

Employment growth by size class: firm and establishment data

The first-time application of the BLS Business Employment Dynamics program firm size class methodology to establishment-level data reveals that some of the net job creation attributed to large firms comes from small and medium-sized establishments; also, the two time series are highly correlated and possess similar cyclical movements

Sherry Dalton,
Erik Friesenhahn,
James Spletzer,
and
David Talan

Size class statistics are one of the most requested products from the Bureau of Labor Statistics (BLS, the Bureau) Business Employment Dynamics (BED) program. Currently published BED size class tabulations are produced with firm-level data, because this methodology is consistent with the role of corporations as the economic decisionmakers. However, employment changes at individual establishments are affected by both corporate decisions and local supply and demand factors. In addition, users of establishment-based surveys may be interested in how firm and establishment size class statistics compare.

In this article, the BED firm size class methodology is applied to establishment-level data to complement the existing firm-level data. The two series are compared in order to study the firm-level and establishment-level size class contributions to jobs created by large and small businesses. Next, these time series are reviewed with a correlation analysis of each size class and a statistical peak–trough study that examines periods of employment growth and loss.

One finding that emerges from the analysis is that some of the net job creation attributed to large firms comes from small and medium-sized establishments. Other findings are that the two time series are highly correlated and that they possess similar cyclical movements.

Data and methodology

BED data. The BED program produces quarterly statistics on gross job flows. The statistics are derived from the BLS Quarterly Census of Employment and Wages (QCEW), a virtual census of 9.1 million business establishments covering 98 percent of employment on nonfarm payrolls. Consisting of high-quality, high-frequency, timely information on employment and wages, QCEW data are used as a sampling frame and a benchmark for other BLS establishment-based surveys and are an important source of data for labor market research.

BED data are tabulated by linking QCEW establishment records across quarters to create a longitudinal history. Published BED data, which cover only the private sector, contain information on 4.8 million firms, composed of 6.7 million business establishments and 107 million employees. To ensure the quality of the longitudinal establishment linkages, the Bureau uses a multistep process to link the microdata over time. The linkage process consists of administrative matches based on a unique identifier, a probability-based weighted match, and an analyst-reviewed match.

The BED data measure gross jobs gains and gross job losses. Gross job gains are the number of jobs gained by establishments

Sherry Dalton and Erik Friesenhahn are economists in the Office of Employment and Unemployment Statistics, Bureau of Labor Statistics. James Spletzer is a senior research economist, and David Talan is a supervisory economist and Chief of the State Operations and Frame Research, in the same office. Email: dalton.sheryl@bls.gov

that open or expand, and gross job losses are the number of jobs lost by establishments that close or contract. The sum of gross job gains and gross job losses is the net employment change.¹

BED data are published approximately 8 months after the end of the quarter and offer a wealth of products that include data for the Nation, by industry, by State, by establishment age, and by size of firm. These series begin with the third quarter of 1992.²

Most BED products use establishment-level microdata that are longitudinally linked across two quarters. An establishment is defined as an economic unit that produces goods or provides services, usually at a single physical location, and engages in either one activity or predominantly one activity. The currently published BED size class tabulations are produced instead with *firm*-level microdata longitudinally linked across two quarters. A firm is a business, either corporate or otherwise, and may consist of one or more establishments, aggregated by the Federal Employer Identification Number (FEIN). Approximately 63 percent of firms are composed of only a single establishment, and single-establishment firms account for 38 percent of total employment.

Dynamic sizing. Although there are many ways to classify longitudinal establishment-level microdata into size classes, the Bureau uses dynamic sizing to create statistics for nine size class categories. Dynamic sizing is based on a measurement process that assumes continuous linear employment growth or loss from quarter to quarter, with the growth or loss allocated to the appropriate size class at the moment it occurred. For example, dynamic sizing assumes that if a firm grows from 3 employees in one quarter to 16 employees in the next quarter, then the quarterly growth of 13 employees occurs through the addition of 1 employee every week. This growth of 13 employees would be allocated as follows: the size class consisting of 1 to 4 employees would be credited with the growth of 1 employee (the growth from 3 to 4), the size class comprising 5 to 9 employees would be credited with the growth of 5 employees (the growth from 4 to 9), and the size class containing 10 to 19 employees would be credited with the growth of 7 employees (the growth from 9 to 16).³

Firm and establishment size class data

In this section, firm and establishment size class data are compared, first empirically and then statistically.

