

# The declining average size of establishments: evidence and explanations

*Although the average size of establishments rose through the expansionary years of the 1990s, it has fallen during each year of the first decade of the 2000s; a primary explanation is that new establishments are starting and staying smaller*

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**K**een observers of labor market statistics have noticed that the average size of establishments has been decreasing during the past decade. The average size of establishments rose through each of the expansionary years of the 1990s but then fell slightly during each year of the 2000s regardless of whether the economy was expanding or contracting, as shown in the bottom graph of chart 1.<sup>1</sup> The opposing trends of these Bureau of Labor Statistics (BLS) data suggest that the U.S. economy has changed in some fundamental way during the past two decades.

In this article, we seek to understand the change in trend in the average size of establishments during the last two decades. We begin with an exploration of the robustness of the basic empirical facts—we document the data used to discern the trends in the average size of establishments, and we show that a similar change in trends has taken place in the average size of firms. We also show that publicly available Census Bureau data on the average size of establishments and firms show trends similar to those of the BLS data, and we use the Census Bureau data to show

that the trend of the 1990s was similar to those in the late 1970s and the 1980s.

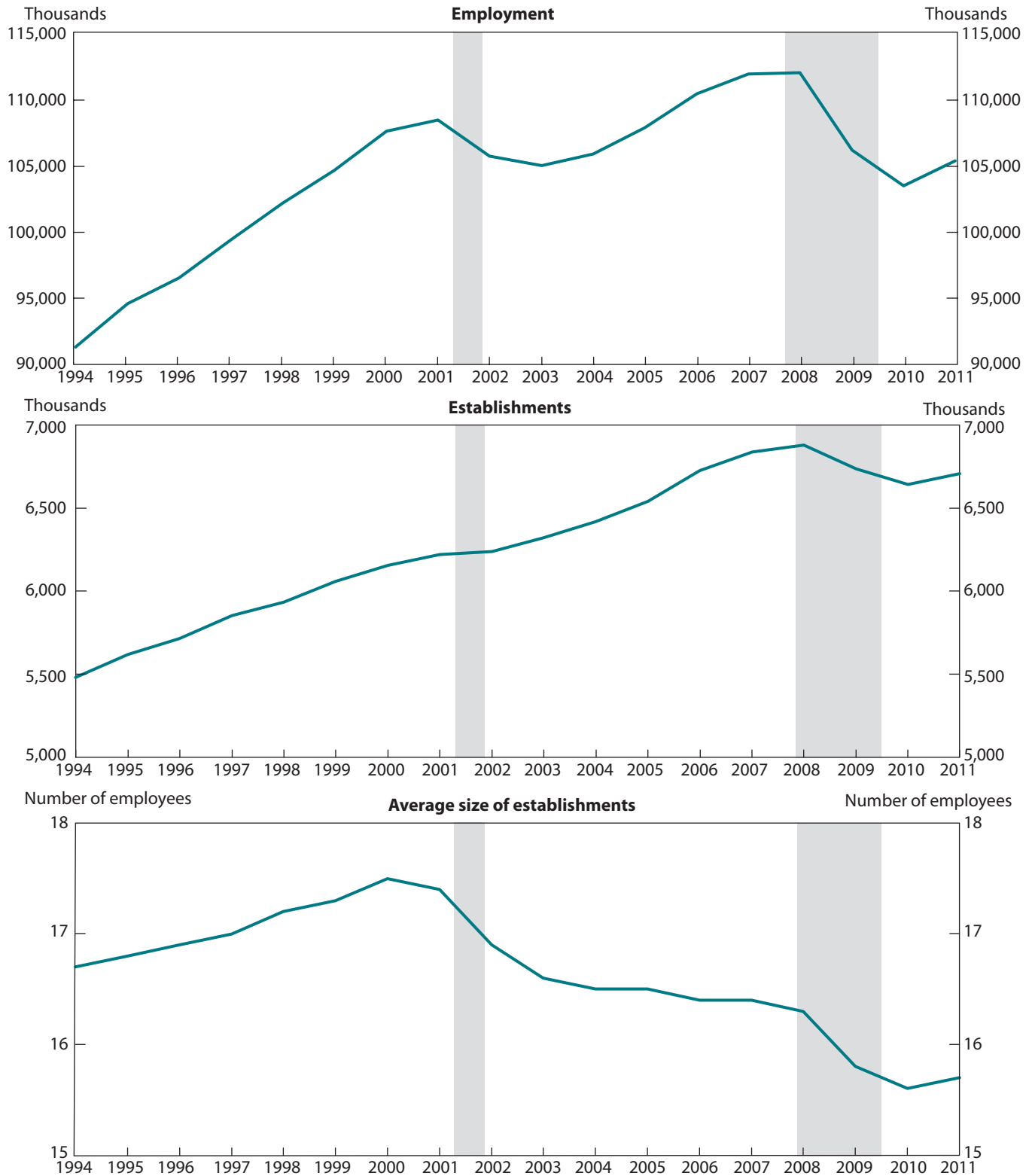
Our empirical analysis results in two main conclusions. First, the change in trend of the average size of establishments occurred in almost all industries, and the sizeable shifts in industry composition that took place in the U.S. economy account for only about half of the downward trend during the 2003–2007 expansion. Second, we find that the decrease in the average size of establishments during the 2000s expansion can be explained by the age of establishments. Specifically, we find that establishments are starting smaller and staying smaller. The average size of establishment births (new startups, excluding seasonal businesses) in the 1990s was around 7.6 employees, whereas the average size of births fell from 6.8 employees in 2001 to 4.7 employees in 2011.<sup>2</sup>

## The declining size of establishments

*Basic facts.* In chart 1, the bottom graph shows the declining average size of establishments during the last decade. The graph was created from Business Employment Dynamics (BED) statistics publicly available from BLS. The BED microdata are constructed by longitudinally linking the Quarterly Census of Employment

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**Chart 1. Private sector employment, number of establishments, and average size of establishments, 1994–2011**



NOTE: Shaded areas represent recessions as designated by the National Bureau of Economic Research (NBER).

SOURCE: Business Employment Dynamics (BED) data derived from first quarter data from the Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics

and Wages (QCEW) microdata. The QCEW is the Bureau's business register, with employment and wage information for all establishments covered by state and federal unemployment insurance (UI) laws. The QCEW data are used as the sampling frame and the employment benchmark for other BLS establishment-based surveys.<sup>3</sup> The BED program publishes private sector employment data and the associated number of establishments for the month of March.<sup>4</sup> We compute the average size of establishments as employment divided by the number of establishments.

As shown in the bottom graph of chart 1, the average size of establishments rose during the 1990s, from 16.7 employees in March 1994 to 17.5 in March 2000. Establishment size declined during and immediately following the 2001 recession, falling to 16.6 in March 2003. The average size of establishments then declined slightly during the mid-2000s to 16.4 in March 2007. There was another decline during and immediately after the most recent recession as establishment size fell to 15.6 in March 2010, followed by a slight uptick to 15.7 in March 2011. The other graphs in chart 1 provide a look at the employment level and number of establishments, the two components of average establishment size.

The decline in the average size of establishments during recessions is not surprising. Recessions are a period of employment loss in the economy, and are often referred to as a period of "cleansing" as many establishments decrease their employment.<sup>5</sup> What we find interesting in the bottom graph of chart 1 is how the slope during the expansion of the 1990s contrasts with the slope of the expansion of the 2000s. The goal of this paper is to better understand this phenomenon.

*Establishment versus firm: does it matter?* As a check on robustness, we asked whether the average size of firms also has exhibited contrasting slopes in the last two decades. In light of the advances in telecommunication and telework during the last decade, a large firm might set up new establishments and transfer existing staff to these new places of work, thus generating an increase in the number of establishments with no corresponding increase in employment. In this simple example, the decline in the average size of establishments that we observe would not be mirrored by a decline in the average size of firms.

