

## The births and deaths of business establishments in the United States

*Bureau of Labor Statistics economists have tested various methods for defining and counting births and deaths of establishments and businesses; the results of their research will allow BLS to better measure entrepreneurship in the United States*

Akbar Sadeghi

The role of entrepreneurs in the American economy is legendary. One of the unique characteristics of the U.S. economic system is the freedom to start a business relatively easily and quickly. Indeed, one of the engines of growth is the employment and wages generated by new businesses. It is also an economic reality that businesses close frequently. The interplay of business births and deaths is not fully understood with the existing range of economic measures available from U.S. statistical agencies.

The story of entrepreneurship also entails a never-ending search for new and imaginative ways to combine the factors of production into new methods, processes, technologies, products, or services. These efforts lead to the growth of new businesses, the decline of less productive ones, and the reallocation of resources from less profitable businesses and establishments to more profitable ones. This process is often referred to as “creative destruction,” a concept popularized by the economist Joseph Schumpeter.<sup>1</sup>

This article describes more than 2 years of research and development of concepts and methods. These findings lead towards a greater understanding of the role and dynamics of business formations and business deaths, of business survival, and of the changing contribution of American entrepreneurs. This work is expected to lead to the publication of new

data series with quarterly estimates of business births and deaths under the BLS Business Employment Dynamics (BED) program, an outgrowth of the Quarterly Census of Employment and Wages (QCEW) program. In this article, the terms “births” and “deaths” refer to the births and deaths of entire firms or individual establishments. When the word “business” is used in the context of this article, it refers to both establishments and firms. However, establishment births and deaths are the article’s main focus.

The BED statistics are based on measurement of “gross job flows.” Data development and economic analysis based on job flows are a new approach in labor market analysis that came about primarily through access to the microdata of U.S. business establishments.<sup>2</sup> Over the past decade, researchers utilized data sources such as the QCEW and the Census Bureau’s longitudinal database for the manufacturing sector to create a rich body of literature on this subject.<sup>3</sup> Gross job flows are estimated by simply aggregating the net changes in employment at the establishment level. Gross job gains are the sum of all net gains in expanding and opening establishments. Gross job losses, similarly, are the sum of all net losses in contracting and closing establishments. The net change in employment is the difference between gross job gains and gross job losses. Gross job gains and gross job losses are indica-

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tive of job churn, and they reflect adjustments made by businesses in response to changes in economic events and conditions.

For the purposes of BED statistics, openings are defined as those establishments that had positive employment for the first time in the third month of the current quarter with no link to the previous quarter, or had positive employment in the current quarter and zero or no employment in the previous quarter.<sup>4</sup> “Zero employment” means that an employment level of zero was reported, whereas “no employment” means that there were not any employment numbers reported at all. In this article, the term “zero employment” is used to mean either zero employment or no employment. According to the BLS definition of openings, openings include both new startups (births) and reopenings of the existing seasonal establishments that reported zero employment in the previous quarter. Closings are defined in an analogous manner. Closings are establishments that reported positive employment in the third month of the previous quarter and zero employment in the current quarter. Closings include establishments that go out of business permanently (deaths), as well as seasonal businesses that shut down temporarily.

The concepts of establishment birth and establishment death—both of which exclude seasonal businesses—are highly significant for understanding the job market and the business cycle. Birth data provide a measure of entrepreneurial activities and gauge new entries and reallocation of resources towards growing areas. Births are entirely different from reopenings of existing businesses, which are included in current BED data on openings. Similarly, business death data measure failing enterprises and identify sectors from which resources are being shifted away. That again is different from the temporary plant shutdowns included in BED closings data. This article provides preliminary tabulations of business births and deaths and offers a methodology based on an analysis of the proposed definitions of birth and death. In what follows, first a brief overview of the Business Employment Dynamics concept, definitions and methodology is presented, followed by an analysis of the data on births and deaths that are based on the preferred method of estimation. Finally, alternative definitions of birth and death are discussed using birth and death estimates from the third quarter of 1994 through the first quarter of 2007.

## What are Business Employment Dynamics?

The BED program publishes quarterly statistics on gross job gains and gross job losses. These statistics are derived

from establishment-level microrecords of the QCEW program. The QCEW program’s estimates are based on mandatory quarterly reports on employment and wages submitted by all employers subject to unemployment insurance laws. The quarterly reports are only the starting point. The incoming UI data are reviewed and edited, industry codes are assigned and routinely updated, geographical codes are assigned and updated, employment and wage data are scrutinized, respondents are contacted to validate significant changes in employment, predecessors and successors are identified, and corrections are made on the basis of new information. This value-added process turns raw, unedited administrative data into high-quality, reliable, and consistent economic statistics. The resulting QCEW statistics are the most accurate, timely, and frequent in the Federal statistical system at the local level. Each year, more than 850,000 records of newly born establishments are captured, coded and researched for predecessor and successor relationships. In the fourth quarter of 2007, the QCEW program reported an employment level of 137.0 million in 9.1 million establishments for the total U.S. private and public sectors.

The data gathered in the QCEW program provide a virtual census of employees on nonfarm payrolls, covering 98 percent of such employees. In addition to being an accurate and detailed source of employment statistics, QCEW serves as the sampling frame for numerous BLS surveys, as a benchmark for BLS’s critical Current Employment Statistics and Occupational Employment Statistics surveys, and as an input to the Bureau of Economic Analysis’ National Income and Product Accounts.

The QCEW records are matched across quarters to create a longitudinal history for each establishment. Records are linked by their unique identifiers, including State codes, unemployment insurance numbers, and reporting unit numbers. The linkage method is designed in such a way as to create a history for continuous records and identify entries and exits, while avoiding spurious births and deaths that could be reported in the event of any changes of ownership, mergers, acquisitions, spinoffs, or other corporate restructuring.

The longitudinal database created from the linked records is used to construct BED data, including employment levels and counts of establishments at opening, expanding, closing, and contracting businesses. Employment figures can also be aggregated by an employer’s Employer Identification Number to measure BED data at the firm level. During the tabulation process, the employment reported in the third month of each consecutive quarter is used to measure the over-the-quarter employment change. The

sum of employment at the opening establishments and the change in employment of the expanding establishments is gross job gains. Similarly, the sum of the prior-quarter employment at the establishments that closed in the current quarter and the change in employment of the contracting establishments is gross job losses. The net employment growth for all firms can be measured in one of two ways: as the difference between total employment in the current and previous quarters or as the difference between gross job gains and gross job losses in the current quarter.

## Business births

Although the concept of business births seems self-explanatory, in practice, measuring business births and deaths raises a number of definitional issues that have to be resolved. One issue is related to timing—that is, when a birth actually occurs. New businesses go through different phases. A new business often starts with an idea in the mind of an entrepreneur, then emerges in a home office setting with only the founder or founders as employees, and finally reaches the point at which it hires additional labor. One important question is whether births should be identified and measured at the point at which employees are hired or sometime prior to that. In a similar vein, another question is whether the “employment” concept or the “employee” concept should be the basis for identifying and measuring births. If employment is the basis, then self-employed people should be counted when measuring births. EUROSTAT, the statistical arm of the European Union, recommends this approach and thus includes entrepreneurs who have not hired any additional employees in their estimation of births. By contrast, the Organization for Economic Cooperation and Development uses only enterprises with hired employees as the basis for birth counts.

In some European countries, in response to a certain public policy, a large number of self-employed unincorporated enterprises regularly convert to formal corporations and become employers with one employee. This conversion distorts birth data that are based on the concept of having no employment in one period and having one or more employees in the next period. For that reason, the Organization for Economic Cooperation and Development initially recommended a two-employee threshold as another birth concept and referred to it as “economic birth.” It was eventually decided that the threshold would be an establishment with one employee, and this concept was incorporated into the final version of the Manual on

Business Demography Statistics.<sup>5</sup>

Another methodological issue in defining births is the distinction between births and entries. Births are defined as the creation of a combination of new factors of production such as organization, fixed assets, employment, and so on. Entries, by contrast, include, in addition to births, events such as mergers and takeovers as well as reactivation, relocation and industrial reclassification of existing businesses. Birth estimates can change as the result of the inclusion or exclusion of any of these events that change the demography of businesses.

In the United States, the Census Bureau’s Statistics of U.S. Businesses publishes annual series with data similar to the BED quarterly data from a longitudinal database called Business Information Tracking System.<sup>6</sup> However, the Census Bureau’s definitions of terms related to births and deaths differ from BLS definitions. Census annual estimates of births exclude self-employment. Statistics of U.S. Businesses defines births as “establishments that have zero employment in the first quarter of the initial year and positive employment in the first quarter of the subsequent year.”<sup>7</sup> When births are estimated from March to March, this definition is similar to BED’s definition of openings. According to the Census Bureau, entries are equal to new births plus reentries of temporarily inactive establishments. However, an establishment that reopens a few months into the year and then shuts down again before the end of the year would not be counted as a reentry.

