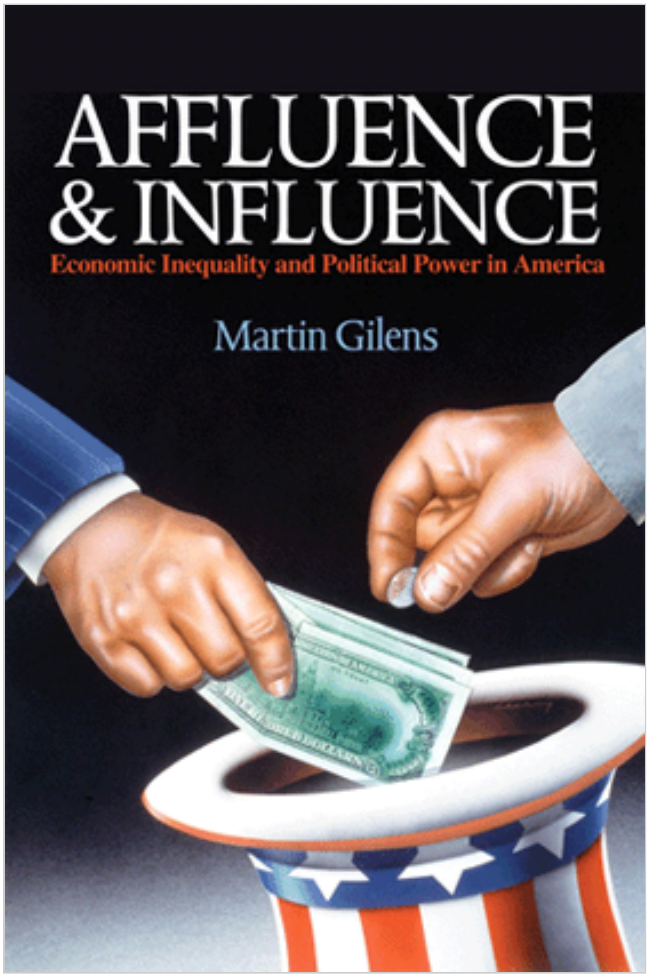
Monthly Labor Review
BLS
September 2016

The price of political power

Affluence and Influence: Economic Inequality and Political Power in America. By Martin Gilens. Princeton, NJ: Princeton University Press, and New York: Russell Sage Foundation, 2012, 329 pp., $24.95.



Do affluent Americans have more influence over government policy than the poor and middle class have? In light of the upcoming presidential election, Martin Gilens' landmark research on economic inequality and political power in America is particularly relevant. His book, *Affluence & Influence,* investigates the relationship between what the American public wants government to do and what the government actually does. A culmination of years of research, the book explores the degree to which the economic affluence of citizens influences public policy. Gilens doesn't stop there, though: he also looks into the effect that elections, differing political parties, gridlock, and interest groups have on what becomes federal policy. The result is a comprehensive analysis of American democracy's ability (or inability) to respond to the wants of its citizens.

Gilens' analysis unveils patterns of responsiveness that look more like a plutocracy than democracy. While he observes a strong policy response when the preferences of rich and poor Americans are similar, the preference–policy link for the less affluent disappears when their preferences diverge from those of the rich. When preferences differ, only the most affluent—those above the 90th percentile of household income—influence policy outcomes at all. This tilt toward the wishes of the wealthy is observed in economic policy, foreign policy, and policy involving moral or religious values. On social welfare issues, the policy response to the middle class and poor is somewhat more

Elesia C. Fasching
fasching.elesia@bls.gov

Elesia C. Fasching is an economist in the Office of Employment and Unemployment Statistics, U.S. Bureau of Labor Statistics

equitable, but even then, Gilens finds that it is due to the coincidental alignment of their preferences with the wants of powerful interest groups on matters such as healthcare, education, and social security.

Only when the political "pressure cooker" is highest—in the face of a presidential election, strong political gridlock, or uncertain control of Congress—does Gilens find that policymakers are at all responsive to the desires of poorer citizens. He observes that, during presidential election years, when political pressures are at their peak, policymakers are more responsive to the preferences of *all* income levels, but the pattern is strongest for the poor and the middle class. In a system tilted strongly in favor of the wealthy, Gilens sees the positive effect of presidential elections on responsiveness as a glimmering sign that democracy still works in America. Like economic competition, the political competition presented by a presidential election forces policymakers to be more responsive in order to appeal to the most voters possible.

If elections spur responsiveness to the less wealthy, how do the differing political parties affect the level of responsiveness? Democrats are generally considered to be the party of the poor and the working class. Consequently, Gilens expected policymakers to be more responsive to the wants of the less wealthy in the years the Democrats controlled the federal government. To his surprise, the data showed the opposite: policy responsiveness was stronger at all income levels when the Republican Party was at the helm. To the disappointment of politicians, Gilens found that this increase in responsiveness wasn't due to ideological differences between Democrats and Republicans; it was due to the degree to which one party controlled the national government. When one party controlled both the executive and legislative branches or had strong control of the legislature, they were free to pursue policies that fit their ideology, rather than policies that represented the preferences of their constituents. Gilens concluded that political competition in the form of gridlock has the same effect as impending elections: it makes policymakers more responsive.

Gilens' analysis of political gridlock allows him to explain the extremely low level of responsiveness seen during the Johnson administration, when Democrats held the presidency and strong control of the legislature. His analysis also explains the high level of responsiveness during the beginning of the George W. Bush administration: Congress was more closely divided when Bush came into office than at any time in the previous 50 years. As Gilens concluded, "Only when political pressures are greatest—when an election looms, when gridlock is strong, or when control of Congress is uncertain—does a preference or policy link emerge for less advantaged Americans." Political competition, like economic competition, forces policymakers to become more responsive to their constituents' wishes in order to stay in power.

Although Gilens presents high-quality analysis grounded in extensive, well-researched data, basing the analysis on the level of income at the 90th percentile and above could be problematic in measuring the level of political influence wielded by the truly wealthy. As he notes, the 90th percentile had an annual *household* income of $135,000 in 2010—hardly the Rolex-wearing, private-jet-owning image the words "90th percentile" evoke. A household at the 90th percentile income level is arguably more financially capable of contributing funds to groups that promote its interests or of giving a sizable donation to a politician than the poorest Americans are, but its ability to do so doesn't differ enough from what a less wealthy household could do. The problem is that lumping households *at* the 90th percentile with those above it, including the ultrawealthy, means that the observed influences exerted by the group may actually be based on the desires and actions of a much wealthier subset: the top 1 percent of the income distribution. The truly wealthy—the 1 percent—are able to donate enormous sums to policymakers and interest groups, or even, as Donald Trump has shown in the years since the book was written,

mount presidential bids. These actions seem much more likely to influence policy than the smaller donations 90th-percentile households are capable of making. Unfortunately, as Gilens found, there is currently little data on the actions of such a select (and often secretive) group as the 1 percent that would allow a robust study.

While *Affluence and Influence* is particularly relevant in today's political environment of rising inequality in America and a growing backlash against the 1 percent, it isn't a page-turner that would engage the casual reader with no background in political science or research. Instead, the writing is quite academic and laden with statistical methodology. Still, those with a particular interest in politics or public policy will find Gilens' work an enthralling foray into the role that the preferences of more affluent Americans play in shaping policy—and into what America might look like without their influence.

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Job openings, hires, and separations return to prerecession levels in 2015

Job openings increased to their highest levels ever, and hires and separations exceeded their prerecession levels, in 2015, according to the BLS Job Openings and Labor Turnover Survey (JOLTS). The increase in both jobs and worker flows likely indicates growing confidence on the part of both employers and workers, with employers becoming more willing to hire and workers having sufficient incentives to leave their current positions.

Ainslie MacLeod
macleod.ainslie@bls.gov

Ainslie MacLeod is an economist in the Office of Employment and Unemployment Statistics, U.S. Bureau of Labor Statistics.

Data from the Job Openings and Labor Turnover Survey (JOLTS), conducted by the U.S. Bureau of Labor Statistics, showed labor market activity returning to prerecession levels in 2015 for several major indicators of the state of the economy, including hires, separations, and quits. Job openings reached 5.8 million in July, a series high for this indicator at the time; the average for the year was 5.3 million. Hires, with an average level of 5.1 million, exceeded their November 2007 prerecession level for the last 3 months of the year. In a reversal of historical patterns, job openings exceeded hires for 9 months in 2015. Total separations also approached their November 2007 prerecession level throughout the year and exceeded that level in December 2015; average total separations were 4.9 million for the year. The growth in total separations was pushed by a large increase in quits, which were up 11.5 percent in 2015. Quits averaged 2.8 million over 2015 and returned to prerecession levels for 4 of the last 5 months of the year.

Job Openings and Labor Turnover Survey

JOLTS measures job openings, hires, total separations, quits, layoffs and discharges, and other separations on a monthly basis. (See accompanying box.) Through a sample of approximately 16,000 nonfarm business establishments from all 50 states and the District of Columbia, JOLTS estimates labor demand and worker flows by industry[1] and geographic region.[2]

This article reviews JOLTS estimates from 2014 and 2015 and assesses how these measures have fared since the most recent recession. First, JOLTS data from 2015 are compared with JOLTS data from previous years by element (job openings, hires, total separations, quits, layoffs and discharges, and other separations). Also, the

JOLTS data elements are analyzed together and compared with data from other statistical series, including the Current Employment Survey (CES) and the Current Population Survey (CPS). The comparisons made will frequently include November 2007, the month before the most recent recession started, and June 2009, the last month of the most recent recession.[3] Except for annual data, all JOLTS data used in this report are seasonally adjusted.

Definitions of JOLTS terms

Job openings. Job openings information is collected for the last business day of the reference month. A job opening requires that: 1) a specific position exists and there is work available for that position, 2) work could start within 30 days whether or not the employer found a suitable candidate, and 3) the employer is actively recruiting from outside the establishment to fill the position. Included are full-time, part-time, permanent, short-term, and seasonal openings. Active recruiting means that the establishment is taking steps to fill a position by advertising in newspapers or on the Internet, posting help-wanted signs, accepting applications, or using other similar methods.

Jobs to be filled only by internal transfers, promotions, demotions, or recall from layoffs are excluded. Also excluded are jobs with start dates more than 30 days in the future, jobs for which employees have been hired but have not yet reported for work, and jobs to be filled by employees of temporary help agencies, employee leasing companies, outside contractors, or consultants. The job openings rate is computed by dividing the number of job openings by the sum of employment and job openings and multiplying that quotient by 100.

Hires. The hires level is the total number of additions to the payroll occurring at any time during the reference month, including both new and rehired employees, full-time and part-time, permanent, short-term and seasonal employees, employees recalled to the location after a layoff lasting more than 7 days, on-call or intermittent employees who returned to work after having been formally separated, and transfers from other locations. The hires count does not include transfers or promotions within the reporting site, employees returning from strike, employees of temporary help agencies or employee leasing companies, outside contractors, or consultants. The hires rate is computed by dividing the number of hires by employment and multiplying that quotient by 100.

Separations. The separations level is the total number of employment terminations occurring at any time during the reference month, and is reported by type of separation—quits, layoffs and discharges, and other separations. (Some respondents are only able to report total separations.)

The *quits* count includes voluntary separations by employees (except for retirements, which are reported as other separations).

The *layoffs and discharges* count is comprised of involuntary separations initiated by the employer and includes layoffs with no intent to rehire; formal layoffs lasting or expected to last more than 7 days;

discharges resulting from mergers, downsizing, or closings; firings or other discharges for cause; terminations of permanent or short-term employees; and terminations of seasonal employees.

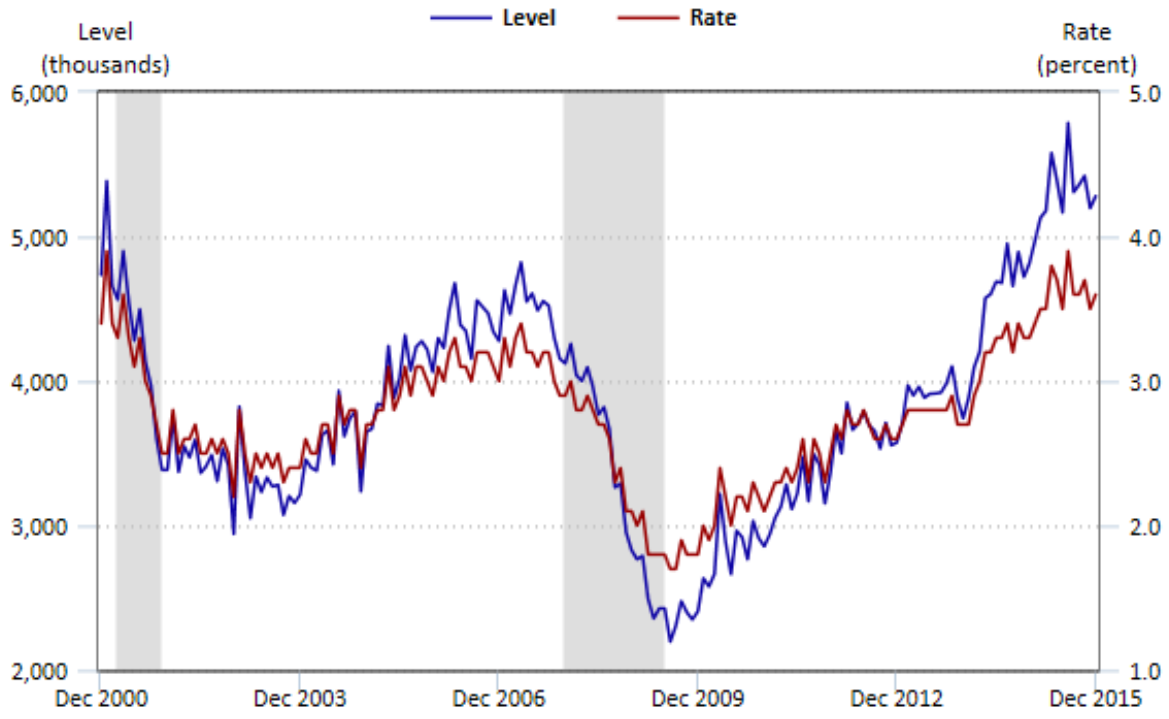
The *other separations* count includes retirements, transfers to other locations, deaths, and separations due to disability.

The separations count does not include transfers within the same location or employees on strike. The separations rate is computed by dividing the number of separations by employment and multiplying that quotient by 100. The quits, layoffs and discharges, and other separations rates are computed similarly.

Job openings

After increasing steadily since the end of the most recent recession, job openings levels reached a series high of 5.8 million in July 2015. (See figure 1.) Job openings rates also reached a series high (3.9 percent) in July 2015, matching a previous high reached in January 2001. Job openings levels decreased by 41.1 percent during the recession, but increased by 117.5 percent between June 2009 and December 2015. Job openings rates decreased by 37.9 percent during the recession, then increased by 100.0 percent between June 2009 and December 2015. The average level of job openings in 2015 was 5.3 million, an increase of 16.4 percent over the 2014 average of 4.6 million. (See table 1.) Annual levels of job openings have increased steadily each year since 2009. (See figure 2.)

Figure 1. Job openings, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded areas represent recessions as designated by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Table 1. Job openings,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Total nonfarm	4,565	5,313	748	16.4
Total private	4,119	4,812	693	16.8
Mining and logging	28	16	-12	-42.6
Construction	131	144	13	10.3
Manufacturing	293	311	18	6.1
Durable goods	179	189	10	5.6
Nondurable goods	114	122	8	7.0
Trade, transportation, and utilities	802	913	111	13.8
Wholesale trade	148	163	16	10.5
Retail trade	485	546	61	12.7
Transportation, warehousing, and utilities	169	203	34	19.8
Information	105	107	2	1.9
Financial activities	278	327	49	17.5
Finance and insurance	224	253	28	12.6
Real estate and rental and leasing	54	74	20	37.8
Professional and business services	860	1,072	212	24.6
Education and health services	817	1,021	204	24.9

See footnotes at end of table.

Table 1. Job openings,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Educational services	81	97	16	19.9
Health care and social assistance	736	924	188	25.5
Leisure and hospitality	657	726	70	10.6
Arts, entertainment, and recreation	72	65	-7	-9.0
Accommodation and food services	585	661	76	13.0
Other services	149	176	27	18.0
Government	446	501	55	12.3
Federal	62	72	10	16.1
State and local	383	429	46	11.9
State and local government education	132	153	21	15.7
State and local government, excluding education	252	276	24	9.7
Northeast	746	868	122	16.3
South	1,747	2,020	273	15.6
Midwest	1,020	1,195	176	17.2
West	1,052	1,229	177	16.8

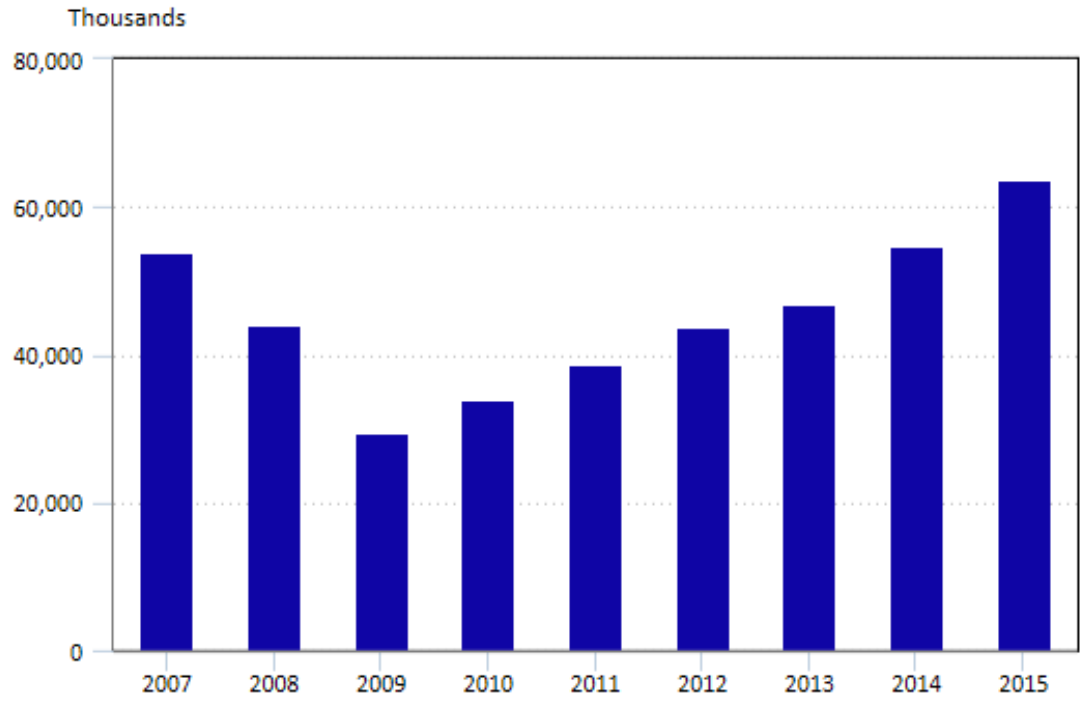
Notes:

[1] Average number of job openings on the last business day of each month during the year.

Note: Details may not sum to totals because of rounding.

Source: U.S. Bureau of Labor Statistics.

Figure 2. Job openings, total nonfarm, not seasonally adjusted, 2007–15



Source: U.S. Bureau of Labor Statistics.

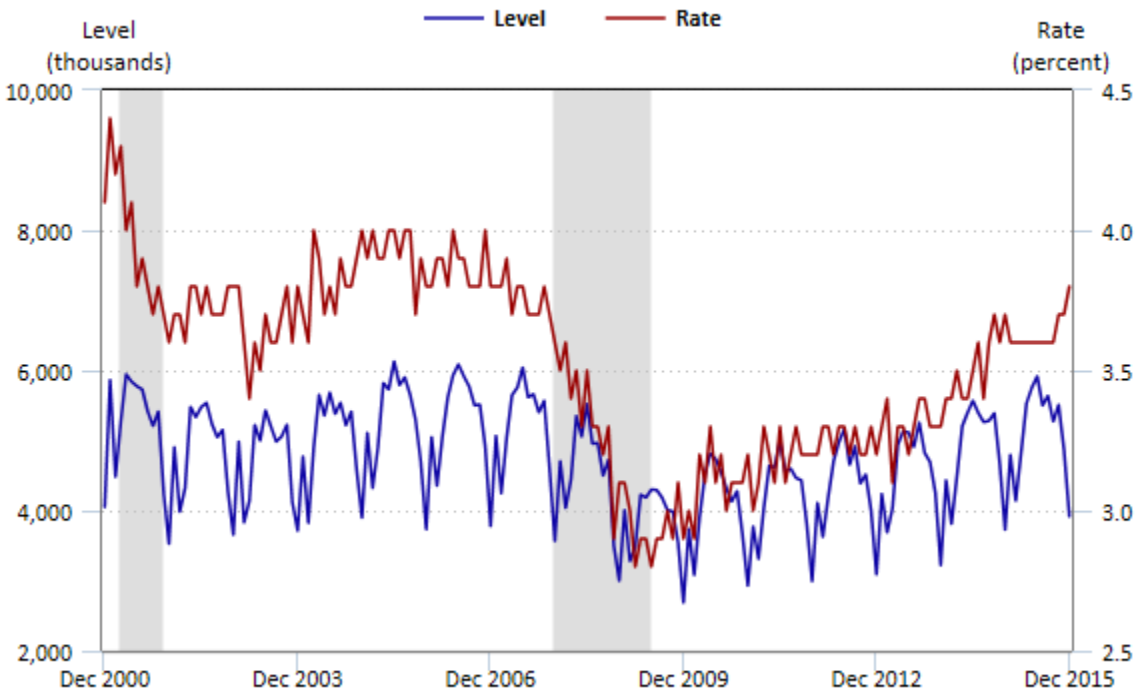
Job openings by industry and region

Within the industries, the largest increases in average annual job openings levels between 2014 and 2015 were in real estate and rental and leasing (37.8 percent); health care and social assistance (25.5 percent); professional and business services (24.6 percent); educational services (19.9 percent); and transportation, warehousing, and utilities (19.8 percent). All other industries also posted increases in job openings, except for mining and logging (–42.6 percent) and arts, entertainment, and recreation (–9.0 percent). Increases were similar in all four census regions, ranging from 15.6 percent in the South to 17.2 percent in the Midwest.

Hires

Hires have increased steadily each year since the end of the recession. (See figure 3.) After decreasing by 26.0 percent during the recession, hires levels increased by 47.0 percent between June 2009 and December 2015. Hires rates decreased by 22.2 percent during the recession and then increased by 35.7 percent between June 2009 and December 2015. Hires levels reached their November 2007 level of 5.2 million in December 2014 and were at or above that level for the last 3 months of 2015. Hires rates returned to the November 2007 rate of 3.7 percent in October 2014 and were between 3.6 percent and 3.8 percent for all of 2015. In 2015, hires averaged 5.1 million, an increase of 5.2 percent over the 2014 average of 4.9 million. (See table 2.) Annual levels of hires have increased every year since 2009. (See figure 4.)

Figure 3. Hires, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded areas represent recessions as designated by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Table 2. Hires,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Total nonfarm	4,886	5,140	254	5.2
Total private	4,582	4,796	215	4.7
Mining and logging	33	26	-7	-21.4
Construction	313	326	13	4.2
Manufacturing	261	264	3	1.2
Durable goods	152	154	2	1.3
Nondurable goods	108	109	1	1.2
Trade, transportation, and utilities	1,068	1,084	17	1.6
Wholesale trade	146	140	-6	-4.2
Retail trade	738	757	20	2.7
Transportation, warehousing, and utilities	185	188	3	1.8
Information	74	79	5	6.1
Financial activities	193	197	5	2.3
Finance and insurance	126	133	7	5.2
Real estate and rental and leasing	67	65	-2	-2.9
Professional and business services	1,005	1,048	43	4.3
Education and health services	573	611	39	6.8
Educational services	82	82	-1	-.8

See footnotes at end of table.

Table 2. Hires,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Health care and social assistance	491	530	39	8.0
Leisure and hospitality	877	954	78	8.8
Arts, entertainment, and recreation	148	148	0	.2
Accommodation and food services	729	807	77	10.6
Other services	187	206	20	10.7
Government	304	344	39	12.9
Federal	33	40	7	22.8
State and local	272	304	32	11.7
State and local government education	130	150	20	15.6
State and local government, excluding education	142	154	12	8.4
Northeast	739	808	68	9.2
South	1,935	2,014	78	4.1
Midwest	1,091	1,153	62	5.7
West	1,121	1,166	45	4.0

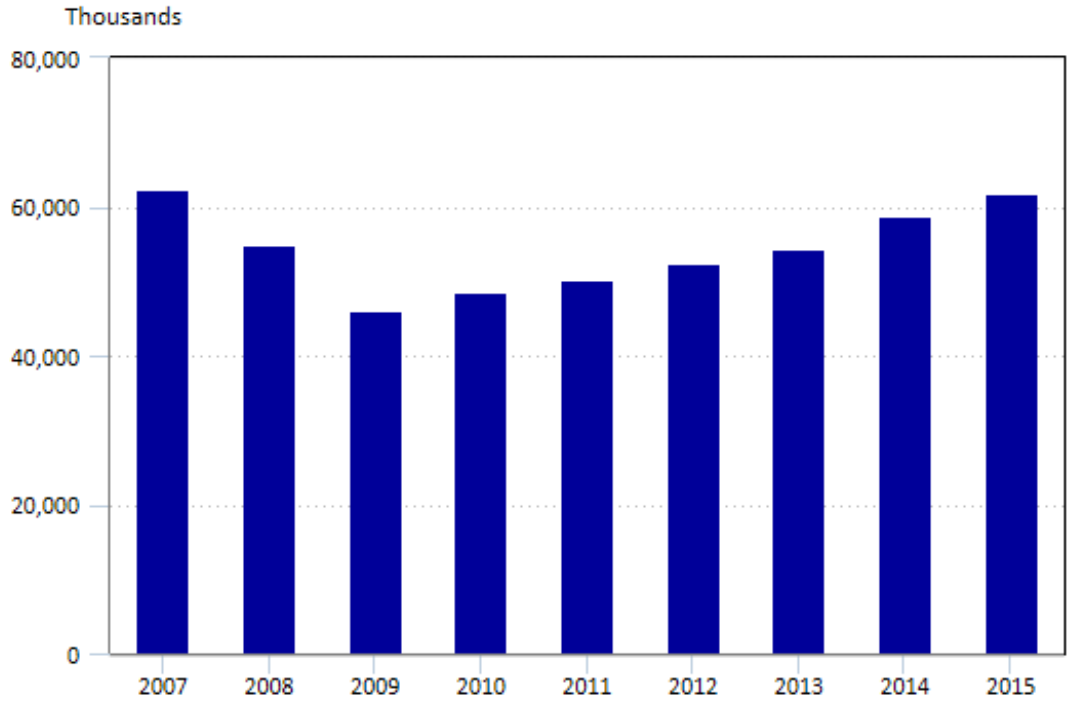
Notes:

[1] Average number of hires over the entire month, for each month during the year.

Note: Details may not sum to totals because of rounding.

Source: U.S. Bureau of Labor Statistics.

Figure 4. Hires, total nonfarm, not seasonally adjusted, 2007–15



Source: U.S. Bureau of Labor Statistics.