We created a data series on the average size of firms using publicly available data on employment and the number of firms from the BED program.<sup>6</sup> We com-

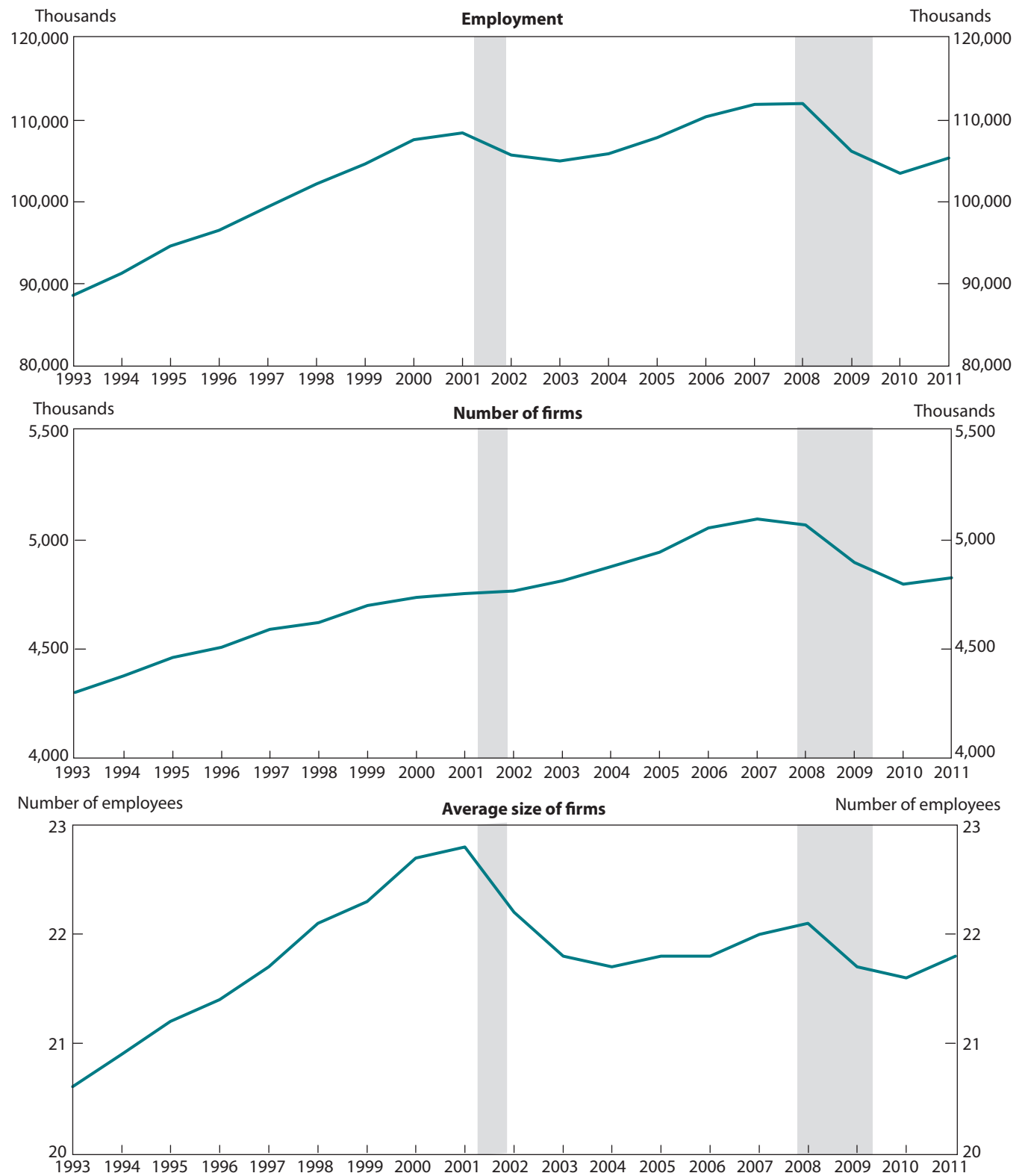
puted the average size of firms as employment divided by the number of firms.

Employment in firms, number of firms, and the average size of firms for the 1993–2011 period is presented in chart 2. Looking at the bottom graph, we see that the time series of the average size of firms is broadly similar to the time series of the average size of establishments: both rose during the 1990s, although the rise in the average size of firms was greater than the rise in the average size of establishments, and then both declined during and immediately following the 2001 recession. During the 2000s expansion, however, the average size of firms rose by 0.2 (from 21.8 in March 2003 to 22.0 in March 2007), whereas the average size of establishments fell by 0.2 (from 16.6 in March 2003 to 16.4 in March 2007). Both series then declined during the 2007–2009 recession.

The data in charts 1 and 2 lead us to conclude that both the average size of establishments and the average size of firms rose during the 1990s expansion, and held relatively steady during the 2000s expansion. This robustness check confirms that, in some manner, businesses are structuring their workforces differently in the 2000s than in the 1990s.

*Do Census data show a declining average size?* The Census Bureau's Business Dynamics Statistics (BDS) are similar to the BED data from the BLS. Both the BDS and the BED programs publish time series of employment, the number of establishments, and the number of firms in the private sector.<sup>7</sup> The average size of establishments and firms from the BDS and the BED are graphed in chart 3.<sup>8</sup> There are two immediate conclusions from chart 3. First, we see that both the BLS and the Census Bureau data show the average size of businesses—measured as either the average size of establishments or the average size of firms—growing during the 1990s expansion, declining during recessions, and basically holding steady during the 2000s expansion. The precise quantifications are as follows: the average size of establishments grew by 0.8 in the BED series and by 1.5 in the BDS series during the 1990s expansion (1994–2000), whereas the average size of establishments fell by 0.2 in the BLS series and by 0.1 in the BDS series during the 2000s expansion (2003–2007). The average size of firms grew by 1.9 in the BED series and by 2.4 in the BDS series during the 1990s expansion, whereas the average size of firms grew by 0.2 in both the BLS series and the BDS series during the 2000s expansion. While the exact amount of growth and decline varies somewhat depending upon whether we are looking at establishments or firms, or whether we are looking at BLS or Census data, all four series plotted in chart 3 show that the average size of businesses rose during the 1990s expansion and was relatively flat or inched downward during the 2000s expansion.