Deaths are defined as “establishments that have positive employment in the first quarter of the initial year and zero employment in the first quarter of the subsequent year.”<sup>8</sup> This definition is equivalent to BED’s annual closings estimates. Exits are deaths plus temporary exits. An establishment that closes a few months into the year and then opens again before the end of the year would not be counted as a temporary exit. Thus, the Census definitions of entries and exits—like BED’s definitions of openings and closings that are based on annual data—eliminate most, but not all, temporary openings and closings. Some establishments that are considered births or deaths according to Statistics of U.S. Businesses could be seasonal businesses that happened to have zero employment in the March of the reference year.<sup>9</sup>

James R. Spletzer estimated the contribution of births and deaths to economic growth by using microdata on all establishments in the State of West Virginia.<sup>10</sup> He defined net employment growth as the difference between total jobs created by births and expansions and total jobs destroyed by deaths and contractions. Births were defined as occurring during the first quarter of positive employment,

and deaths were defined as occurring during the last quarter of positive employment. Spletzer showed the contrast between those definitions of birth and death and an alternative definition in which births and deaths were designated as the first appearance and disappearance of records in the longitudinal database. The source of the difference was the inclusion of the establishments that reported zero employment at some point in their life cycle. In his analysis, Spletzer showed how alternative definitions of terms can aid in understanding the establishment's life cycle and its hazard function—defined as the likelihood of failure for an establishment over a given length of time.

The counts of births and deaths in this article are derived from the BED longitudinally linked database. Self-employed entities are not in the scope of BED data. In addition, establishments with zero employment are excluded from the counts of openings, and records are considered to be continuous in the events of mergers, acquisitions, and changes of ownership, as well as in the events of breakout and consolidation of multiworksite establishments. In addition, industrial reclassification of businesses and relocation of establishments within the States have no impact on the number of openings and closings. However, the reactivation of business units, the length of time between deactivation and reactivation, and the “unit of analysis” (firm or establishment) all have measurable effects on birth and death estimates.

This article defines births as those records that had positive employment in the third month of a quarter and zero employment in the third month of the previous four quarters. This definition includes all records with positive employment that appear in the BED database for the first time—as well as those records that were inactive for longer than five quarters—but excludes seasonal businesses that reappeared with positive employment within the last five quarters. The article defines a death as a unit that reported zero employment in the third month of a quarter and did not report positive employment in the third months of the next four quarters. This definition is symmetric to the birth definition.

### Entrepreneurial birth

Births can be estimated at the *establishment* (plant) level or at the *firm* level. An establishment represents an economic unit that produces goods and services, usually at a single location, and engages in only one or predominantly one activity. A firm, on the other hand, may consist of several establishments. When an establishment opens for business for the first time, it is counted as an establishment

birth, a State-level firm birth, and a national-level firm birth. If the firm in question opens another establishment, this will be counted as another establishment birth and as a firm-level expansion. If that establishment is in another State, it also will be counted as a State-level firm birth.

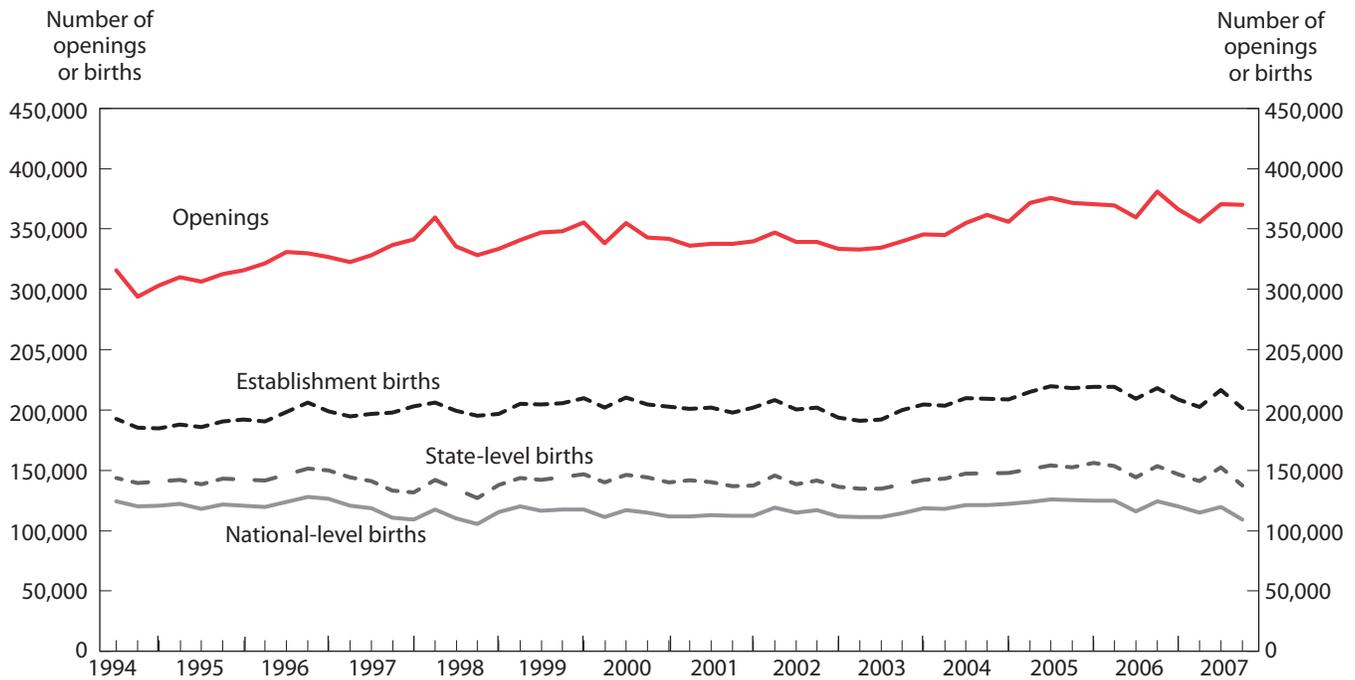
National firm-level births are more indicative of entrepreneurship than establishment-level births. Births at the firm level are referred to as entrepreneurial births; they measure strictly new business creation and the spread of entrepreneurship and innovative activities. Firm-level births were estimated at BLS by aggregating establishment birth records using the corporate parent's Employer Identification Number (EIN). The aggregated birth records were merged with the previous quarter's EIN records, and new EINs were looked for in birth records. EINs are generally the same across all units in multiunit businesses. The aggregation was done at the State and national level, and two sets of estimates for firm-level births were estimated. These different measures of business entries are shown in charts 1 and 2. Some facts stand out from changes revealed in these charts:

1. All measures of births follow the same pattern of change over time, which covers periods of expansion, recession, and recovery during the business cycle.
2. The number of jobs created by openings and births has trended downward since the first quarter of 1998.
3. The number of birth units generally follows an upward trend. The latest upsurge started from September 2003, a month during the quarter in which the net change in employment turned positive for the first time since the official end of the 2001 recession.

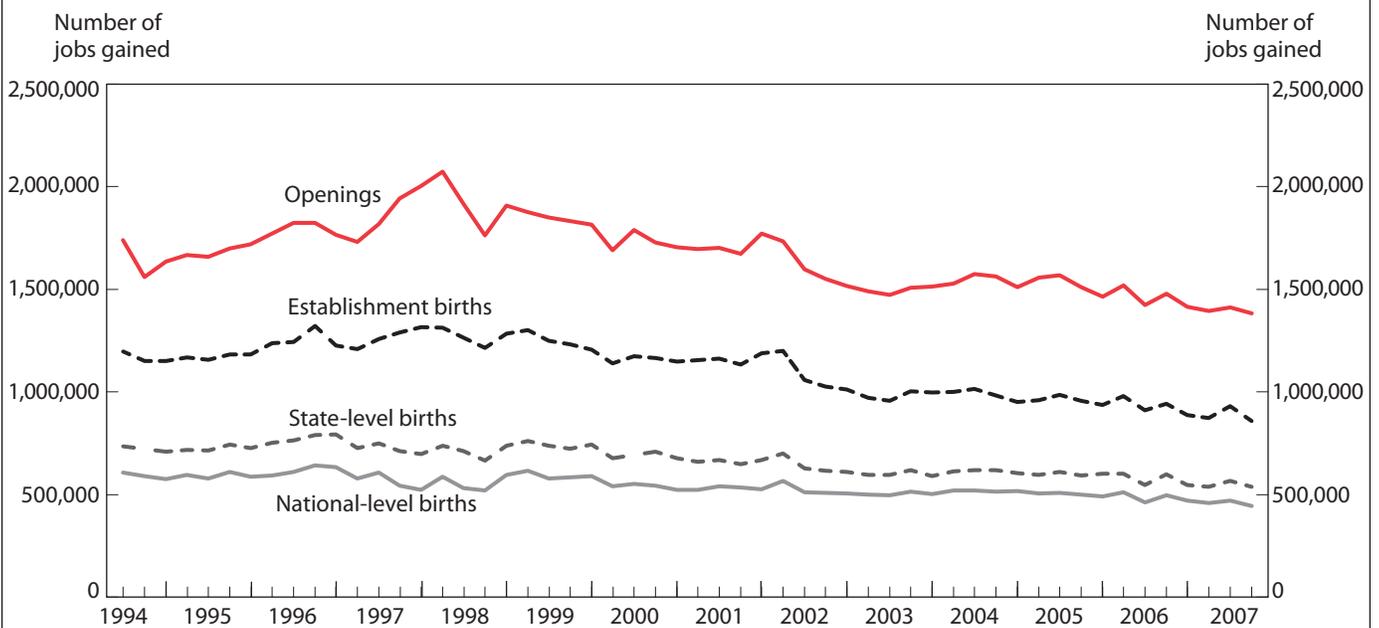
### Establishment births

There were 201,681 establishment births in the fourth quarter of 2007, creating 858,997 jobs. (See table 1.) Seasonally adjusted, the number of establishment births per quarter exhibits an upward trend, whereas employment created by births is on a declining path. (See the smoothed lines in chart 3.) These trends mean a reduction in the average size of new startup businesses. Why is the average size of the new businesses shrinking? One possible explanation is the spread of new technologies and the ensuing rise in productivity that help all firms in general and new startup enterprises in particular. Changes in the average size of births are plotted against changes in the multifactor productivity<sup>11</sup> index in chart 4. The chart shows that the declining average number of employees in new businesses corresponds with the rising level of productivity. It seems that, on the basis of the limited number of observations

