BUSINESS EMPLOYMENT DYNAMICS

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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 paper, 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 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 papers was restricted to data from the manufacturing sector, and the call for more comprehensive 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 datasets 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 datasets in such a way so as to produce longitudinal job flow statistics.

This paper 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 paper 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 second quarter of 2004, the number of gross job gains from opening and expanding establishments was 7.9 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 decline in gross job gains.

The second part of this paper describes some of the research and program enhancements flowing from the BLS Business Employment Dynamics data. The BLS is preparing seasonally adjusted data series at detailed levels of industry and geography, by size

class, at both the establishment and the firm level, and at quarterly and annual frequencies. Research is ongoing into topics such as business survival, comparing the 1991 and 2001 recessions, the employment dynamics associated with mass layoffs, and linkages with the wage records which also originate from the State Unemployment Insurance (UI) systems.

We conclude this paper with the presentation of a seasonally adjusted time series of the distribution of quarterly gross job flows. Our simple analysis of this new time series highlights interesting and informative facts about the business cycle, and in particular the 2001 recession. For example, did the temporary spike in gross job losses occur at a few establishments with large declines, or at many establishments with small declines? And did the substantial and persistent fall in gross job gains occur at a few establishments cutting back significantly on hiring, or many establishments not adding a few new positions?

2) The Business Employment Dynamics Program at BLS

2A] Concepts and Definitions

The cross-sectional or "snap-shot" employment statistics that are published by the Bureau of Labor Statistics are invaluable for policy-makers, researchers, and the business community. The BLS report on monthly changes 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 of supply, demand, labor availability, market share goals, investments in research and development, etc. that face managers every day. 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:

$$(2) \quad \text{Net Employment Growth (t)} = \sum_{\substack{all \\ establishments}} E_{e,t} - \sum_{\substack{all \\ establishments}} E_{e,t-1}$$

$$= \sum_{\substack{all \\ establishments}} (E_{e,t} - E_{e,t-1})$$

$$= \sum_{\substack{establishments \\ increasing \\ employment}} (E_{e,t} - E_{e,t-1}) + \sum_{\substack{establishments \\ decreasing \\ employment}} (E_{e,t} - E_{e,t-1}) +$$

$$\sum_{\substack{establishments \\ with\ no\ change \\ in\ employment}} (E_{e,t} - E_{e,t-1})$$

$$= \sum_{\substack{opening \\ establishments}} (E_{e,t} - 0) + \sum_{\substack{expanding \\ establishments}} (E_{e,t} - E_{e,t-1}) +$$

$$\sum_{\substack{contracting \\ establishments}} (E_{e,t} - E_{e,t-1}) + \sum_{\substack{closing \\ establishments}} (0 - E_{e,t-1}).$$

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 first and second quarters of 2004.

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

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

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

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

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 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 is not observed for several more quarters. Although deaths cannot be defined contemporaneously in the BLS Business Employment Dynamics press releases, it is possible to define births and deaths in the historical microdata.

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 example, if an establishment increases employment from 50 workers to 60 workers, these 10 additional jobs are classified as gross job gains. This addition of 10 jobs during the quarter might have occurred with the addition of 10 new hires, or by the net of 20 new hires and 10 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 (2005) present a thorough description of the conceptual foundations and the empirical estimates from the JOLTS program.

2B] Source Data and Data Flows

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. 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 multi-unit 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 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 Business Employment Dynamics data.

The BLS continues to work on data quality issues to maintain and improve the quality of the Business Employment Dynamics data and the underlying QCEW data. Two issues warrant mention. The relatively recent growth of Professional Employer Organizations (PEOs) causes difficulties for the correct assignment of employment to industries and geographies. PEOs are businesses that supply employees to firms while relieving them of management, administrative services and human resource responsibilities. The tracking of employees shifting to, from, and among these employee "leasing" companies is a considerable challenge. A second issue is the relatively recent growth of SUTA dumping (SUTA stands for State Unemployment Tax Act), which causes difficulties for accurate longitudinal linkages. SUTA dumping is a tax evasion scheme that occurs when a business transfers employees and wages from an existing State UI account with a higher tax rate to a new or different State UI account with a lower tax rate in an attempt to reduce UI tax payments. Monitoring and addressing the data accuracy issues resulting from evolving employer business practices is a constant challenge.

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%) of employees on nonfarm payrolls. In the second quarter of 2004, the QCEW statistics show an employment level of 130.6 million, with 8.4 million establishments in the U.S. economy.

Since the gross job gains and gross job loss statistics are constructed from the establishment level net employment changes, the definitions of establishments and employment in the QCEW program warrant mention. An establishment is defined as an economic unit that produces goods or services, and an establishment is usually a physical location engaged in one or predominantly one type of economic activity. This definition of an establishment is different from the definition of a firm or a company which may consist of one or more establishments at several locations. The BLS and the States go to great efforts to ensure that employers with multiple establishments in the State report employment and wage data for specific establishments.

Employment in the QCEW program is defined as the number of covered workers (whose wages are subject to UI taxes) who earned wages during the pay period which includes the 12th of the month. Although the establishment level UI microdata contain information on monthly employment, the gross job gains and gross job loss statistics in the Business Employment Dynamics program use employment in the third month of the quarter as the measure of the establishment's quarterly employment. This decision was made for several reasons. First, there is some concern about the quality of the monthly employment data in the UI reports: ongoing research at the BLS into monthly employment flows constructed from data reported quarterly is finding evidence suggestive of seam effects. Second, comparisons between specific points in time are easier to interpret than are

comparisons of quarterly averages. And third, the averaging of monthly employment within a quarter distorts the timing of when changes in employment actually occurred, especially employment changes that occur when an establishment shuts down.

The gross job gains and gross job loss statistics published by the BLS are derived from a subset of the establishments in the QCEW data. Government establishments are excluded, as are private households (NAICS 814110), and establishments with zero employment in two consecutive quarters are also excluded. Establishments in Puerto Rico and the Virgin Islands are also excluded.

The BLS is planning for the inclusion of the public sector into at least some of the Business Employment Dynamics measures. Until recently, the public sector reporting was usually of insufficient quality for the detailed measures of openings and closings. Over the past four years, the BLS has worked in a number of ways to improve the detail and accuracy of public sector reporting, particularly in the federal data. Work is progressing at the state and local government levels that may lead to the ability to provide local measures of government gross job gains and gross job losses.

The BLS publishes the Business Employment Dynamics data approximately 7½ months after the end of the quarter. Employers subject to State UI laws have one month following the end of the quarter to file their UI reports to the States. The States then have three months to edit the data and collect delinquent reports before sending the microdata to the BLS. The BLS then reviews and edits the data, and publishes the County Employment and Wages press release approximately 6½ months after the end of the quarter; further information about the QCEW program and the County Employment and Wages press release can be found at www.bls.gov/cew. The BLS then longitudinally links the QCEW microdata across quarters and publishes the Business Employment Dynamics press release (found at www.bls.gov/bdm).

2C] 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, and 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 non-economic 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 multi-step 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 tax paying 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, Huff, Mikkelson, Pivetz, and Winkler (1997). The final step in the matching process is an analyst review and possible manual linkage of selected large unmatched records.

The latter three steps in the linkage system each link approximately 0.2 percent of establishments each quarter. Although these latter three steps link only a relatively small number of establishments, these matches have a significant effect on the number of openings and closings. The final step of analyst review and manual linkage is relatively new. Since the initial release of the Business Employment Dynamics data in September 2003, the BLS has created seasonally adjusted time series of gross job gains and gross job losses at various levels of industry and geography. Every time we cut the data somewhat finer, we find several missed links that do not affect the national topside statistics but do affect the finer level data (for example, a missed link of a mining establishment in West Virginia will not affect the national numbers, but can noticeably affect state, county, city, MSA, and industry time series). 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 also undertaken many detailed reviews and analyses of the quality of its longitudinal linkage algorithm. For example, Pivetz & Chang (1998) used wage records to

examine the quality of the establishment-level matches in the Business Employment Dynamics program. Businesses in the State UI system not only report the establishment totals of monthly employment and quarterly wages, but are also required to submit to the States the name, Social Security Number, and quarterly wages of every employee during the quarter. This latter information is referred to as the wage records. Pivetz and Chang's analysis of the wage records is based on the premise that if a sizable group of individuals move as a group from a closed account (death) to a new account (birth), this action suggests a missed link. Their analysis of the wage records supports the validity of the matches identified by the BLS Record Linkage System. Specifically, over 99 percent of the matches on establishment identifier and 92 percent of predecessor and successor matches were verified by the underlying wage records. Since the Pivetz and Chang research, the BLS continues to conduct research with wage records 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.