Empirical analysis. For this article, the methodology used to create the BED published firm-level size class series is

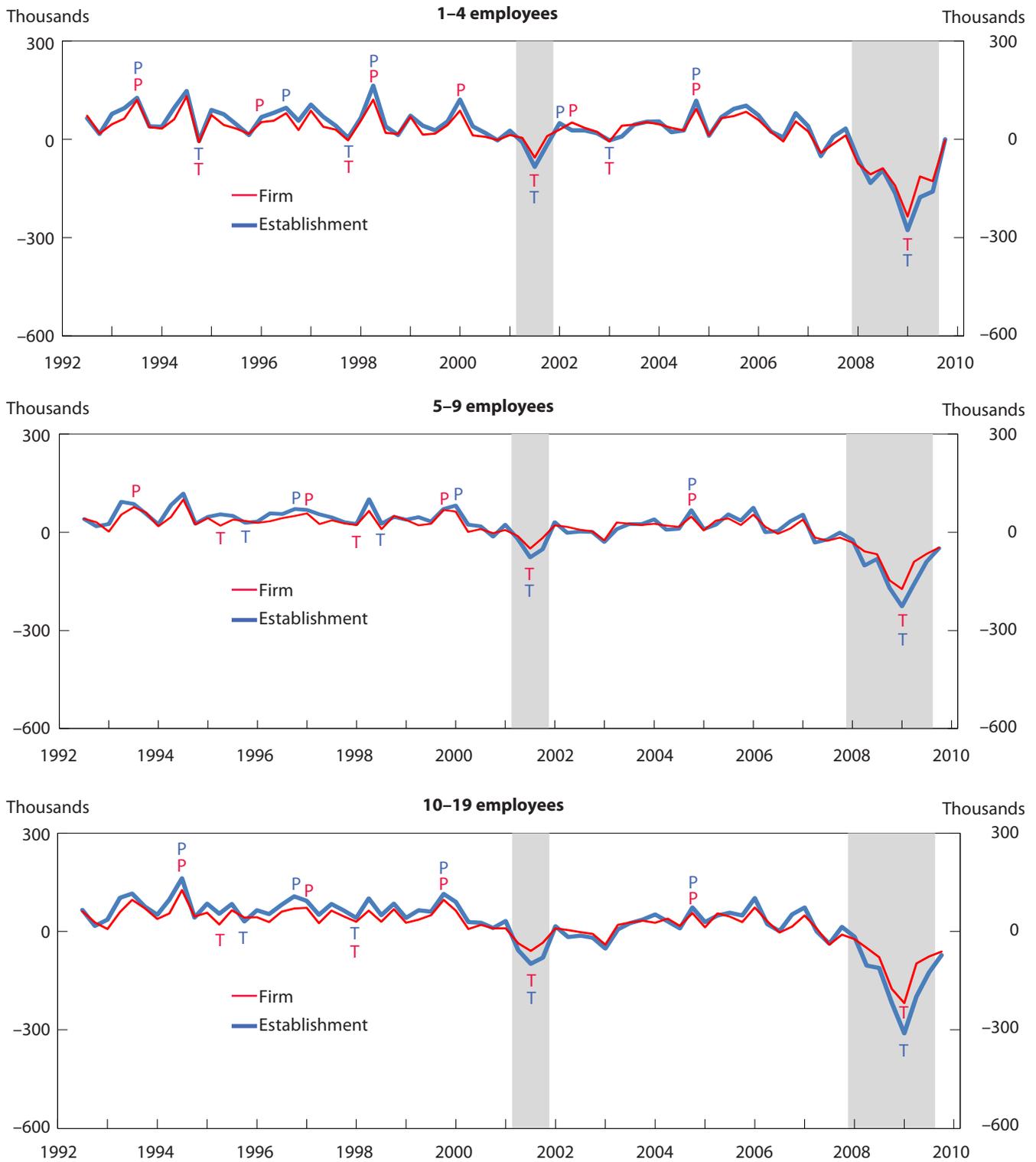
applied to create establishment-level size class data. Chart 1 traces the seasonally adjusted quarterly net employment change by size class from September 1992 to December 2009 for firm-level and establishment-level data.⁴ The shaded areas are recessionary quarters, as determined by the National Bureau of Economic Research (NBER), the official arbiter of the dates of U.S. recessions. Business cycle properties are evident in the chart. For both firm- and establishment-level data, the net employment change for each size class was positive throughout much of the 1990s, became negative during the 2001 recession, was positive during the mid-2000s, and was negative again during the 2007–2009 recession.

Chart 2 quantifies the relationship between the percentage of jobs gained or lost for any given size class and the average employment share for that size class. The top panel shows firm-level data, the bottom establishment-level data, from September 1992 to December 2009. Most of the size classes for both firm- and establishment-level series have employment growth contributions that are similar to their average shares of employment. For example, firms with 10 to 19 employees accounted for 7.5 percent of net jobs created, a percentage similar to their average employment share of 7.7 percent. However, there are two exceptions: (1) Firms with 1,000 or more employees accounted for 28.7 percent of net jobs created; this percentage was lower than their average employment share of 36.9 percent (top panel). (2) Establishments with 1 to 4 employees accounted for 11.4 percent of net employment change, while their average employment share was 6.3 percent (bottom panel).