Hires by industry and region

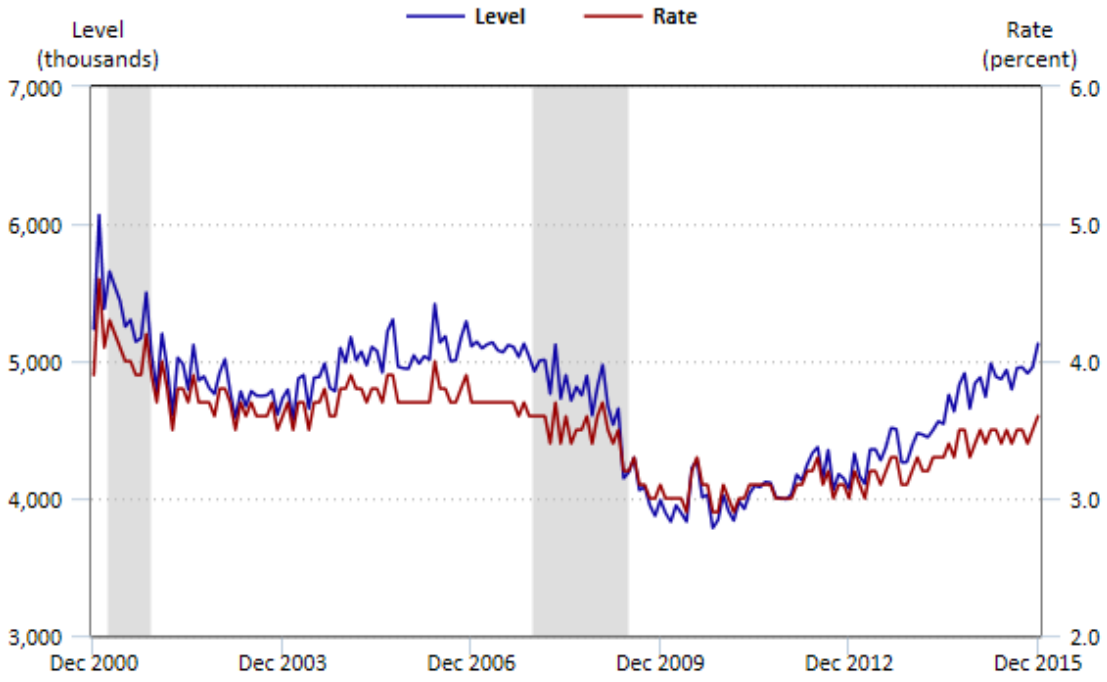
Within the industries, the largest increases in average annual hires levels between 2014 and 2015 were in federal government (22.8 percent), state and local government education (15.6 percent), other services (10.7 percent), and accommodation and food services (10.6 percent). All other industries experienced growth as well, except for mining and logging (–21.4 percent), wholesale trade (–4.2 percent), real estate and rental and leasing (–2.9 percent), and educational services (–0.8 percent). Increases in hires varied from a low of 4.0 percent in the West to 9.2 percent in the Northeast.

Total separations

Total separations, a measure that includes quits, layoffs and discharges, and other separations, have increased slowly compared with both job openings and hires since the end of the recession. (See figure 5.) After decreasing by 14.9 percent during the recession, total separations levels increased by 22.3 percent between June 2009 and December 2015. Total separations rates decreased by 11.1 percent during the recession and increased by 12.5 percent between June 2009 and December 2015. Total separations were at or near their November 2007 level (5.0 million) throughout 2015 and exceeded that level in December 2015. Rates were close to their November 2007 rate of 3.6 percent throughout 2015, ranging from 3.4 percent to 3.5 percent each month before reaching 3.6 percent in December 2015. The average monthly level of total separations in 2015 was 4.9 million, an increase of

6.0 percent over the 2014 average of 4.6 million. (See table 3.) Annual levels of separations have increased each year since 2010. (See figure 6.)

Figure 5. Total separations, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded areas represent recessions as designated by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Table 3. Total separations,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Total nonfarm	4,635	4,912	277	6.0
Total private	4,342	4,580	238	5.5
Mining and logging	30	37	7	23.4
Construction	286	302	15	5.4
Manufacturing	244	262	18	7.3
Durable goods	139	156	17	12.0
Nondurable goods	105	106	1	1.1
Trade, transportation, and utilities	1,016	1,045	28	2.8
Wholesale trade	139	134	-5	-3.5
Retail trade	713	733	20	2.8
Transportation, warehousing, and utilities	164	178	13	8.1
Information	74	77	3	4.2
Financial activities	184	185	1	.7
Finance and insurance	121	123	2	1.4
Real estate and rental and leasing	62	62	0	-.5
Professional and business services	953	998	44	4.7

See footnotes at end of table.

Table 3. Total separations,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Education and health services	530	554	24	4.6
Educational services	75	77	3	3.7
Health care and social assistance	455	477	21	4.7
Leisure and hospitality	843	921	77	9.2
Arts, entertainment, and recreation	143	142	-1	-.9
Accommodation and food services	700	779	79	11.2
Other services	182	201	20	10.7
Government	294	332	38	13.0
Federal	32	39	7	20.9
State and local	262	294	32	12.1
State and local government education	123	145	21	17.2
State and local government, excluding education	139	149	10	7.4
Northeast	728	767	39	5.4
South	1,829	1,946	117	6.4
Midwest	1,021	1,081	60	5.9
West	1,058	1,117	60	5.7

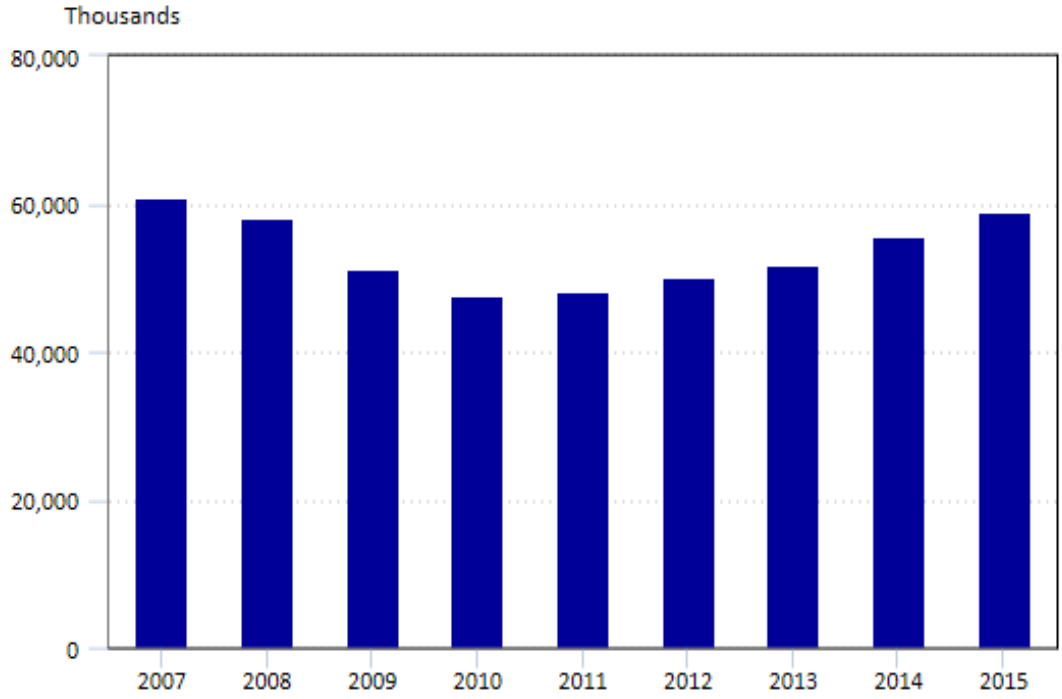
Notes:

[1] Average number of total separations over the entire month, for each month during the year.

Note: Details may not sum to totals because of rounding.

Source: U.S. Bureau of Labor Statistics.

Figure 6. Total separations, total nonfarm, not seasonally adjusted, 2007–15



Source: U.S. Bureau of Labor Statistics.

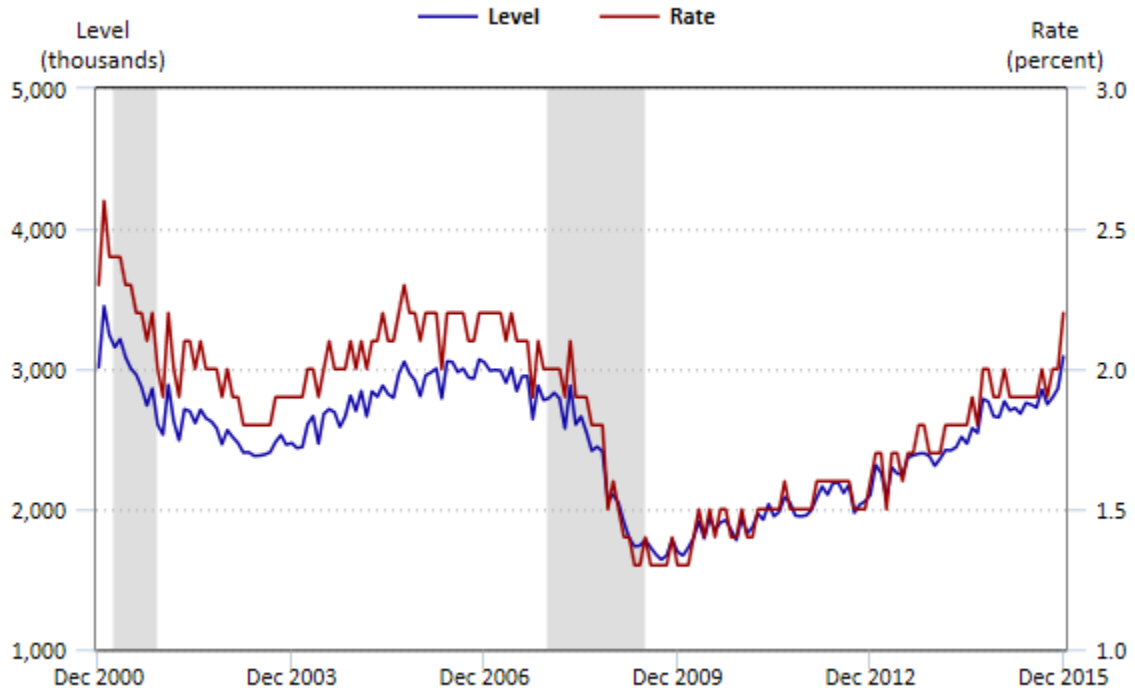
Total separations by industry and region

Within the industries, the largest increases in average annual total separations levels between 2014 and 2015 were in mining and logging (23.4 percent), federal government (20.9 percent), state and local government education (17.2 percent), durable goods manufacturing (12.0 percent), accommodation and food services (11.2 percent), and other services (10.7 percent). All other industries also had higher total separations in 2015 than in 2014, except for wholesale trade (–3.5 percent); arts, entertainment, and recreation (–0.9 percent); and real estate and rental and leasing (–0.5 percent). Increases in total separations ranged from 5.4 percent in the Northeast to 6.4 percent in the South.

Quits

Quits have shown strong growth since the end of the recession. (See figure 7.) After decreasing by 36.2 percent during the recession, quits levels increased by 73.3 percent between June 2009 and December 2015. Quits rates decreased by 30.0 percent during the recession, but increased by 57.1 percent between June 2009 and December 2015. With this growth, in September 2014 quits reached their November 2007 level of 2.8 million for the first time since the recession. Quits levels were at or above their November 2007 level for 4 months during 2015. Quits reached their November 2007 rate of 2.0 percent in September 2014 and were at or above that rate for 5 months during 2015. The average monthly quits level in 2015 was 2.8 million, an increase of 9.2 percent over the 2014 figure of 2.6 million. (See table 4.) Annual levels of quits have increased each year since 2009. (See figure 8.)

Figure 7. Quits, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded areas represent recessions as designated by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Table 4. Quits,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Total nonfarm	2,550	2,785	235	9.2
Total private	2,409	2,627	218	9.1
Mining and logging	15	14	-1	-6.0
Construction	109	115	6	5.7
Manufacturing	121	137	16	13.3
Durable goods	67	78	11	16.8
Nondurable goods	54	59	5	9.0
Trade, transportation, and utilities	585	625	41	6.9
Wholesale trade	76	77	1	1.4
Retail trade	429	456	27	6.2
Transportation, warehousing, and utilities	80	93	13	15.9
Information	41	42	2	3.9
Financial activities	97	101	4	4.1
Finance and insurance	62	68	6	9.5
Real estate and rental and leasing	34	33	-2	-4.9
Professional and business services	468	516	48	10.3
Education and health services	321	366	45	14.0
Educational services	38	41	4	10.4

See footnotes at end of table.

Table 4. Quits,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Health care and social assistance	284	325	41	14.4
Leisure and hospitality	547	598	52	9.4
Arts, entertainment, and recreation	52	55	3	6.6
Accommodation and food services	495	543	48	9.7
Other services	106	112	7	6.2
Government	141	157	17	11.8
Federal	10	13	2	21.8
State and local	130	145	15	11.1
State and local government education	63	73	11	16.9
State and local government, excluding education	68	72	4	5.8
Northeast	347	392	45	13.0
South	1,064	1,154	90	8.5
Midwest	569	619	50	8.8
West	570	620	50	8.7

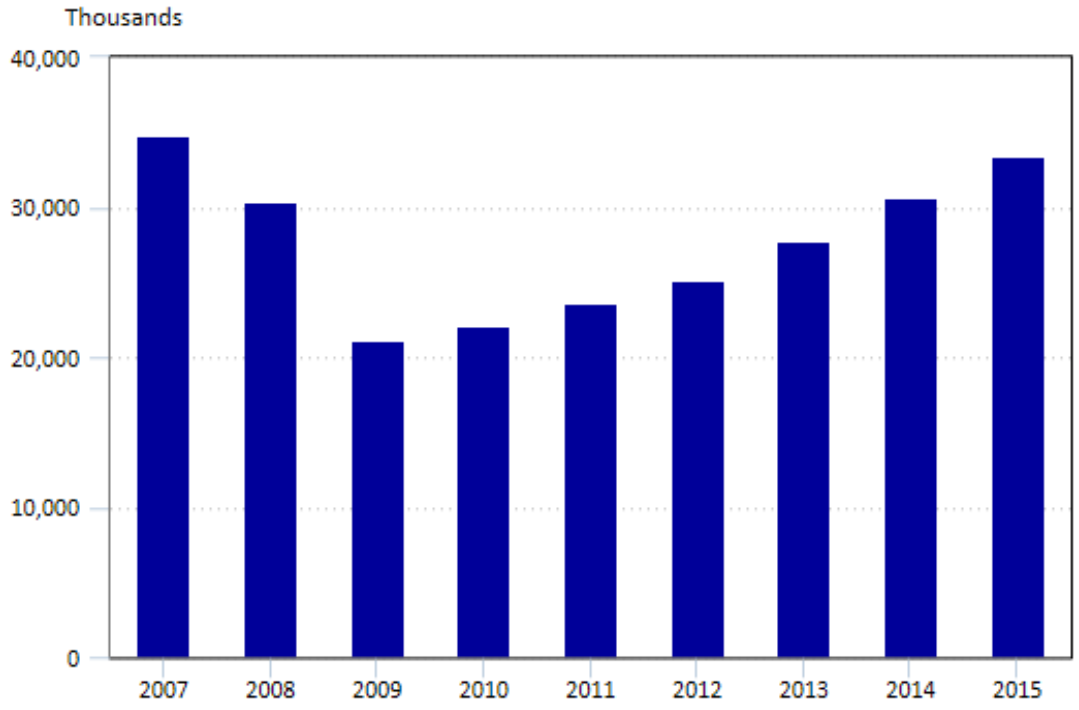
Notes:

[1] Average number of quits over the entire month, for each month during the year.

Note: Details may not sum to totals because of rounding.

Source: U.S. Bureau of Labor Statistics.

Figure 8. Quits, total nonfarm, not seasonally adjusted, 2007–15



Source: U.S. Bureau of Labor Statistics.

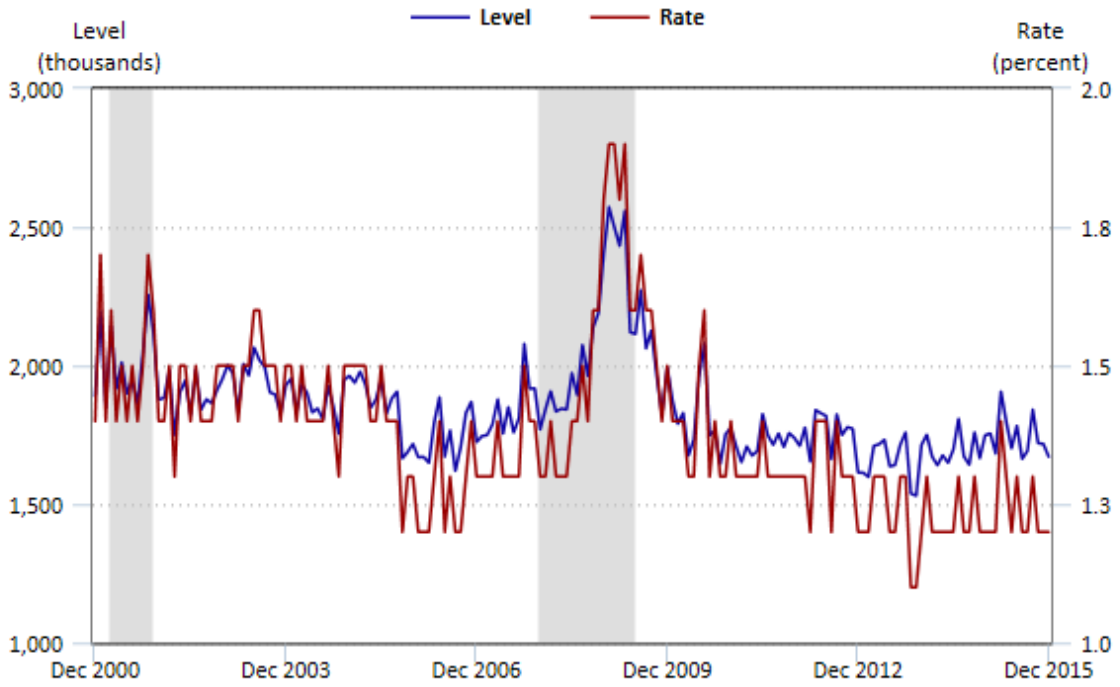
Quits by industry and region

Within the industries, the largest increases in average annual quits levels between 2014 and 2015 were in federal government (21.8 percent); state and local government education (16.9 percent); durable goods manufacturing (16.8 percent); and transportation, warehousing, and utilities (15.9 percent). Other industries experienced a rising number of quits as well, except for mining and logging (–6.0 percent) and real estate and rental and leasing (–4.9 percent). Increases in quits ranged from 8.5 percent in the South to 13.0 percent in the Northeast.

Layoffs and discharges

Layoffs and discharges began to decrease toward the end of the recession and have leveled off since mid-2011. (See figure 9.) After increasing by 19.5 percent during the recession, layoffs and discharges levels decreased by 20.9 percent between June 2009 and December 2015. Rates of layoffs and discharges increased by 23.1 percent during the recession and then decreased by 25.0 percent between June 2009 and December 2015. Average monthly layoffs and discharges were 1.7 million in 2015, similar to the 2014 figure. (See table 5.) Annual levels of layoffs and discharges have been fairly steady since 2010, with small increases during the last 2 years. (See figure 10.)

Figure 9. Layoffs and discharges, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded areas represent recessions as designated by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Table 5. Layoffs and discharges,[1] by industry, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Total nonfarm	1,702	1,745	44	2.6
Total private	1,613	1,635	23	1.4
Mining and logging	12	20	8	69.0
Construction	165	172	7	4.3
Manufacturing	98	102	4	4.5
Durable goods	58	64	6	10.2
Nondurable goods	40	39	-1	-2.9
Trade, transportation, and utilities	325	319	-7	-2.0
Wholesale trade	52	47	-5	-9.0
Retail trade	206	202	-3	-1.5
Transportation, warehousing, and utilities	68	69	2	2.3
Information	26	25	-1	-2.6
Financial activities	56	59	3	5.5
Finance and insurance	34	35	1	3.0
Real estate and rental and leasing	23	25	2	8.9
Professional and business services	432	423	-9	-2.0
Education and health services	167	142	-25	-15.0
Educational services	32	31	-2	-4.9

See footnotes at end of table.

Table 5. Layoffs and discharges,[1] by industry, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Health care and social assistance	135	112	-23	-17.3
Leisure and hospitality	268	294	26	9.7
Arts, entertainment, and recreation	88	83	-5	-6.0
Accommodation and food services	179	211	31	17.5
Other services	64	79	15	22.6
Government	89	110	21	23.1
Federal	11	12	1	12.5
State and local	78	98	19	24.5
State and local government education	38	48	10	26.3
State and local government, excluding education	41	50	10	23.6
Northeast	311	303	-8	-2.5
South	614	639	25	4.0
Midwest	372	387	15	4.1
West	405	417	12	3.0

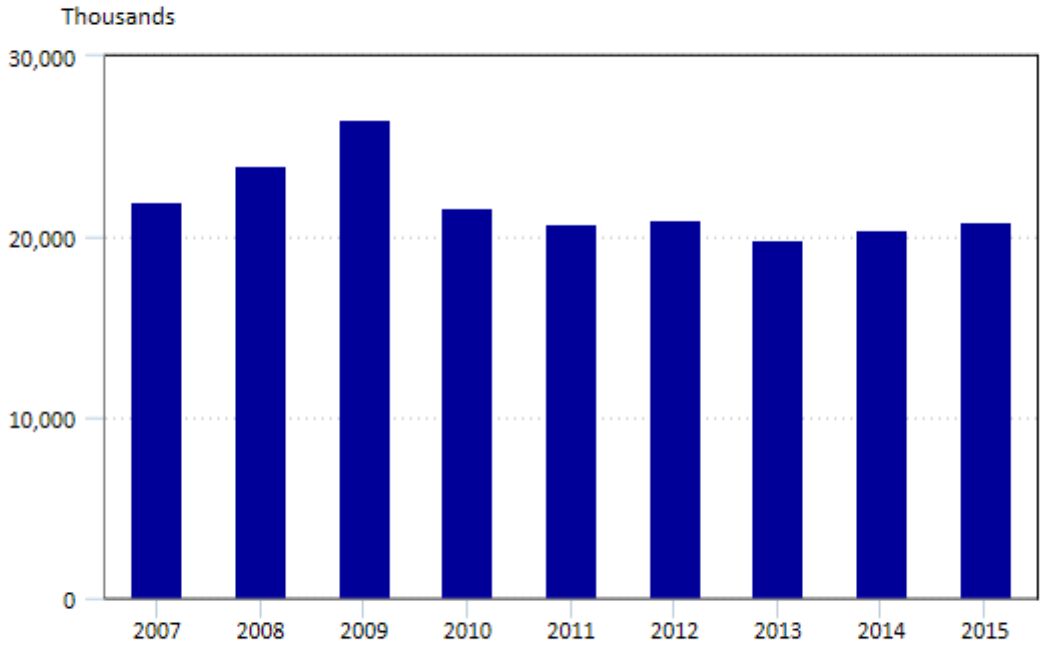
Notes:

[1] Average number of layoffs and discharges over the entire month, for each month during the year.

Note: Details may not sum to totals because of rounding.

Source: U.S. Bureau of Labor Statistics.

Figure 10. Layoffs and discharges, total nonfarm, not seasonally adjusted, 2007–15



Source: U.S. Bureau of Labor Statistics.

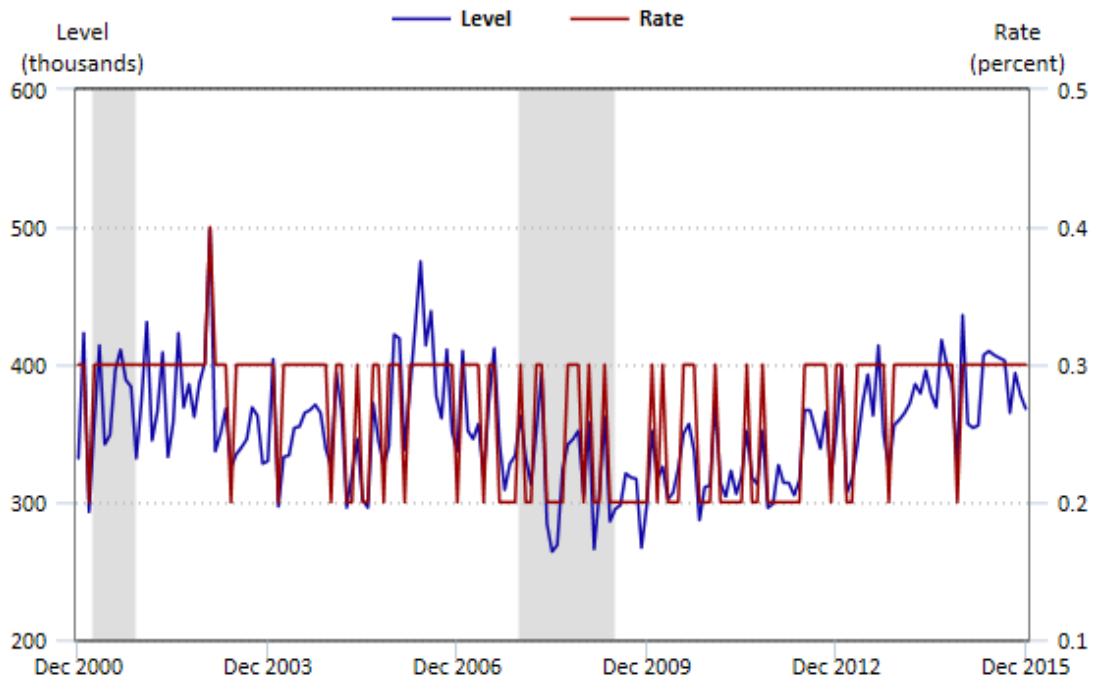
Layoffs and discharges by industry and region

Within the industries, the largest increases in average annual layoffs and discharges levels between 2014 and 2015 were in mining and logging (69.0 percent); state and local government education (26.3 percent); state and local government, excluding education (23.6 percent); other services (22.6 percent); and accommodation and food services (17.5 percent). Other industries had a mix of increases and decreases, with the largest decreases exhibited by health care and social assistance (–17.3 percent); wholesale trade (–9.0 percent); and arts, entertainment, and recreation (–6.0 percent). Changes in layoffs and discharges varied by region: layoffs and discharges decreased by 2.5 percent in the Northeast, while the other regions experienced increases in this measure, with a high of 4.1 percent in the Midwest.

Other separations

Other separations levels have shown little variation throughout JOLTS history, ranging from about 250,000 to 500,000 (see figure 11), with a series average of 353,000. Rates have also shown little variation, generally ranging from 0.2 percent to 0.3 percent. Other separations levels decreased by 18.7 percent during the recession and increased by 24.7 percent between June 2009 and December 2015, while rates decreased by 33 percent during the recession and increased by 50 percent between June 2009 and December 2015. Average monthly levels of other separations numbered 382,000 in 2015, close to the measure's 2014 average. (See table 6.) Annual levels of other separations have increased since 2011, but dropped slightly between 2014 and 2015. (See figure 12.)