**Chart 1. Number of openings and births, seasonally adjusted, third quarter 1994 to fourth quarter 2007**



**Chart 2. Jobs gained from births, seasonally adjusted, third quarter 1994 to fourth quarter 2007**

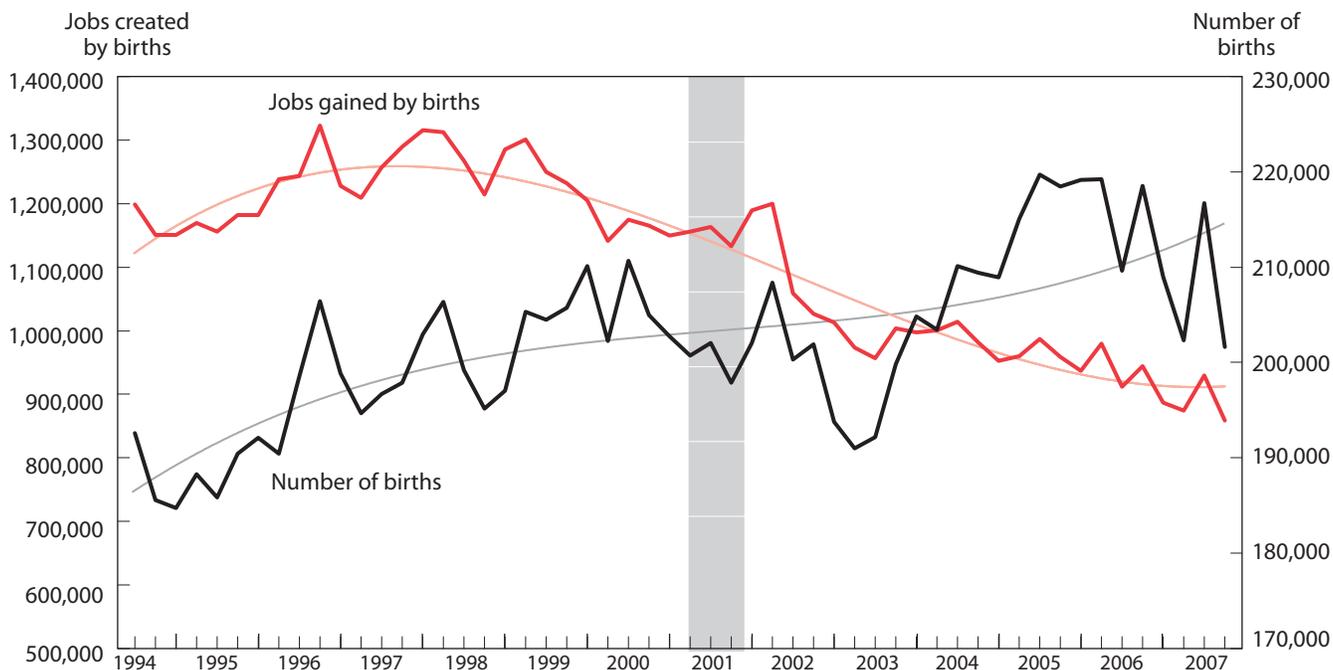


**Table 1. Number of establishment births and deaths, jobs gains from births, and job losses from deaths, seasonally adjusted, 1993–2007**

Year	3 months ended	Number of establishment births				Employment			
		Births		Deaths		Job gains from births		Job losses from deaths	
		Level	Rate	Level	Rate	Level	Rate	Level	Rate
1993 .....	September	–	–	146,411	2.66	–	–	887,415	0.97
	December	–	–	148,902	2.69	–	–	898,689	.98
1994 .....	March	–	–	157,530	2.84	–	–	953,006	1.03
	June	–	–	161,695	2.90	–	–	964,117	1.03
1995 .....	September	192,580	3.42	155,801	2.77	1,199,410	1.27	884,245	.94
	December	185,558	3.28	165,343	2.93	1,150,765	1.21	942,883	.99
	March	184,744	3.25	155,566	2.74	1,151,405	1.20	895,313	.93
	June	188,245	3.29	161,963	2.83	1,169,741	1.21	963,485	1.00
1996 .....	September	185,859	3.24	166,564	2.90	1,156,421	1.19	994,861	1.02
	December	190,420	3.31	167,050	2.90	1,182,439	1.21	983,584	1.01
	March	192,102	3.32	168,674	2.92	1,182,672	1.21	982,355	1.00
	June	190,472	3.28	166,979	2.87	1,239,144	1.26	967,071	.98
1997 .....	September	198,566	3.40	167,051	2.86	1,243,886	1.25	1,045,258	1.05
	December	206,418	3.51	169,248	2.88	1,323,667	1.32	1,004,193	1.00
	March	198,820	3.36	171,722	2.90	1,228,142	1.22	1,037,562	1.03
	June	194,659	3.27	173,518	2.92	1,209,175	1.19	1,009,363	.99
1998 .....	September	196,694	3.29	167,718	2.81	1,257,988	1.23	1,047,536	1.02
	December	197,906	3.30	184,346	3.08	1,290,281	1.25	1,180,490	1.15
	March	202,928	3.38	175,861	2.93	1,316,315	1.27	1,168,365	1.13
	June	206,380	3.41	168,237	2.78	1,312,843	1.26	1,239,501	1.19
1999 .....	September	199,195	3.27	176,625	2.90	1,268,314	1.21	1,127,450	1.07
	December	195,142	3.19	181,148	2.96	1,215,041	1.15	1,101,217	1.04
	March	197,055	3.21	184,257	3.00	1,285,636	1.21	1,217,866	1.14
	June	205,357	3.34	187,169	3.05	1,301,813	1.22	1,140,865	1.07
2000 .....	September	204,504	3.32	185,483	3.01	1,250,538	1.16	1,148,680	1.07
	December	205,743	3.32	182,615	2.95	1,232,524	1.14	1,127,319	1.04
	March	210,098	3.38	185,137	2.98	1,205,869	1.10	1,090,395	1.00
	June	202,284	3.24	184,026	2.94	1,141,189	1.04	1,085,967	.99
2001 .....	September	210,676	3.36	196,283	3.13	1,175,121	1.07	1,180,896	1.07
	December	204,953	3.26	194,205	3.09	1,166,088	1.06	1,136,799	1.03
	March	202,741	3.22	201,817	3.20	1,149,759	1.04	1,269,763	1.15
	June	200,776	3.19	204,769	3.25	1,155,720	1.05	1,259,261	1.14
2002 .....	September	202,060	3.20	207,180	3.29	1,163,121	1.07	1,237,982	1.13
	December	197,852	3.14	198,283	3.14	1,132,764	1.05	1,159,995	1.07
	March	202,060	3.20	189,753	3.00	1,190,106	1.11	1,105,820	1.03
	June	208,377	3.28	188,363	2.97	1,200,356	1.12	1,108,409	1.03
2003 .....	September	200,293	3.14	186,557	2.93	1,059,187	.99	1,034,932	.96
	December	201,901	3.16	189,178	2.96	1,026,783	.96	1,033,221	.96
	March	193,753	3.02	187,785	2.93	1,013,214	.95	1,012,640	.95
	June	191,023	2.98	185,890	2.90	973,700	.91	980,155	.92
2004 .....	September	192,148	2.98	177,140	2.75	956,377	.90	878,156	.82
	December	199,808	3.09	179,594	2.78	1,004,104	.94	923,778	.86
	March	204,878	3.15	182,352	2.81	997,670	.93	919,539	.86
	June	203,491	3.12	182,682	2.80	1,000,340	.93	927,623	.86
2005 .....	September	210,149	3.20	182,726	2.79	1,014,373	.94	941,722	.87
	December	209,405	3.18	177,150	2.69	982,072	.90	895,674	.82
	March	208,937	3.15	186,540	2.81	952,530	.87	862,440	.79
	June	215,103	3.23	178,830	2.68	959,813	.87	857,063	.78
2006 .....	September	219,708	3.27	183,897	2.74	987,041	.89	868,819	.79
	December	218,471	3.23	187,124	2.77	958,623	.86	850,541	.76
	March	219,153	3.22	185,119	2.72	937,312	.84	745,088	.67
	June	219,221	3.20	195,405	2.86	979,419	.87	874,661	.78
2007 .....	September	209,631	3.05	198,054	2.88	911,717	.81	834,542	.74
	December	218,537	3.17	195,428	2.83	944,562	.84	824,354	.73
	March	209,034	3.02	–	–	886,801	.78	–	–
	June	202,337	2.91	–	–	873,919	.77	–	–
	September	216,741	3.11	–	–	930,235	.82	–	–
	December	201,681	2.89	–	–	858,997	.75	–	–

