

Annual measures of gross job gains and gross job losses

As a complement to the quarterly gross job flow statistics, annual gross job gains and losses statistics reveal the tremendous amount of churning that underlies the net growth of employment

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The new Business Employment Dynamics data series from the Bureau of Labor Statistics documents the quarterly gross job gains and losses from 1992 to the present. These data quantify the sizable number of jobs that appear and disappear in the U.S. economy each quarter, adding a new level of understanding that traditional employment statistics cannot provide. For example, these data show that the 2001 recession was characterized by a temporary spike in gross job losses accompanied by a decline in gross job gains that has yet to return to pre-recessionary levels.¹

This article builds on the quarterly Business Employment Dynamics statistics by presenting annual tabulations of gross job gains and losses. These annual statistics provide information about labor market dynamics in two ways. First, in comparison to the quarterly statistics, the annual statistics highlight the transitory nature of short-run establishment level employment changes. Many quarterly expansions and contractions are temporary, and reverse themselves in other quarters during the year. Furthermore, this article finds that a significant number of establishment openings in the quarterly statistics are continuous establishments that close and re-open during the year. Second, the annual statistics provide a framework for a longer run view of how establishments grow and decline, and thus set the stage for understanding business survival. Particularly, this

article explains how establishment openings and closings contribute to employment growth in both the short run and in the longer run.

This article also highlights the importance of understanding the difference between the annual statistics presented in this article versus “annualized” statistics created by summing four quarterly statistics. Although this latter methodology is standard for creating and analyzing net employment growth statistics over different frequencies, the sum of four quarterly gross job flow statistics is not the same as annual gross job flow statistics. These two approaches measure different concepts. The annual gross job flow statistics examine the number of jobs gained and the number of jobs lost *over* the year. The sum of four quarterly gross job flow statistics examine the number of jobs gained and the number of jobs lost *during* the year. Whereas the annual tabulations always have a clear interpretation, this analysis shows that the sum of four quarterly statistics (or the sum of 12 monthly statistics) can sometimes produce results that are difficult to interpret.

The article begins by describing the construction of annual statistics from the Business Employment Dynamics quarterly microdata. The algorithm for creating the annual statistics is more complicated than a simple comparison of two points in time that are 1 year apart. The article then presents the annual gross job gains and gross job loss statistics. The

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analysis focuses on a comparison of how the annual statistics relate to the quarterly statistics, and the value added of the annual statistics relative to the quarterly statistics. The article concludes with a discussion of how annual gross job gains and losses statistics provide a crosswalk between the new BLS quarterly statistics and the annual statistics in much of the existing gross job flows literature.

Sources, definitions, and the algorithm

The quarterly BLS Business Employment Dynamics data series is constructed from microdata originating from the Quarterly Census of Employment and Wages (QCEW), also known as the ES-202 program. All employers subject to State unemployment insurance laws are required to submit quarterly contribution reports detailing their monthly employment and quarterly wages to the State Employment Security Agencies. After the microdata are edited and, if necessary, corrected by the State Labor Market Information staff, the States submit these data and other business identification information to the Bureau of Labor Statistics as part of the Federal-State cooperative QCEW program. The data gathered in the QCEW program are a comprehensive and accurate source of employment and wages, and provide a virtual census (98 percent) of employees on nonfarm payrolls.

The quarterly gross job gains and gross job loss statistics created in the BLS Business Employment Dynamics program are tabulated by linking establishments across quarters, and establishments are then classified as opening, expanding, contracting, closing, or not changing their employment level. The accuracy of the Business Employment Dynamics statistics depends on the quality of the establishment level microdata being reported to the States. Gross job gains are the sum of all employment increases at either opening or expanding establishments; gross job losses are the sum of all employment losses at either closing or contracting establishments. The familiar net change in employment is the difference between the gross jobs gained and the gross jobs lost.²

The quarterly Business Employment Dynamics microdata provide the foundation for tabulations of annual gross job gains and losses statistics. Creating the annual statistics is more complicated than comparing two quarters of microdata that are 1 year apart. The difficulties come from trying to follow a specific establishment across several quarters, especially through periods of ownership changes, restructurings, or changes in how multi-establishment firms report their unemployment insurance data to the States. The annual statistics presented in this article are based on an extension of the existing longitudinal linkage algorithm developed by BLS for the quarterly gross job gains and losses data series.

As part of the existing process of linking establishments across consecutive quarters in the Business Employment Dynamics program, BLS and the States identify what are termed breakouts and consolidations. The term “breakout” refers to a single establishment splitting into multiple establishments, and the term “consolidation” refers to multiple establishments merging into a single establishment. Breakouts and consolidations may be actual economic events representing business expansions and contractions, or merely administrative reporting changes due to how an employer with multiple establishments within a State reports its data. Although BLS and the States continuously work with employers to obtain data at the establishment level, some employers with multiple establishments within a State report their total employment and wages in a consolidated manner. Occasionally, an employer reporting consolidated data will disaggregate its data to the worksite level (or, much less frequently, vice-versa).

Establishments involved in breakouts and consolidations need to be treated with care when constructing gross job gains and losses statistics. For example, an employer with multiple establishments in the State that disaggregates its data from a statewide level to a worksite reporting level would initially appear in the microdata to be a closing of an existing large establishment and the opening of several new small establishments. The record linkage system used in the Business Employment Dynamics program strives to identify the relationships between the establishments that are involved in all one-to-many breakouts and many-to-one consolidations. These establishments can then be treated as continuous, rather than as openings and closings, when constructing the quarterly gross job gains and losses statistics.³

Breakouts and consolidations cause additional difficulties when users attempt to create annual gross job gains and losses statistics. For example, if one wanted to accurately track establishments from March of one year to March of the following year, information on breakouts and consolidations from all quarters within the year needs to be taken into account in order to understand business survival and thus avoid spuriously defining openings and closings.