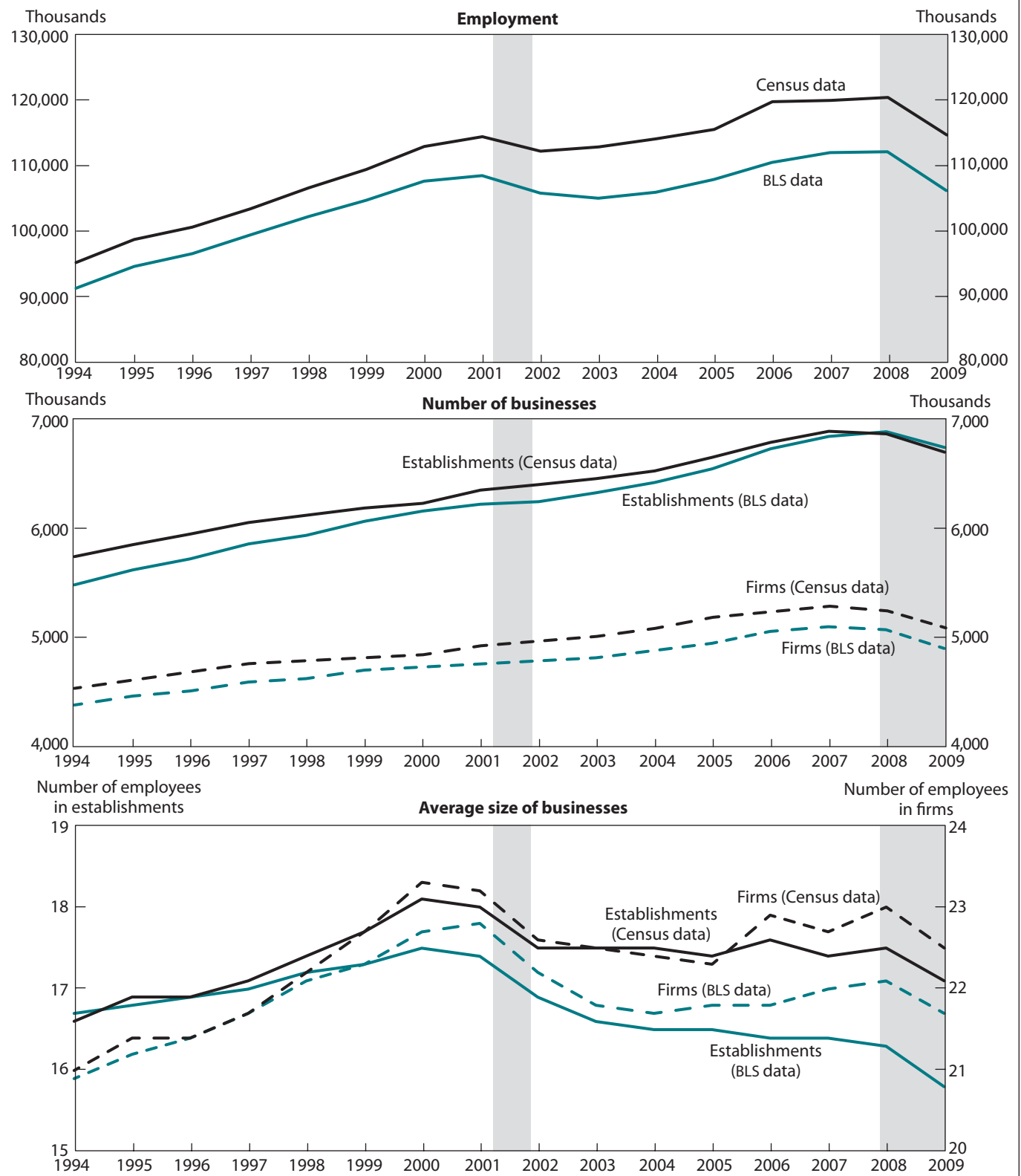
**Chart 2. Private sector employment, number of firms, and average size of firms, 1993–2011**



NOTE: Shaded areas represent recessions as designated by the National Bureau of Economic Research (NBER).

SOURCE: Business Employment Dynamics (BED) data derived from first quarter data from the Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

**Chart 3. Private sector employment, number of businesses, and average size of businesses, 1994–2009**



NOTE: Shaded areas represent recessions as designated by the National Bureau of Economic Research (NBER).

SOURCE: BLS data are from the Business Employment Dynamics (BED) program whose data are derived from first quarter data from the Quarterly Census of Employment and Wages. Census data are from the Business Dynamics Statistics (BDS) program.

The second conclusion from chart 3 is that we see a divergence in the average size of businesses when comparing the BDS and the BED data. The data from both sources show that establishments had an average of 16.9 employees in 1996. In 1998, the average size of establishments was higher in the BDS series than in the BED, and this difference grew until, by 2000, the average size in the BDS was 18.1 and the average size in the BED was 17.5. This difference widened as the economy emerged from the 2001 recession, and in 2004 the difference in the average size of establishments was one full employee (17.5 in the BDS versus 16.5 in the BED series). This difference grew again in the mid-2000s and during the 2007–2009 recession. In 2009, the average size of establishments in the BDS was 17.1 whereas the average size of establishments in the BED series was 15.8. A similar yet somewhat smaller divergence holds for the BED and BDS measures of the average size of firms.

This divergence between the BED average size measure and the BDS average size measure is almost entirely due to divergences in the level of employment rather than divergences in the number of establishments. Visual inspection of the top graph of chart 3 shows a relatively large divergence in employment level as measured by the two data sources. During the mid-1990s, BDS employment was about 4 million higher than BED employment. This difference rose monotonically from 1997 to 2004; the 2004 difference was 8.1 million. By 2009, the BDS had 8.4 million more employment than did the BED.<sup>9</sup> The middle graph of chart 3 shows that the BED has a slightly higher growth rate of the number of establishments than does the BDS, whereas the growth rates of the number of firms appear to be identical. This small divergence in the establishment counts helps explain why the average size of establishments diverges more across data sources than does the average size of firms. A formal decomposition shows that 92 percent of the 1996–2009 divergence in the average size of establishments was due to differential growth rates in employment, with the remaining 8 percent of the divergence due to differential growth rates in the number of establishments.

*A longer run perspective.* A natural question at this stage of the analysis is to ask about the average size of businesses before the 1990s. We know of two data sources that would allow for pushing back the average-size statistics into the 1980s and earlier. The first source is the Census data used in the previous subsection—these data start in 1977. The second is the published data on employment and the number of employers covered by state and fed-

eral UI laws; these data go back to 1938, the start of the UI program. However, as we have been unable to create a consistent time series from the UI data, we used the Census data for our analysis here.<sup>10</sup>

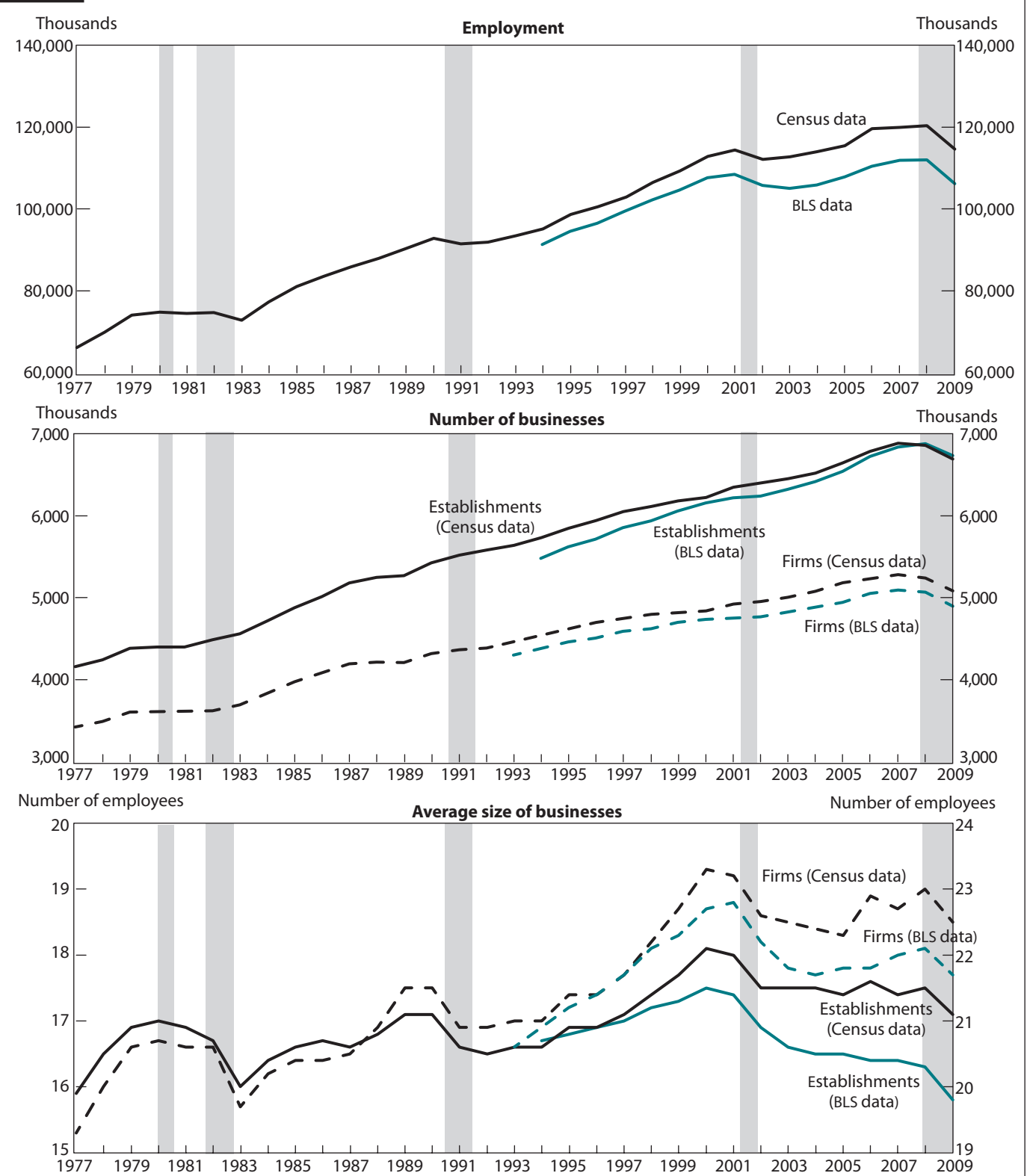
We present the employment, the number of establishments and firms, and the average size of establishments and firms from 1977 to 2009 in chart 4. The main point to take away from chart 4 is that the average size of establishments and the average size of firms declined during recessions and increased during the expansions of the 1970s, the 1980s, and the 1990s. The average size of establishments grew by 1.0 employee during the economic expansion of 1977–1979, by 1.1 during the 1983–1989 expansionary period, and by 1.6 during the 1992–2000 expansion. The average size of firms grew by 1.3 workers from 1977 to 1979, by 1.8 from 1983 to 1989, and by 2.4 from 1992 to 2000. The trend in average size during the 2003–2007 expansion, however, was different from the increases of the previous three decades. In the BDS data, the average size of establishments fell by 0.1 worker during the 2003–2007 period, and the average size of firms only grew by 0.2 during the same period.