Figure 11. Other separations, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded areas represent recessions as designated by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Table 6. Other separations,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Total nonfarm	384	382	-2	-0.4
Total private	320	317	-3	-.8
Mining and logging	3	3	-1	-16.2
Construction	12	14	2	17.4
Manufacturing	25	23	-3	-10.6
Durable goods	15	14	0	-2.3
Nondurable goods	11	8	-2	-22.2
Trade, transportation, and utilities	106	101	-5	-5.1
Wholesale trade	11	10	-1	-10.9
Retail trade	78	75	-3	-4.2
Transportation, warehousing, and utilities	16	16	-1	-4.6
Information	7	9	2	23.6
Financial activities	31	25	-6	-18.4
Finance and insurance	26	21	-5	-19.9
Real estate and rental and leasing	5	5	-1	-10.9
Professional and business services	53	58	5	9.1
Education and health services	42	46	4	9.6
Educational services	5	6	1	11.7

See footnotes at end of table.

Table 6. Other separations,[1] by industry and region, not seasonally adjusted, in thousands, 2014 and 2015

Industry and region	Level		Change, 2014–15	
	2014	2015	Level	Percent
Health care and social assistance	37	40	3	9.3
Leisure and hospitality	29	29	0	-.6
Arts, entertainment, and recreation	3	4	1	25.0
Accommodation and food services	26	25	-1	-2.9
Other services	12	10	-2	-13.0
Government	64	65	1	1.2
Federal	11	14	3	27.7
State and local	54	51	-2	-4.4
State and local government education	23	24	1	4.0
State and local government, excluding education	30	27	-3	-9.4
Northeast	70	73	3	3.8
South	151	154	3	1.9
Midwest	80	75	-5	-6.4
West	83	81	-2	-2.0

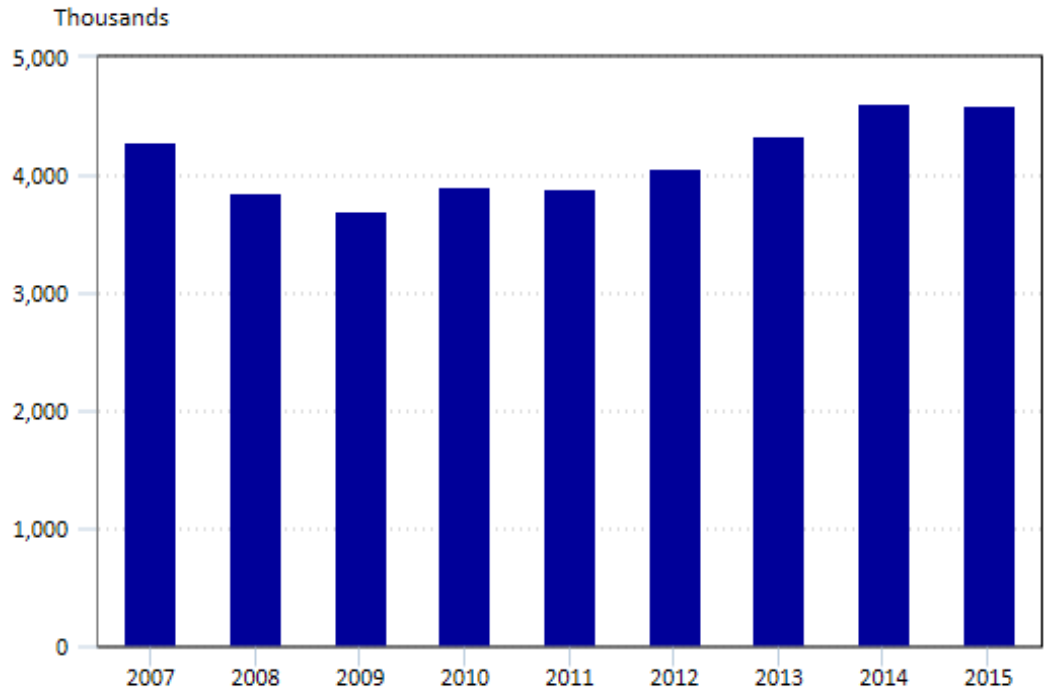
Notes:

[1] Average number of other separations over the entire month, for each month during the year.

Note: Details may not sum to totals because of rounding.

Source: U.S. Bureau of Labor Statistics.

Figure 12. Other separations, total nonfarm, not seasonally adjusted, 2007–15



Source: U.S. Bureau of Labor Statistics.

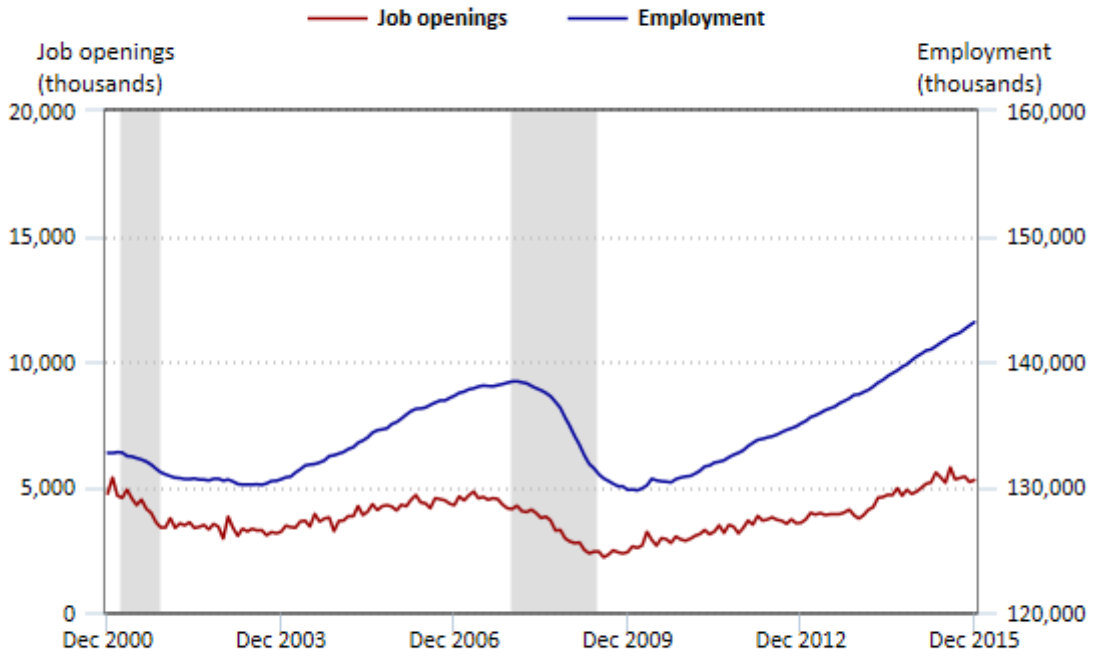
Other separations by industry and region

Within the industries, the largest increases in the average annual level of other separations between 2014 and 2015 were in federal government (27.7 percent); arts, entertainment, and recreation (25.0 percent); information (23.6 percent); and construction (17.4 percent). Other industries had a mix of increases and decreases, with the largest decreases posted in nondurable goods manufacturing (–22.2 percent), finance and insurance (–19.9 percent), and mining and logging (–16.2 percent). Changes in other separations varied by region, with increases in the Northeast (3.8 percent) and the South (1.9 percent) and decreases in the Midwest (–6.4 percent) and the West (–2.0 percent).

Job openings and employment

Job openings are a *procyclical*[4] measure of labor demand. During an economic expansion, employers demand more labor, increasing the number of job openings while adding to employment levels. By contrast, during an economic contraction, employers demand less labor, reducing the number of job openings while subtracting from employment levels. As a result of procyclicality, job openings and CES[5] employment figures tend to follow a similar pattern, with job openings leading employment slightly during both upturns and downturns of the business cycle. (See figure 13.)

Figure 13. Job openings and employment, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded area represents recession as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

This dynamic can be seen during the most recent recession. Job openings peaked at 4.8 million in April 2007, but declined to 4.1 million in December 2007, the first month of the recession. CES employment peaked later, at 138.4 million in January 2008. Both then declined rapidly during the recession. Job openings reached a low of 2.2 million in July 2009, the month following the end of the recession, but then began to increase, although employment continued to decline, to a low of 129.7 million in February 2010.

Unemployed people per job opening

Another way to analyze job openings and unemployment is to consider the ratio of unemployed people per job opening. This ratio is calculated by dividing the number of unemployed from the CPS[6] by the number of job openings. Job openings and unemployment levels generally move in opposite directions. That is, when the economy is strong, job openings are high and unemployment is low, and the ratio decreases. The situation reverses during a contraction, as the economy weakens and unemployment increases while job openings decrease, leading to a higher ratio. Because of this *countercyclical* behavior, the ratio of unemployed people to job openings provides a metric that helps to describe the state of the economy. (See figure 14.)

Figure 14. Ratio of unemployed people to job openings, total nonfarm, seasonally adjusted, December 2000–December 2015

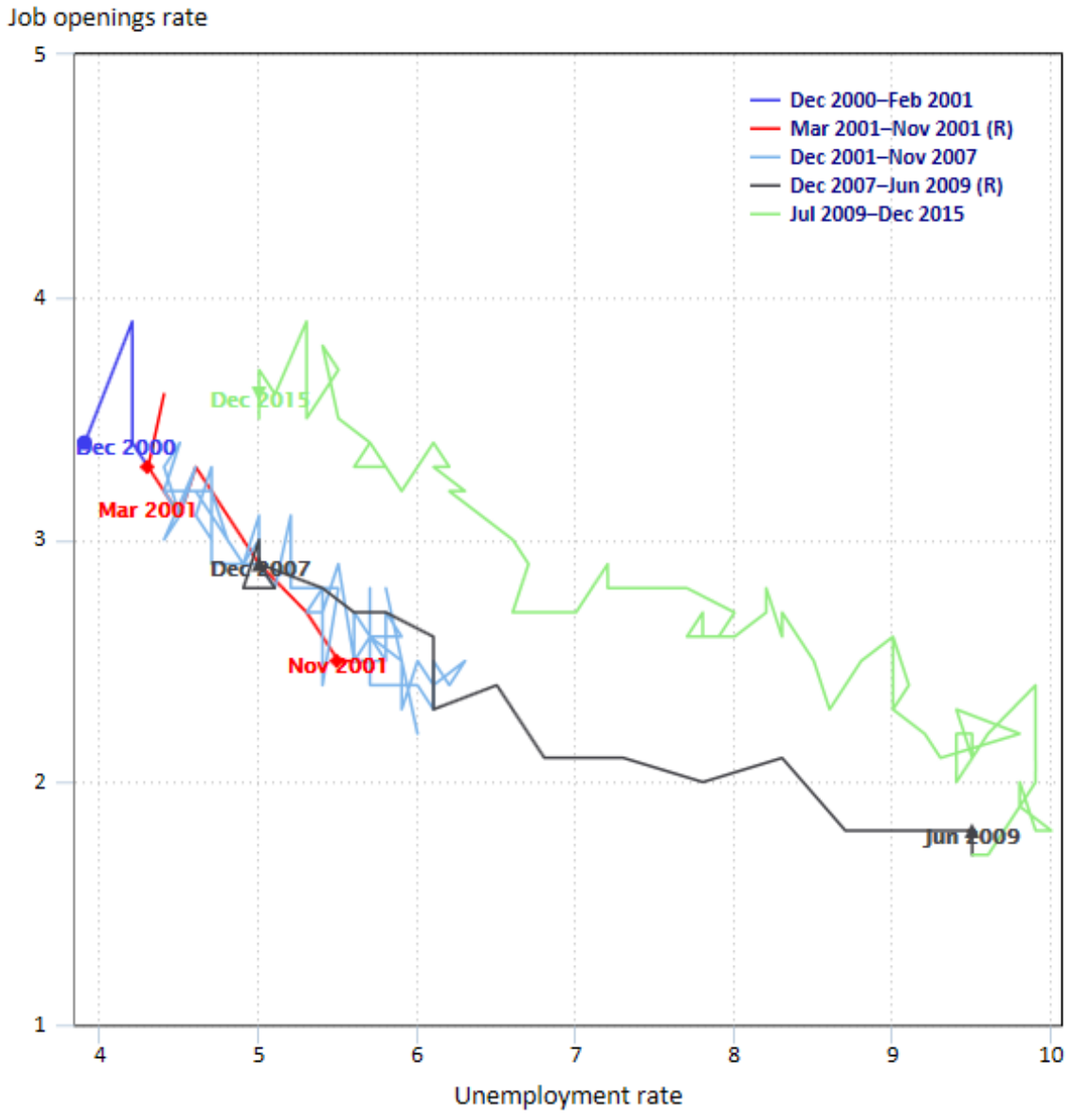
Note: Shaded area represents recession as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

When the most recent recession began in December 2007, the number of unemployed people per job opening was 1.9. The ratio peaked at 6.6 unemployed people per job opening in July 2009, the month after the recession ended, and has trended down since. In 2015, the ratio of unemployed people per job opening ranged from a high of 1.8 to a low of 1.4. The average monthly ratio was 1.6 in 2015, down from 2.1 in 2014.

Beveridge curve

The Beveridge curve[7] plots the intersection of the job openings rate and the unemployment rate. Each point on the downward-sloping curve reflects the state of the business cycle, with the unemployment rate plotted on the *x*-axis and the job openings rate plotted on the *y*-axis. During an expansion, the unemployment rate is low and the job openings rate is high, so the monthly point on the curve is expected to be up and to the left on the graph. Conversely, during a contraction, the unemployment rate is high and the job openings rate is low, so the monthly point on the curve is expected to be down and to the right. (See figure 15.)

Figure 15. The Beveridge curve (job openings rate versus unemployment rate), seasonally adjusted, December 2000–December 2015



Note: R= recession.
Source: U.S. Bureau of Labor Statistics.

The Beveridge curve provides a way to analyze the inverse relationship between unfilled labor demand (measured by job openings) and excess labor supply (measured by the unemployment rate), because the position of the curve is determined by the efficiency of the labor market. Between December 2000, when the JOLTS program began, and August 2009, the Beveridge curve followed a relatively constant pattern. With the start of the most recent recession in December 2007, through the end of 2009, the series trended predictably lower and further to the right as the job openings rate declined and the unemployment rate rose. However, in September 2009, the curve began to shift up and to the right, away from the historical trend. Since then, the curve has stayed up and to

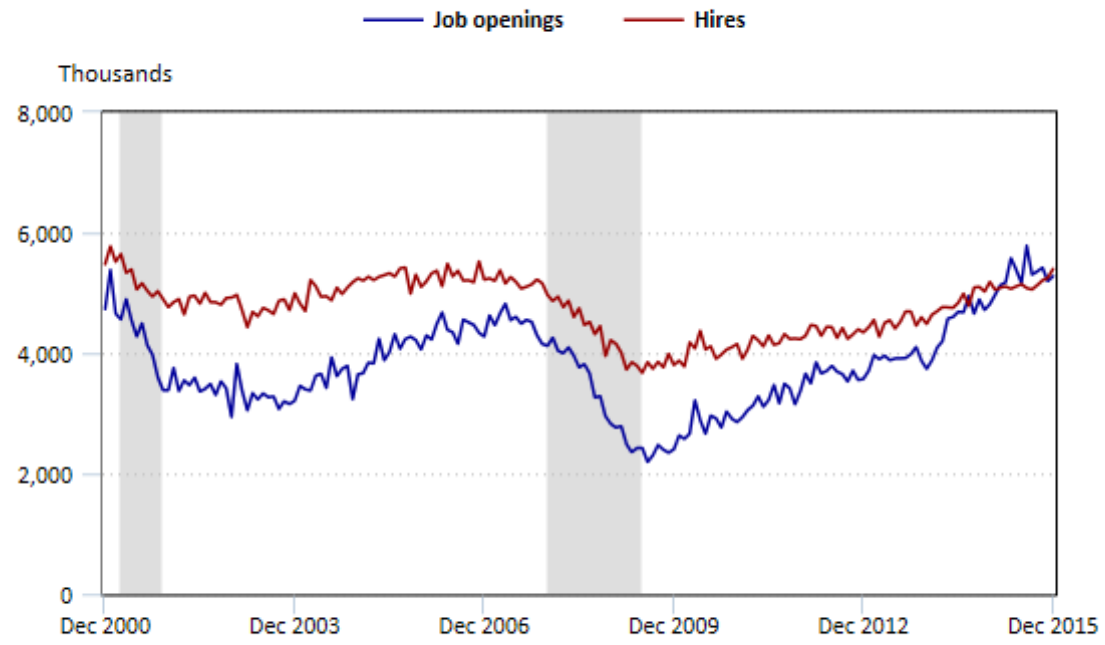
the right of the historical curve, following a new trajectory as the job openings rate has increased and the unemployment rate has decreased. The trajectory continued to the right of the original curve throughout 2015.

The shift of the Beveridge curve since September 2009 is a result of employers hiring fewer workers per job opening than would be expected from historical patterns. The cause of the shift, however, is subject to debate and includes cyclical, structural, and other factors. In 2012, Bart Hobijn and Ayşegül Şahin found that the displacement of a large part of the labor force during the recession resulted in a decline in efficiency in matching workers with jobs. This decline, together with the extension of unemployment insurance (UI) benefits during the recession, led to the shift.[8] Also in 2012, Regis Barnichon, Michael Elsby, Hobijn, and Şahin hypothesized that a mismatch in skills required by employers and skills possessed by employees, along with a decline in recruiting intensity by employers facing uncertainty and search intensity by employees with longer periods of UI benefits, could have contributed to the shift.[9] Two years later, another study, by Alan Krueger, Judd Cramer, and David Cho, found that long-term unemployment increased during the recession, and the authors theorized that the slower rate of reemployment of the long-term unemployed could account for the shift.[10] That same year, Peter Diamond and Şahin argued that historical evidence indicates that a shift in the Beveridge curve following a recession is natural and should be interpreted as a cyclical pattern.[11] The general consensus among these papers is that the current shift is temporary and the points will eventually move back toward the original curve.

Job openings and hires

The monthly levels and rates of total nonfarm hires have exceeded those of job openings for most of JOLTS history. (See figure 16.) The primary reason is that job openings are a stock measure, meaning that they are counted only on the last business day of the month, whereas hires are a flow measure that includes the entire month of activity. However, following steady growth after the end of the recession, job openings started to grow rapidly in early 2014. At the same time, hires also grew, but at a slower pace. As a result, job openings levels exceeded hires for the first time in August 2014. Also in August 2014, the job openings and hires rates were the same for the first time in the series history. Periods during which job openings exceed hires may indicate that employers have unmet demand for workers. In February 2015, job openings levels exceeded hires and remained elevated for most of the year while the job openings rate was at or above the hires rate for 6 months of 2015.

Figure 16. Job openings and hires, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded area represents recession as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Within the industries, the historical dynamic between hires and job openings levels has varied. Hires have almost always been greater than job openings in mining and logging; construction; nondurable goods manufacturing; retail trade; real estate and rental and leasing; professional and business services; arts, entertainment, and recreation; accommodation and food services; and other services. In other industries (durable goods manufacturing; wholesale trade; transportation, warehousing, and utilities; and educational services), the dynamic has gone back and forth over time, with hires exceeding job openings in some months and staying below them in other months. Job openings have regularly exceeded hires in information, finance and insurance, and health care and social assistance.

Job openings grew at a faster rate than hires in almost all industries between 2014 and 2015. (See table 7.) The largest difference was in real estate and rental and leasing, with hires decreasing by 2.9 percent and job openings increasing by 37.8 percent. Hires also decreased (by 4.2 percent), and job openings increased (by 10.5 percent), in wholesale trade. In most industries, both hires and job openings increased, with job openings recording the larger increase. The largest increases in job openings that were not offset by an increase in hires were in educational services; professional and business services; transportation, warehousing, and utilities; and health care and social assistance.

Table 7. Comparison of job openings [1] and hires,[2] levels and changes, by industry, seasonally adjusted, in thousands, 2014 and 2015

Industry	Level				Percent change, 2014–15		Difference in growth
	Job openings		Hires		Job openings	Hires	
	2014	2015	2014	2015			
Total nonfarm	4,565	5,313	4,886	5,140	16.4	5.2	11.2
Total private	4,119	4,812	4,582	4,796	16.8	4.7	12.1
Mining and logging	28	16	33	26	-42.6	-21.4	-21.2
Construction	131	144	313	326	10.3	4.2	6.1
Manufacturing	293	311	261	264	6.1	1.2	4.9
Durable goods	179	189	152	154	5.6	1.3	4.3
Nondurable goods	114	122	108	109	7.0	1.2	5.8
Trade, transportation, and utilities	802	913	1,068	1,084	13.8	1.6	12.2
Wholesale trade	148	163	146	140	10.5	-4.2	14.7
Retail trade	485	546	738	757	12.7	2.7	10.0
Transportation, warehousing, and utilities	169	203	185	188	19.8	1.8	18.0
Information	105	107	74	79	1.9	6.1	-4.1
Financial activities	278	327	193	197	17.5	2.3	15.2
Finance and insurance	224	253	126	133	12.6	5.2	7.4
Real estate and rental and leasing	54	74	67	65	37.8	-2.9	40.7
Professional and business services	860	1,072	1,005	1,048	24.6	4.3	20.3
Education and health services	817	1,021	573	611	24.9	6.8	18.2
Educational services	81	97	82	82	19.9	-.8	20.7
Health care and social assistance	736	924	491	530	25.5	8.0	17.5
Leisure and hospitality	657	726	877	954	10.6	8.8	1.7
Arts, entertainment, and recreation	72	65	148	148	-9.0	.2	-9.3
Accommodation and food services	585	661	729	807	13.0	10.6	2.4
Other services	149	176	187	206	18.0	10.7	7.3
Government	446	501	304	344	12.3	12.9	-.6
Federal	62	72	33	40	16.1	22.8	-6.7
State and local	383	429	272	304	11.9	11.7	.1
State and local government education	132	153	130	150	15.7	15.6	.2
State and local government, excluding education	252	276	142	154	9.7	8.4	1.3

Notes:

[1] Average number of job openings on the last business day of each month during the year.

[2] Average number of hires over the entire month, for each month during the year.

Source: U.S. Bureau of Labor Statistics.

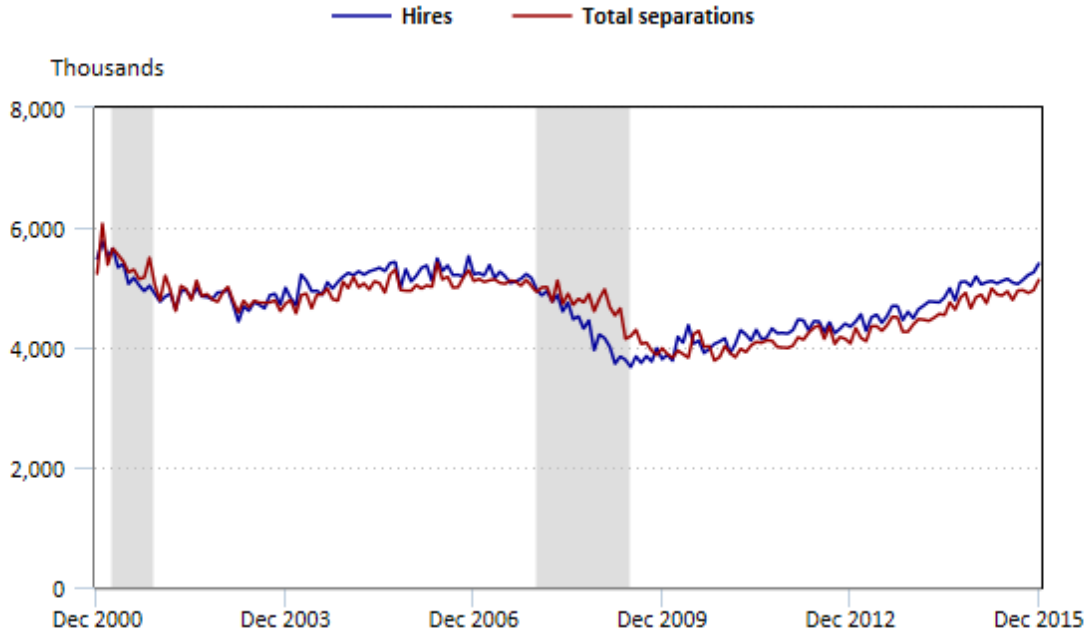
Hires and separations

Analyzing hires and separations together provides a more complete picture than analyzing each separately, because the combined analysis demonstrates worker flows. Hires are a procyclical measure, increasing during expansions and decreasing during recessions. Total separations are more complex, and each component can provide information about the economic climate. Quits, which are voluntary separations and measure workers'

ability or willingness to leave their jobs, are also procyclical. Layoffs and discharges, which are involuntary separations initiated by the employer, are countercyclical. Other separations are a relatively small part of total separations and are unlikely to influence any overall trend in total separations.

Hires have generally outnumbered total separations, except during the recession, when there were more separations than hires. (See figure 17.) The reason for the reversal was a combined decrease in hires and increase in layoffs and discharges, with the latter leading to an increase in total separations despite a decrease in quits. In 2015, hires and total separations showed similar patterns: hires increased 6.9 percent, and total separations increased 5.0 percent, between January and December.

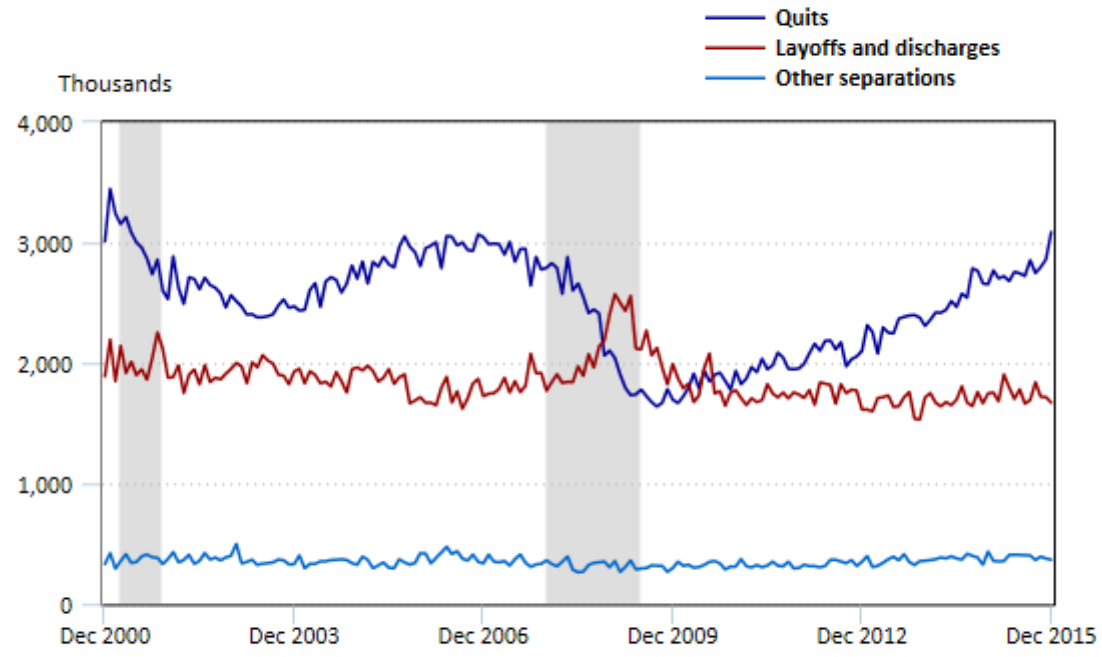
Figure 17. Hires and total separations, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded area represents recession as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Within total separations, quits are generally greater than layoffs and discharges. (See figure 18.) The only year during JOLTS history in which average layoffs and discharges outnumbered quits was 2009. Since then, quits (as a percentage of total separations) have increased each year while layoffs and discharges (also as a percentage of total separations) have decreased each year. In 2015, the difference between quits and layoffs grew: quits increased 11.5 percent, and layoffs and discharges decreased 4.8 percent, between January and December.