The annual gross job gains and losses statistics reported in this article are based upon an algorithm that takes into account information on breakouts and consolidations from all quarters within the year. Previous research shows that an algorithm that uses all information within the year is preferable to a more naïve approach which takes two quarters of microdata that are 1 year apart and links establishments without accounting for breakouts and consolidations that occur within the year. Such a naïve approach, relative to the algorithm used here, increases the annual gross job gains and losses statistics by roughly 7 percent to 9 percent.⁴

Table 1. Quarterly and annual private-sector gross job gains and job losses, first quarter 1998 through first quarter 2002

[Not seasonally adjusted]

Period	Employment			Gross job gains		Gross job losses	
	Previous quarter/year	Current quarter/year	Change	Expanding establishments	Opening establishments	Contracting establishments	Closing establishments
Quarterly:							
1998: I to 1998: II	102,201,556	105,745,572	3,544,016	7,823,083	2,443,361	5,128,625	1,593,803
1998: II to 1998: III	105,745,572	105,895,205	149,633	6,045,188	1,696,143	6,049,428	1,542,270
1998: III to 1998: IV	105,895,205	106,669,216	774,011	6,872,921	1,600,934	6,108,728	1,591,116
1998: IV to 1999: I	106,669,216	104,637,156	-2,032,060	5,881,407	2,305,245	7,621,358	2,597,354
Annual:							
1998: I to 1999: I	102,201,556	104,637,156	2,435,600	10,311,106	5,946,992	8,515,309	5,307,189
Quarterly:							
1999: I to 1999: II	104,637,156	108,121,039	3,483,883	8,075,511	2,285,719	5,311,276	1,566,071
1999: II to 1999: III	108,121,039	108,182,154	61,115	6,316,593	1,705,902	6,277,917	1,683,463
1999: III to 1999: IV	108,182,154	109,278,661	1,096,507	7,207,652	1,823,796	6,298,406	1,636,535
1999: IV to 2000: I	109,278,661	107,672,227	-1,606,434	6,097,257	2,111,495	7,531,814	2,283,372
Annual:							
1999: I to 2000: I	104,637,156	107,672,227	3,035,071	10,692,723	5,712,036	8,391,177	4,978,511
Quarterly:							
2000: I to 2000: II	107,672,227	111,115,514	3,443,287	8,269,019	2,037,883	5,384,637	1,478,978
2000: II to 2000: III	111,115,514	110,783,450	-332,064	6,284,783	1,631,545	6,582,852	1,665,540
2000: III to 2000: IV	110,783,450	111,182,910	399,460	6,985,872	1,641,856	6,622,454	1,605,814
2000: IV to 2001: I	111,182,910	108,561,077	-2,621,833	5,924,318	1,955,772	8,018,068	2,483,855
Annual:							
2000: I to 2001: I	107,672,227	108,561,077	888,850	10,240,477	5,191,521	9,363,412	5,179,736
Quarterly:							
2001: I to 2001: II	108,561,077	110,734,261	2,173,184	7,671,463	2,063,725	5,936,261	1,625,743
2001: II to 2001: III	110,734,261	109,000,401	-1,733,860	5,519,373	1,521,404	7,023,453	1,751,184
2001: III to 2001: IV	109,000,401	108,173,134	-827,267	6,147,166	1,648,088	7,025,677	1,596,844
2001: IV to 2002: I	108,173,134	105,810,039	-2,363,095	5,512,394	1,993,961	7,560,400	2,309,050
Annual:							
2001: I to 2002: I	108,561,077	105,810,039	-2,751,038	8,752,075	5,201,011	11,148,760	5,555,364

SOURCE: Authors' calculations using microdata from the BLS Business Employment Dynamics program.

This article uses data from the first quarter of 1998 through the first quarter of 2002. The quarterly statistics that we present replicate the official (seasonally unadjusted) statistics from the BLS Business Employment Dynamics program.⁵ Employment is defined as the number of workers covered by unemployment insurance and earning wages during the pay period that includes the 12th of the month. The gross job gains and gross job loss statistics use reported employment data in the third month of the quarter as the measure of the establishment's quarterly employment. Thus, employment growth for the second quarter refers to employment growth from March to June. To be consistent with much of the gross job flows literature, many of the annual statistics that this article presents measure employment growth from March of one year to March of the following year.

Annual gross job gains and losses

Based on quarterly and annual tabulations of Business Employment Dynamics statistics, tables 1 through 4 provide the following statistics: table 1 presents the employment levels in the current and previous time periods, the net employment change, and the gross job gains and the gross job losses. Table 2 shows these employment changes as rates rather than levels.⁶ The number and flows of establishments underlying the employment statistics in table 1 are presented in table 3, with corresponding rates presented in table 4. None of the statistics in tables 1–4 are seasonally adjusted.

In March 2001, there were 108,561,077 private sector jobs, and 1 year later in March 2002, there were 105,810,039 private sector jobs. (See the bottom row of table 1.) This annual

decline in employment of 2,751,038 jobs is the sum of the four seasonally unadjusted quarterly changes during the year: an increase of 2,173,184 jobs between the first and second quarters of 2001, and declines of 1,733,860, 827,267, and 2,363,095 jobs, respectively, during the next three quarters. In percentage terms, this annual decline in employment was 2.57 percent. (See table 2.) This annual percentage decline is also the sum of the four seasonally unadjusted quarterly changes (1.98 percent, -1.58 percent, -0.76 percent, and -2.21 percent).