## Basic analysis of employment and establishment size

*The size distribution.* To isolate the source of the difference in the average size growth between the 1994–2000 and 2003–2007 expansions, we start our descriptive analysis by examining where in the size distribution the difference has occurred during the two expansionary periods.

Table 1 presents percent distributions of employment and establishments across the nine standard size categories (1–4, 5–9, 10–19, 20–49, 50–99, 100–249, 250–499, 500–999, and 1,000+ employees) using unpublished BED tabulations. Also shown are similar calculations using the public-use BED data on employment and number of firms. We selected March 1994, March 2000, March 2003, and March 2007 to define the starting and ending points of the 1990s and the 2000s expansions. The establishment data show that employment shifted away from small establishments with 19 or fewer employees and grew in larger establishments with 50–999 employees during the 1994–2000 expansion. During the 2003–2007 expansion, on the contrary, there was not much of a change in the size distribution except that the proportion of employment in establishments with 1,000 or more employees dropped noticeably. The distribution of establishments in each size category exhibits one prominent change across the two expansions: the share

**Chart 4. Private sector employment, number of businesses, and average size of businesses, 1977–2009**



NOTE: In the bottom panel, the average size of establishments is on the left axis and the average size of firms is on the right axis. Shaded areas represent recessions as designated by the National Bureau of Economic Research (NBER).

SOURCE: BLS data are from the Business Employment Dynamics (BED) program whose data are derived from the first quarter data from the Quarterly Census of Employment and Wages. Census data are from the Business Dynamics Statistics (BDS) program.

**Table 1. Percent distribution of total private sector employment, establishments, and firms by establishment or firm size, selected years**

Size category	Establishment data								Firms data							
	Employment				Establishments				Employment				Firms			
	1994	2000	2003	2007	1994	2000	2003	2007	1994	2000	2003	2007	1994	2000	2003	2007
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1-4	6.5	6.0	6.3	6.4	50.2	49.8	50.4	51.0	5.5	4.9	5.2	5.2	53.6	53.1	54.0	54.8
5-9	8.6	7.9	8.3	8.2	21.6	20.9	20.8	20.3	6.7	6.0	6.2	6.0	21.2	20.7	20.6	20.0
10-19	10.9	10.6	11.1	11.2	13.5	13.7	13.6	13.5	8.0	7.5	7.7	7.5	12.5	12.7	12.5	12.2
20-49	16.5	16.5	17.0	17.4	9.1	9.5	9.4	9.4	11.4	10.9	11.0	10.9	7.9	8.2	8.0	7.9
50-99	12.8	13.1	13.2	13.5	3.1	3.3	3.2	3.2	8.5	8.3	8.2	8.2	2.6	2.7	2.6	2.6
100-249	16.1	16.6	16.5	16.7	1.8	1.9	1.8	1.8	10.6	10.5	10.4	10.5	1.5	1.6	1.5	1.5
250-499	9.3	9.9	9.5	9.4	.5	.5	.5	.4	7.1	7.4	7.1	7.2	.4	.5	.5	.5
500-999	7.0	7.4	6.8	6.7	.2	.2	.2	.2	6.6	7.0	6.8	6.8	.2	.2	.2	.2
1,000+	12.3	11.9	11.3	10.5	.1	.1	.1	.1	35.6	37.5	37.4	37.8	.2	.2	.2	.2

SOURCE: Business Employment Dynamics (BED) data derived from first quarter data from the Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics

of establishments with fewer than 5 employees fell during the 1994–2000 expansion (from 50.2 percent to 49.8 percent) but rose during the 2003–2007 expansion (from 50.4 percent to 51.0 percent).

The data in table 1 for firms also tell us that employment share fell in small and mid-sized firms (with fewer than 250 employees) and increased in large firms during the 1994–2000 expansion but stayed relatively constant during the 2003–2007 expansion. The distribution of firms over size classes is similar across the 4 years, with the exception of the smallest size class, which fell in the 1990s but grew in the 2000s.

We wish to highlight the role of the smallest businesses in table 1. During the 1990s expansion, both the employment share and the establishment share shifted from small businesses to medium- and large-sized businesses, but during the 2000s expansion, the employment share in the smallest businesses was constant and the relative share of businesses classified in the smallest size category increased. This suggests that the explanation for the change in trend in the average establishment size will have some of its roots in the smallest establishments and firms.

*Industry analysis.* Our next descriptive analysis examines whether the change in trend of the average size of establishments was driven by changes in industry composition. For example, we know that manufacturing establishments are larger, on average, than service establishments, and the shift in employment out of manufacturing and into services could generate a falling average establishment size.

Table 2 presents percent distributions of employment, establishments, and the average size of establishments by the 2-digit North American Industry Classification System (NAICS) for the same points in time used in table 1. The most noticeable change in the industry composition is the decline of manufacturing since 1994. Manufacturing employed 18.3 percent of U.S. workers in 1994, and this proportion decreased to 16.1 percent in 2000, 13.9 percent in 2003, and 12.4 percent in 2007. Manufacturing's share of establishments also declined, falling from 6.6 percent in 1994 to 6.0 percent in 2000, 5.4 percent in 2003, and 4.8 percent in 2007. This decline in manufacturing was offset by increases in construction; professional, scientific and technical services; administrative and support services; and health care and social assistance.