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.

3a] Cross-Sectional Results

The seasonally adjusted gross job gains and gross job loss statistics for the second quarter of 2004 are presented in Table 1. We see that the economy gained 594,000 net new jobs (seasonally adjusted) between March and June of 2004. This growth in employment is the net result of two components: the gross job gains of 7.857 million jobs and the gross job losses of 7.263 million jobs. The gross job gains and gross job loss statistics are substantially larger than the net employment change.

The BLS publishes quarterly gross job gains and gross job losses for each of the major industries. Focusing on percentages, so we can compare statistics across industries, in the second quarter of 2004, the national gross job gains rate is 7.2 percent and the gross job loss rate is 6.7 percent. The gross job gains rate ranges from a low of 2.3 percent in utilities and 4.2 percent in manufacturing to a high of 11.7 percent in construction and 16.8 percent in natural resources and mining. Observing manufacturing to have one of the lowest rates and

construction to have one of the highest rates is consistent with the findings in the gross job flows literature (see Anderson and Meyer 1995, Foote 1998, and Spletzer 2000).

Gross job gains come from both expanding and opening establishments. In table 1, we see that employment in expanding establishments grew by 6.292 million jobs and employment in opening establishments grew by 1.565 million jobs. These statistics indicate that expanding establishments account for 80 percent of quarterly gross job gains, whereas opening establishments account for 20 percent of quarterly gross job gains. With regard to gross job losses, employment in contracting establishments declined by 5.726 million jobs, and closing establishments accounted for the loss of 1.537 million jobs. Contracting establishments account for 79 percent of quarterly gross job losses, whereas closing establishments account for 21 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 second quarter of 2004, on a seasonally adjusted basis, are reported in table 2. There were 1.504 million expanding establishments and 1.462 million contracting establishments during the second quarter of 2004. There were 343,000 establishments opening during the quarter, and 330,000 establishments closing during the quarter. The difference between the number of opening and closing establishments (13,000) is the net change in the number of active establishments during the quarter.

These Business Employment Dynamics data add to the labor market statistics currently available from the Bureau of Labor Statistics. The traditional measure of net employment change produced by the BLS indicates that employment grew by 594,000 jobs during the second quarter of 2004 (seasonally adjusted). The gross job gains and gross job loss statistics indicate that this net employment loss is the result of 6.292 million jobs added at 1.504 million expanding establishments, 1.565 million jobs added at 343,000 opening establishments, 5.726 million jobs lost at 1.462 million contracting establishments, and 1.537 million jobs lost at 330,000 closing establishments. These gross job flows that underlie the net employment growth statistic were calculated from the same administrative UI microdata without additional data collection efforts or additional respondent burden.

The Business Employment Dynamics statistics also expand our understanding of producer dynamics in the U.S. economy. The gross job flow and the establishment flow statistics reveal the tremendous amount of churning underlying the net growth rates. Each quarter in the U.S. economy, millions of establishments remaining in operation are adding or subtracting from their workforces, creating the turnover of millions of jobs. At the same time, hundreds of thousands of establishments open and close, causing the simultaneous gain and loss of millions of jobs. These new data from the BLS Business Employment Dynamics program demonstrate that there are a sizable number of jobs and establishments that appear and disappear in the short time frame of three months.

3B] Time-Series Results – Business Cycle Analysis

The Business Employment Dynamics data for any given quarter highlight the large amount of churning that underlies net employment growth. One of the principal uses of the BLS Business Employment Dynamics data series is to understand this churning over the course of the business cycle. The business cycle, to a large degree, is defined by the growth of employment (or lack thereof). The new BLS gross job gains and gross job loss statistics 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 from the new BLS Business Employment Dynamics data series is shown in Figure 1. This time series currently covers the period from the third quarter of 1992 to the second quarter of 2004. 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 and averaging 637,000 net new jobs per quarter. But during the recession, as seen in Figure 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 plotted in Figure 2. The difference between the gross job gains and the gross job losses in Figure 2 is the familiar net employment change depicted in Figure 1. The most recent business cycle is evident in Figure 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 (and also declining through much of calendar year 2000) 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 pre-recessionary level in early 2000. The same cannot be said for the gross job gains. In calendar year 2002, the gross job gains remained in the range of 7.9 to 8.1 million jobs gained each quarter, which is substantially lower than its pre-recessionary levels (the gross job gains in calendar year 2000 averaged 8.8 million jobs per quarter). Through much of 2003, the gross job gains were at a level not seen since late 1993 and early 1994. However, the gross job gains have started to increase in late 2003 and the first two quarters of 2004. This recent increase in gross job gains has been accompanied by a gross job loss series that has steadily declined through 2003 and the first two quarters of 2004.

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 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 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.

A simple decomposition can help quantify the contribution of expansions and contractions, and openings and closings, to net employment growth over the business cycle. From the fourth quarter of 1999 through the third quarter of 2001, net employment growth fell from its peak of 1.105 million to its low of -1.380 million. Over this time period, the gross job gains from expansions fell by 1.112 million jobs (from 7.112 to 5.990), and the gross job losses from contractions increased by 0.910 million jobs (from 6.264 to 7.174). The gross job gains from openings fell by 0.273 million jobs (from 2.032 to 1.759), and the gross job losses from closings increased by 0.180 million jobs (from 1.775 to 1.955). These statistics indicate that 81 percent (2.022 million jobs) of the large drop in quarterly net employment growth from the fourth quarter of 1999 to the third quarter of 2001 is attributable to the net of expansions and contractions, whereas 19 percent (0.453 million jobs) of the large drop is attributable to the net of openings and closings. A similar calculation shows that 89 percent of the increase in quarterly net employment growth from its low in the third quarter of 2001 to its current peak in the second quarter of 2004 is attributable to the net of expansions and contractions, whereas 11 percent of this increase is attributable to the net of openings and closings.

4) Ongoing research with BED data

The national time series of Business Employment Dynamics data covering the period from the third quarter of 1992 to the fourth quarter of 2002 were released in September 2003. Statistics for major industry sectors were released in May 2004. The BLS is planning to release Business Employment Dynamics statistics by firm size class and by State within the near future. The rest of this section describes several other ongoing research projects using the longitudinal establishment microdata from the Business Employment Dynamics program.

Before describing this ongoing research, it is worth mentioning the overwhelming demand by outside researchers for access to the confidential microdata records underlying the Business Employment Dynamics statistics. As with all statistical agencies throughout the world, the BLS attempts to accommodate user requests to directly access agency data files, while continuing to protect the confidentiality of the administrative and survey records. While the BLS attempts to produce public use files or develop licensing agreements to provide as much microdata as possible to the public, the only means of access to business establishment microdata, which make up the greatest part of the agency's data collection

effort, is through restricted on-site use at the BLS national office in Washington, D.C. Further details about outside researcher access to confidential microdata files at the BLS can be found at http://www.bls.gov/bls/blsresda.htm.

4A] Annual Measures of Gross Job Flows

In a recent *Monthly Labor Review* article, Pinkston and Spletzer (2004) present annual tabulations of gross job gains and gross job losses created from the quarterly Business Employment Dynamics microdata. These statistics enhance and complement the quarterly statistics from the Business Employment Dynamics program, and were created in response to requests from the user community. Indeed, some users have "annualized" the quarterly Business Employment Dynamics statistics themselves by summing the four quarterly gross job flows statistics to create annual gross job flows statistics. Pinkston and Spletzer show that while summing four quarterly statistics is standard for creating annual net employment growth statistics, the sum of four quarterly gross job flow statistics (or the sum of twelve monthly gross job flow statistics) is not the same as annual gross job flow statistics. These two approaches measure different concepts. Annual gross job flow statistics examine the number of jobs gained and the number of jobs lost *over* the year. The sum of four quarterly gross job flow statistics examine the number of jobs gained and the number of jobs lost *during* the year. The intuition for the difference between these two concepts is straightforward. Many quarterly changes reverse themselves over the course of a year. Many of these reversals are due to lags in hiring for vacant positions (a gross job loss in one quarter followed by a gross job gain in the subsequent quarter), and many are due to seasonality (for example, employment at golf courses in Northern climates expands in the summer and contracts in the winter).