This annual decline in employment is equivalent to stating that fewer jobs were gained than were lost. The bottom row of table 1 shows that for the year ending in March 2002, employment in expanding establishments grew by 8,752,075 jobs, and employment in opening establishments grew by 5,201,011 jobs. The level of gross job gains was 13,953,086

jobs during the year, a rate of 13.02 percent. Employment in contracting establishments declined by 11,148,760 jobs, and closing establishments accounted for the loss of 5,555,364 jobs. The level of gross job losses was 16,704,124 jobs during the year, a rate of 15.58 percent. The difference between the gross job gains and the gross job losses is the net employment decline of 2,751,038 jobs, a rate of -2.57 percent.

An important component of the Business Employment Dynamics data series is the establishment counts underlying the gross job gains and losses. Looking at the annual statistics for March 2001 to March 2002 in tables 3 and 4, one can see that there were 1,633,498 expanding establishments (26.2 percent of all establishments), and 790,237 establishments (12.7 percent) opening during the year. There were 1,735,071 contracting establishments (27.8 percent), and 785,786 establishments (12.6 percent) closing during the year.

Table 2. Quarterly and annual private-sector gross job gains and job losses as a percentage of employment, first quarter 1998 through first quarter 2002

[In percent]							
Period	Net change	Gross job gains			Gross job losses		
		Total	Expanding establishments	Opening establishments	Total	Contracting establishments	Closing establishments
Quarterly:							
1998: I to 1998: II	3.41	9.87	7.52	2.35	6.47	4.93	1.53
1998: II to 1998: III .....	.14	7.32	5.71	1.60	7.17	5.72	1.46
1998: III to 1998: IV .....	.73	7.97	6.47	1.51	7.24	5.75	1.50
1998: IV to 1999: I	-1.92	7.75	5.57	2.18	9.67	7.21	2.46
Annual:							
1998: I to 1999: I	2.36	15.72	9.97	5.75	13.37	8.23	5.13
Quarterly:							
1999: I to 1999: II	3.27	9.74	7.59	2.15	6.46	4.99	1.47
1999: II to 1999: III .....	.06	7.42	5.84	1.58	7.36	5.80	1.56
1999: III to 1999: IV	1.01	8.31	6.63	1.68	7.30	5.79	1.51
1999: IV to 2000: I	-1.48	7.57	5.62	1.95	9.05	6.94	2.10
Annual:							
1999: I to 2000: I	2.86	15.45	10.07	5.38	12.59	7.90	4.69
Quarterly:							
2000: I to 2000: II	3.15	9.42	7.56	1.86	6.27	4.92	1.35
2000: II to 2000: III	-.30	7.14	5.66	1.47	7.43	5.93	1.50
2000: III to 2000: IV .....	.36	7.77	6.29	1.48	7.41	5.97	1.45
2000: IV to 2001: I	-2.39	7.17	5.39	1.78	9.56	7.30	2.26
Annual:							
2000: I to 2001: I .....	.82	14.27	9.47	4.80	13.45	8.66	4.79
Quarterly:							
2001: I to 2001: II	1.98	8.88	7.00	1.88	6.90	5.41	1.48
2001: II to 2001: III	-1.58	6.41	5.02	1.38	7.99	6.39	1.59
2001: III to 2001: IV	-.76	7.18	5.66	1.52	7.94	6.47	1.47
2001: IV to 2002: I	-2.21	7.02	5.15	1.86	9.22	7.07	2.16
Annual:							
2001: I to 2002: I	-2.57	13.02	8.17	4.85	15.58	10.40	5.18

SOURCE: Authors' calculations using microdata from the BLS Business Employment Dynamics program.

Table 3. Quarterly and annual establishments, by direction of employment change, first quarter 1998 through first quarter 2002

[Not seasonally adjusted]

Period	Establishments			Establishments gaining jobs		Establishments losing jobs	
	Previous quarter/year	Current quarter/year	Change	Expanding establishments	Opening establishments	Contracting establishments	Closing establishments
Quarterly:							
1998: I to 1998: II	5,954,688	6,100,295	145,607	1,677,630	399,192	1,217,620	253,585
1998: II to 1998: III	6,102,056	6,111,290	9,234	1,416,065	297,214	1,520,449	287,980
1998: III to 1998: IV	6,112,675	6,141,350	28,675	1,514,463	328,150	1,396,232	299,475
1998: IV to 1999: I	6,139,037	6,047,343	-91,694	1,372,314	322,952	1,563,034	414,646
Annual:							
1998: I to 1999: I	5,949,688	6,043,308	93,620	1,747,912	778,826	1,519,889	685,206
Quarterly:							
1999: I to 1999: II	6,061,444	6,154,715	93,271	1,699,870	383,274	1,249,922	290,003
1999: II to 1999: III	6,157,563	6,153,188	-4,375	1,434,037	307,526	1,542,258	311,901
1999: III to 1999: IV	6,155,545	6,225,768	70,223	1,541,212	376,244	1,413,109	306,021
1999: IV to 2000: I	6,224,233	6,142,674	-81,559	1,406,142	345,268	1,595,453	426,827
Annual:							
1999: I to 2000: I	6,055,507	6,135,781	80,274	1,774,943	804,022	1,548,585	723,748
Quarterly:							
2000: I to 2000: II	6,159,683	6,273,531	113,848	1,721,043	391,847	1,292,080	277,999
2000: II to 2000: III	6,275,908	6,271,181	-4,727	1,442,389	314,945	1,580,817	319,672
2000: III to 2000: IV	6,273,940	6,326,260	52,320	1,511,533	365,672	1,477,681	313,352
2000: IV to 2001: I	6,325,421	6,220,660	-104,761	1,386,268	333,506	1,611,652	438,267
Annual:							
2000: I to 2001: I	6,154,016	6,213,658	59,642	1,723,162	809,301	1,645,873	749,659
Quarterly:							
2001: I to 2001: II	6,236,791	6,327,460	90,669	1,668,308	377,140	1,320,988	286,471
2001: II to 2001: III	6,330,657	6,292,660	-37,997	1,357,255	297,385	1,628,835	335,382
2001: III to 2001: IV	6,294,785	6,344,623	49,838	1,426,118	361,787	1,506,839	311,949
2001: IV to 2002: I	6,345,811	6,243,771	-102,040	1,329,571	328,795	1,603,277	430,835
Annual:							
2001: I to 2002: I	6,232,571	6,237,022	4,451	1,633,498	790,237	1,735,071	785,786

SOURCE: Authors' calculations using microdata from the BLS Business Employment Dynamics program.