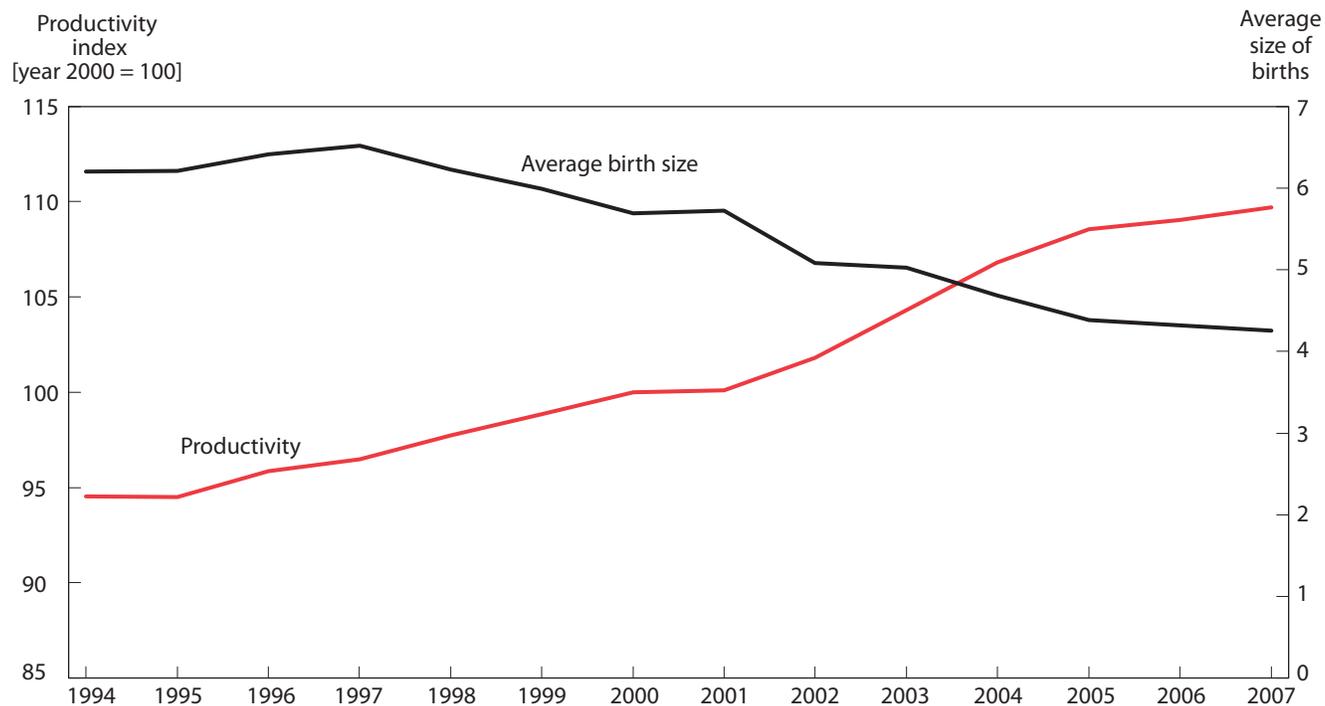
NOTE: Dash indicates datum not available.

**Chart 3. Number of births and jobs created by births, seasonally adjusted, third quarter 1994 to third quarter 2007**



NOTE: Shaded bar denotes National Bureau of Economic Research (NBER)-designated recession (March 2001–November 2001).

**Chart 4. Average size of births and multifactor productivity, seasonally adjusted, 1994–2007**



NOTE: Size of birth is determined by the number of hired employees present at the time of a birth.

for the birth data, there is a correlation between the rise in productivity and the decline in the average size of establishment births. However, a larger number of observations and a more detailed analysis may be needed to provide a conclusive view of the relation between these two factors.

It is commonly recommended that data on business births be used in measuring and comparing entrepreneurial activities. But the number of births trends differently than the total jobs gained by the births: the number of births has risen, and the number of jobs gained has declined. If rising productivity or any other factor causes startup businesses to have a smaller initial size and lower total employment in the quarter in which they debut, the use of employment created by births as a measure of economic impact may not show the true effects of births and entrepreneurship. Because some newly born businesses will expand and become major contributors to gross job gains in subsequent quarters, the number of births may be even more significant than their initial contributions to total employment in measuring the trends of entrepreneurship and innovative activities.

As newly born businesses mature and become continuous units in employment data series, they continue to contribute to total employment—either positively or negatively, depending on the direction of their employment changes. BLS hopes to group establishments into units called cohorts, which are clusters of establishments that were born in the same period. The cohorts that survive will have a long-term impact on the job market following their initial appearance. Because of the dynamic effect of the births, one should observe changes in the number of births in a particular period in order to estimate the births' impact in the future. If a favorable economic condition leads to a surge in the number of births for a period—a “baby-boom event”—the impact will be echoed in the job market with varying intensity in the future periods. As shown in chart 3, the upward slope of the trend line for the number of births began to flatten in the end of the 1990s, thus preceding the eventual economic slowdown that began in the first quarter of 2001. An upward swing in the number of births also resumed earlier than the actual recovery of the job market that began in September 2003.

### Birth and death rates

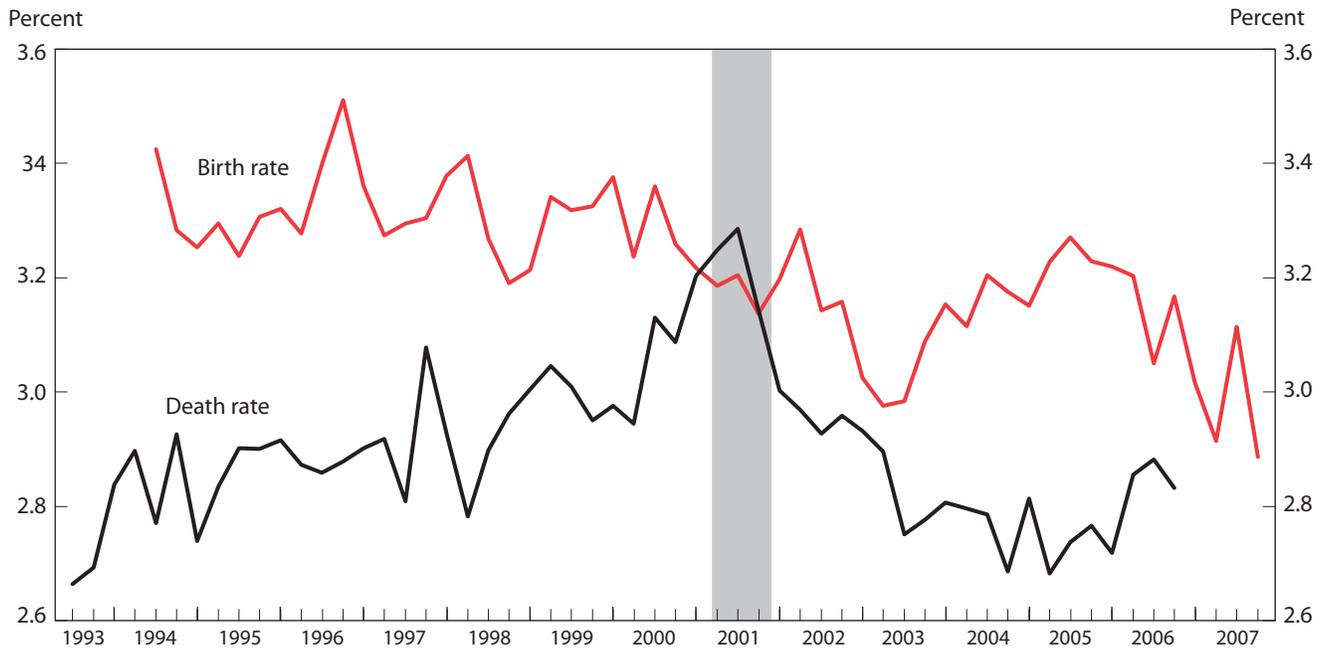
The birth rate as a percent of total active establishments was 2.9 percent for the fourth quarter of 2007, and jobs created by births accounted for .8 percent of total employment.<sup>12</sup> The overall birth rate as well as the birth rates by

major industry sector trended downward from the third quarter of 1994 through the fourth quarter of 2007. (See chart 5.) The average quarterly birth rate for this timespan was 3.2 percent of total active establishments, .3 percent higher than the rate for the last quarter of the period. Employment resulting from births was 1.1 percent of total employment—a rather significant contribution. In the fourth quarter of 2007, jobs created by births were 11 percent of total gross job gains. This 11-percent contribution (achieved in the first quarter of operation), along with the potential to grow and become major contributors to the future expansions, make newly born businesses an important part of the data to follow and analyze. When the net of birth and death employment data is considered, the contribution of birth and death to job creation appears even more dramatic. The net of jobs created by births and jobs lost by deaths accounted for one quarter of the net job growth of 520,000 that occurred during the fourth quarter of 2006.

During the fourth quarter of 2006—the latest quarter for which establishment death data are available—195,428 establishments went permanently out of business, losing 824,354 jobs. The death rate for this quarter was 2.8 percent, and employment loss from deaths accounted for 0.7 percent of total employment. The average death rate for the 1994–2006 period was 2.9 percent of total active establishments. During the same period, average quarterly gross job losses caused by deaths were equal to 1.0 percent of total employment. Birth rates always exceeded death rates from 1994 to 2006 except for the last three quarters of 2001, the same three quarters during which the 2001 recession officially occurred. The gap between birth and death rates narrowed as the economy approached the recession period, and widened as the economy recovered. (See chart 5.) Because it takes a full year to determine whether a closure is temporary or permanent, the death data in chart 5 have a four-quarter lag. BLS will continue to publish death data with such a lag and revise closings as appropriate.

