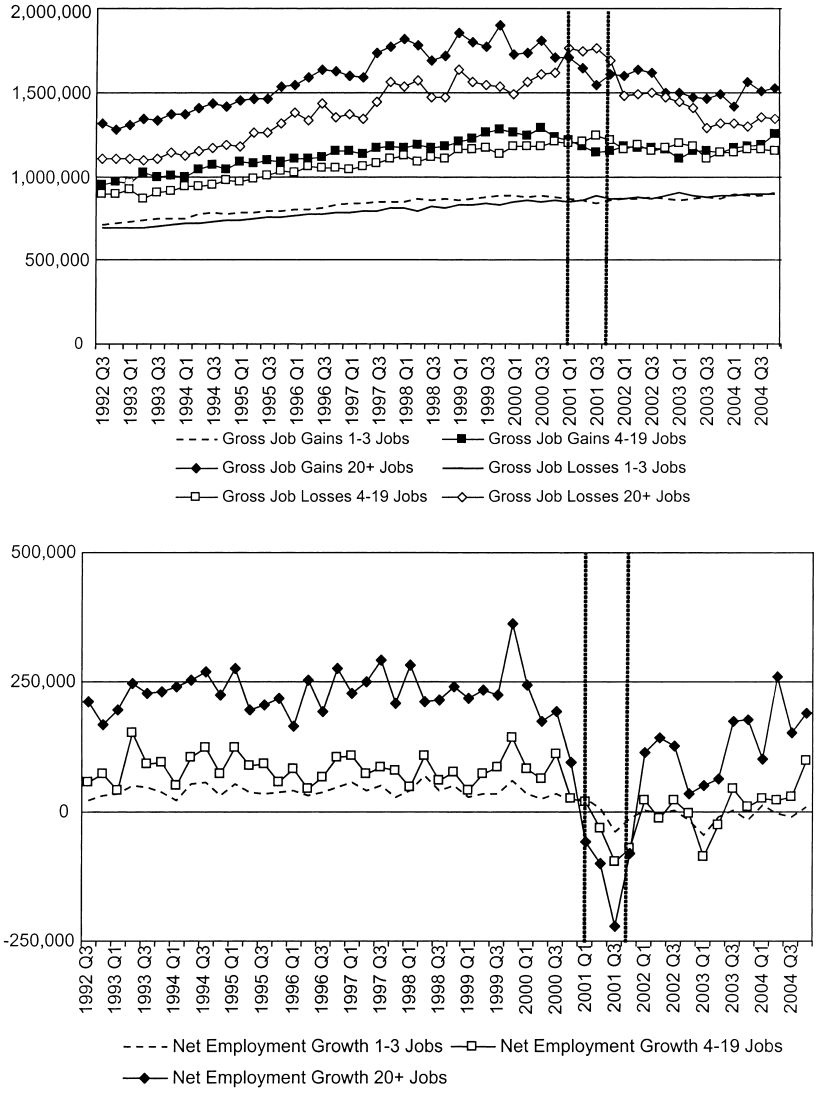

Fig. 4.7 Quarterly gross job gains and losses, services (seasonally adjusted)

ment gains and losses for the manufacturing sector, and the statistics in figure 4.7 show the distribution of employment gains and losses for the services sector. The basic results for these two sectors mimic the analysis we presented for the national statistics. During the 1990s, establishments with large gains or losses in employment are the biggest contributors to the gross job gains and gross job losses. During the 2001 recession, the em-

ployment losses are most evident for the establishments with the largest gains and losses.

4.5 Conclusion

Our goals in this chapter were threefold: to describe the BLS Business Employment Dynamics program, to summarize the data from this program and how it has informed us about the U.S. labor market, and to present a new seasonally adjusted time series of the *distribution* of quarterly gross job gains and gross job losses. The first two objectives are described in the text, and are not summarized here.

This chapter released for the first time a seasonally adjusted time series of the distribution of quarterly gross job gains and gross job losses for the entire U.S. economy. This new data series is motivated by the earlier work of Davis and Haltiwanger (1990, 1992), Davis, Haltiwanger, and Schuh (1996), and Spletzer (2000). We have learned from these earlier studies that gross job gains and gross job losses are concentrated at establishments with large percentage changes in employment. We mimic this finding with the Business Employment Dynamics data—in the fourth quarter of 2004, we find that 39 percent of all gross job gains are contributed by just 3 percent of establishments who gain twenty or more jobs, and 38 percent of all gross job losses are contributed by just 3 percent of establishments who lose twenty or more jobs. Our seasonally adjusted time series shows that these relatively few establishments with large gross job gains and large gross job losses are the drivers of the 2001 business cycle.

The Business Employment Dynamics data is now routinely cited in the economic, statistical, and policy communities, as well as in the popular press. This high level of attention by the user community reinforces our belief that the relatively new BLS Business Employment Dynamics data is a major contributor to our understanding of producer dynamics in the U.S. economy. We do not find this surprising: the data are timely, high quality, high frequency, and historically consistent. And in conclusion, we note that the BLS was able to create the Business Employment Dynamics data with no new data collection efforts and with no new additional respondent burden.

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