Cumulative size class totals for net employment change and average employment share are shown in chart 3 for firm-level data (top panel) and establishment-level data (bottom panel). Each cumulative size class represents the total percentage of employment that falls within or below the corresponding size class or classes from chart 2. For all size classes, except the last, the establishment's cumulative size class contribution to net employment change exceeds the firm's cumulative size class contribution. By definition, multiestablishment firms in any given size class are always composed of establishments from equal or smaller size classes. Therefore, the net employment change that is credited to a multiestablishment firm in a given size class is credited to establishments from equal or smaller size classes.

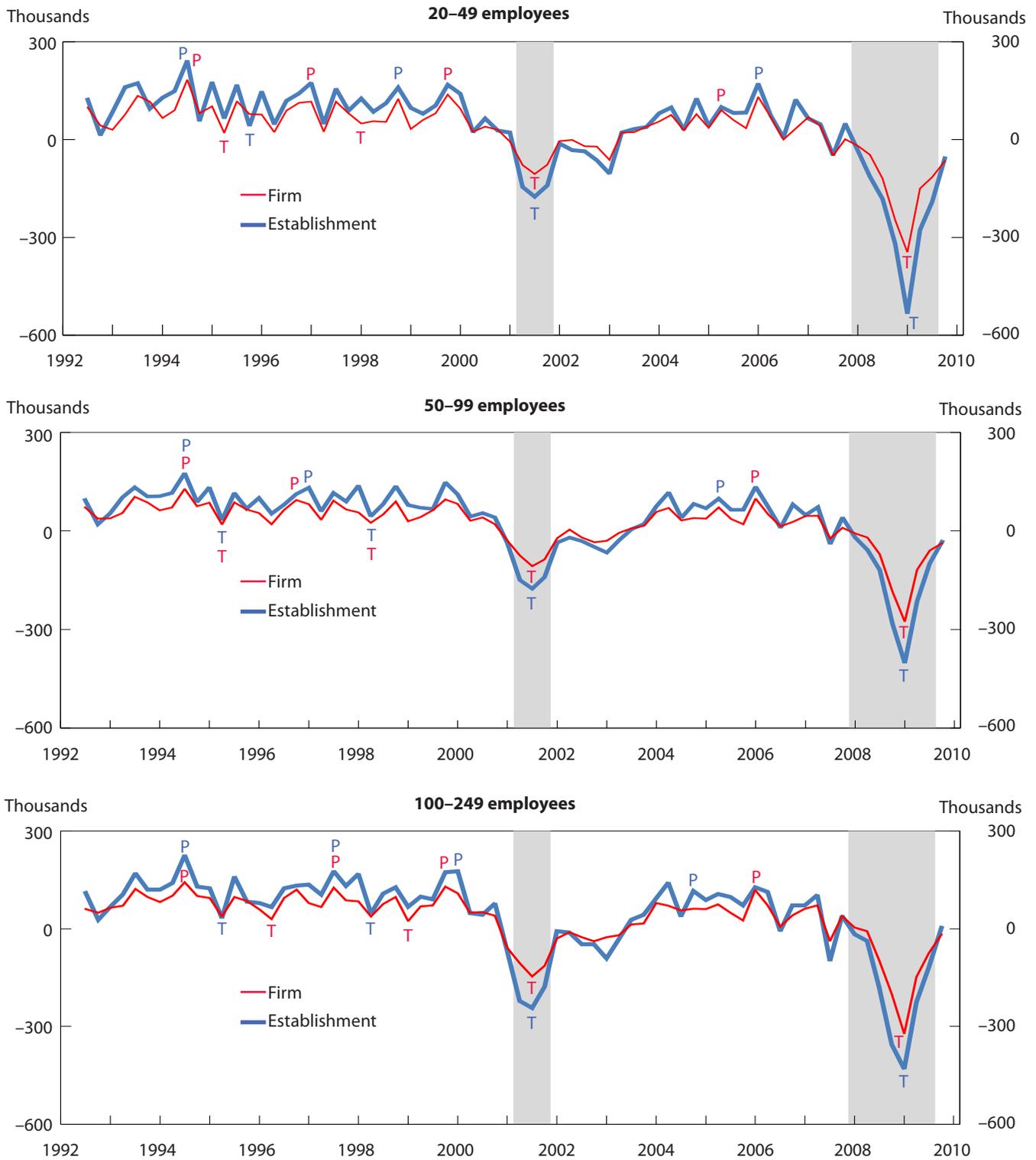
The top panel of chart 3 shows that firms with fewer than 500 employees accounted for 64.9 percent of net jobs created. This statistic, which supports frequently cited sources asserting that two-thirds of all new jobs are created

Chart 1. Total private net employment change, by firm size and establishment size, seasonally adjusted, September 1992–December 2009