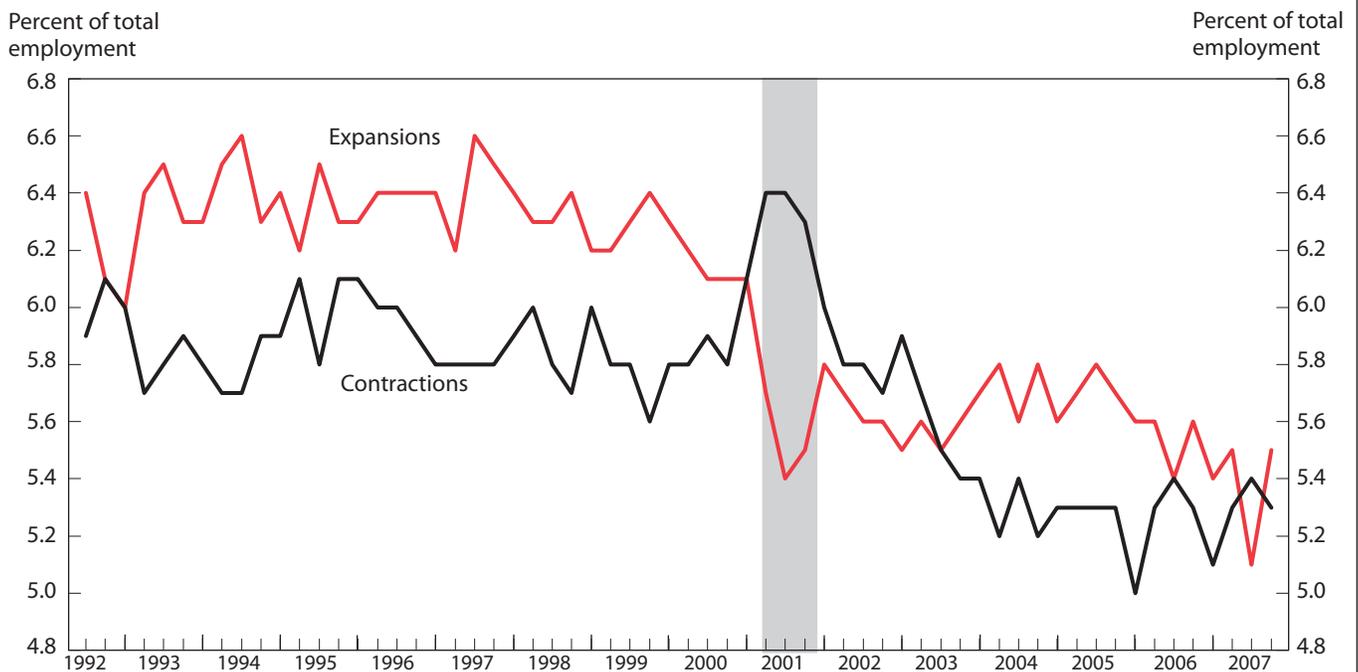
Birth and death rates exhibit a diverse pattern of change compared with rates of expansions and contractions. The contraction and expansion rates remained flat throughout the 1990s, with the expansion rate exceeding the contraction rate. The contraction rate surpassed the expansion rate near the onset of the 2001 recession and remained higher until September 2003, constituting a span of eight quarters. (See chart 6.) In contrast, the birth rate began a downward trend and the death rate began a rise in the second quarter of 1998, and the death rate exceeded the birth rate for only three recessionary quarters in 2001. The

**Chart 5. Total private sector: birth rate from third quarter 1993 to fourth quarter 2007, and death rate from third quarter 1993 to fourth quarter 2006, all data seasonally adjusted**



NOTE: Shaded bar denotes National Bureau of Economic Research (NBER)-designated recession (March 2001–November 2001). A birth must be preceded by four quarters of zero or no employment, and a death must be followed by four quarters of zero or no employment. Therefore, there are no birth data available for the first year in the chart, and there are no death data available for the last year in the chart.

**Chart 6. Expansions and contractions as a percent of total employment, seasonally adjusted, third quarter 1992 to fourth quarter 2007**



NOTE: Shaded bar denotes National Bureau of Economic Research (NBER)-designated recession (March 2001–November 2001).

birth rate fell to the lowest level in September 2003 and then began to increase quickly, nearing the prerecession level in December 2004 and exceeding it in June 2005. Since the fourth quarter of 2005, the birth rate seems to have started a new downward trend.

As of the fourth quarter of 2007—the most recent quarter for which relevant data are available—gross job gains from expansions had not hit the peak they had reached before the 2001 recession. The death rate fell from a high of 3.3 percent in the midst of the recession and reached an all-time low of 2.7 percent in the fourth quarter of 2004. The difference between birth and death rates indicates the rate by which the total inventory of business establishments grows. This net of birth and death rates excludes the quarterly changes in the total number of active establishments caused by temporary openings and closings of seasonal businesses. That rate is shown along with the net change in total employment in chart 7.

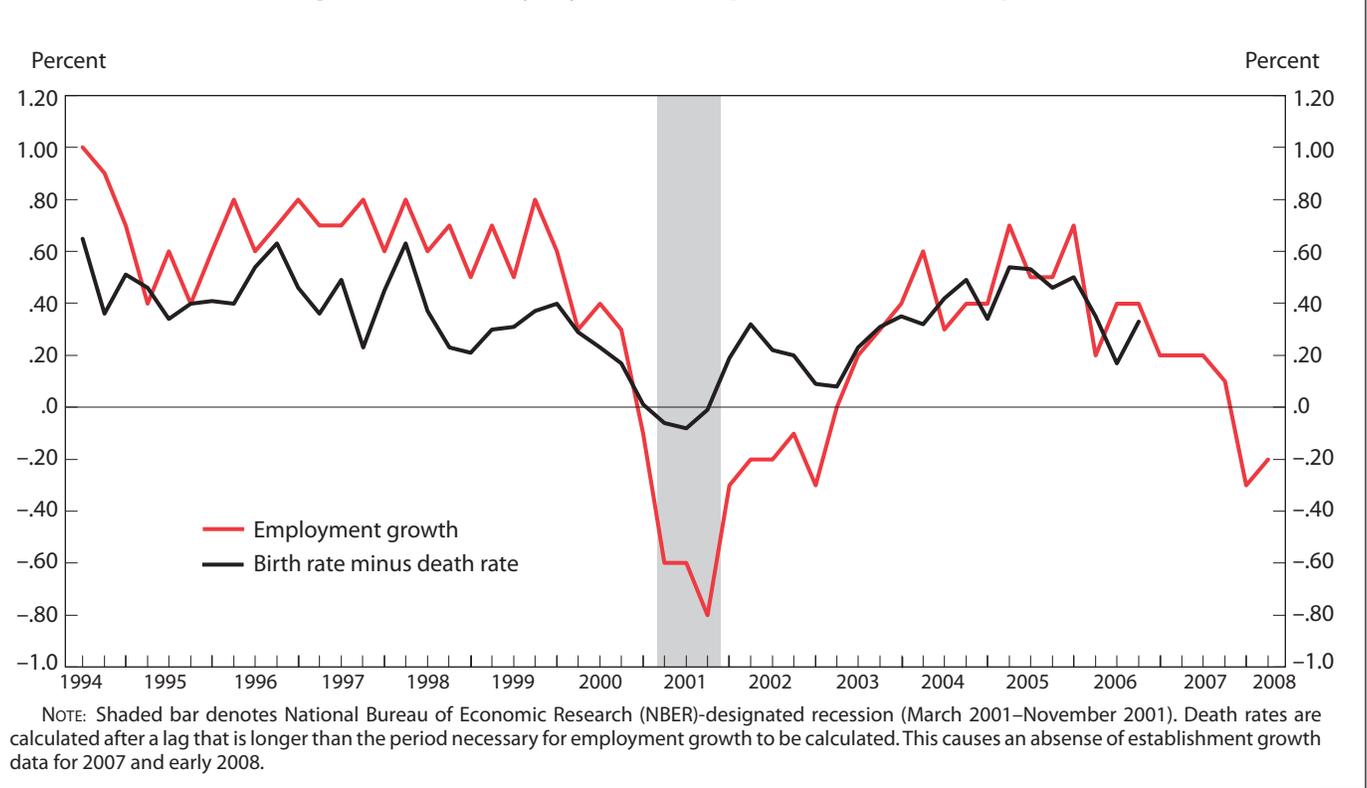
The sharp drop in net job growth in the middle of the 2001 recession occurred at the same time as a brief decline in the total number of active establishments. The net birth rate experienced a slight downward trend prior to the start of the recession, hit a trough in the second quarter of

2001, and has been on the rise since the official end of the recession in the fourth quarter of 2001. The net gains in total employment reached a positive level 2 years later in September 2003. The net addition to the total employers may also be seen through the gap between the birth rate and the death rate in chart 5. The gap narrowed as the economy approached the recession and widened as the economy expanded into full recovery. It appears that the trajectories of the rates of establishment births and deaths can provide additional information on the present state of the economy and help predict what may happen in future phases of the business cycle.

### Entrepreneurship rate

The United States is often viewed as one of the most hospitable environment for starting businesses, but a more precise measure of entrepreneurship is needed in order to make local and international comparisons. For this purpose, one can define the concept of “entrepreneurship rate” as the number of business births per 1,000 persons in the labor force. The ratio of births to population has been used in a number of studies as a measure of entrepreneurial ac-

**Chart 7. Employment growth, seasonally adjusted, third quarter 1994 to second quarter 2008; and establishment growth, seasonally adjusted, third quarter 1994 to fourth quarter 2006**



tivities for regional or international comparisons.<sup>13</sup> Labor force data were used to estimate this measure, taking into account births at both the firm level and the establishment level. The number of firm-level births per 1,000 persons in the labor force was 0.78 in the first quarter of 2007, up from a low of 0.75 in June 2003 but down from a high of 0.94 in the fourth quarter of 1996.