Figure 18. Quits, layoffs and discharges, and other separations, total nonfarm, seasonally adjusted, December 2000–December 2015



Note: Shaded area represents recession as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

Conclusion

JOLTS data for 2015 show that the labor market continued to improve throughout the year. Job openings increased to the highest levels seen since the series began in 2000, indicating further increases in demand for labor. Hires and quits grew steadily over the year, with both returning to levels last seen in November 2007 by the end of the year. This increase in jobs and worker flows is likely indicative of growing confidence on the part of employers and workers, with employers becoming more willing to hire and workers having sufficient incentives to leave their current positions.

SUGGESTED CITATION

Ainslie MacLeod, "Job openings, hires, and separations return to prerecession levels in 2015," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, September 2016, https://doi.org/10.21916/mlr.2016.40.

NOTES

[1] The North American Industrial Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments. For JOLTS, NAICS industries that are out of scope are establishments engaged in agriculture, forestry, fishing, and hunting (NAICS 11), except for logging (NAICS 1133); and private households (NAICS 814110). JOLTS publishes at the two-digit supersector level.

[2] The JOLTS sample provides data for four geographical regions defined by the U.S. Census Bureau: Northeast, South, Midwest, and West.

[3] See “US business cycle expansions and contractions” (National Bureau of Economic Research, updated daily), http://www.nber.org/cycles/.

[4] “Procyclic is a condition of positive correlation between the value of a good, a service or an economic indicator and the overall state of the economy. In other words, the value of the good, service or indicator tends to move in the same direction as the economy, growing when the economy grows and declining when the economy declines.” (*Investopedia*, http://www.investopedia.com/terms/p/procyclical.asp.)

[5] For data on employment levels, see “Current Employment Statistics – CES (National)” (U.S. Bureau of Labor Statistics), https://www.bls.gov/ces/.

[6] For data on unemployment levels, see “Labor force statistics from the Current Population Survey” (U.S. Bureau of Labor Statistics), https://www.bls.gov/cps/.

[7] Named for the British economist William Beveridge (1879–1963).

[8] Bart Hobijn and Ayşegül Şahin, “Beveridge curve shifts across countries since the Great Recession,” paper presented at the 13th Jacques Polak Annual Research Conference, Washington, DC, November 8 and 9, 2012, https://www.imf.org/external/np/res/seminars/2012/arc/pdf/HS.pdf.

[9] Regis Barnichon, Michael Elsby, Bart Hobijn, and Ayşegül Şahin, “Which industries are shifting the Beveridge curve?” *Monthly Labor Review*, June 2012, pp. 25–37, https://www.bls.gov/opub/mlr/2012/06/art2full.pdf.

[10] Alan Krueger, Judd Cramer, and David Cho, “Are the long-term unemployed on the margins of the labor market?” *Brookings papers on economic activity*, Spring 2014, hhttps://www.brookings.edu/wp-content/uploads/2016/07/2014a_Krueger.pdf

[11] Peter A. Diamond and Ayşegül Şahin, “Shifts in the Beveridge curve,” Staff Report No. 687 (Federal Reserve Bank of New York, August 2014), https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr687.pdf.

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September 2016

Young adults and trends in household formation

Scott Berridge

The pace of recovery in the housing market has been slower than the pace of recovery in the overall economy. The slow growth of household formation among young adults, a reversal of the sharp rise that occurred for this group during the housing boom of the late 1990s and early 2000s, is a key factor behind this trend. In "Household formation among young adults" (Federal Reserve Bank of San Francisco, Economic Letter, May 23, 2016), Fred Furlong uses data from the U.S. Census Bureau's Current Population Survey to analyze the evolution of household formation among young adults. He shows that the current behavior of young adults reflects a return to the norm that existed prior to the housing boom of the late 1990s.

Furlong analyzes the relative growth in household formation by looking at the shifts in "headship rates," the share of the population identified as heads of households. For nearly 50 years, the rate of growth in headships exceeded population growth by 0.2 percentage point per year. Since 2007, that has dropped to −0.5 percentage point per year. The paper goes on to examine the distribution of headship rates across four age groups: 18–24, 25–29, 30–34, and 35–44. The first two groups in particular, 18–24 and 25–29, have experienced significant declines in headship rates recently. Headship rates rose for all groups, but dropped after 2007 for the younger groups while remaining relatively stable for the 35–44 year-old group.

For all four groups, ownership rates increased during the housing boom of the late 1990s and early 2000s, but fell after 2007. Ownership rates have been driven down by several factors including tougher credit requirements, rising foreclosures, and deteriorating household finances since the Great Recession. A concomitant effect of the decreased household formation among young adults is the rise of alternative residential choices such as living with parents, other relatives, or friends. The author goes on to note a correlation between these living arrangements and both the rise in student debt and the decline in marriage rates. Headship rates are similarly effected by marriage rates, and CPS data shows that the shares of young adults living with spouses has declined since 1994.

Declines in headship and ownership among young adults is partly attributable to declining labor-force participation, as the data shows a sharp decrease in the share of young adults in the labor force. Since 2000, the share of 18 to 24 year olds not in the labor force has increased by 8.5 percentage points and now totals 35 percent. The share not in the labor force is also associated with a 1 percentage point drop in the headship rate, or 300,000 fewer households. Whatever the reasons for young adults' residential choices, they seem to be merely delaying the decision to head their own household, rather than eschewing home ownership altogether. Even though young adults are living with their parents longer, they are continuing to eventually form households over time.

During the Great Recession, household formation and headship rates among young adults declined substantially. This contrasts with the rates present during the housing boom of the late 1990s and early 2000s. But there are signs that a readjustment is imminent. The current population share of young adults is fairly close to the share that existed at the start of the most recent housing boom. Also, while more young people are living with their parents,

they are forming their own households, albeit later in life, leading to higher headship rates over time. Mr. Furlong notes that U.S. Census Bureau projections suggest that household formations will average about 1.5 million per year through 2020, which is much better than the 900,000 annual average of the last 5 years.

Monthly Labor Review

BLS

September 2016

Popular money-saving strategies prove elusive for low-income households

Shaun Carter

What's something that every household in America purchases, without fail, each year? Toilet paper. And lots of it. Americans use more than 17 billion rolls of toilet paper annually! In "Frugality is hard to afford," (University of Michigan, Ross School of Business, Working Paper No. 1309, March 2016), A. Yesim Orhun and Mike Palazzolo set out to discover the effect income level has on purchasing behavior as it relates to, arguably the most important household commodity, toilet paper.

The authors investigated how sale pricing, bulk discounts, and liquidity constraints affect the quantity and frequency of toilet paper purchases by different income groups. Because toilet paper is a commodity that is purchased by nearly everyone, is nonperishable, has no close substitute, has consistent consumption patterns, and is regularly discounted by retailers, it offers a great unit of analysis for studying the effect a household's cash liquidity has on its ability to take advantage of sales and discounts.

It stands to reason that when a commodity that is regularly consumed by a household goes on sale, the household will purchase more of it to "stock up" at this lower price in preparation for future use. But what about those who live paycheck to paycheck and may not have the ability to stockpile toilet paper during a great sale?

In this study, the toilet paper purchases of more than 100,000 households were analyzed over a 7-year period. The researchers identified differences in the purchase decisions of households in five different income levels: less than $20,000 per year, $20,000–40,000 per year, $40,000–60,000 per year, $60,000–100,000 per year, and more than $100,000 per year. The authors go on to examine bulk purchasing and accelerating purchases in response to sales amongst the five groups, as well as the potential financial impact of those behaviors. The authors conclude with a discussion of how the income groups, particularly those at the lowest levels, are impacted financially by their varying ability to employ money-saving strategies for purchasing toilet paper.

The researchers discovered that high-income households were most likely to utilize money-saving strategies, such as buying in bulk and accelerating purchases in response to sales. The lowest income group was least likely to employ such purchase behaviors despite being the group that would stand to benefit the most from taking advantage of these intertemporal money-saving strategies. Overall, the lowest income group spent the least on toilet paper by making use of a different strategy—purchasing cheaper brands. Still, considering that the discount for buying in bulk (defined as a package size greater than four rolls) ranges from 8.4 percent for 6-roll packages to 44.2 percent for 36-roll packages, why would these low-income households forego bulk purchases? A lack of available financial liquidity is one theory.

The authors found that liquidity constraints and the timing of sales disproportionately govern the purchase behavior of low-income households, even for relatively low-priced products. By comparing the household purchases made during the first week of the month with the remaining weeks, the researchers determined that the purchasing behavior of higher income households did not vary as much as that of lower income households. The lowest income households were more likely to purchase toilet paper on sale during the first week of the month, when they were most likely to have received paychecks and supplemental financial assistance, than during the later weeks in the month, when those sources of income were most likely diminished. Ultimately, this inability of lower income households to accelerate their purchases to take advantage of sales throughout the month and a lack of financial liquidity to stock up by buying in bulk means that they spend an additional 6 percent per standardized roll of toilet paper than their higher income counterparts. The authors posited that this information might help retailers that serve low-income communities determine when best to schedule temporary sales and help policymakers focus on ways to provide liquidity relief to low-income households.

Monthly Labor Review

BLS

September 2016

An update on SOII undercount research activities

Concerns from academic researchers and other data users and stakeholders about the completeness of the injury and illness counts from the Survey of Occupational Injuries and Illnesses (SOII) prompted Congress to allocate funds to the U.S. Bureau of Labor Statistics (BLS) to establish an ongoing research program. Initial research conducted by BLS pointed to an undercount of injuries and illnesses, thereby confirming earlier research. The research did not, however, result in definitive conclusions regarding the magnitude of the undercount. Subsequent research by BLS began to look at reasons why some injuries and illnesses are not recorded by employers nor reported to BLS on the SOII. To do this, BLS partnered with four states that interviewed a large number of SOII respondents about their injury-and-illness recordkeeping experience. This article presents initial results of this four-state study and two Washington-State-specific projects and concludes with a discussion of ongoing BLS-sponsored research.

Matthew M. Gunter
Gunter.Matt@bls.gov

Matthew M. Gunter is an economist in the Office of Compensation and Working Conditions, U.S. Bureau of Labor Statistics.

The Survey of Occupational Injuries and Illnesses (SOII) is an annual employer survey conducted by the U.S. Bureau of Labor Statistics (BLS) and is the only comprehensive national source of data on the number and rate of occupational injuries and illnesses in the United States. This article updates stakeholders on the ongoing BLS-sponsored research into the completeness of the occupational injury and illness counts from the SOII. Previous updates on SOII undercount research activities include "Examining evidence on whether BLS undercounts workplace injuries and illnesses" by John W. Ruser in 2008[1] and "Examining the completeness of occupational injury and illness data: an update on current research" by William J. Wiatrowski in 2014.[2] Ruser discusses work by BLS research economists and external researchers who matched SOII microdata and workers' compensation records from several states so they could evaluate the completeness of the SOII injury and illnesses counts. A short time after publication of that article, BLS received additional funding from Congress to establish an ongoing research program to systematically investigate the completeness of the SOII injury and illness counts and address concerns about an undercount of occupational injuries and illnesses.

BLS began by partnering with three states and one contractor to fund three research projects from 2009 to 2012:

1. Multisource enumeration—Using multiple data sources (including SOII microdata, workers' compensation records, and hospital and emergency room data) to compile a comprehensive count of all work-related amputation and carpal tunnel syndrome cases across 2 or 3 years
2. SOII–workers' compensation matching—Matching SOII data and workers' compensation records to build on previous case matching research
3. Employer interviews—Conducting a small number of interviews with employers regarding their injury and illness recordkeeping practices

Researchers from both BLS and Washington State conducted the employer interviews, which resulted in published reports.[3] While the interviews were qualitative in nature, they generated considerable interest from BLS, our research partners, and other SOII stakeholders for quantitative data on injury and illness recordkeeping practices drawn from a larger sample of employers. A detailed discussion of all three projects is beyond the scope of this article but can be found in a *Monthly Labor Review* article published in 2014.[4]

To fulfill the demand for quantitative data on employer injury and illness recordkeeping practices, BLS partnered with four states to conduct a much larger number of employer interviews from 2012 through 2014. Unlike the qualitative data from interviews conducted from 2009 to 2012, the data collected from the 2012–14 interviews are generalizable to all employers in each of the four states and provide BLS with important information on employer injury and illness recordkeeping practices and barriers to the reporting of injuries and illnesses to the SOII.

In addition to conducting employer interviews as a partner in the four-state study, BLS funded two state-specific research projects in Washington State from 2012 through 2014. The first was a multiyear match of SOII microdata to workers' compensation records to identify and evaluate any undercount trends over time. The second project involved a series of hypothesis-generating interviews with employers in Washington. In these interviews, researchers documented various reasons employers gave for not reporting to the SOII specific injury and illness cases with days away from work despite the existence of corresponding workers' compensation claims for these injuries and illnesses.

The rest of this article focuses on the employer interviews from the four states and the two Washington research projects. It concludes with a brief discussion of current and future undercount research projects.

Employer interviews across four states

In the fall of 2012, BLS entered into cooperative agreements with the following four State Workforce Agencies for the expanded employee interview project:

- The Minnesota Department of Labor and Industry
- The New York State Department of Health
- The Oregon Department of Consumer and Business Services
- The Washington State (hereafter, "Washington") Department of Labor & Industries

To facilitate communication and cooperation throughout the duration of the project, BLS and the states arranged for regular conference calls. Regular communication between all participants in the project was vital for development of the survey instrument and for collaborative problem solving and sharing of ideas as the project advanced from the initial survey development into data collection, and then estimation and tabulation of the collected data.

Development of the survey instrument

From fall 2012 to spring 2013, BLS and the states worked together to develop a survey instrument to be used by all four states when conducting the employer interviews. A draft survey instrument, similar to the one developed for the qualitative employer interviews from round 1, served as the starting point. The survey instrument was revised over the course of several months in late 2012 into early 2013. Following pretesting by all states in spring 2013, the survey instrument was finalized that May.

The final questionnaire consisted of 47 core questions asked of employers in each state. Most were yes/no or multiple-choice questions. Minnesota, New York, and Washington also had a small number of state-specific questions of interest that were included on their respective survey instruments. The final survey instrument was divided by topic into six sections, with questions on

- company/establishment characteristics;
- employee roles within the company;
- injury and illness recordkeeping, in general;
- Occupational Safety and Health Administration (OSHA) recordkeeping;
- SOII recordkeeping; and
- workplace practices and recordkeeping scenarios.

Data and sample selection

BLS provided state-specific microdata files with SOII respondent information to each state. From this file, each state drew a representative sample of employers to contact according to guidance provided by BLS. To ensure comparability to the SOII, each state's sample was stratified by ownership, industry, and establishment size according to the definitions in use by BLS on the SOII. Two states—Minnesota and Oregon—elected to sample unique respondents from the 2010 and 2011 SOII in order to draw from a larger pool of employers. Washington and New York sampled from 2011 SOII respondents only.

Conducting the interviews

States began contacting respondents in the late spring or early summer of 2013. Employers were notified of their selection in this survey, and were encouraged to participate, via a prenotification letter sent by postal mail (or by email, if available) from the state to the SOII point of contact for each employer. Employers are required by federal law to participate in the SOII if contacted by BLS, but participation in this followback survey was voluntary.

After employers received the notification letter or email, states began contacting the employers to recruit their participation in the study and to complete an interview. States made a minimum of three contact attempts to employers, varying the day of the week and time of day of the contact. If the individual listed as the contact was no longer with the employer, states attempted to locate and interview his or her replacement. A typical interview took 25–30 minutes to complete. All interviews were conducted over the telephone. All states completed interviews with participating employers by early 2014.

Employer responses

In total, the states contacted or attempted to contact over 6,000 establishments that were selected to participate in this survey.[5] Response rates reported by Minnesota, New York, and Washington were around 50 percent, while

Oregon reported a response rate over 60 percent. There were some interstate differences in how response rates were calculated, so direct comparisons between states are not possible.

Respondent characteristics across states followed similar patterns by establishment size and ownership. Larger establishments, state and local government establishments, and establishments that were part of a larger company or organization with multiple locations were all generally more likely to respond to state interview requests than smaller establishments, private sector establishments, and single-location establishments.

Initial results

The results presented below, unless otherwise noted, come from the final reports each state provided to BLS at the conclusion of the project.[6] A more detailed analysis of the microdata files each state provided to BLS as part of this project will be forthcoming. (See the concluding section for more details.)

The primary objective of this project was to obtain quantitative data on the recordkeeping decisions employers make when choosing whether to record occupational injuries and illnesses. Employers selected to participate in the SOII must record and report to BLS all injuries and illnesses throughout the calendar year that qualify as a recordable case according to OSHA criteria.[7] In addition, employers are required to provide detailed worker demographic and case circumstance information for any injury or illness where the worker missed at least 1 calendar day away from work following the day of injury or illness.

Preliminary findings from across the four states point toward confusion among employers regarding several aspects of OSHA recordkeeping criteria. A few of these scenarios are discussed below.

Employer confusion about case types. According to OSHA recordkeeping rules, a situation in which a worker experiences at least 1 day of restricted work duty following an injury or illness but does not miss any days away from work is a “Days of Job Transfer or Restriction” (DJTR) case. If a worker misses at least 1 calendar day of work following an injury or illness, employers should record this as a “Days Away From Work” (DAFW) case. The total number of days of job transfer or job restriction or days away from work are counted beginning with the next calendar day following the injury or illness for DJTR and DAFW cases. Injuries and illnesses that are recordable but don’t result in DJTR or DAFW are collectively referred to as “other” recordable cases.

The state reports on the results of the employer interviews indicate confusion on the part of employers regarding the appropriate type of case to record for injuries and illnesses and the correct number of days to assign for DAFW cases. For DAFW (and DJTR) cases, the number of calendar days, not scheduled shifts or work days, should be recorded as the number of days away from work (or restricted duty in the case of DJTR cases). Many employers reported counting scheduled work days or shifts instead of calendar days for DAFW cases. States reported that when employers were presented with a hypothetical recordkeeping scenario,[8] most employers correctly identified the injury as OSHA recordable, but many did not correctly record the injury as a DAFW case.

These results are of concern to BLS because detailed case and demographic data are currently collected and published only for DAFW cases. In addition to providing a potentially distorted picture of the severity of injuries and illness that befall workers, the misclassification of DAFW cases as either “other” or DJTR cases may also contribute to the “missing” SOII cases noted by various researchers who have matched SOII cases with workers’

compensation records. More work will be needed to confirm whether this is a national trend, and BLS is conducting additional work (discussed more below) that will better help us understand this issue nationwide.

Reliance on workers' compensation definitions. Employers are instructed to use OSHA recordkeeping criteria when recording injuries or illnesses and when responding to the SOII. This ensures a consistent recordkeeping standard is used across the nation. The interviews across the four states revealed that many employers use their state's workers' compensation definitions to record injury and illness cases onto their OSHA log.

Unlike OSHA recordkeeping guidelines, workers' compensation guidelines vary by state. Using workers' compensation rules as the basis for recording an injury or illness can result in cases being either erroneously included or excluded by employers who use their state's definition of a compensable case when they respond to the SOII. When employers record injury and illness cases by relying on workers' compensation definitions, they introduce unintended variability into the SOII estimates.

Temporary workers. There appears to be considerable confusion among employers regarding how to record the injuries and illnesses of temporary workers hired through an outside agency. If a temporary worker is supervised on a day-to-day basis by the employer, OSHA regulations require that any occupational injuries and illnesses of that worker be included on the sampled employer's log, rather than on the log of the staffing agency.[9] Initial results reported by the states indicate that many establishments using temporary workers who are supervised at the establishment do not record their injuries and illnesses on their OSHA log. Although temporary workers are used in a relatively small number of establishments, the exclusion of their injuries and illnesses could potentially bias estimates in industries where they are frequently used by employers.

Washington projects

In addition to their work on the employer interviews as part of the four-state study, the Washington State Department of Labor & Industries also completed work on two other projects funded by BLS.

SOII–workers' compensation case matching, 2000–11

Previous work during the first round of undercount research matched only 2 years of SOII microdata and workers' compensation records in California and Massachusetts (2007–08) and 3 years in Washington (2006–08). Given such a short timeframe, BLS could not identify matching rates and trends over time when analyzing these results. For this project, Washington expanded on its initial research by refining and enhancing its methods while extending the match to SOII microdata and workers' compensation records from 2002 to 2011.[10]

The goals of the Washington study were to

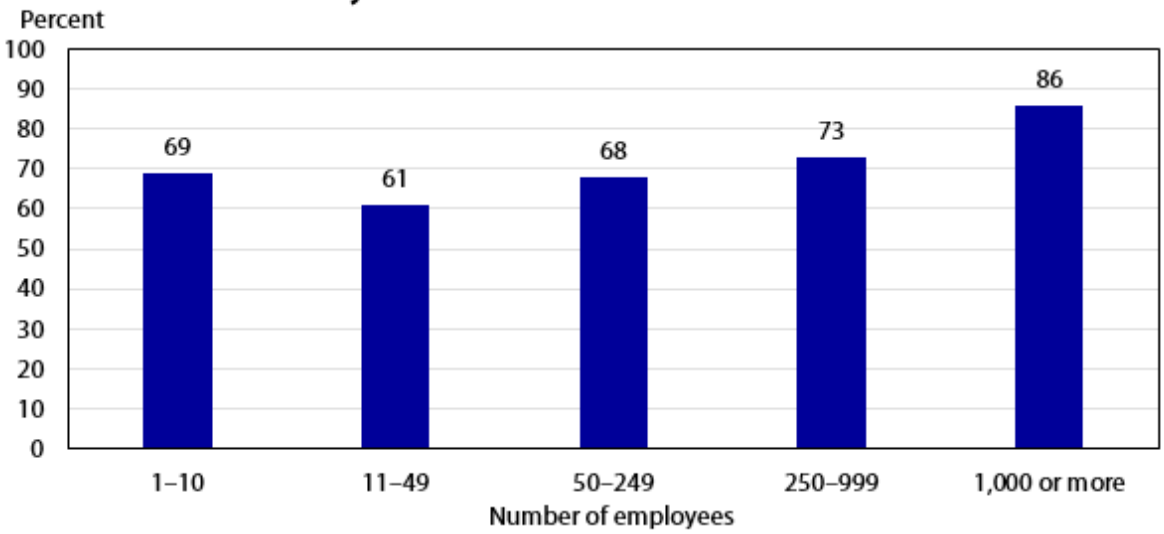
- compare the annual reporting of injuries and illnesses between the SOII and the workers' compensation system,
- evaluate any trends over time, and
- identify establishment or case characteristics associated with differential reporting of injuries and illnesses between the two systems.

BLS supplied the relevant SOII microdata from Washington employers. Washington already had access to workers' compensation records because it oversees the fund that state law requires most employers pay into for workers' compensation insurance. Washington also had an interagency agreement to access state unemployment insurance information, which was used to bridge the workers' compensation records and SOII data using a unique

employer identifier that is found in all Washington administrative databases. This unique arrangement within Washington helped facilitate matching between the SOII microdata and workers' compensation records.

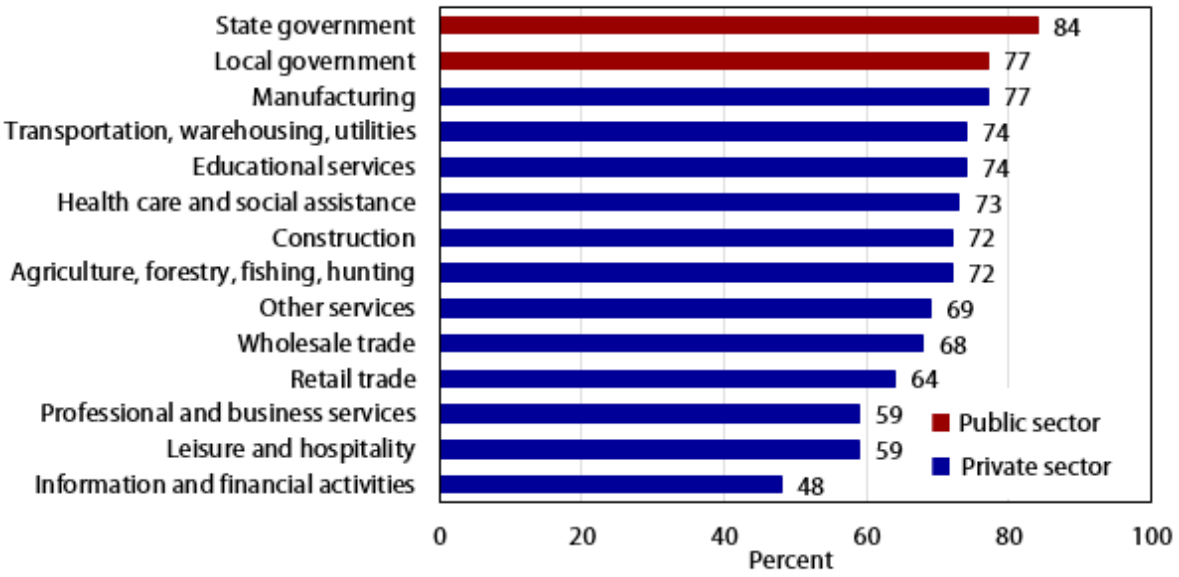
To ensure no potential matches were inadvertently excluded, all workers' compensation records were included in the match with SOII case data. After the match was complete, Washington applied exclusions to workers' compensation records for cases that did not have any missed days of work, for records associated with other company establishment locations not sampled by the SOII, and for records with days of missed work that occurred after the SOII survey year. This was done to include only those workers' compensation records within the scope of the SOII. The state applied these exclusions to both matched and unmatched records in order to ensure the estimates generated for SOII underreporting included only workers' compensation records that met SOII eligibility criteria.

Figure 1. Percentage of claims reported in the Survey of Occupational Injuries and Illnesses by establishment size



Note: Data are adapted from table III of Sara E. Wuellner, Darrin A. Adams, and David K. Bonauto, "Unreported workers' compensation claims," *American Journal of Industrial Medicine*, April 2016.
Source: U.S. Bureau of Labor Statistics.

Figure 2. Percentage of claims reported in the Survey of Occupational Injuries and Illnesses by industry sector



Note: Data are adapted from table III of Sara E. Wuellner, Darrin A. Adams, and David K. Bonauto, "Unreported workers' compensation claims," *American Journal of Industrial Medicine*, April 2016.
Source: U.S. Bureau of Labor Statistics.