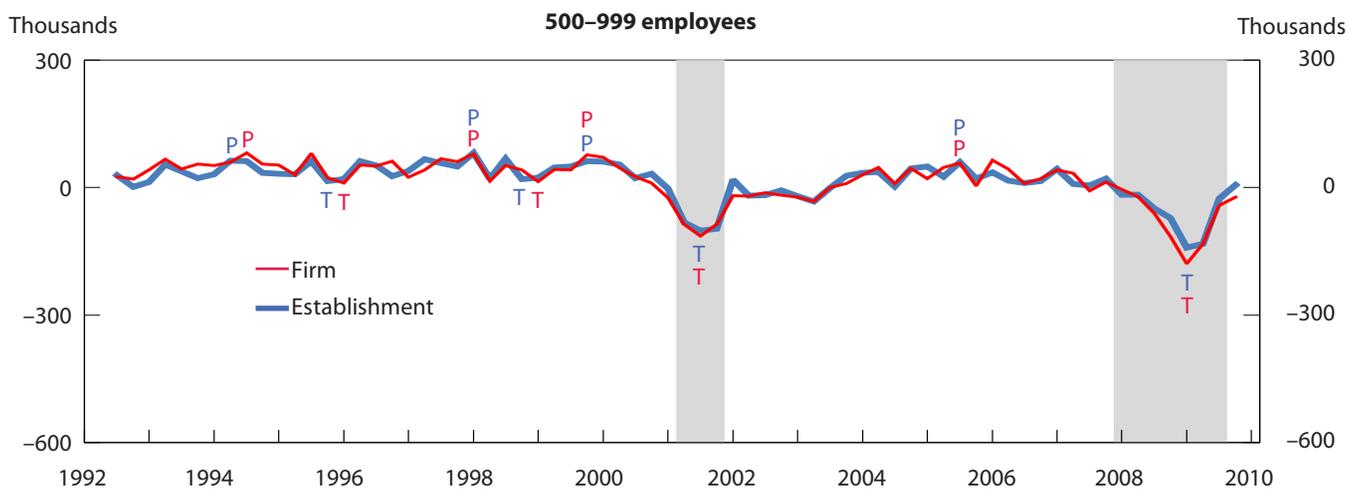
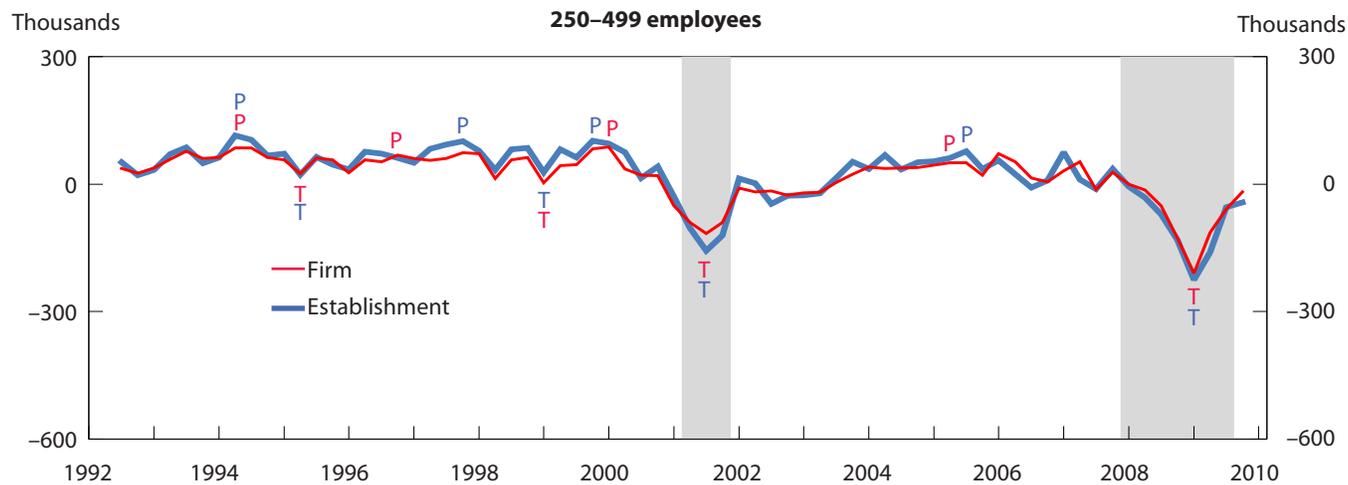
NOTE: P = peak, T = trough.

Chart 1. Continued—Total private net employment change, by firm size and establishment size, seasonally adjusted, September 1992–December 2009



NOTE: P = peak, T = trough.