Pinkston and Spletzer's research was also motivated by many questions of how the BLS Business Employment Dynamics statistics compare to the job creation and job destruction statistics in Davis, Haltiwanger, and Schuh (1996). There are three major differences between the BLS Business Employment Dynamics data and the Davis, Haltiwanger, and Schuh (1996) data: differences in frequency (quarterly versus annual), differences in sectoral coverage (all industries versus manufacturing), and differences in time periods (1992-2003 versus 1973-1988). Much of Pinkston and Spletzer's article is devoted to explaining the difference in magnitude between quarterly statistics and annual statistics – between March 2001 and March 2002, the annual gross job gains rate is 13.02 percent and the annual gross job loss rate is 15.58 percent, whereas the average quarterly gross job gains rate for the corresponding four quarters is 7.37 percent and the average quarterly gross job loss rate is 8.01 percent. Differences in industry sectors also play a major role in comparing gross job flow statistics across research studies. The industry statistics released as part of the BLS Business Employment Dynamics program show that the gross job flow rates in manufacturing are lower than those in the economy as a whole: the gross job gains and gross job loss rates for all industries in the second quarter of 2004 are 7.2 and 6.7 percent, respectively, which are substantially higher than the corresponding statistics of 4.2 and 4.1 percent for the manufacturing sector. Pinkston and Spletzer conclude that the annual manufacturing statistics created from the Business Employment Dynamics quarterly all-industries microdata are

broadly similar to the annual manufacturing statistics published in Davis, Haltiwanger, and Schuh (1996).

The BLS is considering publishing annual gross job gains and gross job loss statistics as part of the Business Employment Dynamics program. The research by Pinkston and Spletzer (2004) shows that the technical challenges of following specific establishments through periods of ownership change, corporate restructuring, and mergers with other companies can be overcome, and thus the administrative UI microdata can be successfully linked across multiple quarters. Taking this one step further, the annual gross job flow statistics created and described by Pinkston and Spletzer provide the framework for an even longer-run analysis of producer dynamics, such as understanding business survival and the life-cycles of establishments.

4B] Establishment Survival Statistics

A forthcoming *Monthly Labor Review* article by Knaup (2005) presents survival statistics created from the Business Employment Dynamics microdata. Knaup begins with all establishment openings in the second quarter of 1998, and selects 212,182 openings which she defines to be single establishment births. The main contribution from this research is the presentation of survival statistics: 81 percent of new establishments survive one year, 66 percent survive two years, 54 percent survive three years, and 44 percent survive four years. These statistics are shown in Figure 4a of this paper. Knaup finds that these survival rates do not vary much by industry. These survivor rates translate into a relatively constant annual hazard rate: 18.8 percent of births die in the first year, 19.0 percent of births that survive one year die in the second year, 17.5 percent of births that survive two years die in the third year, and 18.2 percent of births that survive three years die in the fourth year. Research is ongoing to determine whether this relatively constant hazard rate is partially due to the time period of the analysis – specifically, whether these statistics are influenced by the 2001 recession.

As we have mentioned several times, creating statistical products such as survivor functions from administrative UI microdata is not a simple task. For example, Knaup's (2005) article describes the careful empirical work necessary to distinguish between establishment openings and establishment births. In the UI system, once an employer incurs the fixed cost of obtaining the UI account, there is no further cost beyond time and postage involved with filing a quarterly contributions report. Therefore, it is not surprising that many establishments report zero employment in any given quarter. Occurrences of zero employment when an establishment first appears on the file or immediately preceding its disappearance from the file has led the BLS to be very careful in their terminology of openings and closings relative to births and deaths. Initial occurrences of zero employment when the establishment first appears might occur if business owners apply for a UI account number before actually hiring their first employee. Terminal incidences of zero employment preceding disappearance from the file undoubtedly occur when an establishment temporarily shuts down with expectations of re-opening the business again when economic conditions improve. An establishment that temporarily shuts down may keep its UI account number active by reporting zero employment.

Do establishments reporting zero employment affect the production of statistics relevant to understanding producer dynamics? Defining define births and deaths as the appearance and disappearance of the establishment, rather than the appearance and disappearance of positive employment, will clearly bias downward the contribution of establishment births and deaths to gross job gains and gross job losses. This definitional difference also influences analysis and understanding of the establishment's life cycle. Spletzer (2000) examined the empirical implications of how these two alternative definitions of births and deaths influence the empirical hazard of the time until death. Using a sample of single establishment births, and defining births and deaths as the appearance and disappearance of the establishment, Spletzer finds that the hazard increases during the first three quarters and then begins a gradual decline. On the other hand, when births and deaths are defined as the first and last quarter of positive employment, the hazard is declining for all quarters during the first two years.

This difference between the inverted-U shaped hazard and the monotonically declining hazard has been studied by both economists and those concerned with organizational demography. Different assumptions about how newly born establishments acquire information about their business environment can generate different shapes of the hazard in the first several quarters. If information about profitability takes time to acquire as it does in a Jovanovic (1982) model, we should not observe a substantial number of deaths until several realizations of information signal that shutting down the business is optimal. On the other hand, if information about profitability is known immediately after birth as suggested in the Ericson and Pakes (1995) model of active learning, then we should observe a declining hazard as businesses with poor realizations of profitability decide not to invest in the future value of the firm and shut down immediately (or very soon) after opening. The hazard functions reported by Spletzer (2000) help to interpret and reconcile these competing theories of producer dynamics. Spletzer's findings are consistent with a model where businesses respond to negative shocks by cutting employment to zero but keeping the UI account open in expectation of starting up again. The business then continues to acquire information about costs and output demand while not employing any labor, and then completely shuts down only after confirming the initial realization of non-profitability.

4C] Net and Gross Job Flow Statistics by Employer Size Class

One of the most interesting and often asked questions in empirical economics is whether small businesses create the most jobs. Answering this question requires longitudinal establishment microdata, and is an ideal application for the new Business Employment Dynamics data series produced by the Bureau of Labor Statistics. Although it is often argued that small businesses are the fountainhead of job creation and the engine of economic growth, this view is not universally accepted, largely due to differences in the methodology used to construct net and gross job flow statistics. In a recent *Monthly Labor Review* article, Okolie (2004) calculated net and gross job flow statistics by size class using different methodologies, and showed how data produced using alternative methodologies can produce sharply different portraits of employment growth.

As discussed by Okolie (2004), who builds on the earlier work of Davis, Haltiwanger, and Schuh (1996), there are three immediate methodology issues that influence the calculation and interpretation of employment growth statistics by employer size-class. The first is how businesses should be classified into size classes when constructing net and gross job flow statistics. The second involves the appropriate measure to use in the denominator when calculating net and gross job flow rates. The third is whether there are differences in the statistics if the establishment or the firm is the unit of analysis.

In the gross job flows literature, there are three methodologies for defining size classes. The first is "base-sizing," where establishments are classified into size categories based upon their size in the previous quarter. An alternative is "end-sizing," where establishments are classified into size categories based upon their size in the current quarter. The third possibility is "mean-sizing," which involves classifying establishments into size categories based upon their average size during the previous and current quarters. The methodology of classifying establishments into size categories can have potentially large effects on longitudinal employment growth statistics. For establishments that are growing and move from one size class category to another, base-sizing would result in statistics that make it appear as if employment growth is coming from smaller establishments, whereas end-sizing would result in statistics that make it appear as if employment growth is coming from larger establishments. Similarly, for establishments that are contracting and move from one size class category to another, base-sizing would result in statistics that make it appear as if employment decline is coming from larger establishments, whereas end-sizing would result in statistics that make it appear as if employment decline is coming from smaller establishments.