The statistics from tables 1 and 3 indicate that the average expanding establishment added 5.4 jobs during the year spanning March 2001 to March 2002, and the average contracting establishment lost 6.4 jobs during the year. A similar calculation shows that the average opening establishment starts with 6.6 employees in its first year of positive employment, and the average closing establishment is responsible for the loss of 7.1 employees in its final year with employees.

Annual gross job gains and losses statistics add to the labor market information currently available from BLS. A traditional measure of net employment change shows that employment fell by 2,751,038 jobs during the year measured from March 2001 to March 2002. The annual gross job gains and losses statistics indicate that this net employment loss is the result of 8,752,075 jobs added at 1,633,498 expanding

establishments, 5,201,011 jobs added at 790,237 opening establishments, 11,148,760 jobs lost at 1,735,071 contracting establishments, and 5,555,364 jobs lost at 785,786 closing establishments. These annual statistics from the Business Employment Dynamics data show the tremendous amount of churning of jobs and establishments underlying the annual net employment growth.

Annual statistics: uses and interpretations

To show how the annual statistics relate to the quarterly statistics and the value added of the annual statistics relative to the quarterly statistics, the following subsection directly compares the annual and the quarterly statistics without attempting to standardize the two to the same frequency of measurement. The second subsection "annualizes" the

Table 4. Quarterly and annual establishments, by direction of employment change as a percentage of total establishments, first quarter 1998 through first quarter 2002

[Not seasonally adjusted]

Period	Net change	Establishments gaining jobs			Establishments losing jobs		
		Total	Expanding establishments	Opening establishments	Total	Contracting establishments	Closing establishments
Quarterly:							
1998: I to 1998: II	2.42	34.46	27.83	6.62	24.41	20.20	4.21
1998: II to 1998: III .....	.15	28.06	23.19	4.87	29.61	24.90	4.72
1998: III to 1998: IV .....	.47	30.07	24.72	5.36	27.68	22.79	4.89
1998: IV to 1999: I	-1.50	27.82	22.52	5.30	32.46	25.65	6.81
Annual:							
1998: I to 1999: I	1.56	42.14	29.15	12.99	36.77	25.35	11.43
Quarterly:							
1999: I to 1999: II	1.53	34.10	27.83	6.27	25.21	20.46	4.75
1999: II to 1999: III	-.07	28.29	23.30	5.00	30.12	25.06	5.07
1999: III to 1999: IV	1.13	30.97	24.90	6.08	27.77	22.83	4.94
1999: IV to 2000: I	-1.32	28.32	22.74	5.58	32.70	25.80	6.90
Annual:							
1999: I to 2000: I	1.32	42.31	29.12	13.19	37.28	25.40	11.87
Quarterly:							
2000: I to 2000: II	1.83	33.99	27.68	6.30	25.26	20.78	4.47
2000: II to 2000: III	-.08	28.01	22.99	5.02	30.29	25.20	5.10
2000: III to 2000: IV .....	.83	29.80	23.99	5.80	28.43	23.45	4.97
2000: IV to 2001: I	-1.67	27.42	22.10	5.32	32.68	25.69	6.99
Annual:							
2000: I to 2001: I .....	.96	40.95	27.87	13.09	38.74	26.62	12.12
Quarterly:							
2001: I to 2001: II	1.44	32.56	26.56	6.00	25.59	21.03	4.56
2001: II to 2001: III	-.60	26.22	21.50	4.71	31.12	25.81	5.31
2001: III to 2001: IV .....	.79	28.29	22.57	5.72	28.78	23.84	4.94
2001: IV to 2002: I	-1.62	26.35	21.12	5.22	32.31	25.47	6.84
Annual:							
2001: I to 2002: I .....	.07	38.87	26.20	12.67	40.43	27.83	12.60

SOURCE: Authors' calculations using microdata from the BLS Business Employment Dynamics program.

quarterly statistics prior to comparison, and the third section carefully examines the relationship between quarterly and annual openings.

A simple comparison of annual statistics and quarterly statistics. The annual gross job flow statistics are higher in magnitude than the gross job flow statistics from any quarter within the year. For example, in table 2, for the March 2001 to March 2002 period, the annual gross job gains rate is 13.02 percent, and the annual gross job loss rate is 15.58 percent. These annual statistics are higher than any of the quarterly statistics within the year: the average quarterly gross job gains rate for the four quarters between March 2001 and March 2002 is 7.37 percent, and the average quarterly gross job loss rate is 8.01 percent.

Additional analysis of the data in tables 1 and 2 reveals that the larger annual statistics correspond to a greater importance of establishment openings and closings. That is,

22.5 percent of quarterly gross job gains are due to establishment openings, whereas 37.3 percent of annual gross job gains are due to establishment openings. Similar computations show that 20.9 percent of quarterly gross job losses are due to establishment closings, whereas 33.2 percent of annual gross job losses are due to establishment closings.