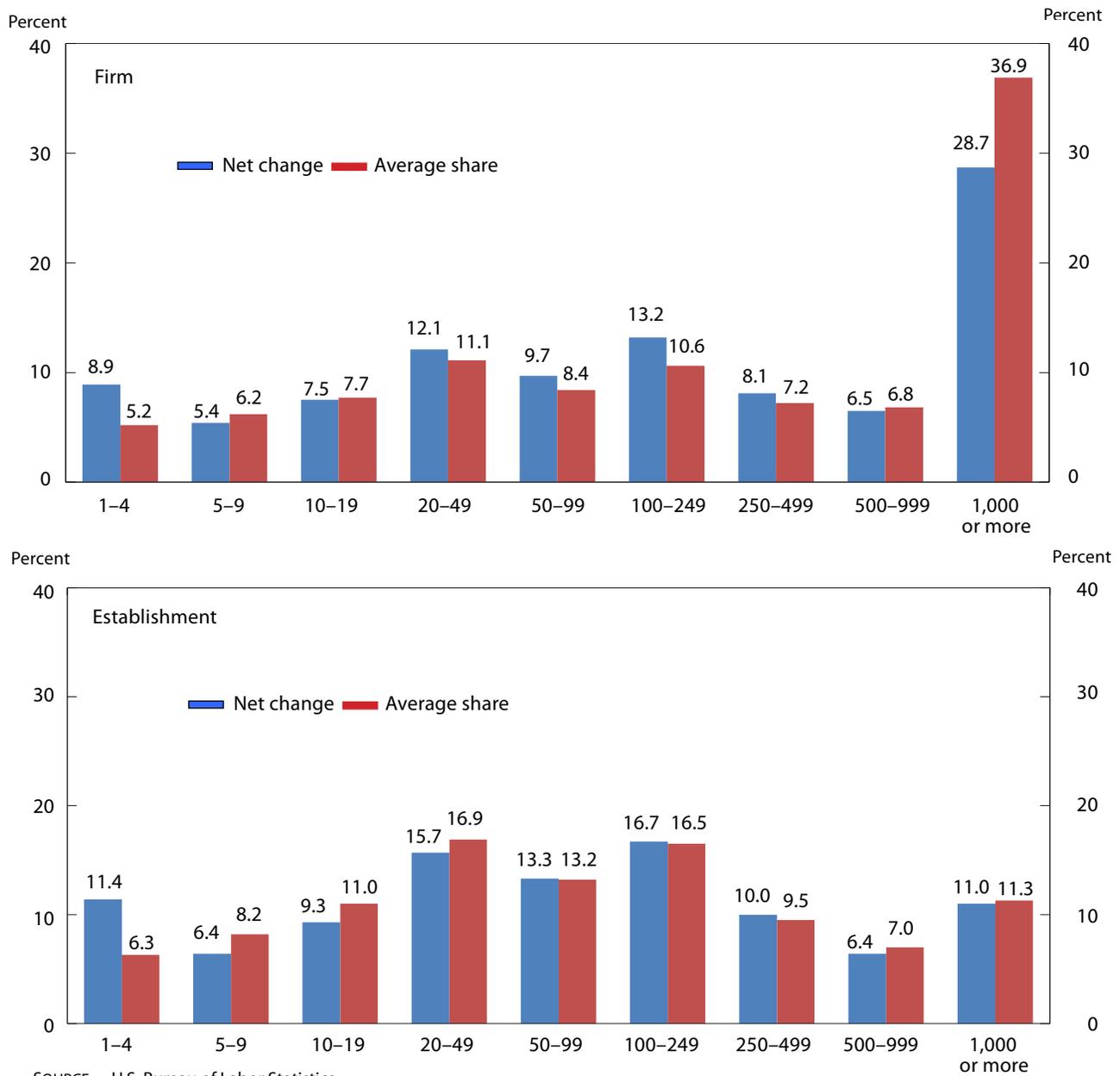
Chart 1. Continued—Total private net employment change, by firm size and establishment size, seasonally adjusted, September 1992–December 2009



NOTE: P = peak, T = trough.

SOURCE: U.S. Bureau of Labor Statistics.

Chart 2. U.S. total private net employment change and average employment share, by firm size and establishment size, seasonally adjusted, September 1992–December 2009