Similar to the size classification issue is the methodological issue of how to compute rates of net and gross job flows. That is, should previous quarter employment, current quarter employment, or an average of the two be used in the denominator? An example will help illustrate the difference between the methods. Suppose employment increases from 1 to 2 and then declines back to 1. A conventional growth rate that uses previous quarter employment in the denominator would be a 100 percent increase followed by a 50 percent decrease. Even though the employment changes in levels sum to zero (a one employee increase followed by a one employee decrease), the percentages do not sum to zero. In fact, when using previous quarter employment in the denominator, the sum of the percentages is greater than zero, but the sum would be less than zero if current quarter employment were used in the denominator. If average employment is used in the denominator, the growth rate in this example would be a 67 percent increase [(2-1)/1.5=0.67] followed by a 67 percent decrease. This example illustrates that using average employment in the denominator results in rates that are equal in magnitude but opposite in sign (i.e., symmetric).

The third issue in the literature on size class and gross job flows is whether to use establishments or firms as the unit of analysis. Establishment and firm level data will often be identical since most firms operate a single establishment. However, the size class distribution of employment differs at the establishment level versus the firm-level, since defining employment for a multi-establishment firm involves aggregating multiple establishments into a single larger firm. The methodological question is whether there is a difference in net and

gross job flow statistics if the establishment or the firm is used as the unit of analysis when classifying businesses into size classes.

Using microdata from the Business Employment Dynamics program, Okolie (2004) examined these three methodological issues involved in estimating net and gross job flows by size class. The main findings from her empirical analysis are: (1) base-sizing and end-sizing methods produce systematically different portraits of job flows, particularly for the smallest employers, (2) the measure used in the denominator to calculate job flow rates has relatively small effects on the net employment growth statistics, and (3) the contribution of large employers to net employment growth depends upon whether the unit of analysis is the establishment or the firm. The effects resulting from the two methodologies that matter – size classification and firms versus establishments – are graphically depicted in Figure 4b of this paper. The BLS will soon publish gross job gains and gross job loss statistics by employer size class, and the research in Okolie (2004) is playing a large role in the methodological decisions being made to prepare the data for publication.

4D] Linking Business Employment Dynamics Data with Wage Records

Recent increases in computing power and the public demand for new data products has led statistical agencies to examine the potential of using existing administrative datasets to fill existing data gaps and provide new information. The BLS Business Employment Dynamics data is a good example of creating new products from existing QCEW microdata. Another example is the relatively recent use of wage records by both State and National statistical agencies. As mentioned earlier, wage records are the individual level microdata that businesses report quarterly to the State UI systems. Matching the employer-level QCEW data with the individual-level wage records provides great potential for understanding the U.S. labor market and various aspects of producer dynamics. Wage records are not very useful alone. They only provide individual wages for a specific quarter for a specific state UI number. When combined with the BLS QCEW, all the establishment level information for industry, addresses, county, and predecessor linkages vastly extend the utility of the wage records. At the state level, a number of other data sources can provide demographic information, educational attainment, program participation, and unemployment status. Furthermore, the BLS QCEW is the only source for the unique cross-walk between the state UI number and the federal Employer Identification number (EIN). With this QCEW cross-walk, wage records could be studied in conjunction with the many other federal data sources that are based on the EIN. Clayton and Mousa (2004) and Abowd, Haltiwanger, and Lane (2004) present excellent summaries of the analytical potential of longitudinal linked employer-employee data created from matching QCEW and wage records microdata.

The usefulness for merging wage records and the QCEW for economic analysis is not new. States have been using wage records for economic analysis since at least 1986. A few examples of state wage records analysis were published in the May 2004 issue of the *Monthly Labor Review*; the papers in this issue were all presented at the 2003 Symposium on Using Wage Records in Workforce Investment, sponsored by the Bureau of Labor Statistics and the Workforce Information Council. Hadland (2004) merged wage records with information on age and educational attainment to study where Alaskan youth get their education – in state or

out of state – and how that decision effects the "brain drain" to areas and jobs outside of the state. Hammida (2004) linked Minnesota wage records with the longitudinal BLS QCEW to study the effects of job mobility and tenure on wage progression. Bowles (2004) used the QCEW and wage records to study employment and wages in the emerging North Carolina high-tech industries. Gordon, Schaff, and Shaw (2004) used Ohio wage records to study outcomes of vocational rehabilitation services under Title V of the Workforce Investment Act to improve their services and other programmatic features.

The BLS and several States are conducting research on how the wage records can be utilized to expand and improve the Business Employment Dynamics data. The classification of establishments as opening, closing, expanding, or contracting depends on the ability to accurately distinguish opening and closing establishments from continuing establishments that may be going through mergers, consolidations, or acquisitions. This identification currently relies heavily on the predecessor and successor information provided by State analysts. Missing predecessor and successor linkages will lead to an upward biased number of openings and closings in the economy, and an upward biased estimate of gross job gains and gross job losses (missed linkages will also affect analysis of gross job flows by age). The ongoing research is evaluating how to use UI wage records to track the movements of groups of employees as they shift from one business to another, and, where appropriate, make a linkage decision. The natural linkages between the QCEW and the UI wage records, in combination with additional information such as addresses and contact information, should enable States to determine whether an apparent new business unit identifier is a true business opening or is an existing business that has undergone an administrative or economic change in ownership.

4E] Using Business Employment Dynamics Data to Compare the 1991 and 2001 Recessions

The time series of quarterly Business Employment Dynamics data begins in the third quarter of 1992. Many analysts who have used these data have asked the BLS whether it is possible to extend the data series backwards in time. The reason for these requests is so that the series not only covers the 2001 recession, but also the 1990-1991 recession. The National Bureau of Economic Research (NBER) has dated the past two recessions as occurring from July 1990 through March 1991, and March 2001 through November 2001.

Although the BLS has QCEW microdata back to 1990, the Business Employment Dynamics program has chosen not to release any gross job flows statistics before the third quarter of 1992. The reason is due to the implementation of the Multiple Worksite Reports (MWRs) in the early 1990s. Prior to the introduction of the MWRs, businesses reported their employment and wage data to the State UI offices at the level of the UI account, rather than reporting data for each establishment within the State. The MWR implementation caused a widespread restructuring of the UI records of many large firms, breaking out a single UI account into multiple establishment records (and often with no associated predecessor and successor information). The gross job flow statistics for the early 1990s show an unusually large number of openings and closings in the quarters corresponding to when various States implemented the MWRs, which suggests that the longitudinal linkage algorithm failed to adequately account for all of the UI account breakouts.

Faberman (2004) documents the work he did to supplement the BLS longitudinal linkage algorithm with a revised algorithm that specifically accounts for the large number of breakouts in the early 1990s. With the resulting longitudinal microdata, he has produced a set of quarterly gross job gains and gross job loss statistics for the crucially important 1990-92 period not covered by the BLS Business Employment Dynamics statistics. The key graph from Faberman's research is reproduced as Figure 4c in this paper. Faberman finds that although the net employment changes over the past two recessions are similar, their underlying dynamics are quite different. In both 1991 and 2001, gross job losses peaks as the recession reaches it height. However, the pattern of gross job gains differs in the two recessions. In the 1991 recession, the gross job gains series shows little change, whereas in 2001 there is a dramatic drop in gross job gains. Both the 1991 and 2001 recessions are followed by periods of stagnant job growth (unlike the recessions of earlier decades). In 1991, Faberman finds that the relatively slow post-recessionary net employment growth results from gross job losses being slow to decline, whereas in 2001 the slow growth is due to exceptionally low gross job gains.

Faberman (2004) also links his 1990-2003 seasonally adjusted time series of gross job gains and gross job loss statistics in the manufacturing sector to the 1972-1993 manufacturing time series of Davis, Haltiwanger, and Schuh (1996). This data shows that the recent (2000-2003) decline in gross job gains has no precedent in at least 30 years. Further research reveals that this recent drop in gross job gains parallels a similarly unusual drop in business investment, and the patterns of both gross job gains and investment in equipment and software track each other closely during the 1990s and 2000s. The links that Faberman has found between gross job flows and the time series trends of investment is expanding the frontier of economic knowledge regarding producer dynamics and the business cycle.