The columns on the right of table 2 show that the trend in the average size of establishments changed in almost all industries during the 2000s expansion compared with the 1990s expansion. The change in trend was either to slower growth or to an accelerated decline after the 2001 recession. The average size grew during the 1990s expansion and then grew at a slower rate during the 2000s expansion in industries such as construction, retail trade, and accommodation and food services. These industries are known as cyclical industries as we would normally expect them to grow during expansions. The average size grew during the 1990s expansion and then became flat during the 2000s expansion in wholesale trade, transportation and warehousing, administrative and support services, and other services. Industries whose average size grew during



**Table 2. Percent distribution of total private sector employment and establishments, and average size of establishments, by industry, selected years**

NAICS code	Industry name	Employment				Establishments				Average size of establishments			
		1994	2000	2003	2007	1994	2000	2003	2007	1994	2000	2003	2007
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	16.6	17.5	16.6	16.3
11	Agriculture, forestry, fishing, and hunting	1.1	1.0	1.0	.9	1.5	1.3	1.3	1.2	12.6	12.9	12.8	13.0
21	Mining	.6	.5	.5	.6	.4	.4	.3	.4	23.1	22.3	22.3	25.1
22	Utilities	.8	.6	.6	.5	.3	.2	.2	.2	50.7	40.7	37.9	35.8
23	Construction	5.0	5.9	6.0	6.5	9.2	9.8	9.9	10.3	9.0	10.5	10.1	10.4
31-33	Manufacturing	18.3	16.1	13.9	12.4	6.6	6.0	5.4	4.8	45.8	46.8	42.5	41.9
42	Wholesale trade	5.4	5.3	5.3	5.3	8.4	8.0	7.9	7.8	10.8	11.6	11.1	11.1
44-45	Retail trade	14.3	13.9	13.9	13.6	17.3	15.6	14.8	13.8	13.7	15.6	15.6	16.1
48-49	Transportation and warehousing	3.7	3.8	3.7	3.8	2.8	2.9	2.7	2.7	22.0	23.3	22.6	22.6
51	Information	3.0	3.3	3.1	2.7	1.7	1.9	1.9	1.7	29.5	29.7	27.0	25.3
52	Finance and insurance	5.5	5.1	5.5	5.4	5.5	5.7	5.9	6.2	16.5	15.7	15.3	14.1
53	Real estate and rental and leasing	1.9	1.9	1.9	1.9	4.5	4.3	4.4	4.6	7.1	7.5	7.3	6.8
54	Professional, scientific, and technical services	5.6	6.2	6.3	6.8	9.3	10.7	11.0	11.5	10.0	10.2	9.5	9.7
55	Management of companies and enterprises	1.6	1.6	1.6	1.6	.5	.6	0.5	.6	56.0	52.1	48.9	42.8
56	Administrative and support services	5.7	7.3	7.0	7.3	4.6	5.0	5.1	5.3	20.9	25.5	22.7	22.7
61	Educational services	1.6	1.7	2.0	2.1	0.8	0.9	1.0	1.0	34.8	33.9	34.0	32.5
62	Health care and social assistance	11.8	11.6	13.0	13.4	9.4	9.1	9.4	9.8	20.7	22.2	22.8	22.4
71	Arts, entertainment, and recreation	1.5	1.6	1.6	1.6	1.3	1.3	1.3	1.4	19.6	21.3	19.7	18.9
72	Accommodation and food services	9.1	9.1	9.6	9.9	7.8	7.5	7.7	7.8	19.6	21.2	20.6	20.9
81	Other services (except public administration)	3.6	3.4	3.6	3.4	8.1	7.7	7.6	7.2	7.3	7.8	7.8	7.8
99	Unclassified	.1	.2	.2	.2	.2	1.1	1.5	1.7	5.7	2.9	2.6	2.1

SOURCE: Business Employment Dynamics (BED) data derived from first quarter data from the Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

the 1990s but declined during the 2000s included manufacturing, information, real estate and rental and leasing, health care and social assistance, and arts, entertainment, and recreation. In the finance and insurance, management of companies and enterprises, and educational services industries, the average size of establishments was flat or declined during the 1990s expansion and declined more rapidly during the 2000s expansion.

To get a more formal understanding of how industry changes affect the average establishment size, we decom-

posed the total change in the average establishment size between 1994 and 2000 as well as between 2003 and 2007 into the average size effect and the establishment share effect by industry. The average size effect measures the change in the average size of establishments attributable to the changing average size within industries, holding the industry establishment share fixed. The establishment share effect measures the change in the average size of establishments attributable to changes in the establishment shares among industries, holding the average size of

establishments in each industry constant.

The decomposition formula can be written as the following:

$$\Delta S_t = \sum_i \Delta S_{it} \bar{\lambda}_{it} + \sum_i \Delta \lambda_{it} \bar{S}_{it}. \quad (1)$$

Here,  $\Delta S_{it} = S_{it_1} - S_{it_0}$  is the change in the average establishment size in industry  $i$  over time interval  $t = [t_0, t_1]$ ,  $\bar{\lambda}_{it} = (\lambda_{it_1} + \lambda_{it_0}) / 2$  is the average establishment share of industry  $i$  at time  $t_0$  and  $t_1$ ,  $\Delta \lambda_{it}$  is the change in the average establishment share during the time interval  $t = [t_0, t_1]$ , and  $\bar{S}_{it} = (S_{it_1} + S_{it_0}) / 2$  is the average of industry  $i$ 's establishment size at time  $t_0$  and  $t_1$ . We implemented this decomposition using the 20 industry categories at the two-digit NAICS level.

Tables 3 and 4 present the industry decomposition results for the 1994–2000 and 2003–2007 expansions, respectively. The average size of establishments increased by about 0.8 employee during the 1994–2000 expansion; as shown in table 2, this is the growth from 16.6 to 17.5.<sup>11</sup> The 130.0 percent in the top row of table 3 shows that, when the establishment share is held constant, this increase is more than entirely explained by the average size change within industries. The increases in average size in industries such as construction, retail trade, administrative and support services, health care, and accommodation and food services were the main contributors to the increase in the average size effect. The negative sign of the establishment share effect (–30.0 percent in the top row of table 3) indicates that, if the average size within industries had remained constant, the average size of total establishments would have declined because of composition changes in the establishment shares across industries during the 1994–2000 period. The establishment share effect mainly resulted from the relative decline of the manufacturing and retail trade industries.

Table 4, on the other hand, analyzes the average establishment size decrease of 0.3 employee during the 2003–2007 expansion; as shown in table 2, this is the decline from 16.6 to 16.3. Holding the establishment share of each industry constant, the changes in the industry-specific average sizes explain 46 percent of the 0.3 decrease. The major contributors to this decrease were the manufacturing, information, finance and insurance, management, and health care industries. These are industries where technological change generally can easily be adopted. Holding the average size of each industry constant, the changes in the establishment shares across industries explain 54 percent of the 0.3 decrease in the average size. In particular, the declining relative shares of the manufacturing and retail trade industries drove the 2003–2007

establishment share effect.

Our analysis in tables 3 and 4 led us to conclude that the change in trend of establishment size growth over the last two decades was not driven by a particular industry but rather by many industries, although the decline of manufacturing had a relatively large effect. The composition effect that occurs when the economy shifts from manufacturing, with its large average establishment sizes, to services, with its smaller establishment sizes, is estimated to have decreased the average size of establishments in the total private sector by 0.24 employee during the 1994–2000 period ( $0.8 \times -30$  percent) and by 0.16 in the 2003–2007 period ( $-0.3 \times 53.6$  percent).

*Age analysis.* Our final descriptive analysis examines whether the change in trend of the average establishment size is related to the age distribution of establishments. We used BED data on employment and number of establishments by age.<sup>12</sup>

Table 5 presents percent distributions of employment and establishments as well as the average size of establishments by establishment age in 1994, 2000, 2003, and 2007. (Because the data series begins in 1994, we have incomplete information on the age distribution in 1994.<sup>13</sup> Three conclusions are immediately apparent from this table. First, older establishments are larger, on average, in all years. For example, in 2007, the youngest establishments have an average of 5.3 employees whereas the establishments 7 years or older have an average of 22.2 employees. This positive relationship between age and average size is not surprising and occurs both because large establishments tend to survive and because surviving establishments grow during their early years. Second, more than half of establishments are 7 years or older, and these establishments employ more than 70 percent of workers. Establishments and employment became more concentrated in the 7+ years category over the last decade. Third, and most importantly in our analysis, the average size of establishments decreased substantially in the younger age categories between 2000 and 2007.