At the establishment level, the birth rate per 1,000 persons in the labor force was 1.37 in the fourth quarter of 2007, down from a high of 1.52 in the fourth quarter of 1996. The gap between the two measures reveals the share of new establishments born under the ownership of the existing firms. The birth rate per 1,000 persons in the labor force does not include “nonemployer” business entities. Nonemployers are basically self-employed people who are not included in the BED database. The birth rate per 1,000 persons in the labor force, therefore, measures entrepreneurship at the stage where startup businesses begin to hire employees. The entrepreneurship rate is an extremely valuable byproduct of birth and death data. It can not only show and compare the level and change of entrepreneurial activities across countries and regions, but can also measure the effectiveness of policies as well as the role of the number of high-paying jobs in accelerating or decelerating entrepreneurial initiatives.

### **Birth and death rates by industry**

Birth and death rates also have been estimated and analyzed by eight selected industries: manufacturing, retail trade, information, accommodation and food, financial services, health services, education services, and construction. Birth rates have been on a downward trend across all industries. However, rates differ by industry and change at varying paces over time. Because of such variability, the ranking of industries in terms of birth and death rates changes over time. For example, the birth rate in the information sector was the highest among all industries because of the rapid development and expansion of technology in the 1990s. The rate surged from 4.0 percent in 1994 to 5.7 percent in 2000. That rate has since decreased to 2.7 percent in the fourth quarter of 2007. The birth rate in the information sector is now third highest, ranking after construction and education services. The death rate in this sector also rose—from 3.0 percent in 1994 to 5.7 percent in the third quarter of 2001. The death rate in the information sector has been declining since its peak in 2001, but it still ranks the highest among all industries’ death rates.

In manufacturing, the birth rate has fallen, and it ranks

the lowest among all selected industries’ birth rates. The death rate in this sector was trending upward until the end of the 2001 recession. Since then, the death rate in manufacturing has been declining, and it currently ranks the second lowest among all selected industries’ death rates. Birth rates in particular sectors generally reflect the economic conditions in the sector in question. The current downturn in the construction and financial services sector is reflected in the sharp declines in birth rates in these two sectors that occurred in the first quarter of 2007.

### **Other definitions of birth and death**

The specific definitions of birth and death chosen by BLS were the result of careful study. Economists defined five proposed measures of birth and three proposed measures of death for which they calculated time series of data from the third quarter of 1994 through the first quarter of 2007 for births, and from the third quarter of 1993 to the first quarter of 2006 for deaths. They followed two approaches. One approach is based on the first appearance of a business unit in the QCEW longitudinal database of establishments with positive employment in the third month of the quarter; the other approach is based on examining the history of each record, and this approach identifies births as records with positive employment in the current quarter preceded by zero employment in the previous four or five quarters.

Whereas the former method created one measure of birth, the latter method generated two measures, one based on analyzing employment from the third month of a quarter, and the other based on analyzing employment from all months of the quarter. The estimates generated by the second approach varied depending on the length of time during which the birth records had zero employment before reporting positive employment. To measure the effect of time, records were linked from six consecutive quarters and births were calculated on the basis of comparisons of employment from four and five consecutive third-months (henceforth, “third-month” refers to the third month of a quarter) and from 12 and 15 consecutive months; four additional measures of birth were created using these methods. The numbers of quarters that were included in the calculations were arbitrary; the primary objective in reaching back various numbers of quarters or months was to determine the amounts by which different lengths of time would change the resulting number of births. For the quarterly data, this period should exceed four quarters in order to exclude the effect of exit and re-entry of seasonal businesses. Five possible definitions of

births are summarized as follows:

- Definition 1: births are new records that appeared for the first time in the QCEW longitudinal database and have positive employment in the third month of the quarter.
- Definition 2: births are records with positive employment in the third month of a quarter and zero employment in the third months of the previous four quarters. (This is BLS's preferred definition.)
- Definition 3: births are records with positive employment in the third month of a quarter and zero employment in the third months of the previous five quarters.
- Definition 4: births are records with positive employment in the third month of a quarter and zero employment in all months of the previous four quarters.
- Definition 5: births are records with positive employment in the third month of a quarter and zero employment in all months of the last five quarters.

A death occurs when a business with positive employment reports zero employment or does not report at all for a length of time. The questions under consideration when defining deaths are similar to those under consideration when defining births as establishments with positive employment preceded by zero employment. One must decide whether employment in the third month of the quarter or employment in all 3 months of the quarter should be used, and one must also decide how many quarters or months of zero employment need to follow the positive employment in order for a death to occur. Three measures of death were calculated. Each measure is based on a particular period with zero employment following a month with positive employment reported. The relevant periods are the following:

1. four consecutive quarters in which there is zero employment in the third month,
2. five consecutive quarters in which there is zero employment in the third month, and
3. twelve consecutive months of zero employment.

The relevant length of time is the period of inactivity that is allowed before a business unit is declared dead. In the case of quarterly data, this should be at least four quarters in order to exclude seasonal businesses that have been shut down temporarily. To be symmetric, it would be preferable for the relevant timespan to be equal to the

timespan applied in defining births. For these reasons, BLS's preferred measure of death is the first one: four consecutive quarters—following a month with zero employment reported—in which there is zero employment in the third month.

## Evaluation of proposed methods

To evaluate the merits of the five possible definitions of birth, one needs to examine three questions that define the differences among them. The first is whether to define a birth on the basis of the initial appearance of a record in the QCEW longitudinal database with positive third-month employment, or to define a birth on the basis of positive employment reported by a business after four or five consecutive third-months, or 12 or 15 consecutive months, of zero employment. (New records have the status of “no employment” in the previous periods.) The former definition comprises new businesses registered with positive employment for the first time, whereas the latter includes not only births but also businesses that have been inactive for more than 1 year but reported positive employment again in the current quarter. (Establishments that are reactivated within a year are considered seasonal and are counted as openings in the BED data).

Which of these two concepts is more suitable in defining a business birth? Establishment births based on the first appearance in the registry are more intuitive and logically consistent with the notion of birth as a new entity coming to life. Such a measure, however, may not be consistent with the openings in existing BED statistics and could underestimate the number of births. For example, if a business enters into the BED database for the first time with zero third-month employment, even if it has positive employment in the first and second month of the quarter, this unit will not be counted as an opening or birth. In the subsequent quarters, when the unit reports positive third-month employment, it will be counted as an opening, but not as a birth. Therefore, such a birth will never get a chance to be counted in a method based on the first appearance in the QCEW database. The sharp difference between estimates using this method and estimates using other methods indicates that using this method would underestimate the number of births.

The second question that defines the differences among the methods of counting births is the following: in the zero-to-positive employment approach, what month of employment should be used—the third month? or all months of the quarter? The third-month approach is less restrictive, and it generates the highest estimates of births

in comparison with the all-months estimates. The third-month approach is consistent with other BED data in which employment numbers from the third month of the quarter are used as the basis for job gains and job losses estimates

The third question is: how many months of zero employment need to be present before the emergence of positive employment in a record qualifies as a birth? There is no objective criterion used in selecting the length of the period of zero employment when defining a birth by the zero-to-positive-employment approach. The longer the period is, the more likely the method is to exclude reactivated businesses and to generate proper births. In data that were discussed earlier in this article, openings with third-month positive employment and zero employment in the previous four quarters were the records that were identified as births.

### All methods compared

In a time series from the third quarter of 1994 through the first quarter of 2007, under five proposed definitions, chart 8 shows the number of private sector births and chart 9 shows jobs created by births. As can be seen, the pattern of change over time is similar for all definitions; in other words, the lines on each graph, although separate, move up and down almost in sync with the other lines on the same graph. Definition one, which measures birth on the basis of the first appearance of a record with positive third-month employment, generates the lowest number of births and displays a slightly different pattern of change from the other methods. Definition two has the least restriction and generates the largest number of births and employment. Definitions four and five, which define births as 12 and 15 months, respectively, of consecutive zero employment followed by positive employment, are almost identical.

Chart 10 and chart 11 show the number of establishment deaths and the number of job losses resulting from deaths—according to all three methods for estimating deaths—from the third quarter of 1993 through the first quarter of 2006. As is the case with births, the methods of estimation exhibit few differences and display the same general pattern of change over time. The number of deaths and employment losses from deaths is the highest when following the definition defined by positive employment in the third month of a quarter followed by zero employment during the third month of the four following quarters. Extending the length of time for zero employment to five quarters or observing 12 consecutive months of zero employment following reported positive employment