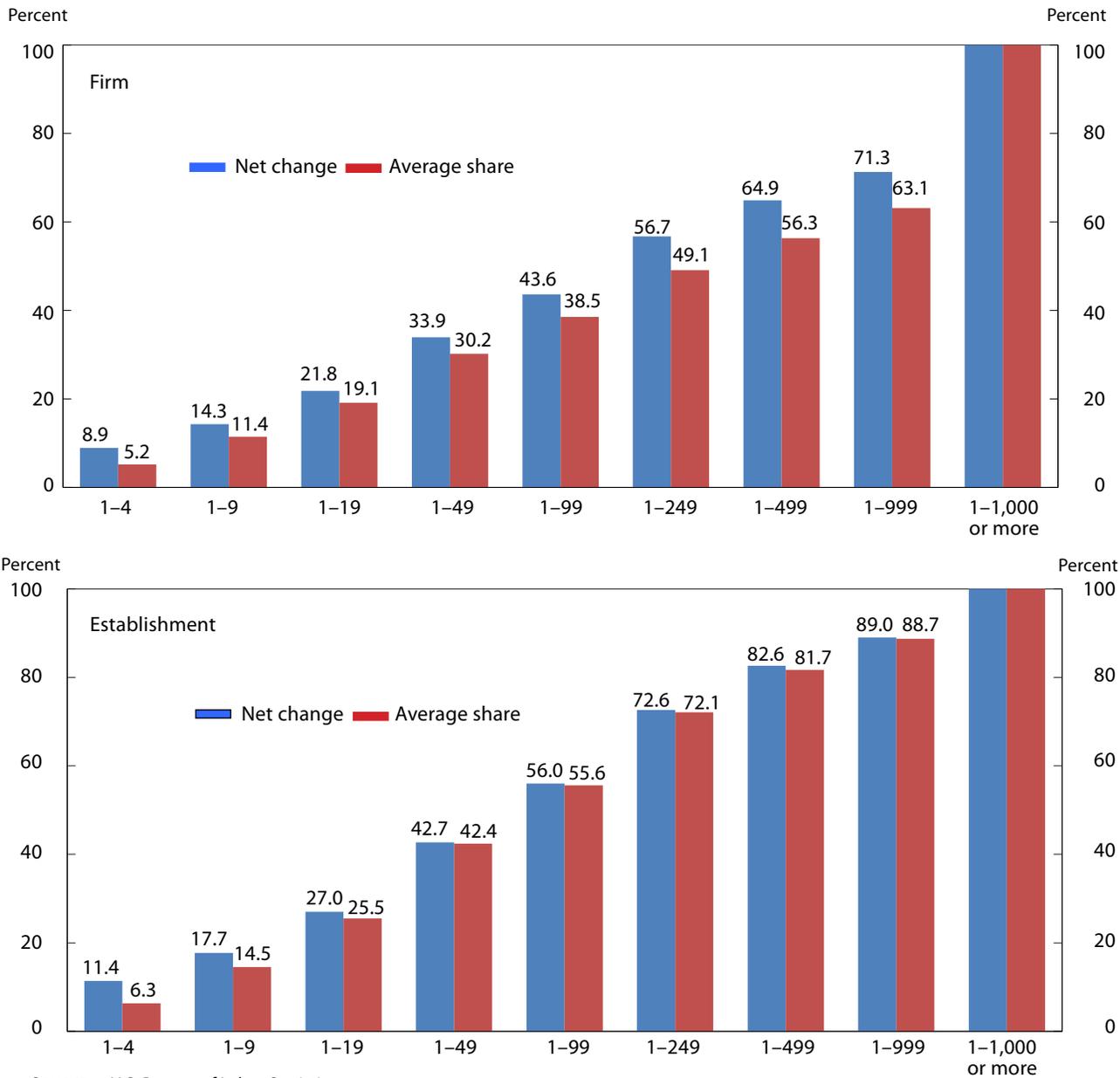


by small businesses, can be traced back to a December 2005 BLS press release that stated, “from September 1992 through March 2005, firms with fewer than 500 employees accounted, on average, for 65 percent of quarterly net employment change.”⁷⁵ In contrast, establishments with fewer than 500 employees accounted for 82.6 percent of net jobs created (bottom panel of chart 3).

To better understand how existing firm-level and establishment-level data behave throughout business

cycles, the data have been subdivided into periods representing employment growth and employment loss. There are two possibilities for choosing these periods: recessions and expansions as determined by the NBER, or time spans when net employment change is either positive or negative. For the analysis presented here, the latter is chosen, because the NBER business cycle dates often are determined by measures of output rather than employment, whereas the concept of “net jobs created”

Chart 3. U.S. total private net employment change and average employment share, by cumulative firm size and cumulative establishment size, seasonally adjusted, September 1992–December 2009



coincides more closely with periods of net job gains and net job losses.

In the remainder of this article, the statistics of interest are calculated for the following four periods of employment growth and loss:

- Period 1: third quarter, 1992, through first quarter, 2001 (22.8 million net jobs gained)
- Period 2: second quarter, 2001, through second quarter, 2003 (4.0 million net jobs lost)

- Period 3: third quarter, 2003, through fourth quarter, 2007 (6.9 million net jobs gained)
- Period 4: first quarter, 2008, through fourth quarter, 2009 (9.7 million net jobs lost)

Table 1 compares the percentage of firm and establishment net employment change with the average employment share attributable to each size class for each of the four periods.⁶