Charts 5 and 6 show the average size of establishments born between 1993 and 2010 by age and by birth cohort, respectively. Each line in chart 5 indicates the time series profile of each age group, and each line in chart 6 indicates the age profile of each birth cohort. The lowest line in chart 5 shows that the average size of new births was constant at around 7.6 employees from 1994 to 1999, and has gradually declined almost every year since 1999. In 2011, the average size of new births was 4.7. Chart 5 also shows that the average size of establishments less than 6

**Table 3. Decomposition of the change in the size of total private sector establishments from 1994 to 2000, by industry**

NAICS code	Industry name	2000–1994 difference		Decomposition of total 0.8 change		
		Average size	Establishment share (percentage point)	Average size effect (percent)	Establishment share effect (percent)	Total effect (percent)
	Total	0.8	–	130.0	–30.0	100.0
11	Agriculture, forestry, fishing, and hunting	.3	–.1	.5	–1.6	–1.1
21	Mining	–.7	–.1	–.4	–2.2	–2.6
22	Utilities	–10.0	–.01	–3.0	–.7	–3.7
23	Construction	1.5	.6	17.3	7.4	24.6
31–33	Manufacturing	1.1	–.7	8.0	–36.2	–28.1
42	Wholesale trade	.8	–.4	7.8	–5.2	2.6
44–45	Retail trade	1.9	–1.7	36.7	–30.6	6.1
48–49	Transportation and warehousing	1.3	.1	4.3	2.1	6.4
51	Information	.1	.3	.3	9.4	9.6
52	Finance and insurance	–.8	.2	–5.6	4.0	–1.6
53	Real estate and rental and leasing	.5	–.2	2.4	–1.6	.8
54	Professional, scientific, and technical services	.2	1.4	2.0	17.2	19.2
55	Management of companies and enterprises	–3.9	.1	–2.4	4.8	2.4
56	Administrative and support services	4.6	.4	26.1	11.6	37.8
61	Educational services	–.9	.1	–.9	4.7	3.8
62	Health care and social assistance	1.5	–.3	16.7	–8.6	8.1
71	Arts, entertainment, and recreation	1.7	.02	2.7	.4	3.0
72	Accommodation and food services	1.6	–.2	14.8	–6.0	8.8
81	Other services (except public administration)	.5	–.4	4.7	–3.6	1.1
99	Unclassified	–2.8	.9	–2.1	4.8	2.7

SOURCE: Business Employment Dynamics (BED) data derived from first quarter data from the Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

years old was almost flat or increased slightly during the 1994–2000 expansion and decreased around and after the 2001 recession. The average size of establishments 6 years or older was almost flat or increased slightly during the 2003–2007 expansion, although it is hard to generalize as we have limited data for these older establishments in these years. Interestingly, the lines do not cross and are almost parallel except for establishments that were 11–14 years old. In chart 6, the age profiles slope upward and are almost parallel for the cohorts born during the 2000s expansion. Among establishments born after 2000, the age profiles for more recent birth cohorts started lower and generally stayed lower than those for earlier birth cohorts.

In our working paper (<http://www.bls.gov/osmr/pdf/ec120010.pdf>), we present the average size of establishments by age and by birth cohort in each industry. The time series profiles of the average establishment size in almost all industries were downward sloping and almost parallel among young establishments during the 2000s expansion, which is what we observe for the total private sector in chart 5. Similarly, the age profiles were upward sloping and parallel among young establishments in most industries. The slopes of the age and time series profiles were steeper among technology-intensive industries than labor-intensive industries. The former include manufacturing, information, management, and administrative and support services, whereas construction, wholesale trade, retail trade,

**Table 4. Decomposition of the change in the size of total private sector establishments from 2003 to 2007, by industry**

NAICS code	Industry name	2007–2003 difference		Decomposition of total –.3 change		
		Average size	Establishment share (percentage point)	Average size effect (percent)	Establishment share effect (percent)	Total effect (percent)
	Total	–.3	–	46.4	53.6	100.0
11	Agriculture, forestry, fishing, and hunting	.2	–.1	–1.0	5.3	4.2
21	Mining	2.8	.03	–3.9	–2.5	–6.4
22	Utilities	–2.0	–.02	1.8	2.8	4.7
23	Construction	.3	.4	–12.5	–15.7	–28.2
31–33	Manufacturing	–.5	–.6	10.6	99.4	110.0
42	Wholesale trade	.002	–.1	–.05	4.7	4.6
44–45	Retail trade	.5	–.9	–27.0	57.8	30.8
48–49	Transportation and warehousing	.004	–.01	–.04	1.2	1.2
51	Information	–1.7	–.1	11.9	13.7	25.6
52	Finance and insurance	–1.2	.3	28.3	–17.0	11.2
53	Real estate and rental and leasing	–.4	.2	7.3	–5.0	2.3
54	Professional, scientific, and technical services	.1	.4	–5.7	–16.4	–22.1
55	Management of companies and enterprises	–6.1	.1	13.6	–15.5	–1.9
56	Administrative and support services	–.05	.2	1.0	–16.6	–15.6
61	Educational services	–1.5	.1	5.8	–12.3	–6.5
62	Health care and social assistance	–.4	.3	15.7	–29.8	–14.0
71	Arts, entertainment, and recreation	–.9	.1	4.6	–4.6	.003
72	Accommodation and food services	.2	.1	–7.0	–7.1	–14.2
81	Other services (except public administration)	–.0002	–.4	.01	12.2	12.3
99	Unclassified	–.5	.1	3.2	–1.2	2.1

SOURCE: Business Employment Dynamics (BED) data derived from first quarter data from the Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

and real estate and rental industries are among the latter.

We conducted a decomposition of the change in the average establishment size into the average size effect and the establishment share effect by age group. The decomposition formula is the same as in equation (1), but now *i* indicates age groups instead of industries. The decomposition was implemented with the eight age categories used in table 5. With the limited age data, this decomposition can be performed between 2003 and 2007 but not between 1994 and 2000.

Table 6 presents the decomposition results. The 0.2 decline in the average size of establishments between 2003 and 2007 is more than entirely explained by the average-size effect, which is estimated to be 150.8 percent.<sup>14</sup> The interpretation of this 150.8 percent statistic is that, holding constant the establishment shares of age cohorts, the changing average size of age cohorts would suggest the decrease in the average size should be greater (in abso-

lute value) than the observed decrease in the average size. The average size effects are generally larger for younger establishments. The estimated establishment share effect of –50.8 percent suggests that, holding constant the average size of each age cohort, the changing share of establishments towards older cohorts should have resulted in an increased average size. The largest contributor to the establishment share effect is establishments that are 7 or more years old. Overall, looking at the total effect column in table 6, the declining average size between 2003 and 2007 is quite uniformly contributable to the youngest age categories of 1–6 years old, with the 7+ year age category suggesting that the average size of establishments should have increased.

This statistical analysis in table 6 confirms what we saw in charts 5 and 6. We find that new establishment births are starting smaller and staying smaller, whereas older establishments are increasing their average size. This decline

**Table 5. Percent distribution of total private sector employment and establishments, and average size of establishments, by establishment age, selected years**

Age class	Employment				Establishments				Average size of establishment			
	1994	2000	2003	2007	1994	2000	2003	2007	1994	2000	2003	2007
Total	–	100.0	100.0	100.0	–	100.0	100.0	100.0	16.7	17.5	16.6	16.4
Less than 1 year	4.5	4.3	3.7	3.1	10.0	10.3	9.6	9.6	7.5	7.3	6.3	5.3
1 year	–	4.4	3.8	3.1	–	7.9	7.6	7.6	–	9.8	8.2	6.7
2 years	–	4.4	3.6	3.2	–	6.8	6.4	6.4	–	11.2	9.3	8.2
3 years	–	4.2	3.9	3.1	–	6.1	5.9	5.4	–	12.2	10.9	9.4
4 years	–	3.8	3.8	3.2	–	5.2	5.1	4.9	–	12.9	12.3	10.8
5 years	–	3.7	3.7	3.3	–	4.7	4.7	4.5	–	13.9	13.1	12.1
6 years	–	3.4	3.5	3.2	–	4.1	4.3	4.1	–	14.6	13.7	12.7
7+ years	–	71.7	74.1	77.7	–	55.0	56.3	57.5	–	22.8	21.8	22.2

SOURCE: Business Employment Dynamics (BED) data derived from first quarter data from the Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

in the average size of establishments at birth is a pattern that is monotonic across years and industries, with a starting point around the 2001 recession.