This greater importance of openings and closings in the annual statistics, relative to the quarterly statistics, is due in part to an increased number of establishment openings and closings. Using data from March 2001 to March 2002, the rate of establishment openings increases from 5.41 percent on an average quarterly basis to 12.67 percent on an annual basis, and the rate of establishment closings increases from 5.41 percent on an average quarterly basis to 12.60 percent on an annual basis. (See table 4.) This striking difference does not exist between the quarterly and annual rates of expansions and contractions: the average quarterly expansion

rate is 22.94 percent, relative to an annual expansion rate of 26.20 percent, and the average quarterly and the annual contraction rates are 24.04 percent and 27.83 percent, respectively.

In addition to an increased number of openings and closings, one might expect the average size of establishment openings and closings to increase as the time horizon is lengthened over which employment growth is measured. First, the composition of establishment openings is different in the quarterly and the annual statistics, because many openings that do not survive several quarters will not be in the annual statistics. The existing literature finds that the smallest establishments are the most likely to die shortly after birth.⁷ Second, if employment growth in surviving births is a gradual process as these new establishments learn about their business environment, then quarterly measures of employment growth will understate (relative to annual measures) the amount of gross job gains attributable to openings. Similarly, if closing establishments decrease their size gradually over time, then quarterly measures of gross job losses will understate the jobs lost from these establishments. Calculations using March 2001–March 2002 statistics from tables 1 and 3 show an increasing average size of openings and closings over a longer run horizon: The size of the average opening increases from 5.3 jobs measured quarterly to 6.6 jobs measured annually, and the average size of a closing increases from 5.3 jobs measured quarterly to 7.1 jobs measured annually.

Also, the average size of expansions and contractions is larger in the annual statistics compared with the quarterly statistics. The average expansion has 5.4 employees measured annually versus 4.3 employees measured quarterly, and the average contraction has 6.4 employees measured annually versus 4.5 employees measured quarterly. One explanation is that in the short run, some of the expansions and contractions in the data are transitory fluctuations caused by the hiring process taking some time. In the long run, sustained expansions and contractions will distinguish themselves from these short run transitory employment fluctuations.

Comparing the annual statistics to the sum of four quarterly statistics. The new quarterly Business Employment Dynamics data series has been used by many analysts for many applications. There has been a demand by the user community for annual gross job gains and losses statistics, and some users have “annualized” the quarterly statistics themselves.⁸ This section addresses whether it is appropriate to use the sum of the four quarterly gross job flows statistics as an annual gross job flows statistic.

As noted earlier, the sum of the four quarterly net employment changes in table 1 is the annual net employment

change. However, the sum of the four quarterly gross job gains is much greater than the annual gross job gains, and the sum of the four quarterly gross job losses is much greater than the annual gross job losses. For example, the sum of jobs created by expanding establishments in each quarter from March 2001 to March 2002 is 24,850,396, whereas the annual tabulation shows that only 8,752,075 jobs were added by expanding establishments.

Caution should be used with regard to distinguishing between annual statistics and the sum of four quarterly statistics. Neither is inherently right or wrong; the two different approaches are simply answers to different questions. The annual statistics show job gains and losses *over* a year. The sum of quarterly numbers look at the gains and losses *during* a year.

The intuition for the difference between these two concepts is straightforward. Many quarterly changes reverse themselves over the course of a year. Many of these reversals are due to lags in hiring for vacant positions (a gross job loss in one quarter followed by a gross job gain in the subsequent quarter), and many are due to seasonality (for example, employment at amusement parks expands in the summer and contracts in the winter). The data indicate that 53 percent of the establishments that expanded in the quarter between March and June of 2001 also expanded over the year from March 2001 to March 2002. The data also indicate that 62 percent of the establishments that expanded over the year had at least one quarter during the year in which they contracted. Only 2 percent of the establishments that expanded over the year expanded in all four quarters during the year.

Summing high frequency statistics, such as quarterly statistics, to examine job gains and losses during a longer period such as a year has two drawbacks. First, this method will result in different answers depending on whether one sums 12 monthly statistics, 4 quarterly statistics, and so on. To illustrate this, assume a user wants to know the gross jobs gained *during* the 2-year period from March 2000 to March 2002. The sum of the two annual statistics from table 2 suggests that 29,385,084 jobs were gained during the 2-year period, whereas the sum of the eight quarterly statistics suggests that 66,808,622 jobs were gained during the 2-year period. If one wanted to truly count every single job that was gained or lost during a year, one would have to sum statistics from time periods that are small enough such that no single gain or loss has time to reverse itself.

A second drawback is that summing quarterly statistics can produce strange results that are difficult to interpret—this is especially true for percentages, which may sum to more than 100 percent. This can easily be seen using statistics from table 4: between 26 percent and 32 percent of establishments gained jobs in any quarter between March 2001 and March 2002, but the sum of the four quarterly

Table 5. Quarterly and annual opening establishments, second quarter 2001 through first quarter 2002

Period	Number of establishments	Percent of openings	Conditional percent
2001: II openings (n = 377,140):			
Remains open 2001: III	318,561	84.47	...
Remains open 2001: IV	278,575	73.87	...
Remains open 2002: I	232,157	61.56	...
Opening in annual table	232,157	61.56	100.00
Continuous in annual table	0	0.00	0.00
2001: III openings (n = 297,385):			
Remains open 2001: IV	248,040	83.41	...
Remains open 2002: I	219,007	73.64	...
Opening in annual table	170,821	57.44	78.00
Continuous in annual table	48,186	16.20	22.00
2001: IV openings (n = 361,787):			
Remains open 2002: I	247,679	68.46	...
Opening in annual table	175,646	48.55	70.92
Continuous in annual table	72,033	19.91	29.08
2002: I openings (n = 328,795):			
Remains open 2002: I	328,795	100.00	...
Opening in annual table	240,519	73.15	73.15
Continuous in annual table	88,276	26.85	26.85

statistics cannot be interpreted as saying that 113.4 percent of establishments gained jobs during the year.