Employer Size Class

Table 1. Percentage of net employment change and average share of employment, by firm and by establishment, by successive quarters of positive or negative employment, U.S. total private sector, seasonally adjusted, 1992–2009				
[In percent]				
Firm or establishment size (number of employees)	Period 1: third quarter, 1992, through first quarter, 2001 (positive)	Period 2: second quarter, 2001, through second quarter, 2003 (negative)	Period 3: third quarter, 2003, through fourth quarter, 2007 (positive)	Period 4: first quarter, 2008, through fourth quarter, 2009 (negative)
1 to 4				
Firm:				
Net change	6.9	-3.3	9.2	9.5
Average share	5.2	5.1	5.2	5.2
Establishment:				
Net change	9.6	-5	11.0	11.8
Average share	6.2	6.1	6.3	6.6
5 to 9				
Firm:				
Net change	5.5	.7	4.6	7.3
Average share	6.3	6.1	6.1	6.0
Establishment:				
Net change	7.7	3.7	5.6	10.0
Average share	8.2	8.1	8.2	8.4
10 to 19				
Firm:				
Net change	7.4	3.6	6.7	8.3
Average share	7.8	7.6	7.6	7.5
Establishment:				
Net change	10.8	8.2	8.7	12.8
Average share	10.8	10.9	11.2	11.5
20 to 49				
Firm:				
Net change	11.6	8.9	11.6	11.9
Average share	11.2	11.1	11.0	10.8
Establishment:				
Net change	17.2	18.1	16.4	19.1
Average share	16.6	17.0	17.3	17.5
50 to 99				
Firm:				
Net change	9.1	9.5	9.4	8.2
Average share	8.5	8.3	8.3	8.2
Establishment:				
Net change	13.9	18.3	14.5	13.6
Average share	13.0	13.3	13.5	13.5
100 to 249				
Firm:				
Net change	11.6	13.0	12.7	9.2
Average share	10.6	10.5	10.5	10.4
Establishment:				
Net change	17.0	23.0	17.1	15.1
Average share	16.4	16.6	16.7	16.5
250 to 499				
Firm:				
Net change	7.6	10.2	8.5	6.3
Average share	7.2	7.2	7.2	7.2
Establishment:				
Net change	9.9	12.8	9.2	8.0
Average share	9.6	9.6	9.5	9.3
500 to 999				
Firm:				
Net change	6.8	10.3	7.0	6.1
Average share	6.8	6.8	6.8	6.8
Establishment:				
Net change	6.4	9.4	6.3	5.0
Average share	7.2	7.0	6.7	6.5
1,000 or more				
Firm:				
Net change	33.3	47.0	30.2	33.2
Average share	36.3	37.3	37.3	38.1
Establishment:				
Net change	7.5	6.9	11.2	4.5
Average share	12.0	11.3	10.6	10.3

For a given size class, regardless of the period, average employment shares were stable. However, that was not always the case for net employment change. During period 2, both firms and establishments with 1 to 4 employees gained jobs. As a result, their contribution to jobs lost during that period was negative (−3.3 percent and −0.5 percent, respectively). This size class was the only one to have a negative contribution to net jobs lost in period 2. Firms with 1,000 or more employees accounted for almost half (47.0 percent) of the job losses during that period. This contribution from the largest firms contrasts with that from the largest establishments, which contributed 6.9 percent of job loss during period 2.

Establishments with 50 to 249 employees and, to a lesser extent, establishments with 250 to 999 employees lost the most jobs in period 2, relative to their contributions in other periods and relative to their average employment shares. (See table 1.) By contrast, the largest firms contributed the most, on a relative basis, to the job losses in period 2. Thus, it appears that the businesses which lost the most jobs in the 2001 recession and in the next several quarters were large firms composed of midsized establishments.

Another finding that emerged from the analysis is that, over time, the percentage that any given size class contributed to net employment change was similar to the average employment share of that size class, with the exception of period 2. For example, firms with 50 to 99 employees accounted for between 8.2 percent and 9.5 percent of the net jobs gained or lost, while their average employment shares ranged from 8.2 percent to 8.5 percent. Similarly, establishments with 20 to 49 employees contributed between 16.4 percent and 19.1 percent of the net employment change, while their average employment shares ranged from 16.6 percent to 17.5 percent.

Statistical analysis. The employment dynamics of establishments are closely correlated with those of firms of similar size. Over the time span from September 1992 to December 2009, the correlations between the firm- and establishment-level series for net employment change are high. As the following tabulation shows, for all but the largest of the nine size classes examined, the correlations are 0.95 and above (the correlation for the largest size class, 1,000 or more employees, is 0.83):

<i>Number of employees</i>	<i>Correlation</i>	<i>Number of employees</i>	<i>Correlation</i>
1 to 4.....	0.98	100 to 249.....	0.98
5 to 9.....	.97	250 to 499.....	.97
10 to 19.....	.98	500 to 999.....	.95
20 to 49.....	.97	1,000 or more...	.83
50 to 99.....	.98		

However, although these high correlations suggest a strong agreement between the two series, they do not provide insight into the specific nature of that relationship. Examining the turning points through a peak–trough analysis can help answer the question “Are business cycle properties the same for the firm-level and establishment-level series?”

A return to chart 1 shows the turning points identified by the peak–trough algorithm used in the analysis.⁷ Peaks and troughs in the firm-level series are marked by a red P and T, respectively, those in the establishment-level series by a blue P and T.

The peak–trough analysis yields two chief findings. First, the cyclical movements in each of the two series are similar: both series exhibit similar periods of growth and loss. Second, although the cyclical movements in each series are similar, the magnitude of the net employment change in each differs. These findings hold across all nine size classes.

Similar patterns of net gains and net losses are apparent in both series. The net employment change series possess two prominent troughs. The dates of each of these major contractions are identical for both the firm and establishment series across all nine size classes. The two troughs coincide with the 2001 and 2007–2009 recessions.