In a recently published analysis of the matching results, Washington found that only about 70 percent of SOII-eligible workers' compensation claims were reported in the SOII. In looking at underreporting by establishment size, Washington found the largest establishments (those with more than 1,000 employees) had the highest percentage of workers' compensation claims reported in the SOII. (See figure 1.) When Washington researchers examined underreporting by ownership and industry, they found state and local government establishments had the highest percentage of eligible claims reported to the SOII, followed by private sector manufacturing establishments. (See figure 2.) In a multivariable analysis of establishment size, ownership, and industry, Washington found the highest rates of underreporting occurred in large private construction establishments (those with more than 250 employees) and small private educational services establishments (those with fewer than 50 employees). The lowest rates of underreporting were found in state and local government establishments.[11]

Washington also found differential match rates by the physical characteristics, or nature,[12] of the worker's injury or illness. Acute injuries (such as fractures, bruises, and instances of a worker experiencing multiple traumatic injuries) were more likely to be matched to a corresponding worker's compensation claim than sprains, strains, tears, and other nontraumatic disorders and illnesses. Washington observed a slight increase in the rate of underreporting across the reporting period (2002–11). These matching results suggest that the SOII is doing a better job of capturing acute or highly visible traumatic injuries (such as fractures) than less visible traumatic injuries (such as sprains, strains, and tears) or nontraumatic illnesses and disorders.[13]

One important limitation of this project, and other similar SOII–workers' compensation matching work, is that SOII underreporting was assessed only in relation to workers' compensation claims. Since SOII-eligible injuries and illnesses may be missing from the workers' compensation systems, the overall rate of eligible injuries and illnesses not captured by the SOII may be higher than Washington estimated in its analysis. More details on this project are

available in the state's final report submitted to BLS and in a recently published peer-reviewed paper by the Washington research team.[14]

"Real time" interviews with SOII respondents

To estimate the percentage of missing injury and illness cases from the SOII, undercount research from 2009 to 2012 involved matching individual SOII cases to workers' compensation claims. In this earlier work, employers were not contacted to discuss specific reasons why potentially eligible cases had not been reported to the SOII. The goal of this Washington study was to identify reasons why specific workers' compensation claims from employers were not included in the SOII case data reported to BLS. The objective was not to obtain quantitative data generalizable to a larger population of employers, but instead to generate a comprehensive list of different reasons employers gave for submitting a workers' compensation claim but not reporting that injury or illness to the SOII.

In order to identify workers' compensation cases not reported to the SOII, Washington matched 2012 SOII respondent data provided by BLS to SOII-eligible workers' compensation claims using state unemployment insurance data to help bridge these two data sets. Washington then conducted a standard structured interview with respondents using the phone instrument developed in the four-state study, followed by a more unstructured interview about the potential missing SOII cases. In total, Washington interviewed 103 establishments regarding 171 different workers' compensation claims. Employers' responses were categorized by the reason they gave for a case's exclusion from the SOII. Table 1 lists these categories and shows employer-provided examples within each category.

Table 1. Reasons for SOII–workers' compensation discrepancy

Inaccurate OSHA 300 log, *n* = 78 (45 percent)	Inaccurate SOII, *n* = 25 (15 percent)	Harmonizing issues, *n* = 60 (35 percent)
Misunderstood Occupational Safety and Health Administration regulation	Misunderstood SOII reporting instructions	OSHA recordable, but not as a days-away-from-work case
Transfer of information issue	Did not keep OSHA log or injury tracking system	Injury was not OSHA recordable
Data entry error or recordkeeper oversight	Data entry error or recordkeeper oversight	Claim was reported on SOII, but differences in systems obscured the link
—	—	Injury not included in SOII-sampled workforce

Note: Table 1 is adapted from figure 1 on page 12 of "SOII undercount research: 'real time' interviews with SOII respondents about unreported WC claims, Washington, final report" (Washington State Department of Labor & Industries, August 2014), https://www.bls.gov/iif/wa_realtime.pdf.

Source: U.S. Bureau of Labor Statistics.

Almost half of unlinked workers' compensation claims were due to inaccurate OSHA's Form 300 logs[15]— which employers use to record employees' work-related injuries and illnesses—and another 15 percent were due to mistakes made by employers when responding to the SOII. About one-third of the unlinked claims were due to problems reconciling cases between SOII and workers' compensation records. These harmonizing issues—instances in which a case was eligible for workers' compensation wage replacement but was not considered an OSHA-recordable DAFW case by the employer—illustrate the challenges involved in accurately matching cases

between an injury and illness surveillance system, such as the SOII, and an administrative records system, such as workers' compensation data, that were designed for very different purposes.

The full report from Washington, with additional details on this project, is available online.[16]

Current and future research

Analysis of the four-state study data will continue in 2016, and analysis of a recently completed national survey of employers will begin. BLS is also continuing newly initiated research on the feasibility of conducting a worker survey of occupational injuries and illnesses.

Continued analysis of four-state study data

The four states that partnered with BLS to conduct the employer interviews provided BLS with a rich set of respondent data suitable for detailed analysis. One of the state research partners that participated in the four-state study was awarded a BLS/American Statistical Association/National Science Foundation research fellowship and is working with BLS to analyze this data set. The analysis will focus on (1) investigating the role of state-level differences in criteria used to record injuries and illnesses on the SOII, (2) looking at employer reliance on workers' compensation data when reporting SOII case information, and (3) reviewing employer's injury and illness recordkeeping practices.

National recontact survey

Building on the success of the four-state study, BLS partnered with a contractor to conduct a national recontact survey of 2013 SOII respondents. One of the primary goals of this project is to obtain nationwide data on the effect of "late cases" on the counts of workplace injuries and illnesses estimated by the SOII. Late cases include injuries or illnesses that

1. occurred late in the calendar year,
2. were discovered or reported by employers after they had responded to the SOII, or
3. were initially not recordable but became recordable at a later date.

Preliminary results from the four-state study indicate that these late cases may not be consistently recorded on employer OSHA logs, and then not reported to BLS when the employer is responding to the SOII. Thus, these late cases may be undercounted. The recontact study should assist BLS is assessing the magnitude of this issue nationwide.

In addition to being asked about late cases, employers were asked a series of OSHA recordkeeping questions similar to those in the four-state study. This series of questions was designed to obtain national data on the scope of employer misunderstanding of OSHA recordkeeping criteria. The data will help inform BLS decisionmaking aimed at improving SOII data collection procedures.

OSHA's Form 300 log was also collected from employers for reference year 2013 as a part of this study. Many employers use the form to record employees' work-related injuries and illnesses that occur throughout the year and then use the completed form to report these injuries and illnesses to BLS when responding to the SOII. Analysis of these logs will help BLS evaluate the results of the recontact survey.

Initial analysis of the results of this study will begin in late 2016.

Research on a worker survey of occupational injuries and illnesses

The SOII is an establishment survey and is designed, pursuant to the Occupational Safety and Health Act of 1970, to collect injury and illness data directly from employers. As discussed in "Occupational injury and illness surveillance: conceptual filters explain underreporting,"[17] there are many "filters" that can lead to OSHA-recordable injuries and illnesses going unreported by workers to their employer, which then go unreported by the employer to BLS. For example, a worker may refrain from reporting an occupational injury for fear of employer retribution, or may choose to use private insurance to get medical care instead of reporting a work-related illness and going through the workers' compensation system. One possible way to circumvent filters to occupational injury and illness reporting is to contact workers directly. BLS is currently sponsoring exploratory research on how occupational injury and illness data may be collected directly from workers. The goal of this data collection would be to complement, not replace, the valuable data we get from employers as a part of the SOII.

As in the past, BLS will report on the results of all SOII undercount research through various publications, such as the *Monthly Labor Review* and other economic and public health journals; sessions at relevant conferences; and on the SOII undercount web page.[18]

SUGGESTED CITATION

Matthew M. Gunter, "An update on SOII undercount research activities," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, September 2016, https://doi.org/10.21916/mlr.2016.41.

NOTES

1 John W. Ruser, "Examining evidence on whether BLS undercounts workplace injuries and illnesses," *Monthly Labor Review*, August 2008, https://www.bls.gov/opub/mlr/2008/08/art2full.pdf.

2 William J. Wiatrowski, "Examining the completeness of occupational injury and illness data: an update on current research," *Monthly Labor Review*, June 2014, https://www.bls.gov/opub/mlr/2014/article/examining-the-completeness-of-occupational-injury-and-illness-data-an-update-on-current-research.htm.

3 See Polly Phipps and Danna Moore, "Employer interviews: exploring differences in reporting work injuries and illnesses in the Survey of Occupational Injuries and Illnesses and state workers' compensation claims," 2010 JSM (Joint Statistical Meetings) proceedings, https://www.bls.gov/osmr/research-papers/2010/pdf/st100210.pdf; and Sara E. Wuellner and David K. Bonauto, "Exploring the relationship between employer recordkeeping and underreporting in the BLS Survey of Occupational Injuries and Illnesses," *American Journal of Industrial Medicine*, October 2014, http://onlinelibrary.wiley.com/doi/10.1002/ajim.22350/full.

4 Wiatrowski, "Examining the completeness of occupational injury and illness data."

5 Private companies and government organizations with multiple establishments often have a contact who is responsible for injury and illness recordkeeping at multiple business locations. In such instances, one interview was conducted with the contact, but the responses represent multiple units. Therefore, the total number of completed interviews in this study was less than the total number of establishments that responded.

6 These reports, along with additional information on the BLS SOII undercount program, can be accessed on the BLS website at https://www.bls.gov/iif/undercount.htm.

7 OSHA's injury and illness recordkeeping criteria can be found on the OSHA website at https://www.osha.gov/recordkeeping/index.html.

8 The scenario presented to employers was as follows: “An employee cut his arm at work on Friday. His doctor recommended he take 2 days off from work. He was not scheduled to work the weekend, and he returned to work on Monday.” In this scenario, the injury is an OSHA-recordable injury, and the 2 days away from work should be recorded per OSHA recordkeeping criteria.

9 See OSHA’s regulations on recording and reporting occupational injuries and illnesses, standard number 1904.31(b)(2) at https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12775.

10 Years 2000 and 2001 were ultimately excluded from Washington's SOII–workers’ compensation match because of significant changes in OSHA recordkeeping regulations that took effect on January 1, 2002.

11 For more information and a more detailed analysis of the results, see Sara E. Wuellner, Darrin A. Adams, and David K. Bonauto, “Unreported workers’ compensation claims to the BLS Survey of Occupational Injuries and Illnesses: establishment factors,” *American Journal of Industrial Medicine*, April 2016, http://onlinelibrary.wiley.com/doi/10.1002/ajim.22563/abstract.

12 The BLS SOII uses the Occupational Injury and Illness Classification System (OIICS) to describe the nature of an injury or illness. Per OIICS, nature is defined as “the principle physical characteristic(s) of the work-related injury or illness.” More information on OIICS is available on the BLS website at https://www.bls.gov/iif/oshoiics.htm.

13 For additional detail, see the Washington State report on this project, “SOII undercount research: Washington SOII-WC record linkage, 2000–2011, final report,” August 30, 2014, https://www.bls.gov/iif/wa_workercomp.pdf.

14 For the Washington State final report, see “SOII undercount research,” https://www.bls.gov/iif/wa_workercomp.pdf. For the peer-reviewed paper by the Washington State research team, see Wuellner, Adams, and Bonauto, “Unreported workers’ compensation claims.”

15 To see OSHA’s Form 300, go to https://www.bls.gov/respondents/iif/forms/oshaforms.pdf.

16 See “SOII undercount research: ‘real time’ interviews with SOII respondents about unreported WC claims, Washington, final report,” August 2014, https://www.bls.gov/iif/wa_realtime.pdf.

17 Lenore S. Azaroff, Charles Levenstein, and David H. Wegman, “Occupational injury and illness surveillance: conceptual filters explain underreporting,” *American Journal of Public Health*, September 2002, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1447253/.

18 The SOII undercount webpage, “Research on the completeness of the injury and illness counts from the Survey of Occupational Injuries and Illnesses,” is at https://www.bls.gov/iif/undercount.htm.

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Monthly Labor Review
BLS
September 2016

Heterogeneous education output measures for public school students with and without disabilities

Elementary and secondary schools provide a wide range of services to diverse groups of students, including students with disabilities and English language learners, at differing costs. The exploratory research presented in this article uses data on students with disabilities and students without disabilities to investigate the importance of constructing elementary and secondary school output measures that take account of differences in services provided. Results suggest that it may be valuable to include information on the diverse educational services provided in public schools in order to generate an education output measure that reflects historical changes in the mix, cost, quality, and growth of these services over time.

Susan G. Powers
powers.susan@bls.gov

Susan G. Powers is a research economist in the Office of Productivity and Technology, U.S. Bureau of Labor Statistics.

Education output measures for elementary and secondary schools typically include a physical volume measure, such as number of students, to estimate the quantity of education services provided. The quantity measure is then quality adjusted to capture increases in educational output due to curriculum changes, improved teaching methods, smaller classes, and other factors.[1] Determining the best approach to capturing quality changes in education output has been the focus of much recent research in this area.[2] But the measures that have been proposed assume that students are homogeneous; consequently, such measures do not account for different types of students.

In reality, both elementary and secondary schools offer substantially different services to well-defined groups of students. Today, public and private schools in the United States provide students with not only instructional services, but also supplementary student support services, such as guidance counseling, healthcare services (including school nurses; school psychologists; vision, dental, audiology, and speech screenings; and speech therapy services), food services, and transportation services (offered primarily by public schools). Additional support services for students with learning, emotional, or physical disabilities are also provided when appropriate.

Students with disabilities, English language learners, and students from impoverished backgrounds require more and different services than their counterparts without disabilities require.

This article constructs alternative measures of education output for public elementary and secondary schools that account for differences in both instructional and noninstructional services provided to students with and without disabilities.[3] In what follows, I compare these heterogeneous education output measures with homogeneous measures, for all public elementary and secondary school students. I also construct labor productivity measures for public elementary and secondary schools, using only the homogeneous "all students" output measure, the composite "students with and without disabilities" output measure, and U.S. Bureau of Labor Statistics research data series on public school labor input.

The physical volume–based education output measures I use are constructed from National Center for Education Statistics (NCES) enrollment data.[4] The output measures are quality adjusted by means of National Assessment of Educational Progress (NAEP) Long Term Trend (LTT) test scores. The quality-adjusted "all students" and "students with/without disabilities" measures are augmented to explicitly account for selected noninstructional services. I draw conclusions from these results regarding the potential value of including further distinctions on services provided to other student groups and regarding the importance of improving, on a national basis, education-related data collection, particularly the collection of expenditure data targeted toward educational services for English language learners and impoverished children.

Background

Public elementary and secondary schools in the United States are required to meet the needs of a diverse population of students, including students with disabilities, English language learners, and students from impoverished backgrounds.[5] To do so, they provide, among other services, instructional services; student support services, such as guidance counseling, health room services, attendance services, and occupational and physical therapy; speech pathology services; and noninstructional services, such as transportation and food services. Public schools typically provide free bus transportation to students, including special transportation services as required by students with disabilities. Public schools also participate in the free and reduced-price lunch program overseen by the U.S. Department of Agriculture.

Students with disabilities include children with physical, mental, emotional, behavioral, and learning disorders.[6] Under Section 504 of the Rehabilitation Act of 1973, the 1990 Americans with Disabilities Act, and the Education for All Handicapped Children Act of 1975, most recently updated by the Individuals with Disabilities Education Improvement Act (IDEA) of 2004, these students are entitled to receive a free and appropriate education in the least restrictive environment possible.[7] Among the variety of services that students with disabilities may receive are the following:

- Direct instruction in a self-contained classroom or "resource room" setting, to assist in developing reading and language, writing, mathematics, and organizational skills
- Accommodations and support in general classrooms (students with learning disabilities)
- Instruction in alternative settings (children with emotional disorders)
- Speech and language services

- Assistive technologies and consultation and other services (deaf, hard-of-hearing, and vision-impaired students)
- Special-education instruction and occupational and physical therapy (students with physical disabilities)
- Special transportation services

English language learners are offered a range of different instructional approaches that vary by state and school district. Among these approaches are the following:

- English-only instruction in English immersion programs
- English-as-a-second-language programs, which provide instruction primarily in English, accompanied by support for enhancing English language skills
- Transitional bilingual education, in which instruction is in the student's native language and part of the school day is used to develop English language skills
- Dual-language instruction, in which instruction is given in two languages to students in the same classroom by two teachers who team teach, one in each language[8]

Students who come from families that are near or below the poverty level are provided with additional services through Title I, Part A, of the federal Elementary and Secondary Schools Act of 1965, most recently reauthorized by the Every Student Succeeds Act of 2015.[9] This legislation provides financial assistance to local education agencies (LEAs) and schools with high numbers or high percentages of children from low-income families, to help ensure that all children meet challenging state academic standards. Title I funds are offered in the form of grants to LEAs,[10] which then target the funds to schools with the highest percentages of children from low-income families. Schools in which children from low-income families make up at least 40 percent of enrollment are eligible to use Title I funds for schoolwide programs (programs that serve all children in the school). Unless a school is operating a schoolwide program, the school must focus Title I services on children who are failing, or most at risk of failing, to meet state academic standards.[11] In addition to receiving Title I funds, students from families near or below the poverty level benefit from the National School Lunch Program, which provides free and reduced-price meals, school breakfasts, and, in some instances, summer meal programs to eligible students.[12]

The public school system relies on state and local funding, supplemented by funds from federal programs, to provide educational services to all students. Because both instructional and noninstructional services vary according to the type of student, the cost of providing educational services differs for each category of student. For example, educational services for a non–English language learner without a disability and from a family living above the poverty line are different in nature and cost from those for a student with a disability, an English language learner, or a student from a family living at or below the poverty line.

Ideally, to examine the importance of measuring the provision of different educational services to uniquely identified groups of students in capturing education output, each of the important student groups and associated services would be included in the output measure. Data on the number of students enrolled in public schools from each of these categories are readily available, and NAEP test scores of students in these groups have recently become available. However, adequate expenditure data on services provided to English language learners and low-income students are currently not available.[13] Consequently, this article focuses on the importance of distinguishing the educational services provided to students with and without disabilities.

The population of public school students with disabilities has increased from 11 percent of all students in 1990 to 13 percent in 2013.[14] At the same time, the percentage of public school students with disabilities who spend 80 percent or more of their time mainstreamed in a regular classroom increased from 33 percent in 1990 to 62 percent in 2013.[15] Another large group, English language learners, saw its numbers increase in all but 11 states. The group grew from 5.0 percent of public school students in 1993 to 9.3 percent in 2013 and made up as much as 16.6 percent of public school students in large cities that year.[16] Future research may focus on the educational services provided to these students as well.

In what follows, I develop the underlying data and framework required for distinguishing educational services provided to students with and without disabilities and for capturing the impact on measured output of providing services to these two groups of students at differing costs. I also develop measures of noninstructional services, including special and regular transportation services and food services, that are explicitly incorporated into one output measure in order to examine the impact of accounting for these services separately.

Output measures

I begin by constructing three heterogeneous education output measures that I subsequently compare with three homogeneous "all students" education output measures. The homogeneous measures include the simple quantity measure

$$Q^A = S^A_{K-12}, \quad (1)$$

based on unadjusted "all students" enrollment, and the quality-adjusted measure

$$Q^A_q = S^A_{K-4} \times (\mathrm{QualAdj}_{K-4}) + S^A_{5-8} \times (\mathrm{QualAdj}_{5-8}) + S^A_{9-12} \times (\mathrm{QualAdj}_{9-12}), \quad (2)$$

based on "all students" enrollment,[17] where S^A_{K-12} (S^A_{K-4}, S^A_{5-8}, S^A_{9-12}) is the number of students enrolled in grades K–12 (grades K–4, 5–8, and 9–12); the superscript *A* indicates that the measure includes "all students"; the superscript *q* indicates that the output data were quality adjusted; $\mathrm{QualAdj}_{K-4}$ is a weight based on a simple average of mathematics and reading LTT test scores for age 9; $\mathrm{QualAdj}_{5-8}$ is a weight based on a simple average of mathematics and reading LTT test scores for age 13; and $\mathrm{QualAdj}_{9-12}$ is a weight based on a simple average of mathematics and reading LTT test scores for age 17.

The third homogeneous output measure, $Q^A_{q,T,F}$, includes transportation services and food services besides the aforementioned measures. Educational services are estimated as a physical volume measure based on public school student enrollment of students in grades K–12, quality adjusted with the use of NAEP LTT test scores.[18] Transportation and food services for all students are explicitly included as separate noninstructional outputs. Transportation services for "all students" are estimated by a physical count of elementary and secondary school students transported at public expense.[19] Food services for "all students" are estimated by a physical count of the number of school lunches served.[20] For each individual output measure underlying the "all students" output measure, shares of total expenditures are constructed from expenditure data from the National Public Education Financial Survey.[21] For the more inclusive output measure, education output is a weighted function of quality-adjusted educational services $Q^A_{q,E}$, transportation services Q^A_T, and food services Q^A_F, for all public school students—namely,

$$Q^{A}_{q,T,F} = w^{A}_{E} \times Q^{A}_{q,E} + w^{A}_{T} \times Q^{A}_{T} + w^{A}_{F} \times Q^{A}_{F}, \quad (3)$$

where *w* is the total expenditure share weight, *E* indicates educational services, *T* denotes transportation services, and *F* designates food services.

The three heterogeneous education output measures include a simple quantity measure, Q^{DND}, based on expenditure-weighted public school enrollment of students with and without disabilities (ND = nondisability), unadjusted for quality change:

$$Q^{\mathrm{DND}} = w^{D} \times S^{D}_{K-12} + w^{\mathrm{ND}} \times S^{\mathrm{ND}}_{K-12}. \quad (4)$$

A second measure, Q^{DND}_{q}, is based on expenditure-weighted public school enrollment of students with and without disabilities, quality adjusted with the use of NAEP LTT test scores, and is given by

$$Q^{\mathrm{DND}}_{q} = w^{D} \times Q^{D}_{q} + w^{\mathrm{ND}} \times Q^{\mathrm{ND}}_{q}, \quad (5)$$

where *w* is as before,

$$Q^{D}_{q} = S^{D}_{K-4} \times (\mathrm{QualAdj}^{D}_{K-4}) + S^{D}_{5-8} \times (\mathrm{QualAdj}^{D}_{5-8}) + S^{D}_{9-12} \times (\mathrm{QualAdj}^{D}_{9-12}), \quad (6)$$

and

$$Q^{\mathrm{ND}}_{q} = S^{\mathrm{ND}}_{K-4} \times (\mathrm{QualAdj}^{\mathrm{ND}}_{K-4}) + S^{\mathrm{ND}}_{5-8} \times (\mathrm{QualAdj}^{\mathrm{ND}}_{5-8}) + S^{\mathrm{ND}}_{9-12} \times (\mathrm{QualAdj}^{\mathrm{ND}}_{9-12}). \quad (7)$$

Note that, in general, S^{h}_{j-m} is the number of students, where *h* denotes whether the student has (*D*) or does not have (ND) a disability and *j–m* indicates the grade range; and $\mathrm{QualAdj}^{h}_{j-m}$ is a weight based on a simple average of mathematics and reading LTT test scores for students of status *h* at age 9 for grades K–4, age 13 for grades 5–8, and age 17 for grades 9–12.

The third heterogeneous measure of education output, $Q^{\mathrm{DND}}_{q,ST,RT,F}$, is a weighted function of quality-adjusted educational services for students with disabilities, quality-adjusted educational services for students without disabilities, special transportation services for students with disabilities who require such services, regular transportation services for students with and without disabilities, and food services for all students, and is given by

$$Q^{\mathrm{DND}}_{q,ST,RT,F} = (w^{D}_{E} \cdot S^{D}_{q,E}) + (w^{\mathrm{ND}}_{E} \cdot S^{\mathrm{ND}}_{q,E}) + (w^{D}_{\mathrm{Spec\,T}} \cdot Q^{D}_{\mathrm{Spec\,T}}) + (w^{D}_{\mathrm{Reg\,T}} \cdot Q^{D}_{\mathrm{Reg\,T}}) + (w^{\mathrm{ND}}_{\mathrm{Reg\,T}} \cdot Q^{\mathrm{ND}}_{\mathrm{Reg\,T}}) + (w^{A}_{F} \times Q^{A}_{F}), \quad (8)$$

where Spec T indicates special transportation services and Reg T denotes regular transportation services. The weights *w* are total expenditure weights.

Educational services for students with and without disabilities are physical volume measures based on public school enrollment of those students, quality adjusted by means of NAEP LTT scores for the two student categories. Public school enrollment of students with disabilities is estimated from data on the percentage of children in prekindergarten through grade 12 who are served under IDEA, Part B, on the basis of total enrollment in public schools.[22]

I construct two measures of transportation services to account, respectively, for the more costly “special transportation” services for some students with disabilities and for the less costly “regular transportation” services used by students who do not require special transportation. Using data on the total number of students transported and the percentage of students with disabilities who receive special and regular transportation services, I estimate

the number of students with disabilities who receive special transportation services and the number of students (both those with and those without disabilities) who receive regular transportation services. Along with estimating the number of students who receive special transportation services, I use data on total transportation expenditures and the per-pupil cost of transporting students with disabilities via special transportation services to develop an expenditure weight for special transportation services. Similarly, I develop an expenditure weight for regular transportation services, using data on total transportation expenditures and the per-pupil cost of providing regular transportation services.[23] I do not distinguish food services separately for students with and without disabilities, and I estimate such services by a physical count of the number of lunches served.

Data

Public elementary and secondary school enrollment

Public school student enrollment data for grades K–12, obtained from NCES, are used as the basis for the physical volume measures of education output. NCES conducts a number of surveys on education at all levels, including early childhood, elementary and secondary, and postsecondary education. Data on elementary and secondary public school education are available from the NCES Common Core of Data database and are obtained from public school administrative records.

Using data on the number of students ages 3–21 served under IDEA, I estimate public school enrollment of students with and without disabilities as a percentage of all public school enrollment. Data on the percentage of public school students enrolled are from the U.S. Department of Education, as published in the *Digest of Education Statistics*.[24] The NCES public school enrollment data on all students are split into the categories of students without disabilities and students with disabilities on the basis of the percentage of the latter students enrolled in public schools. This percentage ranged from 10.1 percent in 1980 to 13.2 percent in 2009, with a high of 13.8 percent in 2004.[25]

Quality adjustment

For both the “all students” education output measures and the output measures for students with and without disabilities, I adjusted public school enrollment in each year with the use of NAEP LTT test score data. NAEP maintains two assessment programs: the Main NAEP Assessments,[26] which are revised about every decade to reflect changes in curriculum in the nation’s schools, and the LTT Assessments, which have remained relatively unchanged since they were first administered in 1969.[27] Both of these assessment programs include public and private elementary and secondary schools, with data reported for all schools, public schools only, and private schools only.[28]

To measure changes in the educational levels of students over time, LTT data are used. Because the framework underlying the Main NAEP Assessments is revamped approximately every decade to match changes in curriculum and instructional services, the length of time during which the Main NAEP Assessments can be used to make comparisons is reduced.[29] By comparison, the LTT Assessment has used “substantially the same assessments” since it was first administered in 1969.[30] The LTT Assessment originally covered reading, mathematics, writing, and science subjects. Writing and science, however, began to be transferred to the Main Assessment in 2004 and are no longer included in the LTT Assessment.