4F] Employment Dynamics Associated with Mass Layoffs

Empirical studies of job displacement have generated a wealth of knowledge about individuals undergoing permanent job loss. This research has investigated the determinants of displacement, the characteristics of displaced workers and how they have changed over time, and their post-displacement earnings and employment. This literature, however, focuses almost exclusively on the experiences of individuals. Mostly as a result of the lack of firm- or establishment-level data, there is far less evidence on what happens to businesses that undergo a severe contraction in labor demand.

Hyson and Spletzer (2002) use the Business Employment Dynamics data, merged with data from the BLS Mass Layoff Statistics (MLS) program, to examine a number of questions about firms that experience large-scale layoffs. The MLS data contains administrative and survey information on all firms that undergo a mass layoff (mass layoffs are defined as establishments which have at least 50 initial claims for unemployment insurance filed against them during a 5-week period). Of particular relevance and importance, firms with mass layoffs are asked to provide the reason for the layoff. Between 1995 and 1999, there were over 29,000 mass layoff events affecting more than six million individuals. Hyson and Spletzer merge the MLS microdata with the Business Employment Dynamics microdata,

creating a dataset with quarterly wage and employment data at the firm for the eight pre-layoff quarters and eight post-layoff quarters.

Hyson and Spletzer (2002) use this longitudinal data to assess whether mass layoffs are either frequent or one-time adjustments to labor demand, and to examine the employment dynamics, wage changes, and survival of firms with mass layoffs. The employment dynamics of surviving firms who state the reason for the layoff is either seasonal or financial difficulties is shown in Figure 4d of this paper. Hyson and Spletzer find that certain firms do repeatedly employ layoffs to adjust labor inputs, but these primarily represent seasonal patterns. At the establishments where large layoffs are rare events, the findings differ. While there is not much heterogeneity in these firms' pre-layoff employment patterns, there is a wide range of post-layoff employment changes, ranging from a group of firms that experiences employment growth to a group of firms in which employment contracts by more than half. There is also variation in the hazard rate that a firm survives following a mass layoff, and much of this variation can be explained by the reason for the layoff.

5) The Distribution of Gross Job Gains and Gross Job Losses

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 2 of this paper, 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 paper, we present seasonally adjusted time series of the distribution of gross job gains and gross job losses underlying the BLS Business Employment Dynamics statistics. Our goal is to use these distribution statistics to answer several basic questions about the most recent business cycle. 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 paper 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:

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

This equation can be rewritten as:

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

In the above equation, 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). In figure 2.2 of their book, Davis, Haltiwanger, and Schuh (1996) report the distribution of job creation rates and job destruction rates for intervals spanning five percentage points. In what follows, 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. We have seasonally adjusted each of these series over the time period 1992 Q3 – 2003 Q4. 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 2003, 16 percent of employment is in establishments that don't change their employment level, 33 percent of employment is in establishments that change their employment level by 1-3 jobs, 30 percent of employment is in establishments that change their employment level by 4-19 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:

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

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

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

In the top panel of figure 5, we present the establishment counts for establishments gaining or losing 1-3 jobs, 4-19 jobs, and 20 or more jobs. The bottom panel of figure 5 reports the net number of establishments gaining 1-3 jobs, 4-19 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 2003, there were 1.396 million establishments (seasonally adjusted) that gained 1-3 jobs, and 1.385 million establishments that lost 1-3 jobs. This indicates that 10 thousand more establishments (rounded) were gaining 1-3 jobs than were losing 1-3 jobs; this 10 thousand figure is plotted in the bottom panel of figure 5. There were 354 thousand establishments gaining 4-19 jobs, and 341 thousand establishments losing 4-19 jobs. There were 53 thousand establishments gaining 20 or more jobs, and 51 thousand establishments losing 20 or more jobs.

The establishment counts in figure 5 clearly show business cycle properties. Looking at the bottom panel of figure 5, the net number of establishments gaining 1-3 jobs falls from a high of 88 thousand in the fourth quarter of 1999 to a low of negative 72 thousand in the third quarter of 2001. The net number of establishments gaining 20 or more jobs also hits a peak of 8 thousand in the fourth quarter of 1999, and falls to its low of negative 12 thousand in the third quarter of 2001.

The statistics in figure 6 show the employment gains and losses associated with the establishments gaining or losing 1-3 jobs, 4-19 jobs, and 20 or more jobs. The ordering of the series in figure 6 is opposite than in figure 5. In the top panel of figure 6, we see that the 1.4 million establishments gaining 1-3 jobs contributed 2.1 million jobs to the gross job gains in the fourth quarter of 2003. The 354 thousand establishments growing by 4-19 jobs contributed 2.6 million jobs to the count of gross job gains in the fourth quarter of 2003 (the average growth of these job-gaining establishments is 7.3 jobs), and the 53 thousand establishments growing by 20 or more jobs added 3.0 million new jobs to the economy (an average growth of 56 jobs per establishment).

The key graph is in the bottom panel of figure 6. During the 1990s, establishments gaining or losing 1-3 jobs created an average of 99 thousand net new jobs per quarter. During the 1990s, establishments gaining or losing 4-19 jobs created an average of 227 thousand net new jobs per quarter, and establishments gaining or losing 20 or more jobs created an average of 329 thousand jobs per quarter. These three statistics sum to the average net employment growth of 655 thousand per quarter during the 1990s (the three series in the bottom panel of figure 6 sum to the series graphed in figure 1).

The 2001 recession is clearly evident in both the top and bottom panels of figure 6. Establishments that were gaining or losing 1-3 jobs lost a net 115 thousand jobs during the third quarter of 2001, establishments that were gaining or losing 4-19 jobs lost a net of 338 thousand jobs in that quarter, and establishments that were gaining or losing 20 or more jobs lost a net of 754 thousand jobs in the third quarter of 2001. Thus even though the bottom panel of figure 5 shows only 12 thousand more establishments losing 20 or more jobs than establishments gaining 20 or more jobs, these relatively few establishments accounted for 62 percent of the net job losses in the most severe recessionary quarter.

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 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. For example, it would be interesting to know whether the establishments that are adding or losing 20 or more jobs are relatively small establishments with a large percentage change in employment, or 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 (20 or more) establishment-level gains or losses in a quarter are one-time changes within a year, or whether they are one incremental step towards even larger gains or losses within the year. We hope that the 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.

6) Conclusion

Our goals in this paper were fourfold: to describe the source data and the construction of the new BLS Business Employment Dynamics program, to summarize the data from this program and how it has informed us about the U.S. labor market, to highlight some ongoing research at the BLS that uses the Business Employment Dynamics data, and to present a new seasonally adjusted time series of the *distribution* of quarterly gross job gains and gross job losses. The first three objectives are described in the text, and are not summarized here.

This paper 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. The statistics that we present in this paper extend these earlier analyses from a cross-sectional perspective to a time-series perspective. We replicate the cross-sectional findings – although there are 1.8 million establishments gaining 7.6 million jobs in the fourth quarter of 2003, 39 percent of all gross job gains are contributed by just 3 percent of establishments who gain 20 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 has made a big splash in the economic, statistical, and policy communities, as well as in the popular press. The data were highlighted in an above-the-fold front page article in the New York Times on October 1st, 2003. The data are frequently used by the Federal Reserve Board – not only in major speeches by the Governors of the Board (see, for example, Ferguson (2005) and Bernanke (2004)), but also in a multitude of staff research studies (see, for example, Schweitzer (2005) and Aaronson, Rissman, and Sullivan (2004)). Since the first release of the Business Employment Dynamics data series in September 2003, these new data have captured the attention of economists and policymakers across the country, and they are being used for a variety of research and analytical purposes.

This high level of attention by the user community reinforces our belief that the new BLS Business Employment Dynamics data is a major contributor to our understanding of producer dynamics in the U.S. economy. We don't find this surprising: the data are timely, high quality, high frequency, and historically consistent. We are particularly proud that we were able to create the Business Employment Dynamics data with no new data collection efforts and with no new additional respondent burden. The Business Employment Dynamics program will also expand in the near future with the release of statistics by size class and by geography. The forthcoming State-level gross job gains and gross job loss statistics are suggesting that the recessionary decline in gross job gains started in the Rust Belt States around the Great Lakes almost one year before the national gross job gains series began declining. Increasing the industry and geography detail, in addition to extending ongoing research, will provide new data series which will bring new information to businesses, analysts, and other decision-makers who drive our economy.