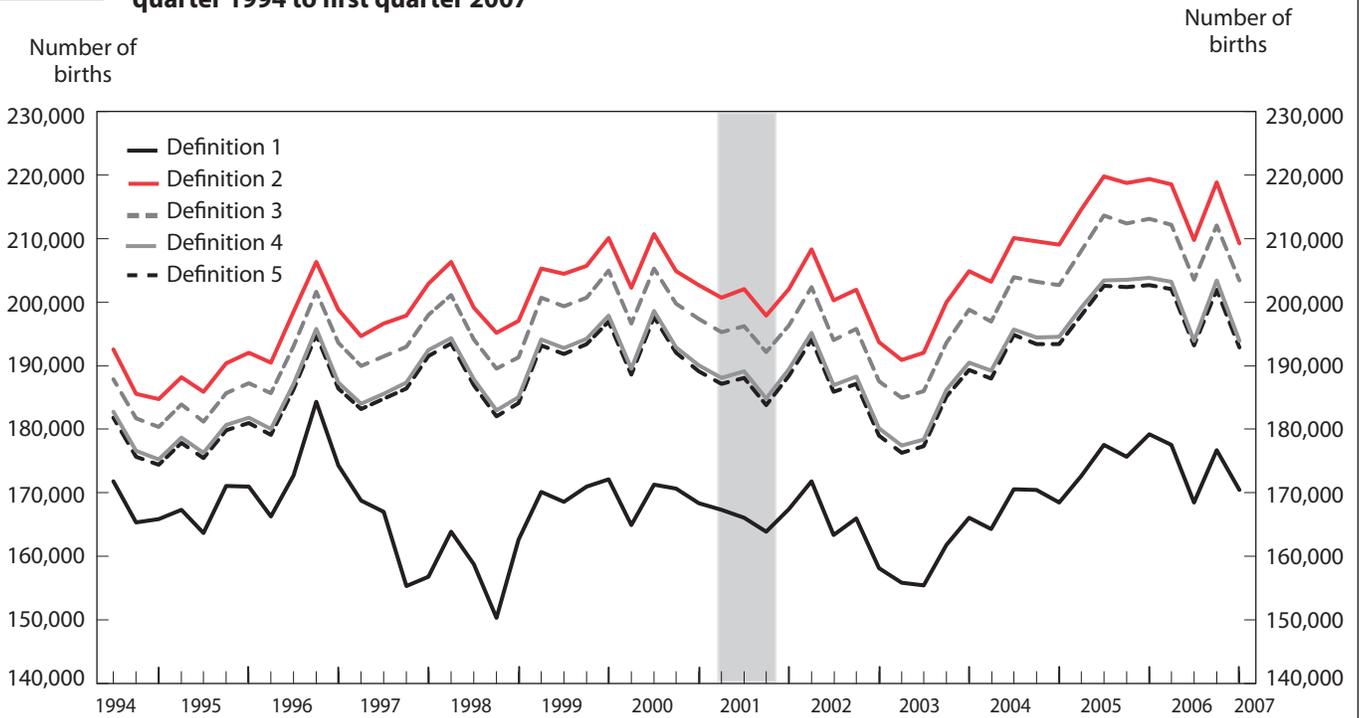
does not generate significant changes.

For births, definition one is rejected because it excludes a significant number of new records that appear initially with zero employment. Although definitions two, three, four, and five all generally exhibit the same trend and pattern of change with few differences, it is definition two that is selected because it is consistent with the basic BED concepts and methodology. For establishment deaths, definition one is selected. (Definition one is based on at least four quarters zero employment after the last positive employment reported.) This definition of death is somewhat unique among worldwide measures. Because the QCEW contains monthly employment, one can more easily and quickly separate seasonal closings from more permanent closings. Economists using other data sources may have to wait 2 or more years before being confident that closings are permanent. As a result, use of the QCEW-based BED measure of death will result in the most current and frequently published figures available.

These chosen measures of births and deaths have the advantage of 1. being consistent with other BED data in that they use third-month employment as a defining factor, 2. being symmetrical in dealing with both births and deaths: four quarters of zero employment before a given quarter defines birth, and four quarters of zero employment after a given quarter defines death, and 3. making births a subset of openings, which makes them consistent with the existing published BED data. The analysis of data presented earlier in this article was based on birth and death estimates derived from these selected definitions.

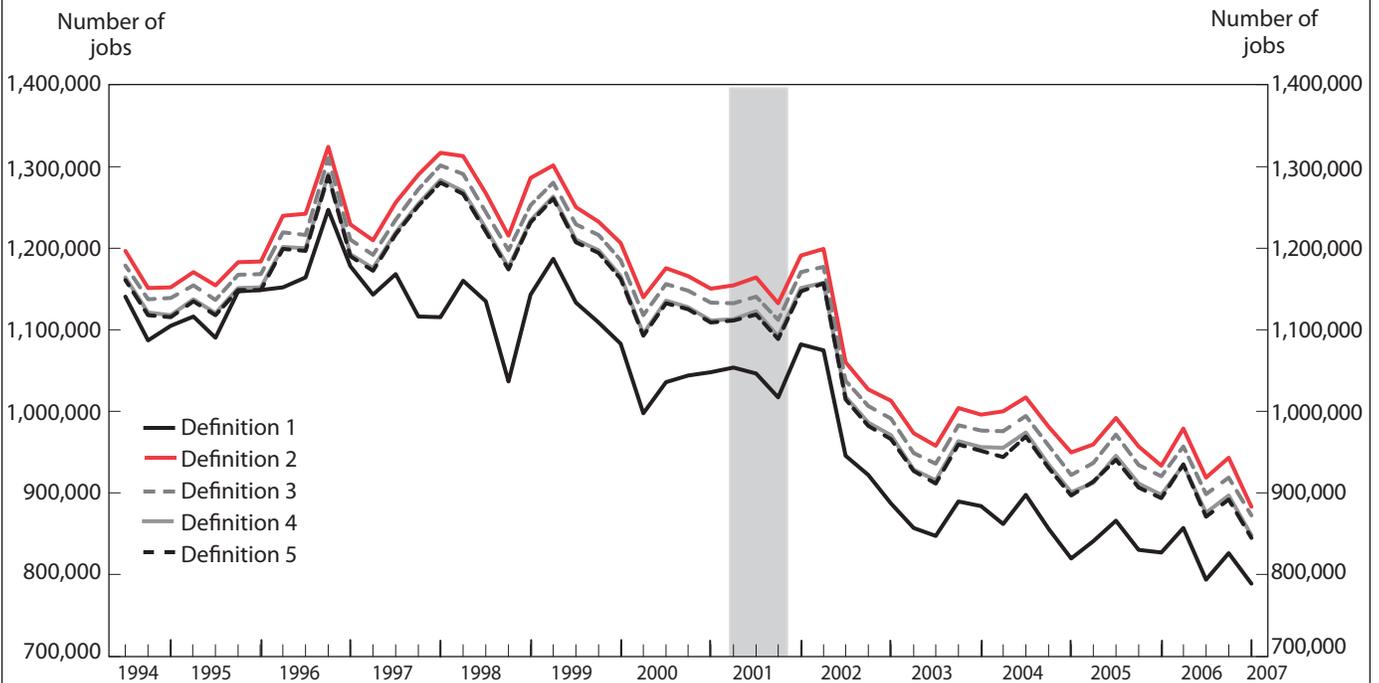
IN THIS ARTICLE BUSINESS BIRTHS AND DEATHS were measured using the QCEW longitudinal database. Alternative definitions were estimated and results were compared over time. The results showed small differences in the magnitude of births measured by alternative methods, but no significant differences in their patterns of change over time. The estimation of births on the basis of positive employment in the third month of a quarter and zero employment in the four previous quarters was selected as the preferred method. The same approach was employed in defining establishment deaths. Deaths are records with positive employment in the third month of a quarter followed by four consecutive quarters with zero employment during the third month. Entrepreneurial births were defined by measuring births at the firm level and excluding newly born units of multiestablishment businesses from total births.

**Chart 8. Number of establishment births, by proposed definition of births, seasonally adjusted, third quarter 1994 to first quarter 2007**



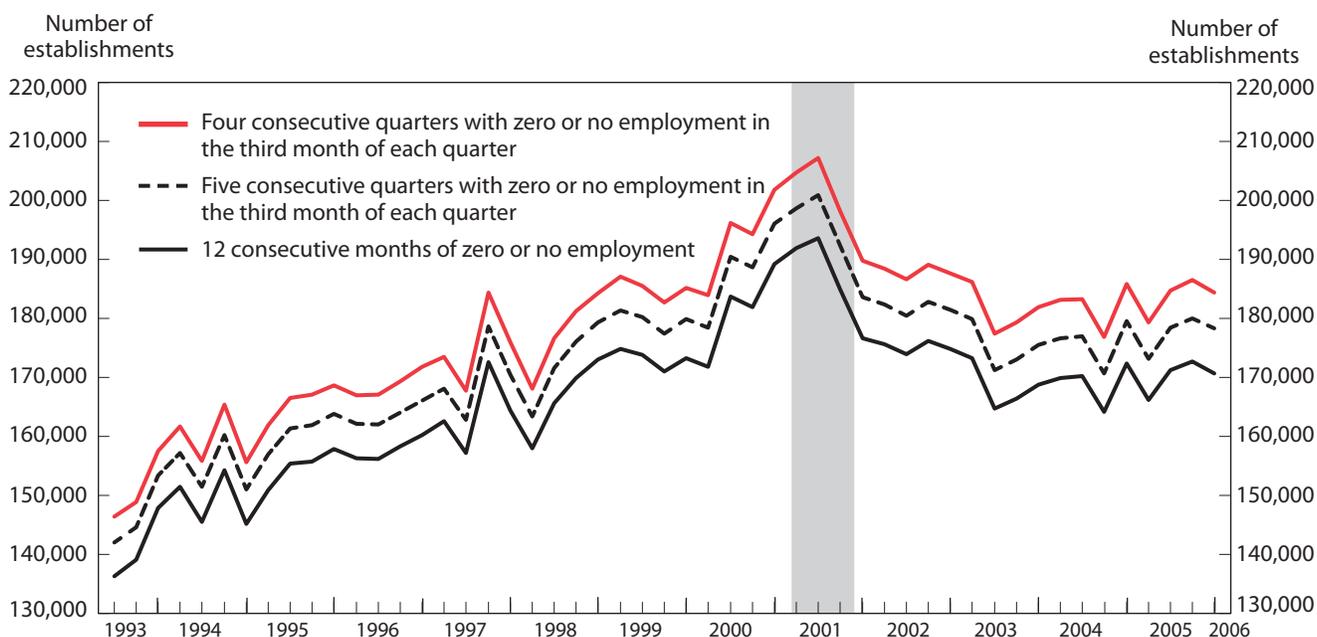
NOTE: Shaded bar denotes National Bureau of Economic Research (NBER)-designated recession (March 2001–November 2001).