Until 1996, differences in the educational performance of students with specific educational needs were difficult to track. NAEP provided no testing accommodations for students with disabilities or for English language learners prior to that year. As a result, many of these students were excluded from NAEP testing, thus limiting the number who were available for testing. With the passage of the IDEA Amendments of 1997, NAEP prepared new guidelines for testing accommodations and for the inclusion of students with disabilities and English language learners in NAEP testing.[31] Beginning in 2004, NAEP published the long-term reading and mathematics test scores of students with disabilities, English language learners, and students approved for free and reduced-price lunches.[32]

The LTT reading and mathematics scores for "all students" ages 9, 13, and 17 in public schools are used to quality adjust the NCES elementary and secondary public school student enrollment data series for "all students." Reading test score data for public schools are available for 1980, 1984, 1988, 1990, 1992, 1994, 1996, 1999, 2004, 2008, and 2012. Mathematics test score data for public schools are available for 1978, 1982, 1986, 1990, 1992, 1994, 1996, 1999, 2004, 2008, and 2012. The test score data are interpolated between testing years to estimate scores for nontesting years. A ratio of the reading or mathematics test score to the perfect score for "all students" in public schools is computed for each year.

For public school quality-adjusted education output measures for "all students," public school student enrollment for grades K–4 is adjusted by averaging the mathematics and reading test score ratios for age 9 to get a single score for grades K–4. The resulting test score ratio series is multiplied by public school "all students" enrollment for grades K–4 to obtain a quality-adjusted education output measure for grades K–4. A similar procedure is followed to quality adjust output for students in grades 5–8 and 9–12, using LTT mathematics and reading test scores for ages 13 and 17, respectively. The quality-adjusted enrollment data series for grades K–4, 5–8, and 9–12 are then summed to obtain a quality-adjusted "all students" elementary and secondary public school education output series for grades K–12.

For quality-adjusted education output measures for students with and without disabilities, public school enrollments are adjusted separately for the two groups with the use of the NAEP LTT reading and mathematics scores for students ages 9, 13, and 17 with and without disabilities.[33] Because reading and mathematics test scores for both groups of students are published only for 2004, 2008, and 2012, these test scores are extrapolated back to 1980 by multiplying the current years' "all students" test score by the ratio of the previous years' test score for students with (or without) disabilities to the previous years' "all students" test score. The test score data for students with and without disabilities are interpolated between the 2004, 2008, and 2012 testing years to estimate test scores for nontesting years.

Interestingly, for the 2004–12 period, for students with disabilities, reading test scores of those ages 9, 13, and 17, and mathematics test scores of those age 9, grew at a faster pace than test scores of students without disabilities who were the same ages, as shown in table 1. Over the lengthier 1990–2012 period, mathematics test scores of students with disabilities at age 9 and reading test scores at ages 9, 13, and 17 had larger growth rates than corresponding scores of students without disabilities. This difference suggests a relatively faster pace of improvement in learning at later ages for students with disabilities than for students without disabilities.

Table 1. Average annual growth rates in test scores, public and private school students, selected periods, 1990–2012

Period and category of student	Mathematics			Reading		
	Age 9	Age 13	Age 17	Age 9	Age 13	Age 17
2004–12:						
All students[1]	0.240	0.276	0.042	0.293	0.293	0.184
Students with disabilities[1]	.404	.306	-.012	.409	.411	.642
Students without disabilities[1]	.239	.316	.068	.333	.350	.194
1990–2012:[1]						
All students[1]	.276	.239	.026	.246	.106	-.052
Students with disabilities[2]	.315	.225	.021	.264	.185	.191
Students without disabilities[2]	.237	.256	.061	.262	.173	.015

Notes:

[1] National Assessment of Educational Progress, Long Term Trend test scores.

[2] National Assessment of Educational Progress, Long Term Trend test scores and estimated test scores prior to 2004 for students with and without disabilities.

Sources: U.S. Department of Education and U.S. Bureau of Labor Statistics.

As is done for the “all students” group, ratios of the reading and mathematics test scores to the perfect score are computed each year for the group of students with disabilities and, separately, the group of students without disabilities, in order to quality adjust the enrollment of students with disabilities and students without disabilities and obtain appropriate output measures. For example, the estimated public school enrollment of students with disabilities who are in grades K–4 is adjusted by using a simple average of the reading and mathematics test score ratios for students with disabilities at age 9. The resulting test score ratio is then multiplied by the public school enrollment of students with disabilities who are in grades K–4, yielding a quality-adjusted education output measure for students in those grades. The procedure is repeated for grades 5–8 and 9–12, with the estimated public school enrollment of students with disabilities who are in grades 5–8 and 9–12 adjusted by using simple averages of the reading and mathematics test score ratios for ages 13 and 17, respectively. The resulting test score ratios are then multiplied by the public school enrollment of students with disabilities who are in grades 5–8 and 9–12, respectively, to obtain quality-adjusted education output measures for students with disabilities who are in those grades.

Finally, the quality-adjusted enrollment data series for grades K–4, 5–8, and 9–12 are totaled to obtain a quality-adjusted elementary and secondary public school education output series for students with disabilities who are in grades K–12. A similar procedure is followed for students without disabilities, using LTT test scores for the group “students without disabilities” to obtain a quality-adjusted elementary and secondary public school education output series for students without disabilities who are in grades K–12.

Transportation services

Data on transportation services for “all students” include data on the number of students transported at public expense and data on public school transportation expenditures.[34] However, our third heterogeneous education output measure for students with and without disabilities, $Q^{DND}_{q,ST,RT,F}$ described in equation (8), requires estimates of

regular and special transportation services. Although all students without disabilities receive regular transportation services, only a portion of the population of students with disabilities receives special transportation services. Accordingly, data on the percentage of students who require special transportation, the per-pupil transportation expenditure for students who receive special transportation, and the per-pupil transportation expenditure for students who receive regular transportation are used to estimate separate transportation services for students with disabilities who require special transportation and for both students with disabilities and students without disabilities who require regular transportation.[35]

Special transportation services are estimated as

$$Q_{\mathrm{Spec\,T}} = (S^{D} \times T^{D}) \times (T^{D}_{\mathrm{Spec\,T}}), \quad (9)$$

where S^{D} is the number of students with disabilities who are in public schools, T^{D} is the percentage of students with disabilities who receive any transportation services (regular or special), and $T^{D}_{\mathrm{Spec\,T}}$ is the percentage of students with disabilities who receive transportation services and who require special transportation.

Transportation services for students who require regular transportation are estimated as the number of students without disabilities who receive regular transportation services plus the number of students with disabilities who receive regular transportation services. The number of students with disabilities who receive regular transportation services is estimated as

$$S^{D}_{\mathrm{Reg\,T}} = ((S^{D} \times T^{D}) \times T^{D}_{\mathrm{Reg\,T}}), \quad (10)$$

where S^{D} is the number of students with disabilities who are in public schools and $T^{D}_{\mathrm{Reg\,T}}$ is the percentage of students with disabilities who require regular transportation services. The number of students without disabilities who receive regular transportation services is estimated on the basis of the equation

$$\mathrm{TrExp} = P_{\mathrm{Spec\,T}} \times S^{D}_{\mathrm{Spec\,T}} + P_{\mathrm{Reg\,T}} \times (S^{\mathrm{ND}}_{\mathrm{Reg\,T}} + S^{D}_{\mathrm{Reg\,T}}), \quad (11)$$

where TrExp denotes transportation expenditures, $P_{\mathrm{Spec\,T}}$ is the per-pupil cost of special transportation in public schools, $P_{\mathrm{Reg\,T}}$ is the per-pupil cost of regular transportation in public schools, $S^{D}_{\mathrm{Spec\,T}}$ is the number of public school students with disabilities who require special transportation, $S^{\mathrm{ND}}_{\mathrm{Reg\,T}}$ is the number of public school students without disabilities who require regular transportation, and $S^{D}_{\mathrm{Reg\,T}}$is the number of public school students with disabilities who require regular transportation. Solving equation (11) for $S^{\mathrm{ND}}_{\mathrm{Reg\,T}}$ yields the number of students without disabilities who receive regular transportation services:

$$S^{\mathrm{ND}}_{\mathrm{Reg\,T}} = (((\mathrm{TrExp} - (P_{\mathrm{Spec\,T}} \times S^{D}_{\mathrm{Spec\,T}}))/P_{\mathrm{Reg\,T}}) - S^{D}_{\mathrm{Reg\,T}}). \quad (12)$$

The number of students who require regular transportation is then computed by summing the number of students with disabilities who require regular transportation and the number of students without disabilities who require regular transportation:

$$Q_{\mathrm{Reg\,T}} = S^{D}_{\mathrm{Reg\,T}} + S^{\mathrm{ND}}_{\mathrm{Reg\,T}}. \quad (13)$$

Food services

Data on food services include the number of lunches served and total expenditures for food services.[36] To construct the separate composite output measure $Q^{\mathrm{DND}}_{q,ST,RT,F}$[37] for students with and without disabilities,[38] I use the ratio of students with disabilities to all students and the ratio of students without disabilities to all students to

estimate the number of lunches served and expenditures on school lunches for, respectively, students with and students without disabilities. These ratios are then applied to school lunch data from the U.S. Department of Agriculture National School Lunch Program and the U.S. Department of Education to create separate estimates of the number of school lunches and the amount of expenditures for the two groups of students. While food services are assumed to be identical for students with and without disabilities, estimating the cost of food services provided to students with and without disabilities is necessary in order to construct separate expenditure weights for the various outputs, including educational services provided to students with and without disabilities, regular transportation services, and special transportation services.

Expenditures

I constructed expenditure share weights for each of the five individual output measures underlying the education output measure for students with and without disabilities.[39] For the purpose of constructing these weights, I use expenditures on educational services for students with disabilities to estimate a ratio of the average amount spent to educate a student with disabilities relative to the average amount spent to educate a student without disabilities.[40] For students with disabilities, special and regular transportation and food costs are subtracted from educational expenditures to calculate the expenditure weight for educational services. Expenditures for special transportation services for those students are calculated with the use of estimates of both the percentage of students with disabilities who require special transportation services and the higher cost of special transportation services.[41] Expenditures for regular transportation services for those students are estimated with the use of data on the percentage of students with disabilities who require regular transportation services and on expenditures for regular transportation services. Expenditures for food services are based on the same price per meal for students with and students without disabilities and are allocated to those two groups in proportion to their respective percentages within the public school student population.

Empirical results

Six alternative education output measures are presented. Three of the measures—Q^{A}, Q_{q}^{A}, and $Q_{q,ST,F}^{A}$—are based on all public school students, and the other three measures—Q^{DND}, Q_{q}^{DND}, and $Q_{q,ST,RT,F}^{DND}$—separately account for public school students with and without disabilities. Table 2 presents annual growth rates in enrollment of all students, students with disabilities, and students without disabilities in public elementary and secondary schools for 1981–2012. The annual growth rates in enrollment of public school students with and without disabilities tend to differ, correlating at a rate of just 0.67. During the 1990s, the high growth rates of public school students with disabilities relative to those without disabilities were the result of an overall increase in the growth rate of all public school students as well as large increases in the percentage of students identified as having specific learning disabilities.

Table 2. Annual growth rates (percent) in public school enrollment, grades pre-K–12, 1981–2012

Year	All students	Students with disabilities	Students without disabilities
1981	-2.039	-0.757	-2.183
1982	-1.195	.081	-1.341
1983	-.792	.473	-.939
1984	-.112	1.145	-.260

See footnotes at end of table.

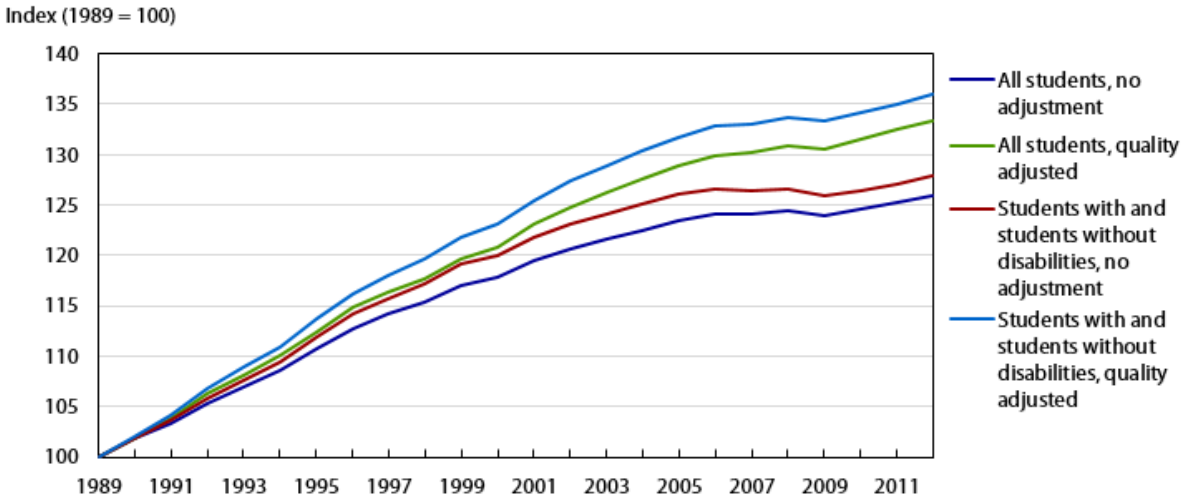
Table 2. Annual growth rates (percent) in public school enrollment, grades pre-K–12, 1981–2012

Year	All students	Students with disabilities	Students without disabilities
1985	.545	1.795	.396
1986	.840	2.078	.690
1987	.642	1.862	.492
1988	.451	1.655	.301
1989	.881	2.076	.730
1990	1.662	2.527	1.552
1991	2.014	3.504	1.822
1992	1.847	3.305	1.655
1993	1.498	3.571	1.222
1994	1.488	3.107	1.267
1995	1.653	3.632	1.378
1996	1.718	2.809	1.564
1997	1.131	3.019	.860
1998	.893	2.575	.646
1999	.685	2.230	.453
2000	.739	1.709	.592
2001	.992	1.773	.872
2002	1.072	1.811	.958
2003	.741	1.693	.592
2004	.526	1.300	.403
2005	.651	-.031	.760
2006	.412	-.458	.550
2007	-.047	-1.347	.157
2008	-.055	-1.726	.204
2009	.194	-.033	.228
2010	.250	-.695	.392
2011	.076	-.543	.168
2012	.504	.679	.478

Sources: U.S. Department of Education and U.S. Bureau of Labor Statistics.

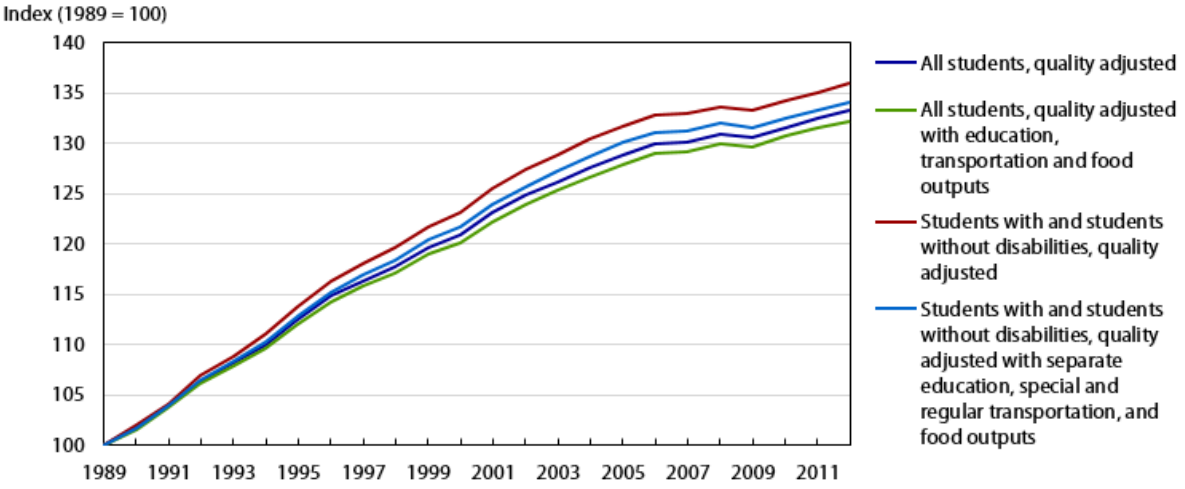
Students identified as having a disability under IDEA are categorized as having 1 of 13 types of disabilities. In 2009, the category into which most of these students (38 percent) fell was “students with a specific learning disability”[42]—a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations.[43] In 2005, public school students with disabilities saw their numbers fall, in part owing to a decline in the percentage of students identified with specific learning disabilities. Because 80 percent of students identified as having a learning disability are identified as such because they have difficulty learning to read, some experts attribute the decline in the number of public school students with disabilities to improvements in early reading intervention programs.[44] Others argue that states began formally identifying fewer students with specific learning disabilities in reaction to the imposition of penalties by “No Child Left Behind” legislation for the failure of significant student subgroups to improve their test scores. By identifying fewer students with specific learning disabilities, these states could avoid creating a statistically reliable subgroup.[45]

Figure 1. Output measures for all students and for students with and without disabilities: all services, 1989–2012



Source: U.S. Bureau of Labor Statistics.

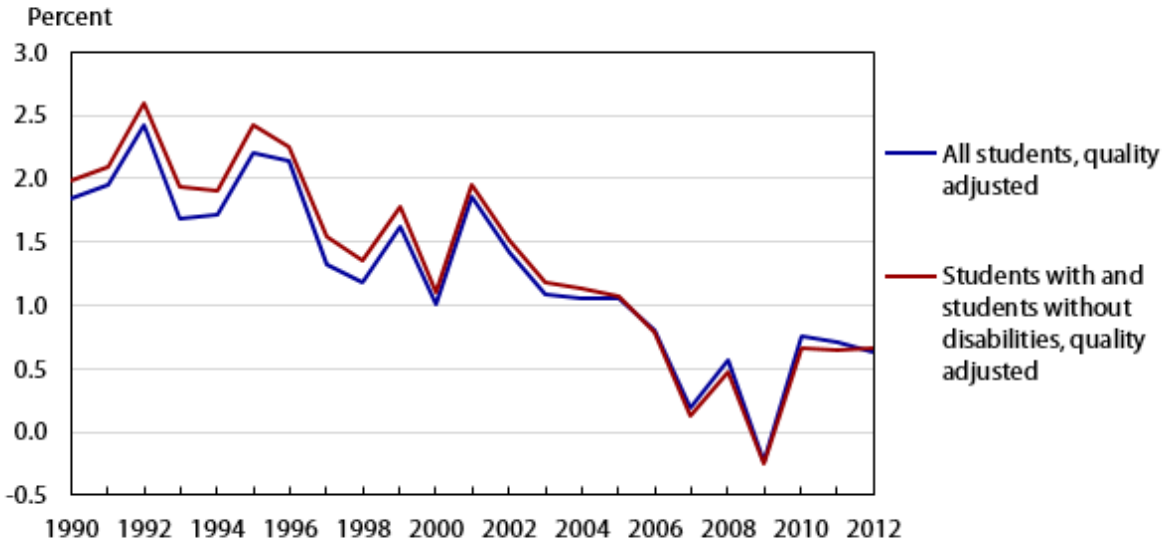
Figure 2. Output measures for all students and for students with and without disabilities, quality adjusted: all services; and education, special and regular transportation, and food services, 1989–2012



Source: U.S. Bureau of Labor Statistics.

The unadjusted homogeneous output measure for “all students” and the unadjusted heterogeneous output measure for students with and without disabilities for the 1989–2012 period fall below the respective quality-adjusted measures, as shown in figure 1. Explicitly accounting for differences in education between students with and without disabilities, on the one hand, and “all students,” on the other, results in somewhat higher output on both an unadjusted and a quality-adjusted basis. Separately accounting for education, special and regular transportation, and food services results in slightly reduced output levels, a minor impact, as shown in figure 2.

Figure 3. Output measure for all students and for students with and without disabilities, quality adjusted, 1990–2012 (annual growth rate)



Source: U.S. Bureau of Labor Statistics.

Measuring output by first constructing separate output measures for students with and without disabilities and then aggregating to total output with the use of expenditure weights captures the effects of variation in quality-adjusted outputs for those two categories of students over time. As shown in figure 3, quality-adjusted output based on the composite output measure for students with and students without disabilities, Q_q^{DND}, grew at a faster annual rate than the quality-adjusted "all students" output measure, Q_q^A, prior to 2005 and at a similar annual rate from 2005 to 2012.

For the 1989–2012 period, as shown in table 3, quality-adjusted output constructed by combining separate quality-adjusted output measures for students with and without disabilities and using expenditure share weights (Q_q^{DND}) grew more quickly than quality-adjusted output based on all students. For the subperiod 1990–2000, growth in this composite measure was above that of the "all students" measure, Q_q^A ; for 2000–07, the average annual growth rates were similar, and for 2007–12, the composite measure Q_q^{DND}grew slightly more slowly than the "all students" measure.

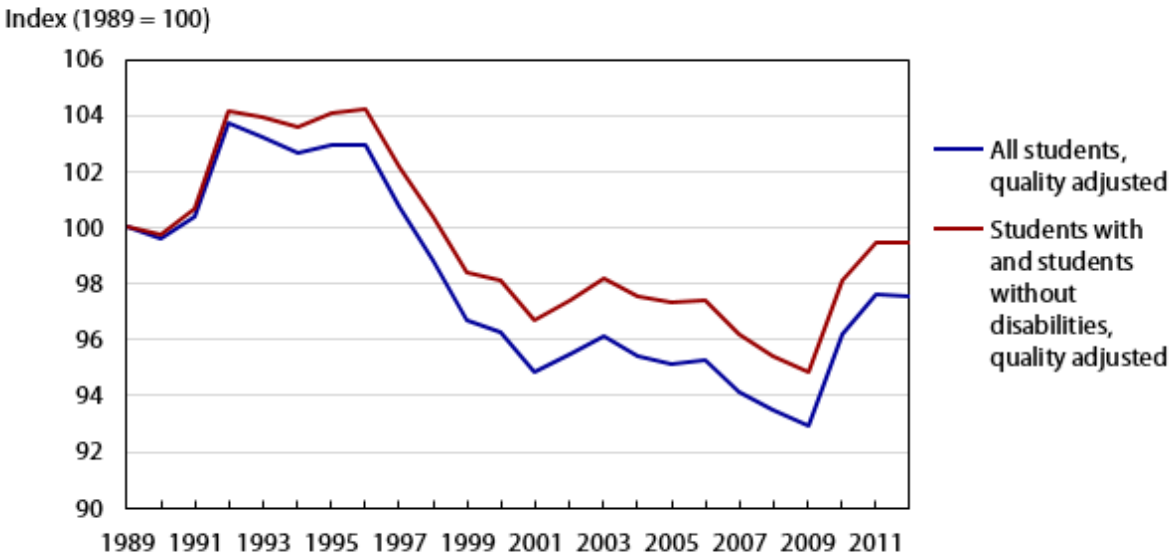
Table 3. Alternative output measures for elementary and secondary public school students, selected periods, 1989–2012 (annual average growth rates, in percent)

Period	All students			Students with and without disabilities, combined		
	Q^A (no quality adjustment)	Q_q^A (quality adjusted)	$Q_{q,T,F}^A$ (quality adjusted and separate education, transportation, and food services outputs)	Q^{DND} (no quality adjustment)	Q_q^{DND} (quality adjusted)	$Q_{q,ST,RT,F}^{DND}$ (quality adjusted and separate education, transportation, and food services outputs)
1989–2012	1.007	1.258	1.219	1.073	1.343	1.280
1990–2000	1.478	1.724	1.681	1.653	1.898	1.800
2000–07	.743	1.066	1.056	.748	1.109	1.097
2007–12	.288	.484	.455	.218	.440	.413

Source: U.S. Bureau of Labor Statistics.

As expected, the average annual growth rates of the quality-adjusted measures, Q_q^A and Q_q^{DND}, are greater than those of the unadjusted measures, Q^A and Q^{DND}. The average annual growth rates of the "all students" measure with explicit transportation and food services, $Q_{q,T,F}^A$, are slightly below, but still close to, those of the quality-adjusted "all students" measures, again illustrating that explicitly including total transportation and food services in the "all students" output measure is of limited value. Similarly, the average annual growth rate of $Q_{q,ST,RT,F}^{DND}$ is very close to the quality-adjusted measure for the composite output measure for students with and without disabilities, Q_q^{DND}. Accordingly, explicitly accounting for special and regular transportation services, as well as food services, with the measure $Q_{q,ST,RT,F}^{DND}$ has little impact.

Figure 4. Labor productivity based on output measure for all students and for students with and without disabilities, quality adjusted, 1989–2012



Source: U.S. Bureau of Labor Statistics.

Measures of labor productivity, defined as output per unit of labor input, for public elementary and secondary schools and based on the quality-adjusted "all students" output measure and the quality-adjusted composite output measure for students with and without disabilities are presented in figure 4.[46] Using the composite output measure for students with and without disabilities results in labor productivity indexes that are consistently greater than labor productivity based on the homogeneous "all students" output measure.

Labor productivity did not grow over the 1989–2012 period; in fact, it fell by –.024 percent, according to the composite output measure Q_q^{DND} for students with and without disabilities, and by –.108 for the "all students" output measure Q_q^A. For the subperiod 1989–2005, labor productivity based on the composite output measure dropped by –.171 percent, and the decline was even greater, –.310 percent, with the homogenous "all students" output measure. For the 2005–12 subperiod, labor productivity grew, by .312 percent on the basis of Q_q^{DND} and again by a greater .353 percent on the basis of Q_q^A. For the period 1990–2000, labor productivity decreased by –.17 percent by the composite output measure Q_q^{DND} and by –.34 percent by the "all students" measure. Over the 2000–07 subperiod, labor productivity similarly declined, by . –279 percent according to the measure Q_q^{DND} and, again, by a greater –.321 percent according to the Q_q^A measure. For the subperiod 2007–12, labor productivity grew, by .665 percent with the composite measure $Q_q^{DND}$and .71 percent with the "all students" output measure.

All these results suggest that it is important to include information on the diverse educational services provided to public elementary and secondary school students in the education output measure in order to generate a measure that reflects historical changes in the mix, cost, quality, and growth of these services over time. For both students with and students without disabilities, substantial differences in the education services provided and in the relative costs of those services exist. However, students with disabilities made up only 11–13 percent of all public school students over the 1990–2012 period. Accounting for diversity in education services and expenditures provided to other groups, such as English language learners, would capture additional changes in services over time. Improving national data, such as expenditure data, on education services for English language learners would

facilitate future analysis and improvements to the education output measure for public elementary and secondary schools.

SUGGESTED CITATION

Susan G. Powers, "Heterogeneous education output measures for public school students with and without disabilities," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, September 2016, https://doi.org/10.21916/mlr.2016.42.

NOTES

[1] Susan G. Powers and Steven Flint, “Labor productivity growth in elementary and secondary school services: 1989–2012,” *Monthly Labor Review*, June 2016, https://www.bls.gov/opub/mlr/2016/article/labor-productivity-growth-in-elementary-and-secondary-school-services.htm.

[2] See, for example, Barbara M. Fraumeni, Marshall B. Reinsdorf, Brooks B. Robinson, and Matthew P. Williams, “Price and real output measures for the education function of government: exploratory estimates for primary and secondary education,” NBER Working Paper No. 14099 (Cambridge, MA: National Bureau of Economic Research, June 2008), http://www.nber.org/papers/w14099. In this paper, the authors summarize alternative measures of public sector education output that have been used in the international community. Having developed their own experimental estimates of public school education output in the United States for comparison, they find that, although many countries have experimented with various quality adjustments to education output measures, those countries often adopt a simple output measure, such as number of students enrolled or number of pupil hours taught, as their official education output measure.

[3] The article focuses on public elementary and secondary schools because of the limited data available on private schools.