A closer examination of quarterly and annual openings. A comparison of quarterly openings with annual openings will help illustrate why the sum of quarterly statistics differs from the annual statistic. In table 3, there are 377,140 opening establishments in the second quarter of 2001, 297,385 opening establishments in the third quarter of 2001, 361,787 opening establishments in the fourth quarter of 2001, and 328,795 opening establishments in the first quarter of 2002. The sum of these four quarterly statistics is 1,365,107, which is substantially higher than the 790,237 opening establishments reported in the annual tabulation. There are several reasons for this difference.

The amount of time that opening establishments remain in business is a major factor in understanding the relationship between quarterly openings and annual openings. If an establishment opens in the second quarter of 2001, but closes before the first quarter of 2002, it would not be listed as an opening establishment in the annual table. Statistics in table 5 examine the status of opening establishments over a timeframe longer than one quarter. In the top panel of table 5, there are 377,140 establishments that open in the second quarter of 2001. One quarter later, 84.5 percent of these establishments remain open, 73.9 percent are still open two quarters later, and 61.6 percent are still open three quarters later (in the first quarter of 2002).⁹ The second panel of table 5, which tracks the status of establishments that open in the third quarter of 2001, indicates that 73.6 percent of these quarterly openings are still open two quarters later.

Another factor that affects the relationship between quarterly openings and annual openings is the large number of establishments that close and re-open within the year. To understand this explanation, it is helpful to return to the definition of opening and continuous establishments. By definition, an annual opening in the March 2001–March 2002 tabulation either does not exist or has zero employment in the first quarter of 2001, but has positive employment in the first quarter of 2002. An annual continuous establishment, by definition, has positive employment in both the first quarter of 2001 and also in the first quarter of 2002. The continuous establishments in the annual tabulations do not need to have positive employment in all quarters between the first quarter of 2001 and the first quarter of 2002. An annual continuous establishment that has zero employment in some quarter within the year would be classified as a closing in the quarter it went from positive to zero employment, and then classified as an opening in the quarter it went from zero to positive employment. How often does this occur? Table 5 shows that between 22 percent and 29 percent of establishments classified as quarterly openings (in the third, fourth, and first quarters) that remain open in the first quarter of 2002 are classified as continuous establishments in the annual tables. This finding illustrates that a significant number of establishment openings in the quarterly statistics are continuous establishments that close and re-open during the year.

There is one more interesting finding about opening establishments that warrants mention. Table 5 shows that 232,157 establishments that opened in the second quarter of 2001 and remain open in the first quarter of 2002 are classified as annual openings. The corresponding statistics for opening

establishments are 170,821 in the third quarter of 2001, 175,646 in the fourth quarter of 2001, and 240,519 in the first quarter of 2002. The addition of these four statistics is 819,143, which exceeds the annual opening statistic of 790,237 by 28,906 establishments (or 3.7 percent). The explanation for this difference is that 3.7 percent of establishments that are classified as annual openings have two quarterly openings within the year.

The time series of annual statistics

One of the most interesting conclusions that has come from the new BLS Business Employment Dynamics data series is that the 2001 recession is characterized by a decline in gross job gains accompanied by an increase in gross job losses. The most recent business cycle is also evident in the annual job flow statistics. The annual net employment change in table 2 is more than 2 percent in March 1999 and March 2000, falls to 0.82 percent in March 2001, and is -2.57 percent in March 2002. The business cycle is also evident in the annual gross job gains and losses statistics. The annual rate of gross job gains is essentially similar in 1999 and 2000, and then falls from 15.45 percent in 2000 to 13.02 percent in 2002. The annual rate of gross job losses is roughly steady if not declining during 1999 through 2001, followed by a relatively large increase in 2002. It is difficult to say much more about the 2001 recession, dated by the National Bureau of Economic Research as occurring between March 2001 to November 2001, because there are only four annual statistics in table 2.

However, it is possible to gain further information about the business cycle by computing annual gross job gains and losses for all quarters of the year. Table 6 presents statistics that measure the annual rates of gross job gains and losses from March to March, June to June, September to September, and December to December. The 2001 recession is evident in these statistics: the annual net employment change is more than 2 percent for the first several quarters of 2000, and then falls rapidly throughout 2001. This declining annual net employment growth rate reflects two factors—a declining annual gross job gains rate and a rising annual gross job loss rate. (See chart 1.) This annual time series of gross job gains and losses, computed quarterly, is consistent with the time series pattern of the seasonally adjusted quarterly series from the Business Employment Dynamics program.

The quarterly time series of annual tabulations in table 6 is not seasonally adjusted, and does not appear to show any obvious seasonal effects. This is different than the quarterly statistics in table 1 or table 2, where it is obvious that any time series analysis of quarterly gross job gains and losses requires seasonal adjustment of the data. Thus, the annual statistics can serve as a crude alternative to seasonally adjusted quarterly numbers, and could be especially useful for

purposes where it may be infeasible to compute a long enough time series for seasonal adjustment.