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Table 1: Gross job gains and job losses, June 2004
Seasonally adjusted quarterly data, in thousands

Net Change, Employment	594
Gross Job Gains	
Total	7,857
Expanding Establishments	6,292
Opening Establishments	1,565
Gross Job Losses	
Total	7,263
Contracting Establishments	5,726
Closing Establishments	1,537

Table 2: Number of establishments, by direction of employment change, June 2004
Seasonally adjusted quarterly data, in thousands

Net Change, Establishments	13
Establishments Gaining Jobs	
Total	1,847
Expanding Establishments	1,504
Opening Establishments	343
Establishments Losing Jobs	
Total	1,792
Contracting Establishments	1,462
Closing Establishments	330

Figure 1: Quarterly Net Employment Growth (in thousands)

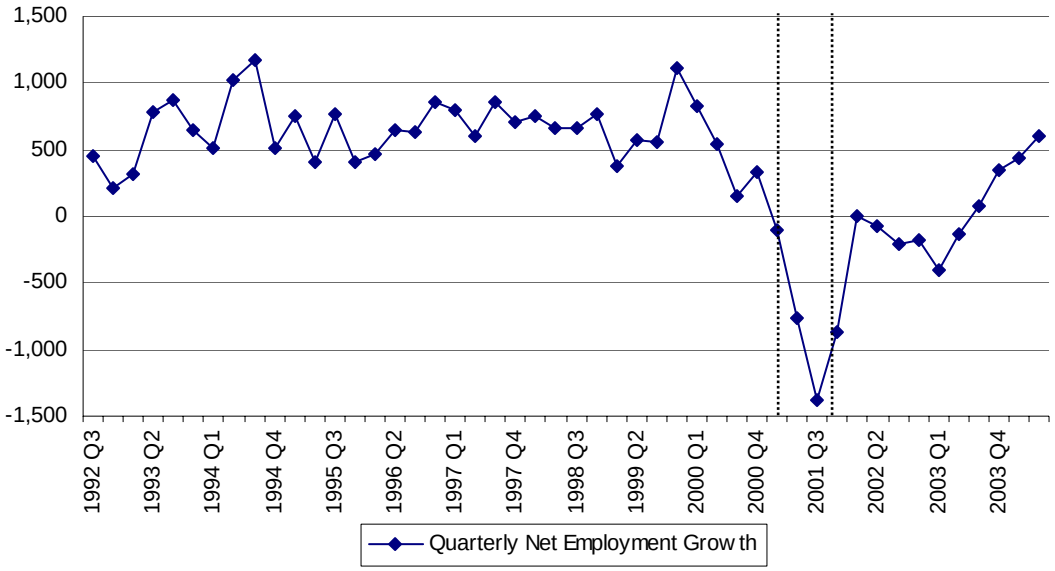


Figure 2: Quarterly Gross Job Gains and Losses (in thousands)

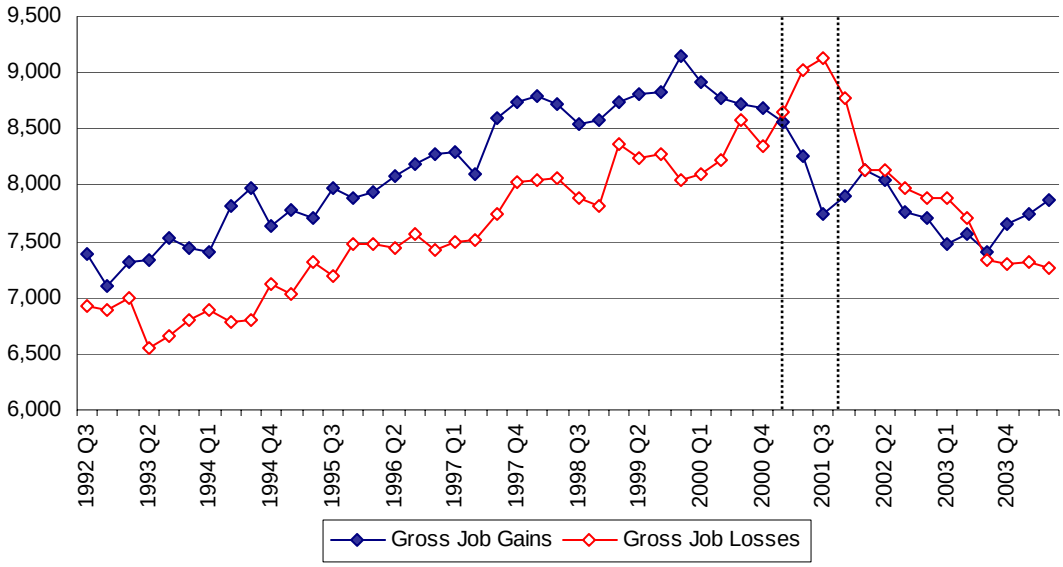


Figure 3: Quarterly Gross Job Gains and Losses (in thousands)

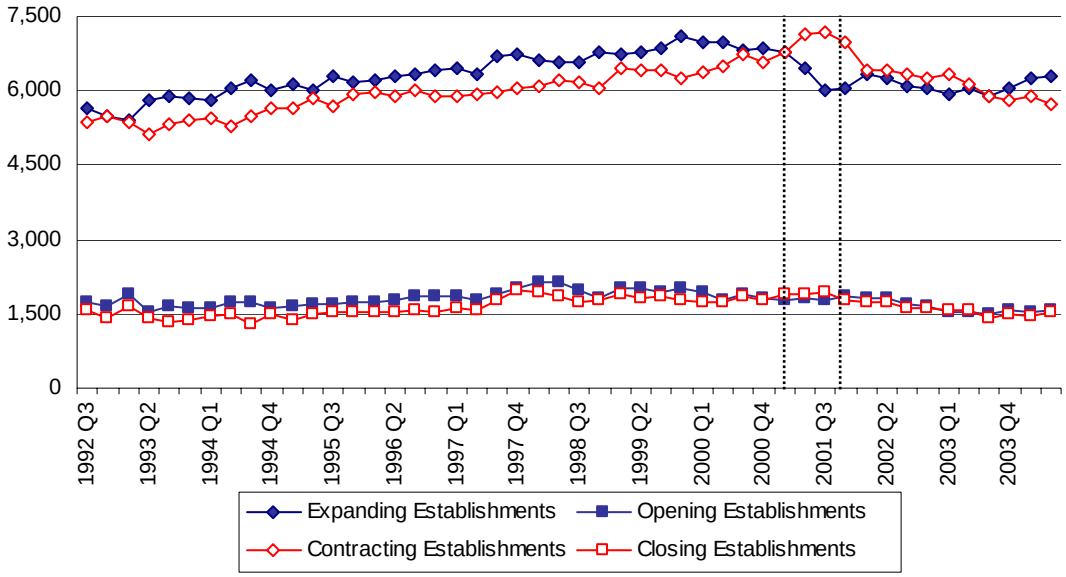


Figure 4a (From Knaup 2005)