**Chart 9. Job gains from establishment births, by proposed definition of births, seasonally adjusted, third quarter 1994 to first quarter 2007**



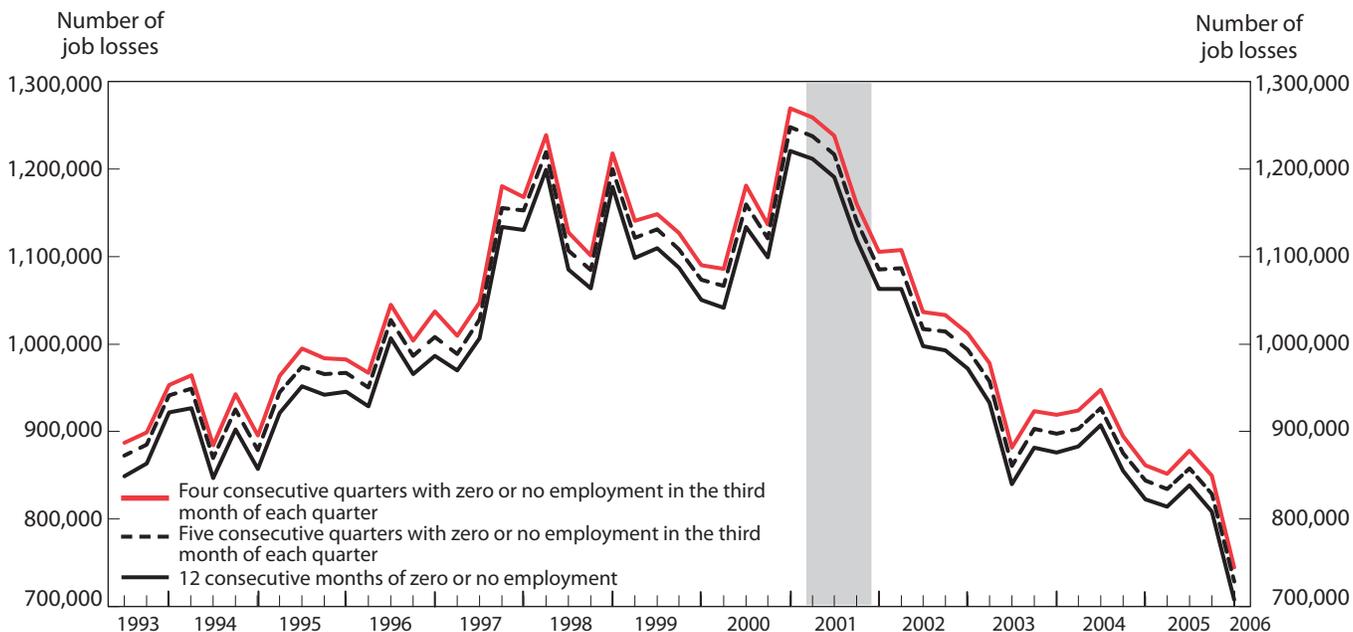
NOTE: Shaded bar denotes National Bureau of Economic Research (NBER)-designated recession (March 2001–November 2001).

**Chart 10. Number of establishment deaths, by three different measures of death, seasonally adjusted, third quarter 1993 to first quarter 2006**



NOTE: Shaded bar denotes National Bureau of Economic Research (NBER)-designated recession (March 2001–November 2001).

**Chart 11. Job losses from establishment deaths, by three different measures of death, seasonally adjusted, third quarter 1993 to first quarter 2006**



NOTE: Shaded bar denotes National Bureau of Economic Research (NBER)-designated recession (March 2001–November 2001).

The birth data exhibited an upward trend in the number of births, a declining trend in the total number of jobs created by births, and a downward trend in the average size of births. A decreasing average size of births was found to be likely associated with rising productivity in the U.S. economy. The number of births per 1,000 persons in the labor force has been on the rise since September 2003,

following a declining trend that started in the late 1990s.

This research and analysis effort at BLS may result in routine publication of birth and death estimates. These major additions to the BED data series should prove to be useful in assessing aspects of the underlying health of the U.S. economy and in comparing U.S. employment dynamics with those of other countries. □

## Notes

<sup>1</sup> J.A. Schumpeter, *Capitalism, Socialism, and Democracy* (New York, Harper, 1975 [originally published in 1942]), pp. 82–85.

<sup>2</sup> For more details on gross job flows, see: Steven J. Davis, John C. Haltiwanger, and Scott Schuh, *Job Creation and Job Destruction*, (Cambridge, Mass., MIT Press, 1996). See also John M. Abowd, John Haltiwanger, and Julia Lane, “Integrated Longitudinal Employer-Employee Data for the United States,” *American Economic Review Papers and Proceedings*, May 2004, pp. 224–29. See also Timothy R. Pivetz, Michael A. Searson, and James R. Spletzer, “Measuring job and establishment flows with BLS longitudinal microdata,” *Monthly Labor Review*, April 2001, pp. 13–20.

<sup>3</sup> See Timothy Dunne, Mark J. Roberts, and Larry Samuelson, “Patterns of Firm Entry and Exit in U.S. Manufacturing Industries,” *Rand Journal of Economics*, Winter 1988, pp. 495–515; Timothy Dunne, Mark J. Roberts, and Larry Samuelson, “Plant Turnover and Gross Employment Flows in the U.S. Manufacturing Sector,” *Journal of Labor Economics*, January 1989, pp. 48–71; Steven J. Davis and others, *Job Creation and Job Destruction*; James R. Spletzer, “The Contribution of Establishment Births and Deaths to Employment Growth,” *Journal of Business and Economic Statistics*, January 2000, pp. 113–126; Christopher L. Foote, “Trend Employment Growth and the Bunching of Job Creation and Destruction,” *Quarterly Journal of Economics*, August 1988, pp. 809–834. For a comprehensive review of employment dynamics, see Richard L. Clayton and James R. Spletzer, “Business Employment Dynamics,” National Bureau of Economic Research, forthcoming. The survival of business establishments has been discussed in Amy E. Knapp and Merissa C. Piazza, “Business Employment Dynamics data: survival and longevity, II,” *Monthly Labor Review*, September 2007, pp. 3–10.

<sup>4</sup> For a complete description and analysis of Business Employment Dynamics data series, see James R. 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.

<sup>5</sup> See Nadim Ahmad, “A Proposed Framework for Business Demography Statistics,” Organization for Economic Cooperation and Development, Statistics Directorate STD/DOC(2006)3, October 2006. Many of the methodological and measurement differences regarding birth, death and other concepts related to business demography statistics have been discussed and resolved in a joint effort by the Organization for Economic Cooperation and Development and EUROSTAT

in a recently published handbook entitled “EUROSTAT-OECD Manual on Business Demography Statistics,” on the Internet at [www.oecd.org/document/34/0,3343,en\\_2649\\_34233\\_39913698\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/34/0,3343,en_2649_34233_39913698_1_1_1_1,00.html) (visited Dec. 15, 2008).

<sup>6</sup> Business Dynamics Statistics is another Census Bureau Program, and it is similar to Statistics of U.S. Businesses. See [www.ces.census.gov/index.php/bds/bds\\_overview](http://www.ces.census.gov/index.php/bds/bds_overview) (visited Dec. 15, 2008).

<sup>7</sup> See [www.census.gov/csd/subs/deferterm.html](http://www.census.gov/csd/subs/deferterm.html) (visited Dec. 15, 2008).

<sup>8</sup> *Ibid.*

<sup>9</sup> For more information on Statistics of U.S. Businesses, see Ron S. Jarmin and Javier Miranda, “The Longitudinal Business Database, on the Internet at [www.ces.census.gov/index.php/ces/cespapers?detail\\_key=101647](http://www.ces.census.gov/index.php/ces/cespapers?detail_key=101647) (visited Dec. 15, 2008); to open the document, click on “View Paper.” See also Catherine Armington, *Development of Business Data: Tracking Firm Counts, Growth, and Turnover by Size of Firms*, SBA Office of Advocacy, Small Business Research Summary No. 245.

<sup>10</sup> James R. Spletzer, “The Contribution of Establishment Births and Deaths to Employment Growth,” *Journal of Business and Economic Statistics*, January 2000, pp. 113–26.

<sup>11</sup> For the private business and private nonfarm business sectors, BLS defines the growth rate of multifactor productivity as “the growth rate of output less the growth rate of combined inputs of combined labor and capital.” See [www.bls.gov/bls/glossary.htm#M](http://www.bls.gov/bls/glossary.htm#M) (visited Dec. 15, 2008).

<sup>12</sup> Birth and death rates are defined as the number of births or deaths divided by total active establishments, and active establishments are the counts of establishments with positive employment in the third month of the current quarter. To be consistent with the BED program’s methodology, the number of establishments in the current quarter is averaged with the number of establishments in the previous quarter, and the resulting figure is used as the denominator in calculating the rates.

<sup>13</sup> See Business demography in Europe: Results for 10 Member States and Norway, Eurostat, 2004, available online at [http://epp.eurostat.ec.europa.eu/cache/ITY\\_OFFPUB/KS-DV-04-001/EN/KS-DV-04-001-EN.PDF](http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-DV-04-001/EN/KS-DV-04-001-EN.PDF). See also S. Michael Camp, *The Innovation-Entrepreneurship NEXUS* (Powell, Ohio, Advanced Research Technologies, LLC, 2005), available online at [www.sba.gov/adv/research/rs256tot.pdf](http://www.sba.gov/adv/research/rs256tot.pdf) (visited Dec. 15, 2008).