[4] See Susan G. Powers, “Measuring education output in elementary and secondary schools: first steps” (unpublished paper, December 8, 2011), which compares U.S. Census Bureau data on the enrollment of all students in public and private schools with NCES enrollment data in respect of constructing quality-adjusted measures of output in public and private elementary and secondary schools. This paper is available on request from the author.

[5] Private schools also may provide schooling for these groups. However, the majority of such students attend public schools.

[6] Examples of disabilities covered under the Individuals with Disabilities Education Act are mental retardation; hearing impairment; speech or language impairment; visual impairment; serious emotional disturbance; orthopedic impairment; autism; traumatic brain injury; other health impairments, including limited strength, vitality, or alertness due to chronic or acute health problems; specific learning disabilities; and multiple disabilities, such as deaf–blindness. (For further information, see “Building the legacy: IDEA 2004” (U.S. Department of Education), http://idea.ed.gov.)

[7] Rehabilitation Act of 1973, Pub. L. No. 93-112, September 26, 1973, https://archive.org/stream/publiclaw931129300unit#page/n1/mode/2up; Individuals with Disabilities Education Act Amendment of 1997, Pub. L. No. 108-446, December 3, 2004, https://www.congress.gov/108/plaws/publ446/PLAW-108publ446.pdf (based on the Education for All Handicapped Children Act, Pub. L. No. 94-142, November 29, 1975), https://www.govtrack.us/congress/bills/94/s6/text; and Americans with Disabilities Act, Pub. L. No. 101-336, July 26, 1990, https://www.congress.gov/bill/101st-congress/senate-bill/933/text/pp?q=%7B%22search%22%3A%5B%22americans+with+disabilities+act+1990%22%5D%7D&resultIndex=2.

[8] “English-language learners,” *Education Week*, August 4, 2004, updated June 16, 2011, http://www.edweek.org/ew/issues/english-language-learners.

[9] Elementary and Secondary Schools Act of 1965, Pub. L. No. 89-10, April 11, 1965, https://federaleducationpolicy.wordpress.com/2011/02/19/1965-elementary-and-secondary-education-act/; Every Student Succeeds Act, Pub. L. No. 114–95, December 10, 2015, https://www.congress.gov/114/plaws/publ95/PLAW-114publ95.pdf.

[10] *Basic Grants* provide funds to LEAs for which the number of schoolchildren counted in the formula is at least 10 and exceeds 2 percent of an LEA's school-age population. *Concentration Grants* flow to LEAs for which the number of schoolchildren counted in the formula exceeds 6,500, or 15 percent of the total school-age population. *Targeted Grants* are based on the same data used for Basic and Concentration Grants, except that the data are weighted so that LEAs with higher numbers or higher percentages of children from low-income families receive more funds. Targeted Grants flow to LEAs for which the number of schoolchildren counted in the formula (without application of the formula weights) is at least 10 and at least 5 percent of the LEA's school-age population. *Education Finance Incentive Grants* distribute funds to states on the basis of (1) factors that measure a state's effort to provide financial support for education compared with the state's relative wealth as measured by its per-capita income and (2) the degree to which education expenditures among LEAs within the state are equalized. (See "Programs: improving basic programs operated by local educational agencies: (Title I, Part A)" (U.S. Department of Education, Oct. 5, 2015), http://www2.ed.gov/programs/titleiparta/index.html.

[11] LEAs also must use Title I funds to provide academic enrichment services to eligible children enrolled in private schools. (For further information, visit the U.S. Department of Education's website, www.ed.gov.)

[12] See "National School Lunch Program (NLSP)" (U.S. Department of Agriculture, published daily), https://www.fns.usda.gov/nslp.

[13] Programs for English language learners receive both federal and state funding. Expenditure data on these programs are not available at a national level. Additional research to develop expenditure data for English language learners and low-income students may be undertaken in the future.

[14] *Digest of education statistics*, table 204.30, "Children 3 to 21 years old served under Individuals with Disabilities Education Act (IDEA), Part B, by type of disability: selected years, 1976–77 through 2013–14" (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2015), https://nces.ed.gov/programs/digest/d15/tables/dt15_204.30.asp.

[15] *Digest of education statistics*, table 204.60, "Percentage distribution of students 6 to 21 years old served under Individuals with Disabilities Education Act (IDEA), Part B, by educational environment and type of disability: selected years, fall 1989 through fall 2013" (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2015), https://nces.ed.gov/programs/digest/d15/tables/dt15_204.60.asp.

[16] See "English language learner students in U.S. public schools: 1994 and 2000," in *Issue brief*, NCES 2004–035 (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, August 2004), p. 1, http://nces.ed.gov/pubs2004/2004035.pdf; *Digest of education statistics*, table 204.20, "Number and percentage of public school students participating in programs for English language learners, by state: selected years, 2003–04 through 2013–14" (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2015), https://nces.ed.gov/programs/digest/d15/tables/dt15_204.20.asp; and Lauren Musu-Gillette, Jennifer Robinson, Xiaolei Wang, Amy Rathbun, Jijun Zhang, Sidney Wilkson-Flicker, Amy Barmer, and Erin Dunlop Velez, *The condition of education 2015*, NCES 2015-144 (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, May 2015), http://nces.ed.gov/pubs2015/2015144.pdf, especially p. 85.

[17] Data on NAEP Long-Term Trend test scores are used to quality adjust this measure.

[18] Enrollment data for public school students are obtained from the National Center for Education Statistics (NCES) of the U.S. Department of Education and consist of the number of enrolled public school students in grades K–12 as well as students who are ungraded.

[19] *Digest of education statistics*, table 236.90, "Students transported at public expense and current expenditures for transportation: selected years, 1929–30 through 2012–13" (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2015), https://nces.ed.gov/programs/digest/d15/tables/dt15_236.90.asp.

[20] School lunch data are obtained from the U.S. Department of Agriculture, National School Lunch Program.

[21] *National Public Education Financial Survey* (U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD)), https://nces.ed.gov/ccd/stfis.asp. Note that, for educational services, the expenditure share weight is calculated as total expenditures less expenditures for transportation and food services.

[22] U.S. Department of Education, *Digest of education statistics*, table 204.30.

[23] See *What are we spending on transportation services for students with disabilities, 1999-2000?* Report 3, Special Education Expenditure Project, prepared under the auspices of the U.S. Department of Education, Office of Special Programs (American Institutes for Research, Center for Special Education Finance, November 2002); M. T. Moore, E. W. Strang, M. Schwartz, and M. Braddock, *Patterns in special education service delivery and cost* (Washington, DC: Decision Resources Corp., 1988); and U.S. Department of Education, *National Public Education Financial Survey*.

[24] Data on the percentage of students served in 1989 under IDEA are obtained from the *Digest of education statistics*, table 52, "Children 3 to 21 years old served in federally supported programs for the disabled, by type of disability: selected years, 1976–77 to 2001–02" (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003), https://nces.ed.gov/programs/digest/d03/tables/dt052.asp; similar data for 1980 and 1990–2013 are obtained from U.S. Department of Education, *Digest of education statistics*, table 204.30. Data for the years 1981 through 1988 are interpolated.

[25] *Digest of education statistics* (National Center for Education Statistics, 2001 and 2010).

[26] The Main NAEP Assessments occur at grades 4, 8, and 12 every 2 years in various subjects. Mathematics assessment data for grades 4 and 8 are available for 1990, 1992, 1996, 2000, 2003, 2005, 2007, and 2009; data for grade 12 are available only for 2005 and 2009. Reading assessment data are available for 1992, 1994, 1998, 2000, 2002, 2004, 2005, 2007, and 2009. Other subjects assessed are the arts, civics, economics, foreign languages, geography, science, technology and engineering literacy, U.S. history, world history, and writing. However, the number of years of available assessment data for these additional subjects is limited.

[27] See "More about the NAEP Long-Term Trend Assessment," in *National Assessment of Educational Progress (NAEP)* (National Center for Education Statistics, June 25, 2013), http://nces.ed.gov/nationsreportcard/ltt/moreabout.asp.

[28] NCES and the National Assessment Governing Board have established participation rate standards that states and jurisdictions are required to meet in order to have their results published. The weighted participation rate for the initial school sample must be greater than or equal to 85 percent for results to be published. Prior to 2003, the requirement was 70 percent. For further information on participation rate requirements, see "Participation rate requirements," in *National Assessment of Educational Progress (NAEP)* (National Center for Education Statistics, September 3, 2012), http://nces.ed.gov/nationsreportcard/about/participrates.asp.

[29] See "About national NAEP," in *National Assessment of Educational Progress (NAEP)* (National Center for Education Statistics, December 30, 2009), https://nces.ed.gov/nationsreportcard/about/.

[30] See U.S. Department of Education, "More about the NAEP Long-Term Trend Assessment."

[31] Individuals with Disabilities Education Improvement Act of 2004, Pub. L. No. 108-446, December 3, 2004, https://www.congress.gov/108/plaws/publ446/PLAW-108publ446.pdf.

[32] *NAEP 2004 trends in academic progress: three decades of student performance in reading and mathematics*, NCES 2005-464 (National Center for Education Statistics, July 2005), http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005464, especially p. 103. (See also "Inclusion of special-needs students," in *National Assessment of Educational Progress (NAEP)* (National Center for Education Statistics, July 7, 2014), http://nces.ed.gov/nationsreportcard/about/inclusion.asp.

[33] NAEP LTT test scores of only students with disabilities and of only students without disabilities in public and private schools combined are used in these estimates because the representative sample of schools does not allow for separate publication of test scores of the two groups of students for public schools versus private schools. For the categories "students with disabilities" and "students without disabilities," the test scores drawn from all public and private schools combined are typically slightly higher than those for public schools only.

[34] Data on the number of students transported are obtained from the following publications from the U.S. Department of Education, National Center for Education Statistics: *Statistics of state school systems*, 1929–30 through 1975–76, and *Revenues and expenditures for public elementary and secondary education*, 1977–78 and 1979–80; and from the following sources: Common Core of Data (CCD), *National Public Education Financial Survey*, 1987–88 through 2007–08; Bobit Publishing Co., "School transportation: 2000–2001 school year," in *School bus fleet,* and *2010 fact book*; and "K–12 enrollment/transportation data," in *School transportation*

news, 2001–02 through 2007–08; and unpublished data. Data on transportation expenditures are obtained from Common Core of Data (CCD), *National Public Education Financial Survey*, as published in the *Digest of education statistics*.

[35] Data on the percentage of students with disabilities who receive special transportation are obtained from *What are we spending on transportation services for students with disabilities, 1999–2000*?, Report 3 (U.S. Department of Education, Office of Special Education Programs, November 2002); and from Moore, Strang, Schwartz, and Braddock, *Patterns in special education*. Both studies provide data on the percentage of students with disabilities who received special transportation in 1985 and 1999. This percentage is interpolated for 1986 through 1998 on the basis of the data for 1985 and 1989, respectively, and is held constant for 2000–07.

[36] Data on food services are obtained from the U.S. Department of Agriculture National School Lunch Program and the U.S. Department of Education. Data on total expenditures for food services are obtained from Common Core of Data (CCD), *National Public Education Financial Survey*, as published in the *Digest of education statistics*.

[37] See equation (8).

[38] The output measure $Q^{DND}_{q,ST,RT,F}$ is composed of quality-adjusted output of students with disabilities, quality-adjusted output of students without disabilities, regular transportation services, special transportation services, and food services, and is constructed with the use of expenditure share weights for each type of output.

[39] I used data from Common Core of Data (CCD), *National Public Education Financial Survey*; Moore, Strang, Schwartz, and Braddock, *Patterns in special education*; and U.S. Department of Education, *What are we spending?*.

[40] *Total expenditures for students with disabilities, 1999–2000: spending variation by disability*, Report 5, study prepared under the auspices of the U.S. Department of Education, Office of Special Education Programs (American Institutes for Research, Center for Special Education Finance, June 2003).

[41] Data on the per-pupil cost of providing special education transportation services for 1985 and 1999 are obtained from Moore, Strang, Schwartz, and Braddock, *Patterns in special education*, and U.S. Department of Education, *What are we spending?*. The per-pupil cost of special education transportation services is obtained by interpolation for 1986–98 and held at the 1999 value for 2000–07.

[42] "Christina A. Samuels, "Boom in learning disabled enrollment ends," *Education Week*, vol. 30, no. 3, September 15, 2010.

[43] Ibid.

[44] Ibid.

[45] See Candace Cortiella, *The state of learning disabilities* (New York: National Center for Learning Disabilities, 2011).

[46] Data on labor input for public elementary and secondary schools are obtained from the U.S. Bureau of Labor Statistics.

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Explaining changes in educational attainment over time

Lawrence H. Leith

At least since the 1970s, researchers have been documenting the close connection between educational attainment and labor market outcomes. In general, people with more education do better in today's high-tech economy than those with less education. More specifically, people with at least a bachelor's degree are among the highest paid workers in the labor force and are less likely to be unemployed than people with less education. According to the U.S. Bureau of Labor Statistics, among workers age 25 and older, median weekly earnings for those with at least a bachelor's degree were $1,249 per week in the second quarter of 2016, compared with $690 per week for those with a high school diploma (no further schooling). Similarly, the unemployment rate for college graduates was 2.5 percent in July 2016, compared with 5.0 percent for high school graduates with no further schooling. Since World War II, the number of people who have at least a 4-year college degree has increased dramatically. Data from the U.S. Census Bureau show that in 1940, just under 5 percent of the population 25 years and older had bachelor's degrees. By 1990, that figure was just over 21 percent, and in 2015 it had reached nearly a third (33 percent). In a recent article titled "Explaining the evolution of educational attainment in the United States" (*American Economic Journal: Macroeconomics*, July 2016), economists Rui Castro and Daniele Coen-Pirani examine some of the changes in education levels over the last several decades and reach some interesting conclusions.

The authors focus their study on single-year birth cohorts for the white male population born from 1932 to 1972. They employ a human capital investment model that accounts for changes over time in "skill prices," tuition costs, education quality, and heterogeneous learning ability. To calibrate average learning ability for each birth-year cohort, Castro and Coen-Pirani use data from the Congressional Budget Office on standardized test scores for U.S. elementary and secondary school students from the relevant periods. To measure educational attainment, the authors use data from the Current Population Survey (1964–2010) and the 1950 and 1960 censuses. One of the novel features of this study, and a crucial aspect of the authors' analysis, is its inter-cohort comparisons. For example, the 1932–48 cohorts experienced a cumulative increase in their college-graduation rates of more than 14 percentage points. For those born in the years 1949 through 1960, however, the rates actually declined by 10 percentage points. College-graduation rates began to increase again for the 1961–72 cohorts, but the rate for the 1972 cohort remains 3 percentage points lower than the rate for the 1948 cohort. The authors try to explain these trends in their study.

The authors' model uses static expectations, which means that it relies on current skill premiums for future expectations. People deciding whether to attend college in the 1960s were largely unaware that the returns to college-educated workers would decline in the 1970s. As a result, static expectations helped generate the increase in college-graduation rates during the early period, when skill prices were high. They also help explain the decline

in college attainment during the 1970s, when skill prices were lower, as well as the gradual recovery in the 1980s, when they began to increase again.

One of the more striking findings of the study is the relative decline in learning ability, as measured by standardized test scores, beginning with people born in the late 1940s and continuing through those born in the mid-1960s, especially those born during the 1953–63 period. The data from the Congressional Budget Office show a marked decline in scores on the eighth-grade Iowa Test of Basic Skills beginning with the 1953 birth cohort and ending with the 1963 cohort. According to the authors' quantitative model, increasing labor market returns for college graduates during the 1950s and 1960s explain nearly two-thirds of the increase in college-graduation rates for the 1932–48 cohorts. But such “skill prices” do not explain the stagnation in the rates for the later cohorts. Instead, the authors attribute roughly half of the stagnation to increases in college tuition and half to lower learning ability. To illustrate the latter point, Castro and Coen-Pirani assert that the college-graduation rate for the 1972 cohort would have been 2.5 percentage points higher if average learning ability had stayed constant at the level of the 1953 cohort. Further, the authors claim that the decrease in learning ability is “the single-most important factor” in the decline in graduation rates for the 1948–60 cohorts. They suggest that decreased learning ability might also be the primary factor in the relative slowdown in college attainment over the last several decades, as well as in the stagnation in high school graduation rates during that same period. In sum, Castro and Coen-Pirani demonstrate that variations in educational attainment among the different cohorts can be attributed to changes in skill prices, tuition costs, and the quality of education over time, as well as to differences in average learning ability between the cohorts.

Monthly Labor Review

BLS

September 2016

Labor force participation: what has happened since the peak?

The labor force participation rate is the percentage of the civilian noninstitutional population 16 years and older that is working or actively looking for work. It is an important labor market measure because it represents the relative amount of labor resources available for the production of goods and services. After rising for more than three decades, the overall labor force participation rate peaked in early 2000 and subsequently trended down. In recent years, the movement of the baby-boom population into age groups that generally exhibit low labor force participation has contributed to the decline in the overall participation rate. From 2000 to 2015, most of the major demographic groups saw a decrease in labor force participation. Teenagers experienced the largest drop in participation, which coincided with a rise in their school enrollment rate. Young adults 20 to 24 years also showed a decline in labor force participation, but the decrease was not as steep as that for teenagers. The labor force participation rate of women 25 to 54 years also fell, with the decrease more pronounced for women who did not attend college. The labor force participation rate of men 25 to 54 years continued its long-term decline. As in the past, the decrease in participation among men with less education was greater than that of men with more education. However, labor force participation rates of men and women 55 years and older rose from 2000 to 2009 and subsequently leveled off.

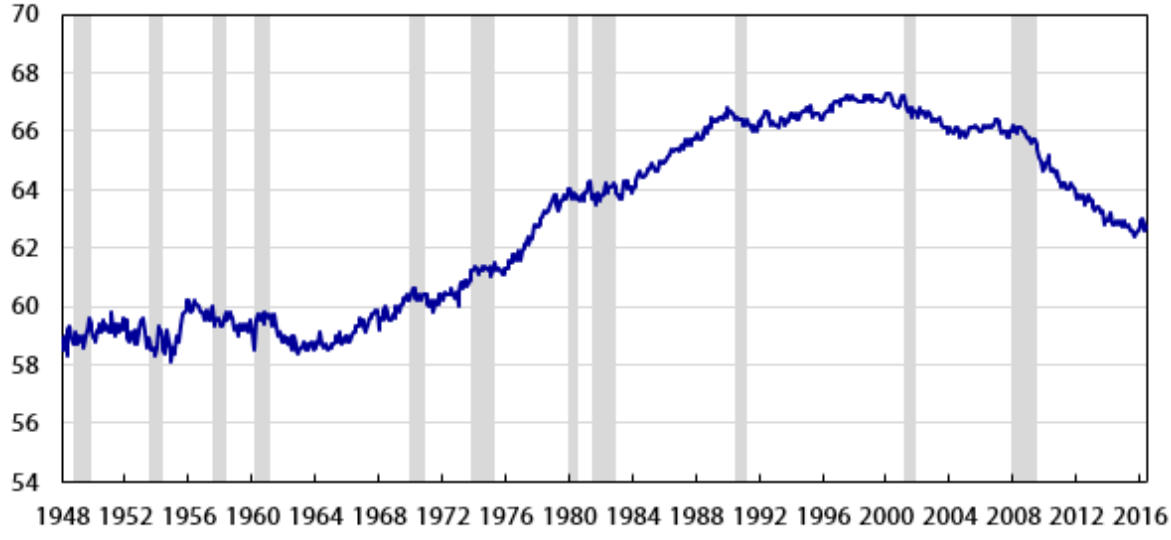
Steven F. Hipple
hipple.steve@bls.gov

Steven F. Hipple is an economist in the Office of Employment and Unemployment Statistics, U.S. Bureau of Labor Statistics.

The labor force participation rate is the proportion of the working-age population that is either working or actively looking for work.[1] This rate is an important labor market measure because it represents the relative amount of labor resources available for the production of goods and services. Though subject to some cyclical influences, labor force participation is primarily affected by longer-term structural changes.[2] These might include changes in the age composition of the population, school enrollment and educational attainment, employer-provided pensions, or Social Security benefits.

After trending up for more than three decades, the labor force participation rate peaked at 67.3 percent in early 2000. Over the next few years, the rate receded to about 66 percent and stayed at that level through 2008. The participation rate then dropped again, and by mid-2016, it stood at 62.7 percent. (See figure 1.)

Figure 1. Labor force participation rate, 16 years and older, seasonally adjusted, 1948–2016



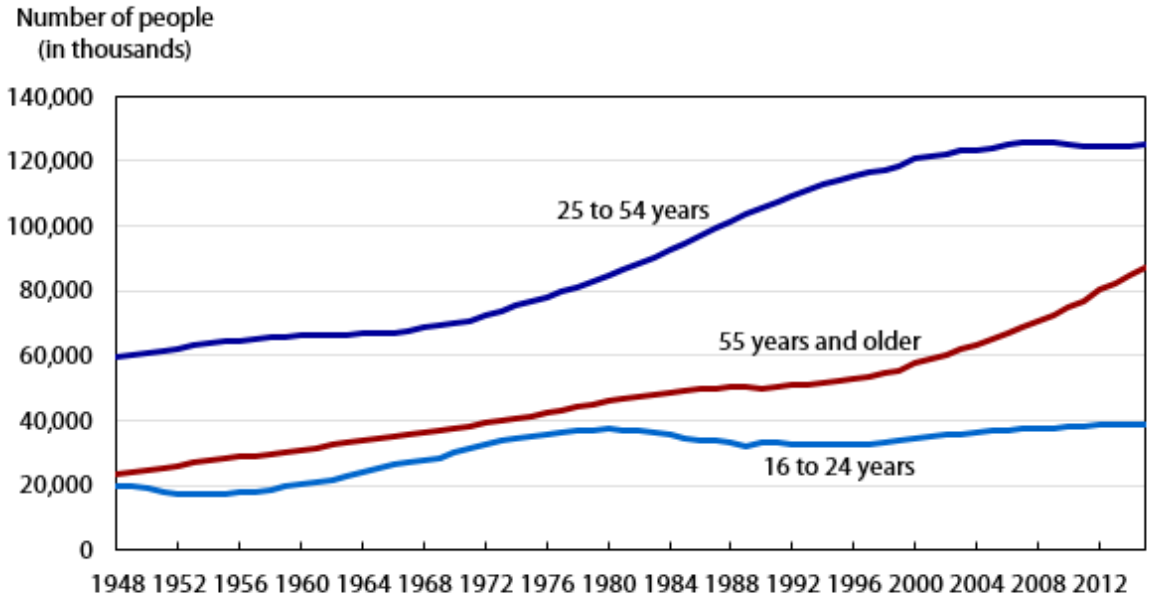
Note: Shaded areas represent recessions as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics, Current Population Survey.

This article describes historical trends in labor force participation on the basis of estimates from the Current Population Survey (CPS), and it focuses on the participation rate since its peak in 2000. It examines changes in labor force participation among major demographic groups and discusses possible reasons for these changes.

Change in the age profile of the population

The age distribution of the population can strongly influence overall labor force participation. Figure 2 shows the change in the civilian noninstitutional population by major age group since 1948. For seven decades, the aging of the baby-boom generation—people born between 1946 and 1964—has profoundly affected the population's size and composition. For example, the population 16–24 years increased from 21.5 million in 1962 to 36.7 million in 1978. From 1971 to 2000, the large population cohort 25–54 years grew from 70.9 million to 120.7 million. After the oldest baby boomers turned 55 in 2001, the population 55 years and older rose from 58.7 million in 2001 to 87.1 million in 2015.

Figure 2. Civilian noninstitutional population (total), by age, annual averages, 1948–2015



Source: U.S. Bureau of Labor Statistics, Current Population Survey.

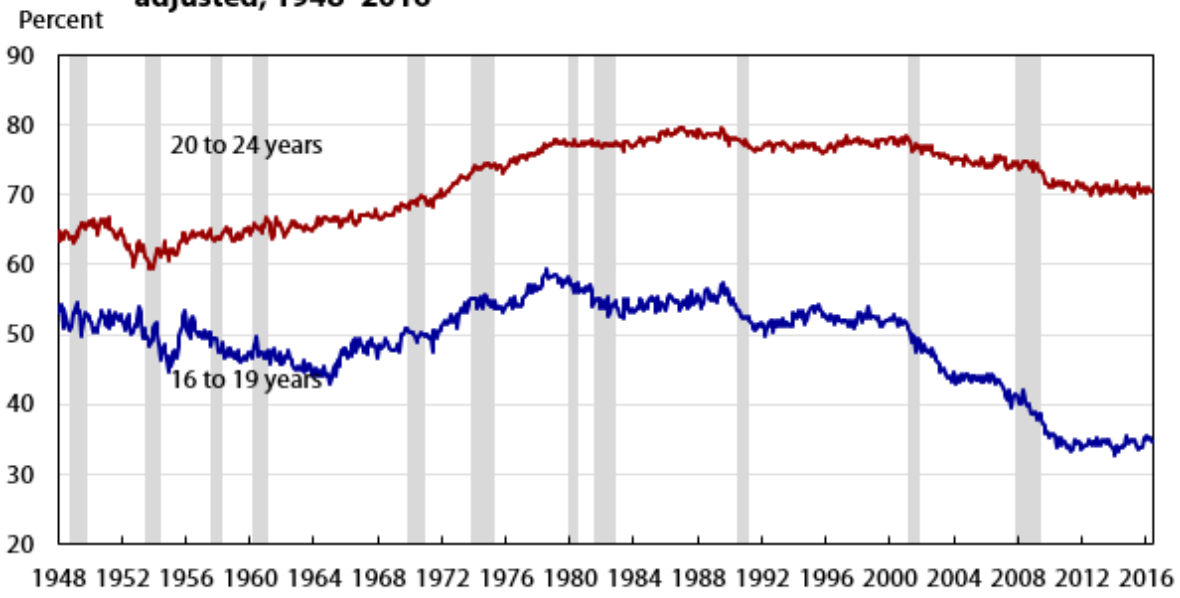
After remaining in a range of about 58–60 percent during the 1950s and 1960s, the total labor force participation rate increased rapidly during the 1970s and 1980s. (See figure 1.) In the 1970s and 1980s, baby boomers entered the age cohorts of 25–34 years and 35–44 years, which typically have very high levels of labor force participation. In recent years, the baby-boom generation has moved into the 55-years-and-older age group, which traditionally has had a lower participation rate. As just mentioned, the oldest baby boomers—those born in 1946—reached age 55 in 2001. In 2001, people 55 years and older made up 27 percent of the total population; by 2015, they composed 35 percent.[3] The aging of the population has put downward pressure on the overall labor force participation rate.

Labor force participation of selected demographic groups

Teenagers

The labor force participation rate of teenagers 16–19 years peaked in the late 1970s and then began a downward trend. (See figure 3.) The participation rate of teenagers fell from 52.0 percent in 2000 to 34.1 percent in 2011 and stayed near that level through 2015.[4] This decrease far exceeded the decline in the rates of other major age groups during this period.

Figure 3. Labor force participation rates of selected age groups, seasonally adjusted, 1948–2016



Note: Shaded areas represent recessions as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics, Current Population Survey.