Figure 1. Survival rates of new establishments from second quarter of 1998

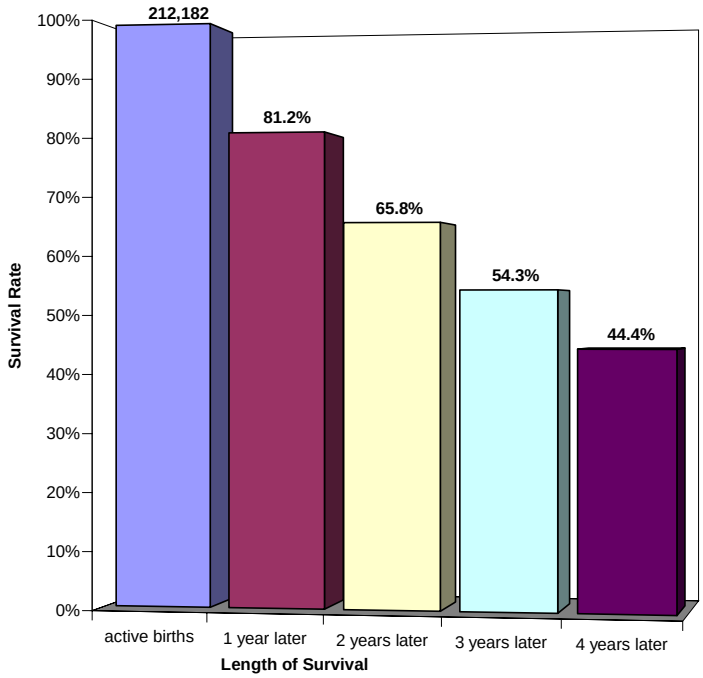
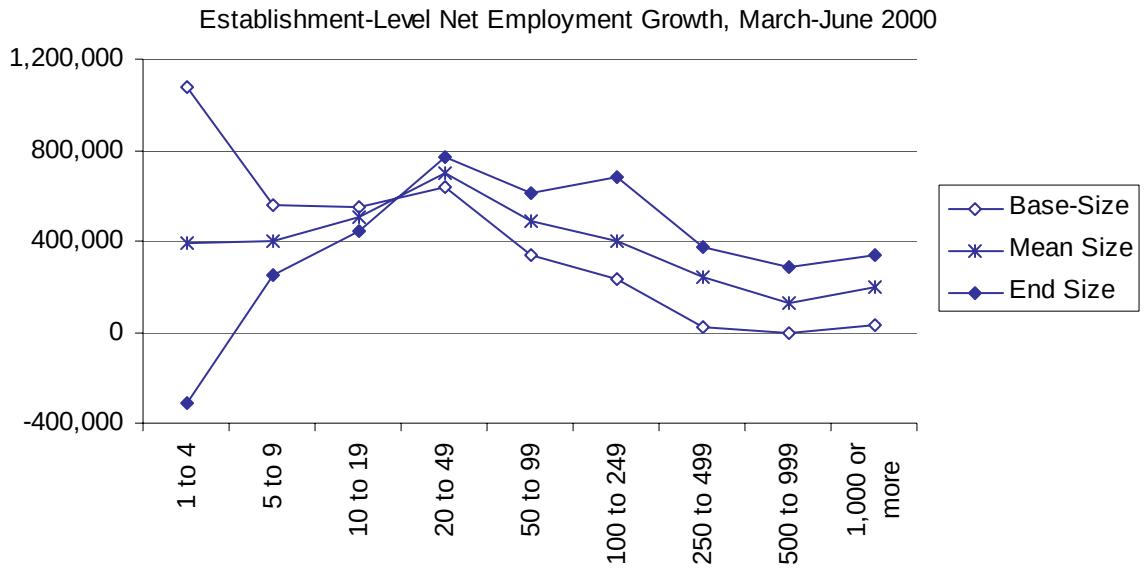


Figure 4b (From Okolie 2004)



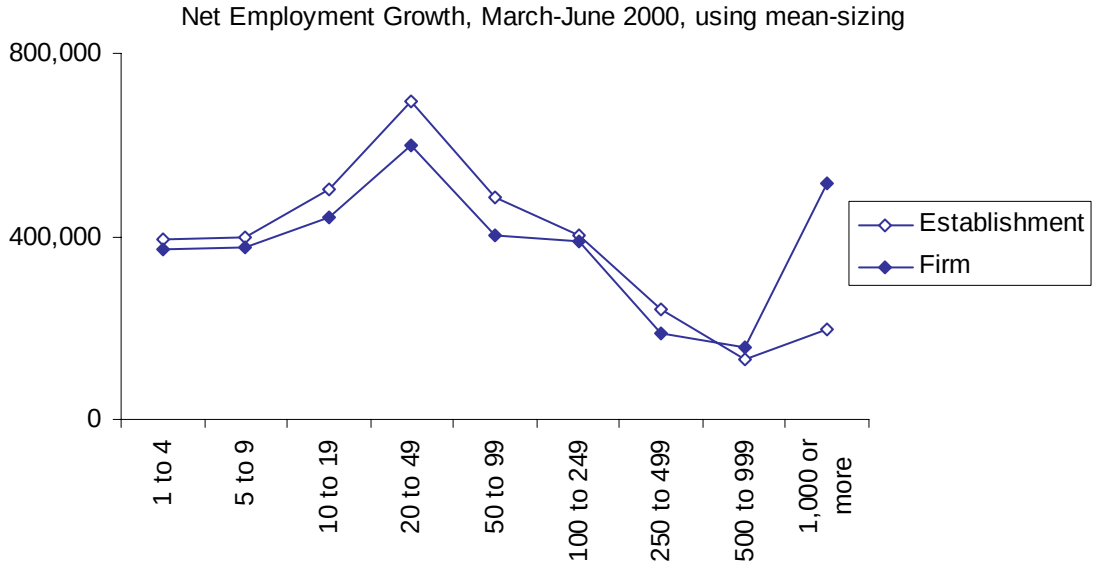


Figure 4c (From Faberman 2004)

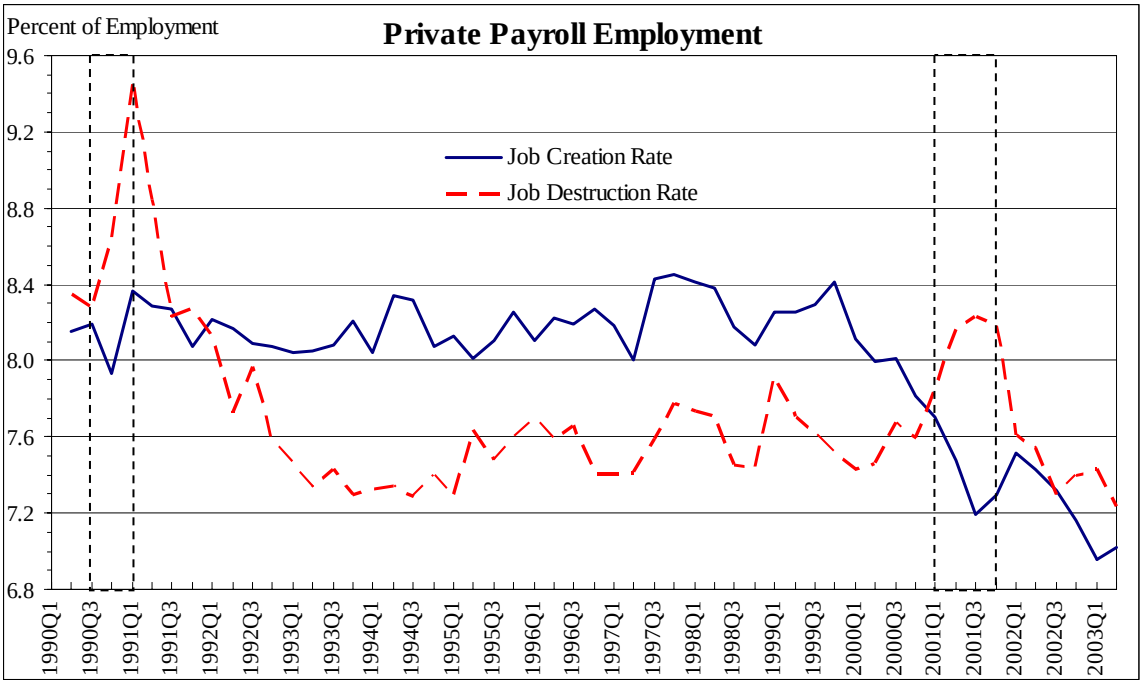
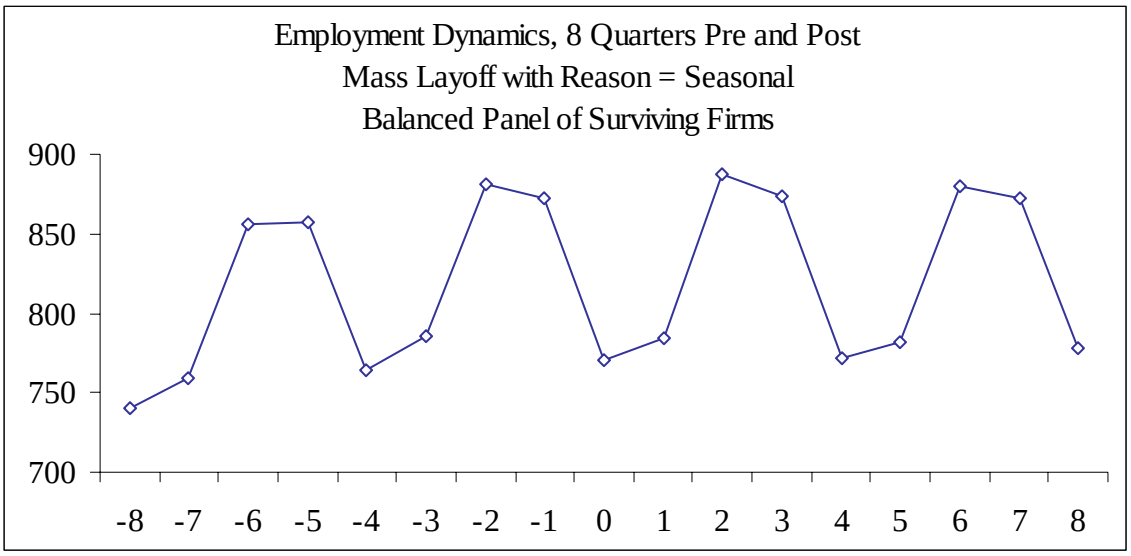