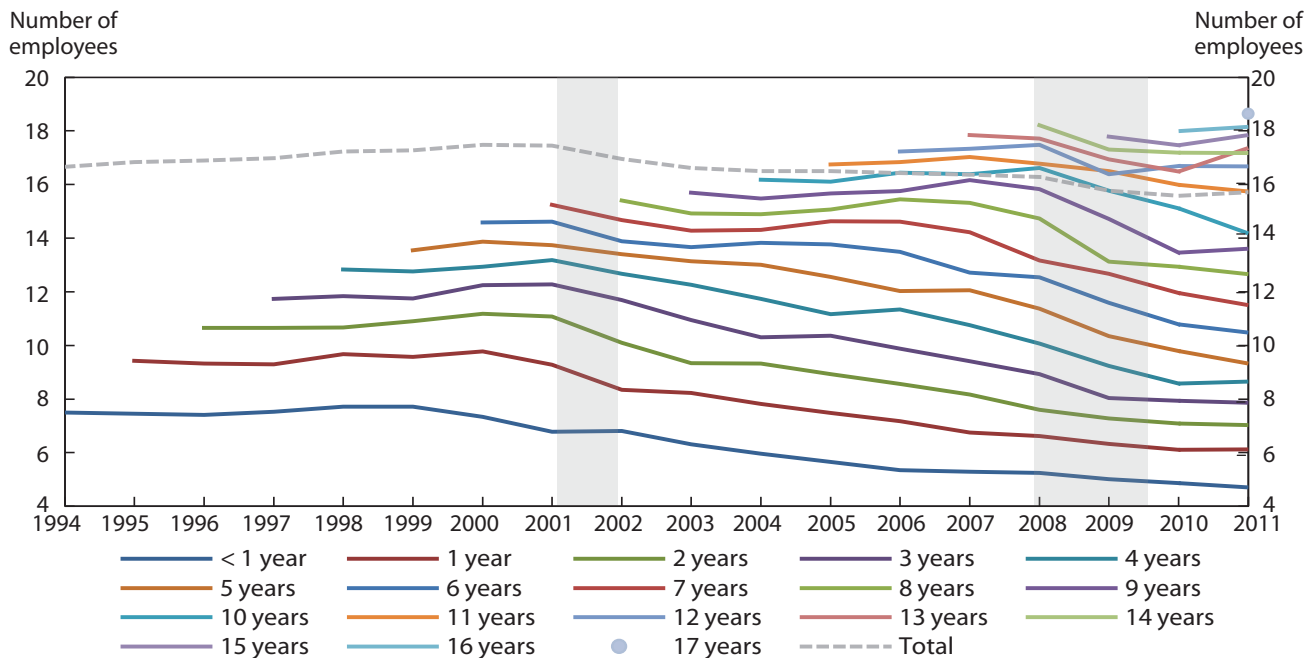
Our key finding—that establishment births are starting smaller and staying smaller—is not found in the Census BDS data, but we believe the BED data are more accurate. E.J. Reedy and Robert E. Litan noted the discrepancy in trends in their 2011 study, *Starting Smaller, Staying Smaller: America's Slow Leak in Job Creation*. In the BED data, the average size of establishment births monotonically falls from 7.7 in 1999 to 4.7 in 2011, yet the average size of establishment births in the BDS is relatively constant around 9.0 during the 2003–2008 period (although this lack of trend in the BDS is sensitive to endpoints).<sup>15</sup> The most noticeable aspects of the Census BDS data are the spikes in employment for establishment births and the spikes in the number of establishment births that occur in years ending in 2 and 7 (which are the years of the quinquennial Economic Census). These spikes affect the entire age distribution of employment and the number of establishments.<sup>16</sup> Because the spikes occur in both employment (the numerator of the average size calculation) and in the number of establishments (the denominator of the average size calculation), the resulting average size series appears relatively smooth. In contrast, the BED employment-by-age series and the BED number-of-establishments-by-age series are quite smooth over time. Given the spikes in the underlying BDS series of the numerator and the denominator, and given the variability of the BDS series, we discount the BDS average size of establishment birth series and put much more belief in the BED data.

THIS ARTICLE HAS BEEN MOTIVATED BY THE OBSERVATION that the average size of establishments has been falling during the decade of the 2000s. Our analysis shows that the average size of establishments rose during the 1990s expansion, fell during both the 2001 and the 2007–2009 recessions, and has been essentially flat during the 2000s expansion. The differing trends when comparing the 1990s expansion and the 2000s expansion exist for both establishments and firms, and exist in both BLS and Census public use data. The business cycle properties of the average size measure are similar in the late 1970s, the 1980s, and the 1990s, but the 2000s expansion was different from the three previous expansions.

Our key conclusion is that during the decade of the 2000s, establishment births started smaller and stayed smaller. This is a pattern that is monotonic across the decade, with a starting point around the 2001 recession. This finding of smaller establishment births is strong enough to explain the decrease in the average size for the total private economy.

We believe that this finding of smaller establishment births is consistent with the hypothesis that new establishments are entering the economy with new modes of production that place a greater emphasis on technology and a lesser emphasis on labor.<sup>17</sup> Our ongoing work is focused on finding empirical evidence consistent with this hypothesis. Some of the evidence that we presented in this paper suggests that industries that intensively use technology are those with the largest change in trends in the average size of establishments. As such, with the assumption that technology can be measured by capital or by specific types of capital such as information capital,

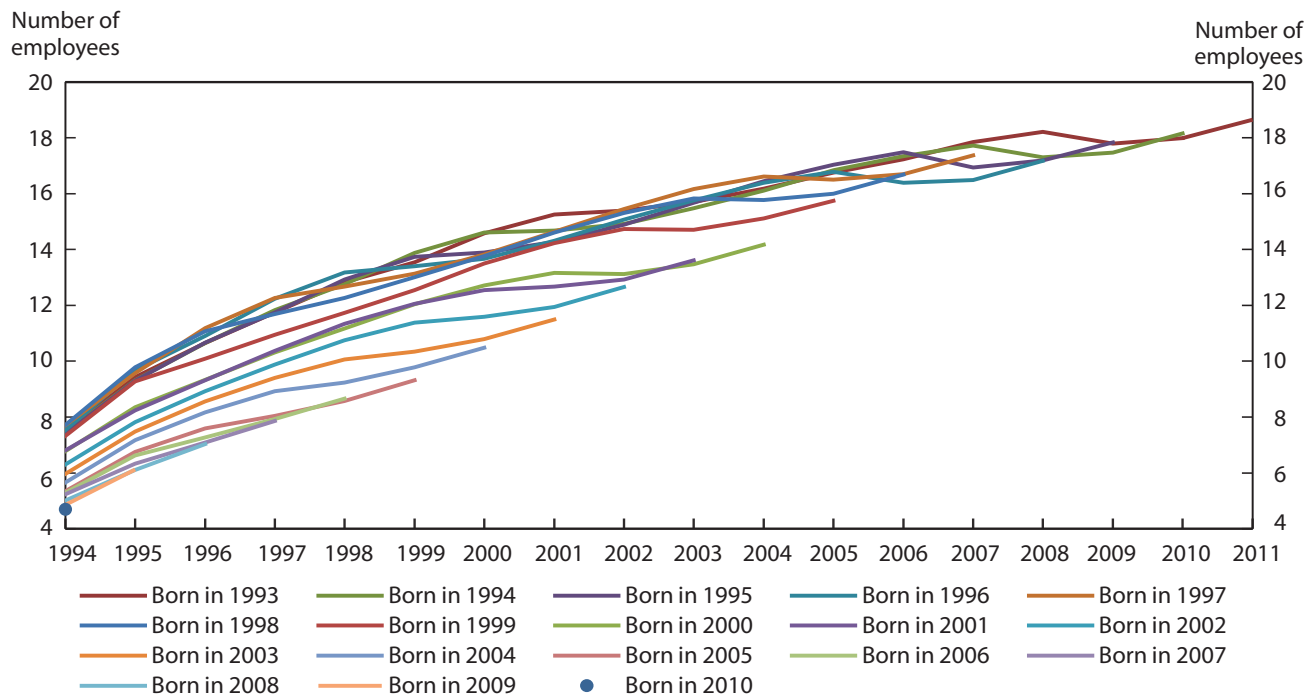
**Chart 5. Time series profile of average establishment size by establishment age**



NOTE: Establishments born before 1993 are not in the graph above but are reflected in the "total" line. Shaded areas represent recessions as designated by the National Bureau of Economic Research (NBER).