Comparisons with existing literature

The first influential studies of gross job gains and losses in the U.S. economy were by Dunne, Roberts, and Samuelson, and Davis, Haltiwanger, and Schuh.¹⁰ Both of these studies focused on data for the manufacturing sector from the Census Bureau; later work by Anderson and Meyer, Foote, and Spletzer used unemployment insurance data from various States to examine how gross job flows in manufacturing may not be representative of other industries.¹¹

From the heavily cited work of Davis, Haltiwanger, and Schuh, one of the main conclusions is that the annual rate of gross job gains in manufacturing during the 1973–88 period is 9.1 percent, and the annual rate of gross job losses in manufacturing during the same period is 10.3 percent. These rates are substantially lower than the annual rates presented in table 2: for the entire U.S. economy during the 1999–2002 period, the average annual gross job gains rate is 15.1 percent, and the average annual gross job loss rate is 14.3 percent. Perhaps the most important explanation for this difference is due to the difference in industry sectors; indeed, the quarterly industry statistics recently released by the BLS Business Employment Dynamics program show that the gross job flow rates in manufacturing are lower than those in the economy as a whole.¹²

Annual gross job gains and losses statistics for the manufacturing sector are computed from the Business Employment Dynamics data. For the manufacturing sector, the average annual rate of gross job gains over 4 years (1999–2002) is 9.4 percent and the average annual rate of gross job losses is 12.6 percent. These rates are broadly similar to those of Davis, Haltiwanger, and Schuh. The two crosswalks described in this article—the crosswalk between the manufacturing sector and the U.S. economy as a whole, and the crosswalk between the quarterly and the annual statistics—enables interested users to compare the quarterly statistics from the BLS Business Employment Dynamics program with the annual manufacturing statistics in the existing literature.

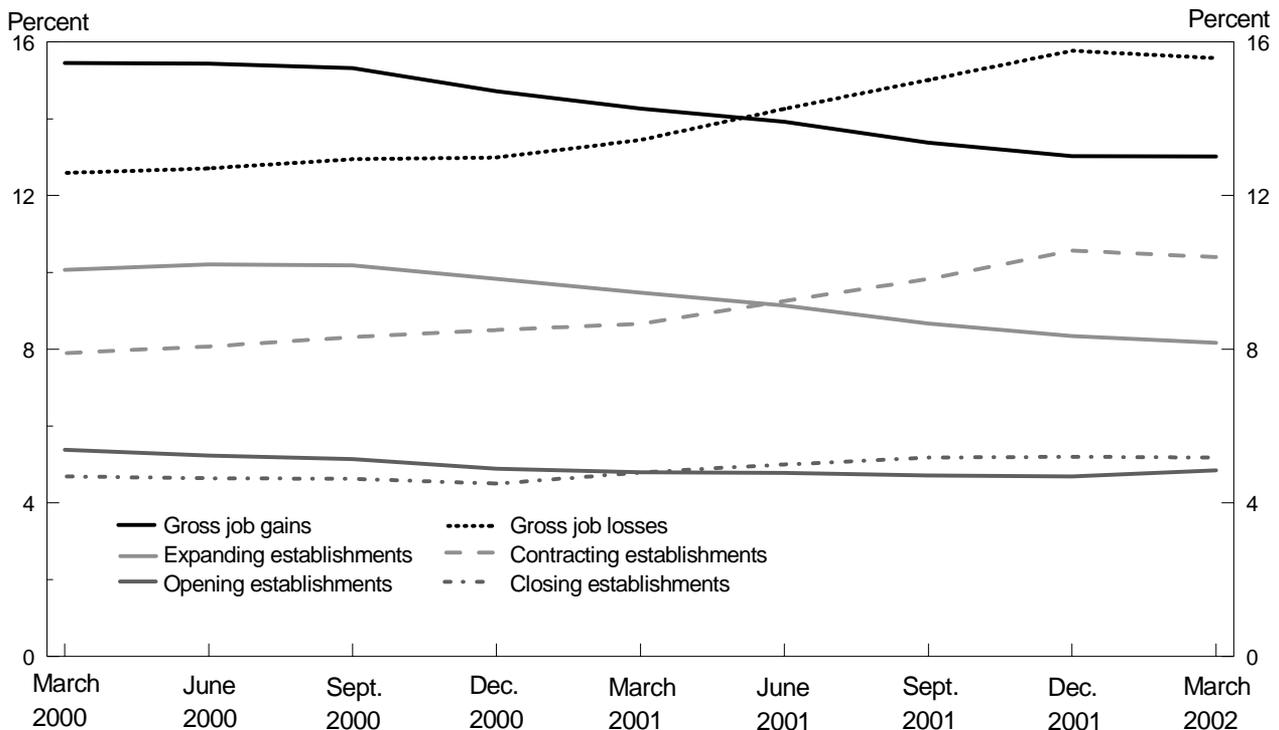
THIS ARTICLE presented annual gross job gains and gross job loss statistics that were created using the quarterly microdata from the Business Employment Dynamics program. The annual gross job gains and losses statistics show the tremendous amount of churning that underlies the net growth of employment. Indeed, every year in the U.S. economy, millions of establishments remaining in operation are adding or subtracting from their workforces, creating the turnover of millions of jobs. At the same time, hundreds of thousands of

Table 6. Annual private-sector gross job gains and job losses, March 1999 to March 2002