Figure 4d (From Hyson and Spletzer 2002)



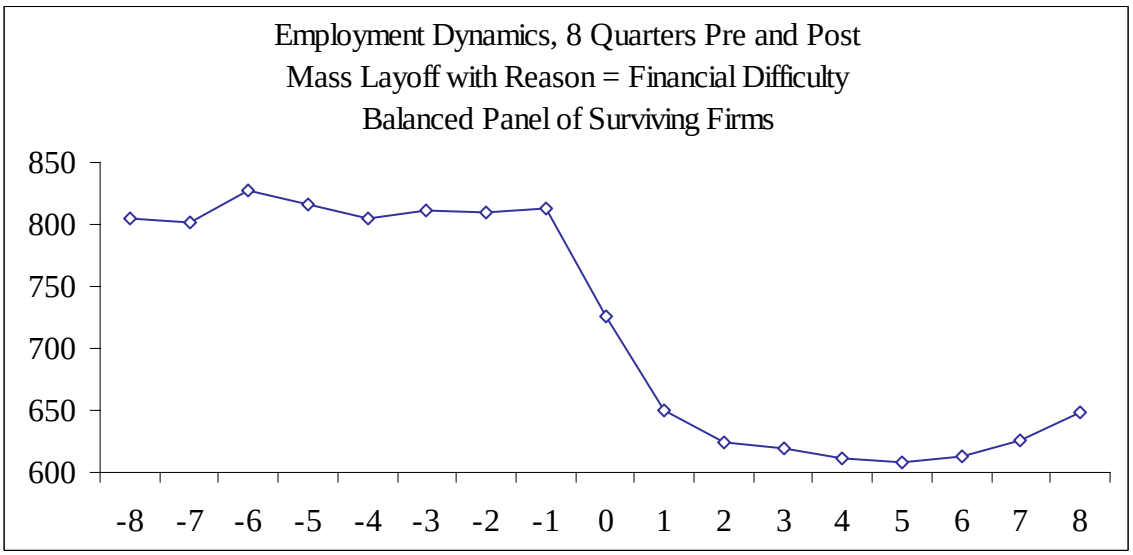
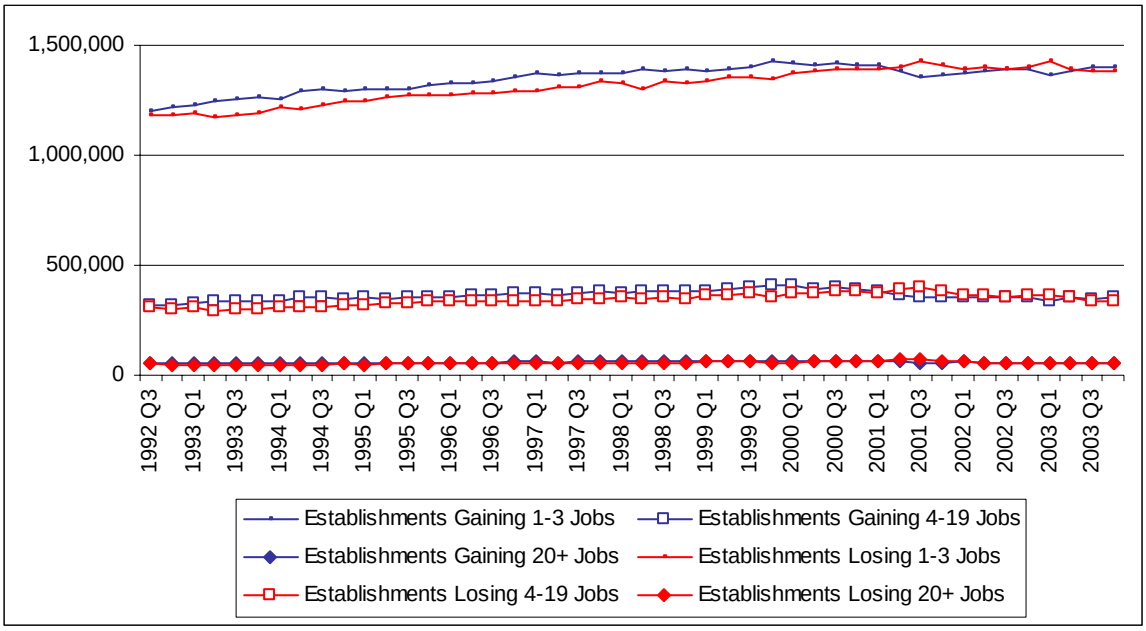


Figure 5: Quarterly Gross Job Gains and Losses, Establishment Counts



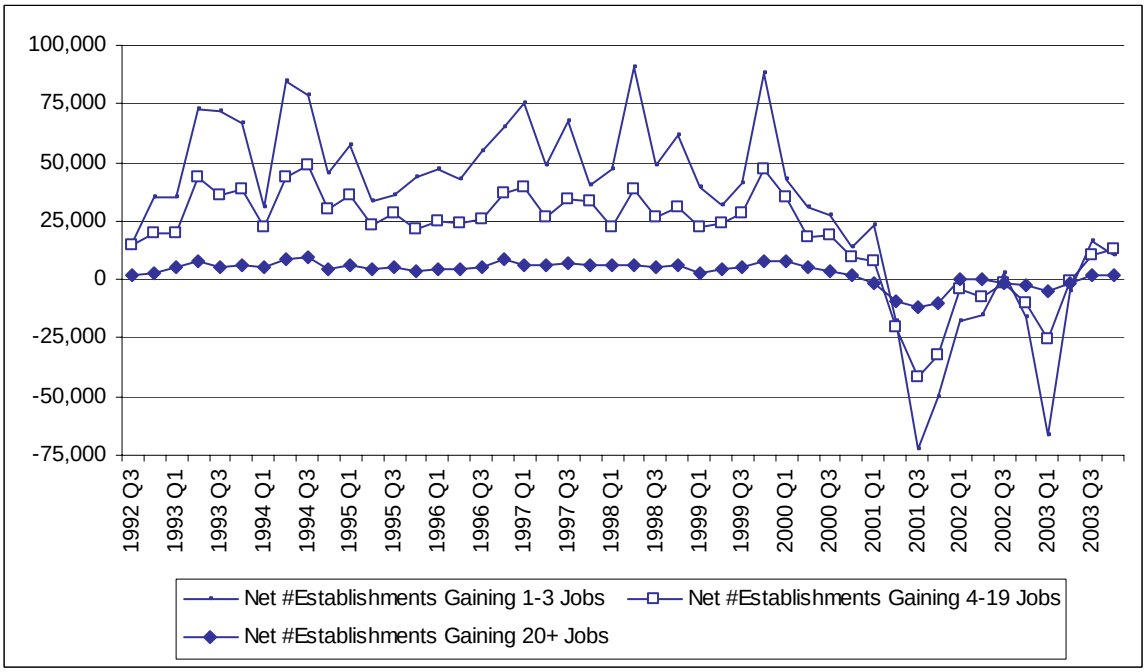


Figure 6: Quarterly Gross Job Gains and Losses