A major peak lies between these two extreme low points. The quarter in which this peak occurs varies with each data series. The major peak occurs as early as September 2004 and as late as March 2006. For the largest six size classes (20 to 49 employees through 1,000 or more employees), the major peak deviates between the two series by as many as five quarters; however, the three smallest size classes have the same major high point (September 2004). It is important to note that the interval between the two major troughs contains only one minor peak-and-trough cycle, which occurs for the smallest size class for both firm-level and establishment-level data.

Robust job creation from the time the BED series began in September 1992 until the 2001 recession resulted in net job gains for most of the quarters making up that period. Consequently, minor cycles of peaks and troughs for all except one size class characterize the period. The lone exception is the largest size class, which did not exhibit any minor cycles during the timeframe examined.

Despite similarities in the peak–trough dates between the firm-level and establishment-level data, the magnitude of change in each series can differ. In size classes with fewer than 500 employees, establishment-level data exhibit greater fluctuations than firm-level data. The two largest size classes exhibit a greater change in the firm-level data

than in the establishment-level data. This finding is most noticeable in the two most recent recessionary troughs. (See chart 1.) Because large firms often are composed of small and medium-sized establishments, the greater fluctuations in the large firms appear as greater fluctuations in the small and medium-sized establishments.

THERE IS A VERY HIGH DEGREE OF SIMILARITY between the firm-level and establishment-level data series for net employment change. However, the size class statistics for these series differ on how they answer the question “Which businesses create the most jobs, large ones

or small ones?” Firms with fewer than 500 employees create 65 percent of net job growth, while establishments with fewer than 500 employees are responsible for 83 percent of net job growth. This difference is not surprising, because large firms often are composed of small and medium-sized establishments. Another difference is that the cyclical movements of each series are similar, whereas the magnitude of the change differs for each size class across all nine size classes. In sum, the establishment-level data complement the existing firm-level series and provide users with additional insights into labor market dynamics. □

Notes

¹ For a more thorough description of the concepts and definitions, the source data, and the longitudinal linkages in the BED program, see James Spletzer, R. Jason Faberman, Akbar Sadeghi, David M. Talan, and Richard L. Clayton, “Business employment dynamics: new data on gross job gains and losses,” *Monthly Labor Review*, April 2004, pp. 29–42, <http://www.bls.gov/opub/mlr/2004/04/art3full.pdf> (visited Dec. 1, 2011).

² Firm-level data (but not establishment-level data) are available back to 1990; see Jessica Helfand, Akbar Sadeghi, and David Talan, “Employment dynamics: small and large firms over the business cycle,” *Monthly Labor Review*, March 2007, pp. 39–50, <http://www.bls.gov/opub/mlr/2007/03/art3full.pdf> (visited Dec. 1, 2011).

³ For a complete description of dynamic sizing and why the Bureau chose this methodology for producing size class tabulations, see Shail J. Butani, Richard L. Clayton, Vinod Kapani, James R. Spletzer, David M. Talan, and George S. Werking, Jr., “Business employment dynamics: tabulation by employer size,” *Monthly Labor Review*, February 2006, pp. 3–22, <http://www.bls.gov/opub/mlr/2006/02/art1full.pdf> (visited Dec. 1, 2011).

⁴ A discussion of the trend lines’ peaks and troughs, represented by the letters P and T, respectively, appears later in the article.

⁵ See “New Quarterly Data from BLS on Business Employment Dynamics by Size of Firm,” <http://www.bls.gov/news.release/pdf/cewfs.pdf> (visited Dec. 1, 2011).

⁶ On the basis of BED seasonally adjusted statistics, the private sector lost 269,000 jobs in the third quarter of 2007, but gained 264,000 jobs in the fourth quarter. For convenience, these two quarters were put into period 3.

⁷ The peak–trough algorithm is a statistical procedure for analyzing the cyclical movements of a data series. When the algorithm is used to compare two or more data series, the expectation is that two highly correlated series possess similar patterns of peaks and troughs. The analysis presented here has adopted guidelines from the NBER publication *Cyclical Analysis of Time Series: Selected Procedures and Computer Programs*, by Gerhard Bry and Charlotte Boschan (New York, National Bureau of Economic Research, 1971). The peak–trough algorithm is a two-step process. First, extreme points are located on a smoothed data series and subjected to a series of restrictions to remove minor fluctuations, after which the amended set of peak–trough dates is overlaid on the original, unsmoothed series. Then, the same restrictions placed on the smoothed series are utilized on the original data series. The result of this two-step process is a filtered set of peak–trough dates that capture the cyclical movements of the series being considered better than the unfiltered dataset does. Note that a chosen peak or trough is not necessarily the most extreme point in its immediate area. Volatility in the data and the nature of the two-step process can affect the dates of the final set of turning points. The authors thank Jürgen Kropf of the Current Employment Statistics program at the Bureau of Labor Statistics for the use of his computer code and for explaining the peak–trough algorithm.