SOURCE: BLS data are from the Business Employment Dynamic (BED) program whose data are derived from first quarter data from the Quarterly Census of Employment and Wages.

**Chart 6. Age profile of establishment size by birth cohort**



SOURCE: BLS data are from the Business Employment Dynamic (BED) program whose data are derived from first quarter data from the Quarterly Census of Employment and Wages.

**Table 6. Decomposition of the change in the size of total private sector establishments from 2003 to 2007, by establishment age**

Age class	2007–2003 difference		Decomposition of total –0.2 change		
	Average size	Establishment share (percentage point)	Average size effect (percent)	Establishment share effect (percent)	Total effect (percent)
Total	–0.2	–	150.8	–50.8	100.0
Less than 1 year	–1.0	–.04	41.1	1.1	42.2
1 year	–1.5	.04	47.5	–1.4	46.1
2 years	–1.2	–.08	31.5	3.1	34.6
3 years	–1.5	–.46	36.4	19.7	56.1
4 years	–1.5	–.20	32.0	9.5	41.5
5 years	–1.1	–.18	20.9	9.5	30.4
6 years	–1.0	–.19	16.8	10.8	27.6
7+ years	.3	1.11	–75.4	–103.0	–178.5

SOURCE: Business Employment Dynamics (BED) data derived from first quarter data from the Quarterly Census of Employment and Wages,

U.S. Bureau of Labor Statistics.

we are using industry-level data to investigate whether changes in capital–labor ratios are correlated with changes in the average size of establishments. We are also looking at the trend of the average size of young establishments in the Occupational Employment Statistics (OES)

microdata, and investigating whether occupations losing employment because of decreasing establishment size are those that we would expect to be affected by technology-reducing labor, including clerical, administrative, and production occupations. □

## Notes

<sup>1</sup> The annual establishment age and survival series from the BLS Business Employment Dynamics program began in 1994, which is why the charts presented in this article start with data for 1994.

<sup>2</sup> Others have remarked on the declining size of establishment births. For instance, see Akbar Sadeghi, “The births and deaths of business establishments in the United States,” *Monthly Labor Review*, December 2008, pp. 3–18, <http://www.bls.gov/opub/mlr/2008/12/art1full.pdf>; E.J. Reedy and Robert E. Litan, *Starting Smaller; Staying Smaller: America’s Slow Leak in Job Creation*, Kauffman Foundation Research Series: Firm Formation and Economic Growth, July 2011, [http://www.kauffman.org/uploadedfiles/job\\_leaks\\_starting\\_smaller\\_study.pdf](http://www.kauffman.org/uploadedfiles/job_leaks_starting_smaller_study.pdf); and John Robertson, “The New Firm Employment Puzzle,” Federal Reserve Bank of Atlanta Macroblog, August 18, 2011, <http://macroblog.typepad.com/macroblog/2011/08/new-firm-employment-puzzle.html>.

<sup>3</sup> For more information about the construction and uses of the BED, see James R. Spletzer et al., “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>.

<sup>4</sup> The employment data are online at [http://www.bls.gov/bdm/us\\_age\\_naics\\_00\\_table6.txt](http://www.bls.gov/bdm/us_age_naics_00_table6.txt), and data on the number of establishments are online at [http://www.bls.gov/bdm/us\\_age\\_naics\\_00\\_table5.txt](http://www.bls.gov/bdm/us_age_naics_00_table5.txt).

<sup>5</sup> See Ricardo J. Caballero and Mohamad L. Hammour, “The Cleansing Effect of Recessions,” *The American Economic Review*, Vol. 84, December 1994, pp. 1350–1368, <http://www.jstor.org/stable/2117776>.

<sup>6</sup> The employment data are online at [http://www.bls.gov/web/cewbd/table\\_f.txt](http://www.bls.gov/web/cewbd/table_f.txt), and data on the number of firms are online at [http://www.bls.gov/web/cewbd/table\\_g.txt](http://www.bls.gov/web/cewbd/table_g.txt).

<sup>7</sup> The BDS data are online at [http://www.ces.census.gov/index.php/bds/bds\\_database\\_list](http://www.ces.census.gov/index.php/bds/bds_database_list). As of March 27, 2012, BDS data for 2010 and 2011 were not yet available.

<sup>8</sup> Note that there is no difference in employment when looking at establishments versus firms.

<sup>9</sup> The fact that the BDS employment is several million higher than BED employment in the early-to-mid 1990s is not surprising—this is one of the primary conclusions from the BLS–Census Business List Comparison Project that was conducted in the mid-2000s. This comparison project also found that the employment difference between BLS and Census data series grew in magnitude during the 1999–2002 period. (The comparison project only analyzed data from 1993 to 2002.) Further details of the BLS–Census Business List Comparison Project can be found in Randy Becker et al., “A Comparison of the Business

Registers Used by the Bureau of Labor Statistics and the Bureau of the Census” (presented at the 2005 American Statistical Association annual meetings), <http://www.bls.gov/osmr/pdf/st050270.pdf>; Joel Elvery et al., “Preliminary Micro Data Results from the Business List Comparison Project” (presented at the 2006 American Statistical Association annual meetings); and Kristin Fairman et al., “An Analysis of Key Differences in Micro Data: Results from the Business List Comparison Project” (presented at the 2008 American Statistical Association annual meetings), <http://www.bls.gov/osmr/pdf/st080020.pdf>.

<sup>10</sup> The data on employment and the number of employers covered by UI laws are published annually by BLS in *Employment and Wages*. This publication is only in hard copy through 2004. BLS now publishes UI-covered employment and the number of establishments online, with statistics available from 2001 to the present. However, for many reasons, the earlier published data, the online data series, and the data we use in chart 1 do not form a consistent 72-year time series.

<sup>11</sup> More precisely, the average size of establishments grew by 0.84 from 16.63 in 1994 to 17.47 in 2000.

<sup>12</sup> These data are available at [http://www.bls.gov/bdm/us\\_age\\_naics\\_00\\_table6.txt](http://www.bls.gov/bdm/us_age_naics_00_table6.txt) and [http://www.bls.gov/bdm/us\\_age\\_naics\\_00\\_table5.txt](http://www.bls.gov/bdm/us_age_naics_00_table5.txt).

<sup>13</sup> Not all of the eight age categories are available from the BED data for each year from 1994 to 2011. For example, less than 1 year and 1 year and older are the only two available age categories in 1994.

<sup>14</sup> The discrepancy between table 6 (–0.2) and table 4 (–0.3) comes from differences in the number of establishments between the published annual age data and the unpublished quarterly industry data. The difference, however, is very small (more precisely –0.24 versus –0.26).

<sup>15</sup> We thank Javier Miranda at the Census Bureau for sending us the unpublished tabulations used in Figure 7 of Reedy and Litan, “Starting Smaller; Staying Smaller.”

<sup>16</sup> For example, the spike in 1992 birth employment leads to a spike in 1993 employment of establishments that are 1 year old, a spike in 1994 employment of establishments that are 2 years old, and so forth.

<sup>17</sup> This hypothesis is inherent in vintage capital models, yet empirical evidence is limited. For a review of the empirical literature and some new empirical results, see Alicia M. Robb and E.J. Reedy, *Casting a Wide Net: Online Activities of Small and New Businesses in the United States*, Kauffman Foundation, October 2011, [http://www.kauffman.org/uploadedfiles/kfs\\_casting\\_wide\\_net.pdf](http://www.kauffman.org/uploadedfiles/kfs_casting_wide_net.pdf).