Period	Employment			Gross job gains			Gross job losses		
	Previous year	Current year	Change	Total	Expanding establishments	Opening establishments	Total	Contracting establishments	Closing establishments
1999–2000:									
March to March	104,637,156	107,672,227	3,035,071 (2.86)	16,404,759 (15.45)	10,692,723 (10.07)	5,712,036 (5.38)	13,369,688 (12.59)	8,391,177 (7.90)	4,978,511 (4.69)
June to June	108,121,039	111,115,514	2,994,475 (2.73)	16,921,558 (15.44)	11,193,695 (10.21)	5,727,863 (5.23)	13,927,083 (12.71)	8,846,055 (8.07)	5,081,028 (4.64)
September to September	108,182,154	110,783,450	2,601,296 (2.38)	16,777,558 (15.32)	11,146,415 (10.18)	5,631,143 (5.14)	14,176,262 (12.95)	9,107,405 (8.32)	5,068,857 (4.63)
December to December	109,278,661	111,182,910	1,904,249 (1.73)	16,226,533 (14.72)	10,840,239 (9.83)	5,386,294 (4.89)	14,322,284 (12.99)	9,367,299 (8.50)	4,954,985 (4.50)
2000–2001:									
March to March	107,672,227	108,561,077	888,850 (.82)	15,431,998 (14.27)	10,240,477 (9.47)	5,191,521 (4.80)	14,543,148 (13.45)	9,363,412 (8.66)	5,179,736 (4.79)
June to June	111,115,514	110,734,261	-381,253 (-.34)	15,441,137 (13.92)	10,135,482 (9.14)	5,305,655 (4.78)	15,822,390 (14.26)	10,276,408 (9.26)	5,545,982 (5.00)
September to September	110,783,450	109,000,401	-1,783,049 (-1.62)	14,708,760 (13.38)	9,532,083 (8.67)	5,176,677 (4.71)	16,491,809 (15.01)	10,804,058 (9.83)	5,687,751 (5.18)
December to December	111,182,910	108,173,134	-3,009,776 (-2.74)	14,286,714 (13.03)	9,146,066 (8.34)	5,140,648 (4.69)	17,296,490 (15.77)	11,594,516 (10.57)	5,701,974 (5.20)
2001–2002:									
March to March	108,561,077	105,810,039	-2,751,038 (-2.57)	13,953,086 (13.02)	8,752,075 (8.17)	5,201,011 (4.85)	16,704,124 (15.58)	11,148,760 (10.40)	5,555,364 (5.18)

NOTE: Percentages are in parentheses.

Chart 1. Quarterly time series of annual private-sector gross job gains and losses, March 2000–02



NOTE: The 2001 recession, according to the National Bureau of Economic Research, occurred between March 2001 and November 2001.

establishments open and close every year, causing the simultaneous gain and loss of millions of jobs. This analysis of the annual gross job flow statistics has highlighted their

value as a complement to the quarterly gross job flow statistics released from the BLS Business Employment Dynamics program. □

NOTES

¹ For a complete description and analysis of the new 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. The Business Employment Dynamics Web site is www.bls.gov/bdm.

² Further details about definitions and the quarterly linkage algorithm can be found in Spletzer and others, "Business employment dynamics," April 2004.

³ Establishments involved in ownership changes also need to be treated with care when constructing gross job gains and gross job loss statistics. When an establishment changes ownership, it is allowed to change its State specific unemployment insurance number. But this change will likely be identified by a State supplied predecessor or successor number or by the probabilistic weighted match in the BLS record linkage system, and as such, the unique establishment identifier in the BLS longitudinal establishment database remains constant through this period of ownership change.

⁴ A detailed description of the algorithm can be found in Joshua C. Pinkston and James R. Spletzer, "Annual Measures of Job Creation and Job Destruction Created from Quarterly Microdata," *American Statistical Association 2002 Proceedings of the Section on Business and Economic Statistics*, pp. 3311–3316. This ASA paper reports that the annual gross job gains rate for California increases from 18.7 percent to 20.0 percent, and the annual gross job loss rate for California increases from 15.4 percent to 16.8 percent, when not using information on breakouts and consolidations within the year.

⁵ See Spletzer and others, "Business employment dynamics," April 2004, table 5, page 40.

⁶ Percentages are calculated using the average of the current and previous levels as the denominator. This ensures that increases and decreases are treated symmetrically. For example, conventional calculations would describe an increase from 4 employees to 8 as a 100-percent increase, whereas a decrease from 8 to 4 would be a 50-percent decrease. Instead, when using average employment in the denominator, both the increase from 4 to 8 and the decrease from 8 to 4 are changes of 66.67 percent.

⁷ See James R. Spletzer, "The Contribution of Establishment Births and Deaths to Employment Growth," *Journal of Business and Economic Statistics*, January 2000, pp. 113–26.

⁸ For instance, "in 1999 alone, 33 million jobs were destroyed and 36 million created." See "All Jobs Count," *The Washington Post*, Editorial, March 4, 2004, p. A22. These statistics are the sum of the four quarterly statistics in table 1.

⁹ We do not interpret these statistics as survival probabilities, primarily because the statistics in table 5 refer to the opening and closing of establishments, whereas the literature on establishment survival refers to the birth and death of establishments. The statistics in table 5 (84.5 percent, 73.9 percent, and 61.6 percent), are lower than survival statistics in the literature. For example, the quarterly survival statistics in Spletzer, "The Contribution of Establishment Births and Deaths to Employment Growth," January 2000, are 90.5 percent, 84.9 percent, and 80.1 percent.

¹⁰ See Timothy Dunne, Mark J. Roberts, and Larry Samuelson, "Plant Turnover and Gross Employment Flows in the U.S. Manufacturing Sector," *Journal of Labor Economics*, vol. 7, no. 1, 1989, pp 48–71; and Steven J. Davis, John C. Haltiwanger, and Scott Schuh, *Job Creation and Destruction* (Cambridge, MA, MIT Press, 1996).

¹¹ See Patricia M. Anderson and Bruce D. Meyer, "The Extent and Consequences of Job Turnover," *Brookings Papers on Economic Activity*, 1994, pp. 177–236; Christopher L. Foote, "Trend Employment Growth and the Bunching of Job Creation and Destruction," *Quarterly Journal of Economics*, vol. 113, No. 3, August 1998, pp. 809–34; and Spletzer, "The Contribution of Establishment Births and Deaths to Employment Growth," January 2000.

¹² Another possible explanation for the difference between the statistics in this article and those of Davis and others, *Job Creation and Destruction*, 1996, is different time periods. It is possible that the late 1990s and early 2000s have higher gross job flow rates than the 1970s and 1980s. However, figure 8 of R. Jason Faberman, "Gross Job Flows over the Past Two Business Cycles: Not all 'Recoveries' are Created Equal," BLS Working Paper no. 372, June 2004, shows that the gross job gains and gross job loss rates for the manufacturing sector are arguably lower in the 1990s than in previous decades.