From 2000 to 2015, the labor force participation rate of teenagers varied considerably by race and ethnicity. (See table 1.) In 2000, the participation rate ranged from 35.8 percent for Asian teenagers to 55.5 percent for White teenagers. Between 2000 and 2015, the participation rate of teenagers in each of the four major race and ethnicity groups fell sharply, with 2015 rates ranging from 20.6 percent for Asian teenagers to 36.4 percent for White teenagers. The decline in teenage labor force participation during this period coincided with a rise in the school enrollment rate—that is, the proportion of the population enrolled in school.

Table 1. Labor force participation rates of selected groups, by race and Hispanic or Latino ethnicity, annual averages, 2000 and 2015

Group	2000	2015	Change, 2000–15
Total, 16 to 19 years			
Total	52.0	34.3	–17.7
White	55.5	36.4	–19.1
Black or African American	39.4	28.1	–11.3
Asian	35.8	20.6	–15.2
Hispanic or Latino	46.3	30.9	–15.4
Total, 20 to 24 years			
Total	77.8	70.7	–7.1
White	79.9	72.7	–7.2
Black or African American	71.8	68.2	–3.6
Asian	63.0	52.8	–10.2
Hispanic or Latino	78.2	71.6	–6.6
Men, 25 to 54 years			
Total	91.6	88.3	–3.3
White	92.7	89.5	–3.2

See footnotes at end of table.

Table 1. Labor force participation rates of selected groups, by race and Hispanic or Latino ethnicity, annual averages, 2000 and 2015

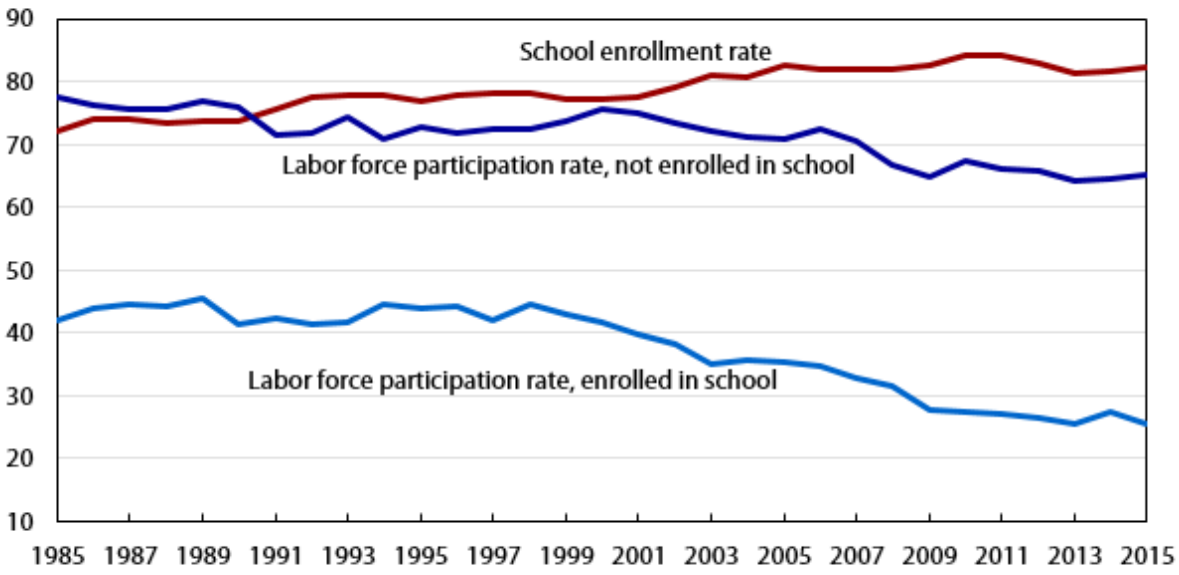
Group	2000	2015	Change, 2000–15
Black or African American	84.4	80.9	–3.5
Asian	91.7	89.2	–2.5
Hispanic or Latino	92.5	90.8	–1.7
Women, 25 to 54 years			
Total	76.7	73.7	–3.0
White	76.8	73.9	–2.9
Black or African American	78.9	76.5	–2.4
Asian	71.3	67.8	–3.5
Hispanic or Latino	67.6	66.3	–1.3
Men, 55 years and older			
Total	40.1	45.9	5.8
White	40.3	46.4	6.1
Black or African American	36.0	39.9	3.9
Asian	46.6	50.6	4.0
Hispanic or Latino	45.2	51.2	6.0
Women, 55 years and older			
Total	26.1	34.7	8.6
White	25.9	34.5	8.6
Black or African American	27.0	34.7	7.7
Asian	29.2	37.6	8.4
Hispanic or Latino	24.0	33.3	9.3

Note: Persons whose ethnicity is identified as Hispanic or Latino may be of any race.

Source: U.S. Bureau of Labor Statistics, Current Population Survey.

Between 2000 and 2015, the school enrollment rate of teenagers increased from 77.2 percent to 82.3 percent.[5] (See figure 4.) The rising school enrollment rate among teenagers could have contributed to their falling labor force participation rate, because those enrolled in school are much less likely to participate in the labor force. From 2000 to 2015, the labor force participation rate of teenagers enrolled in school fell from 41.8 percent to 25.5 percent.

Figure 4. School enrollment rate and labor force participation rates by school enrollment status of people 16 to 19 years of age, 1985–2015



Note: Data for each year are from the October monthly Current Population Survey.
Source: U.S. Bureau of Labor Statistics, Current Population Survey.

A recent study examined data on the self-reported reasons that people who were not in the labor force did not work.[6] Among teenagers, the most often cited reason for not working was school attendance. Researchers have suggested that, among youth enrolled in school, part of the drop in labor force participation might be due to a rise in educational intensity, such as an increase in time devoted to schoolwork or other extracurricular activities.[7]

Teenagers who are not enrolled in school are generally more likely to participate in the labor force than teenagers who are enrolled in school. However, the labor force participation rate of out-of-school teenagers also fell, from 75.7 percent in 2000 to 65.3 percent in 2015. (See figure 4.) For some teenagers, work might have become less desirable because of, for example, stagnant wages: over the 2000–15 period, inflation-adjusted hourly earnings for teenagers were flat. Researchers have suggested that not-enrolled teenagers might face competition for jobs (in retail trade and food services, for example) from less-skilled adult workers.[8]

Adults 20–24 years

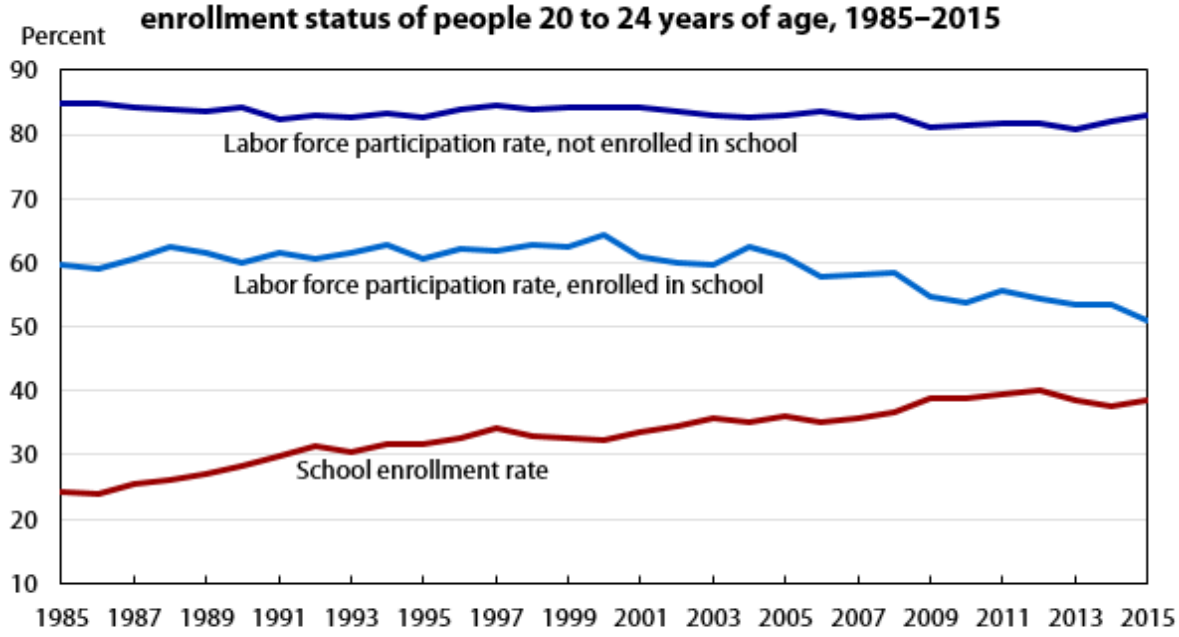
Adults 20–24 years are more likely than teenagers to participate in the labor force. The labor force participation rate of adults 20–24 years peaked around 79 percent in the late 1980s. (See figure 3.) After declining during the early 1990s, the rate then remained relatively flat for several years. Although labor force participation among young adults fell between 2000 and 2015, the decline was less steep than that of teenagers. From 2000 to 2015, the participation rate of young adults fell by 7.1 percentage points, compared with a drop of 17.7 percentage points among teenagers.[9]

Among young adults in 2000, the participation rate was lowest for Asians (63.0 percent) and highest for Whites (79.9 percent). (Labor force participation rates of the four major race and ethnicity groups showed a similar ranking in 2015.) From 2000 to 2015, the participation rate of young adults declined in each of the four major race and ethnicity groups; the drop was largest (–10.2 percentage points) among Asians. (See table 1.)

Although school enrollment rates of teenagers and young adults have increased substantially over the past several decades, enrollment rates of young adults have remained lower than the rates of teenagers because many young adults have completed their formal education. As figures 4 and 5 show, only 38.5 percent of young adults were enrolled in school in 2015, compared with 82.3 percent of teenagers.

As was the case with teenagers, the labor force participation rate of young adults enrolled in school was lower than that of young adults who were not in school. The labor force participation rate for both groups fell between 2000 and 2015. The labor force participation rate of young adults enrolled in school fell from 64.2 percent in 2000 to 51.0 percent in 2015, whereas the participation rate of young adults not enrolled in school edged down from 84.3 percent in 2000 to 83.0 percent in 2015. (See figure 5.) During the same period, the proportion of young adults enrolled in school rose from 32.2 percent to 38.5 percent.

Figure 5. School enrollment rate and labor force participation rates by school enrollment status of people 20 to 24 years of age, 1985–2015



Note: Data for each year are from the October monthly Current Population Survey.
Source: U.S. Bureau of Labor Statistics, Current Population Survey.

Of young adults who were neither enrolled in school nor participated in the labor force in 2015, 61 percent were women and 20 percent had less than a high school diploma. The labor force participation rate of young women not enrolled in school and with less than a high school diploma was only 52.6 percent, or 23.7 percentage points lower than the rate for their male counterparts. (See table 2.) The lower participation rate of young women could reflect that some were caring for young children. In 2015, 49 percent of women 20–24 years who were not enrolled in school and had less than a high school diploma were mothers, and 24 percent of women in this age group who were not enrolled in school and had a high school diploma or more were mothers. In 2015, only 7 percent of women 20–24 years enrolled in school were mothers.

Between 2000 and 2015, individuals with less education generally had the largest declines in labor force participation. At all levels of educational attainment, the labor force participation rate of young men who were not enrolled in school was higher than that of their female counterparts. (See table 2.) The gap in participation rates between young men and women narrowed at higher levels of educational attainment. Among people with at least a

bachelor's degree who were not enrolled in school in 2015, young women had a labor force participation rate of 90.7 percent, compared with 93.4 percent for their male counterparts.

Table 2. Labor force participation rates of people ages 20 to 24 years not enrolled in school, by gender and educational attainment, annual averages, 2000 and 2015

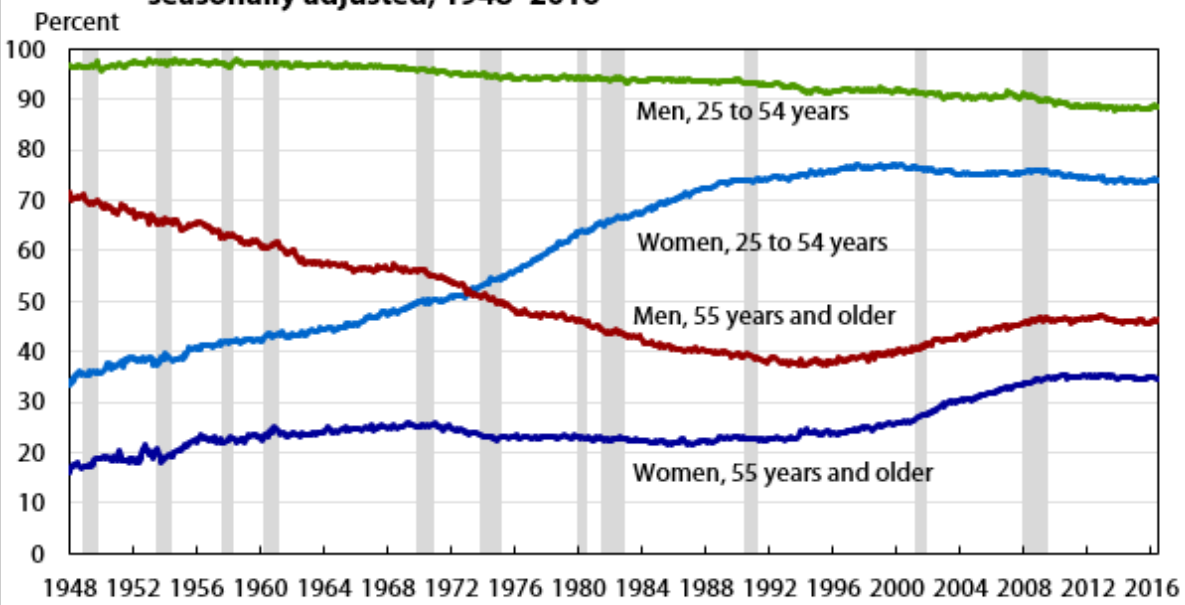
Characteristic	2000	2015	Change, 2000–15
Men			
Total, 20 to 24 years	91.2	86.1	–5.1
Less than a high school diploma	86.7	76.3	–10.4
High school graduates, no college	91.0	84.7	–6.3
Some college, no degree	92.8	87.1	–5.7
Associate's degree	97.4	92.2	–5.2
Bachelor's degree and higher	95.6	93.4	–2.2
Women			
Total, 20 to 24 years	77.4	77.3	–.1
Less than a high school diploma	53.3	52.6	–.7
High school graduates, no college	77.2	72.6	–4.6
Some college, no degree	84.1	80.0	–4.1
Associate's degree	88.0	84.9	–3.1
Bachelor's degree and higher	90.1	90.7	.6

Source: U.S. Bureau of Labor Statistics, Current Population Survey.

Women 25–54 years

The participation rate of women 25–54 years increased throughout the second half of the 20th century, although the pace of the increase varied over time. (See figure 6.) The most rapid rise in women's labor force participation occurred during the 1970s and 1980s. The participation rate of women 25–54 years peaked at 76.8 percent in 1999. Subsequently, the participation rate receded slightly and flattened at 75.5 percent from 2003 to 2009. It then declined to 73.7 percent in 2015, still above the rate in the 1970s and 1980s.

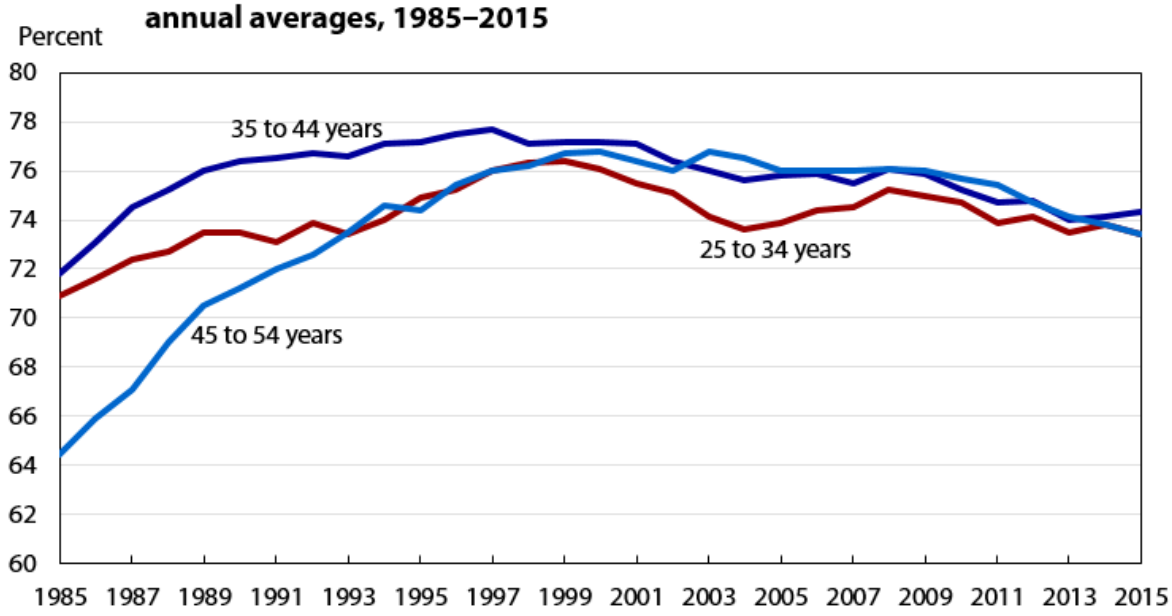
Figure 6. Labor force participation rates of selected age and gender groups, seasonally adjusted, 1948–2016



Note: Shaded areas represent recessions as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics, Current Population Survey.

In 1985, the participation rate of women 45–54 years was much lower than the rates of women 25–34 years and 35–44 years; by 2015, participation rates among the three age groups were similar. (See figure 7.) Between 2000 and 2015, the participation rate of each 10-year age group fell, and the 45- to 54-year age group experienced a slightly larger decline (–3.4 percentage points) than the groups 25–34 years and 35–44 years (–2.7 percentage points and –2.9 percentage points, respectively).

Figure 7. Labor force participation rates of women in selected 10-year age groups, annual averages, 1985–2015



Source: U.S. Bureau of Labor Statistics, Current Population Survey.

Between 2000 and 2015, the labor force participation rate of women 25–54 years varied by race and ethnicity. (See table 1.) In 2000, the participation rate ranged from 67.6 percent for Hispanic women to 78.9 percent for Black women. From 2000 to 2015, the labor force participation rate of women in each of the four major race and ethnicity groups declined. The drop in labor force participation was steepest for Asian women (–3.5 percentage points). In 2015, the participation rate ranged from 66.3 percent for Hispanic women to 76.5 percent for Black women.

From 2000 to 2015, the labor force participation rate of women was higher among those with more education. (See table 3.) During this period, the decline in labor force participation was most pronounced for women with less than a high school diploma (–7.1 percentage points) and for those with a high school diploma and no college (–7.9 percentage points). The participation rate of women with at least a bachelor's degree changed little (–0.6 percentage point) over the 2000–15 period. In 2015, among women 25–54 years, the participation rate ranged from 49.1 percent for those with less than a high school diploma to 82.3 percent for those with at least a bachelor's degree.

Table 3. Labor force participation rates of people ages 25 to 54 years, by gender and educational attainment, annual averages, selected years, 1995–2015

Gender by year	Less than a high school diploma	High school graduates, no college	Some college, no degree	Associate's degree	Bachelor's degree and higher
Men					
1995	79.5	91.2	92.3	94.8	96.1
2000	82.1	90.7	91.9	93.9	95.8
2005	82.0	89.1	90.6	93.2	94.9
2006	82.7	89.0	90.7	93.0	95.0
2007	82.7	89.1	91.0	93.3	95.4
2008	82.3	88.7	90.4	93.1	95.2
2009	81.2	87.6	89.4	92.2	95.1
2010	81.0	87.1	88.6	92.0	94.5
2011	80.6	86.1	87.5	91.1	94.5
2012	79.3	86.0	87.7	91.5	94.5
2013	79.3	85.4	87.5	91.4	94.2
2014	79.6	85.0	86.8	91.0	94.1
2015	79.5	84.8	87.3	91.6	93.9
Change					
1995–2000	2.6	–.5	–.4	–.9	–.3
1995–2015	0.0	–6.4	–5.0	–3.2	–2.2
2000–15	–2.6	–5.9	–4.6	–2.3	–1.9
Women					
1995	50.9	74.0	78.5	83.1	84.6
2000	56.2	74.9	78.8	83.3	82.9
2005	53.1	72.5	76.7	82.6	82.2
2006	53.0	72.7	76.9	82.1	82.5
2007	52.4	72.1	77.0	82.7	82.2
2008	52.0	72.2	77.2	82.8	83.0

See footnotes at end of table.

Table 3. Labor force participation rates of people ages 25 to 54 years, by gender and educational attainment, annual averages, selected years, 1995–2015

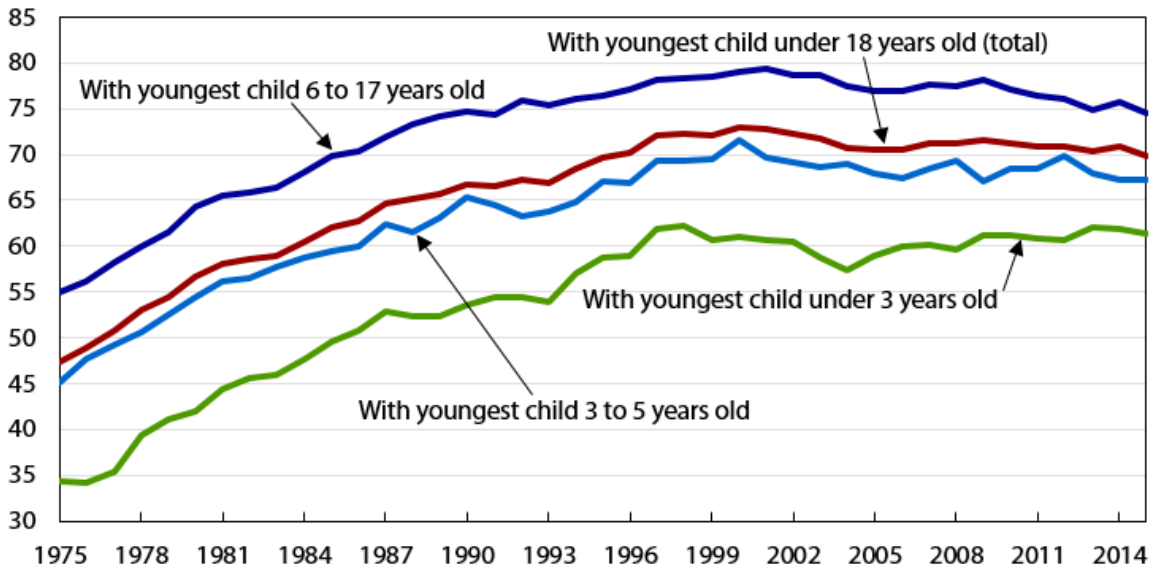
Gender by year	Less than a high school diploma	High school graduates, no college	Some college, no degree	Associate's degree	Bachelor's degree and higher
2009	52.7	71.7	76.2	82.6	83.2
2010	52.2	71.5	75.8	81.6	82.6
2011	51.6	70.2	74.8	81.6	82.3
2012	51.7	69.3	73.9	81.4	82.6
2013	49.9	68.4	73.0	80.0	82.4
2014	49.3	68.2	73.4	79.6	82.4
2015	49.1	67.0	73.4	79.6	82.3
Change					
1995–2000	5.3	.9	.3	.2	–1.7
1995–2015	–1.8	–7.0	–5.1	–3.5	–2.3
2000–15	–7.1	–7.9	–5.4	–3.7	–.6

Source: U.S. Bureau of Labor Statistics, Current Population Survey.

Mothers whose youngest child was under 18 years old

As figure 8 shows, the labor force participation rate of mothers whose youngest child was under 18 years old increased steadily during the 1970s and 1980s. This steady increase contributed to the rise in women's overall participation during this period. Although the 1990s saw small gains, the labor force participation rate of mothers whose youngest child was under 18 years old peaked at 72.9 percent in 2000 and subsequently receded.

Figure 8. Labor force participation rates of mothers, by age of youngest child, 1975–2015

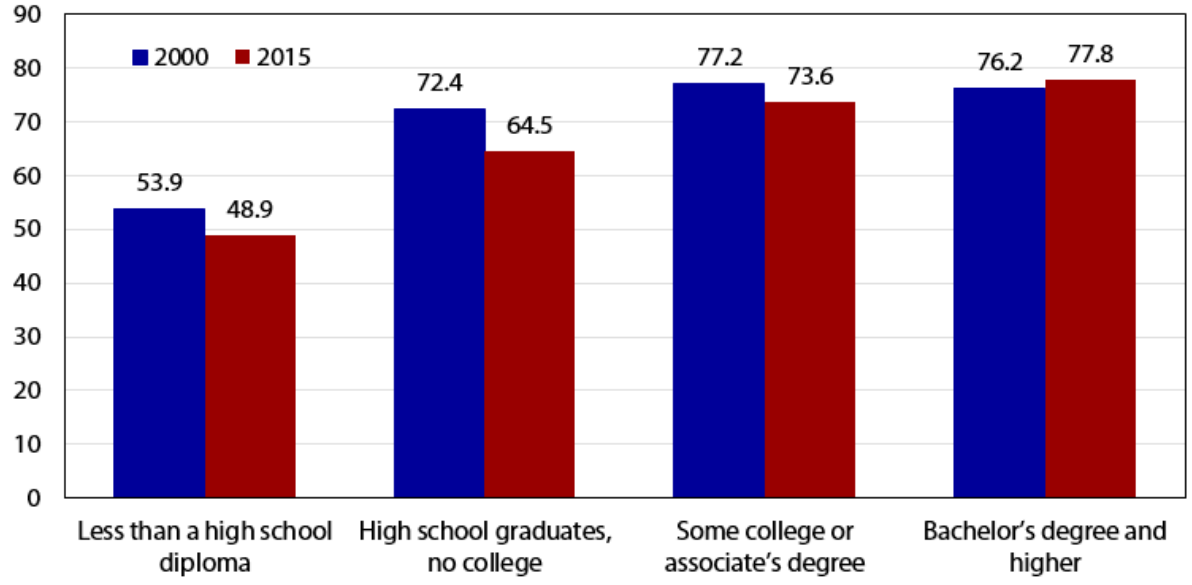


Source: U.S. Bureau of Labor Statistics, Current Population Survey.

As in previous years, mothers whose youngest child was between 6 and 17 years of age were more likely to participate in the labor force (74.6 percent) in 2015 than mothers whose youngest child was between 3 and 5 years of age (67.3 percent) or mothers whose youngest child was under 3 years old (61.4 percent). Presumably, when mothers have young children, they have less time to engage in labor market activities. Data from the American Time Use Survey show that parents of infants spend much more time caring for children relative to parents of older children.[10]

Among mothers whose youngest child was under 18 years of age, the labor force participation rate of those with at least a bachelor's degree edged up from 76.2 percent in 2000 to 77.8 percent in 2015. (See figure 9.) By contrast, the participation rate of mothers with a high school diploma and no college declined during this period, from 72.4 percent to 64.5 percent, while the rate of mothers with less than a high school diploma fell from 53.9 percent to 48.9 percent. The participation rate of mothers with some college or an associate's degree declined from 77.2 percent to 73.6 percent.

Figure 9. Labor force participation rates of mothers ages 25 years and older, by educational attainment, annual averages, 2000 and 2015



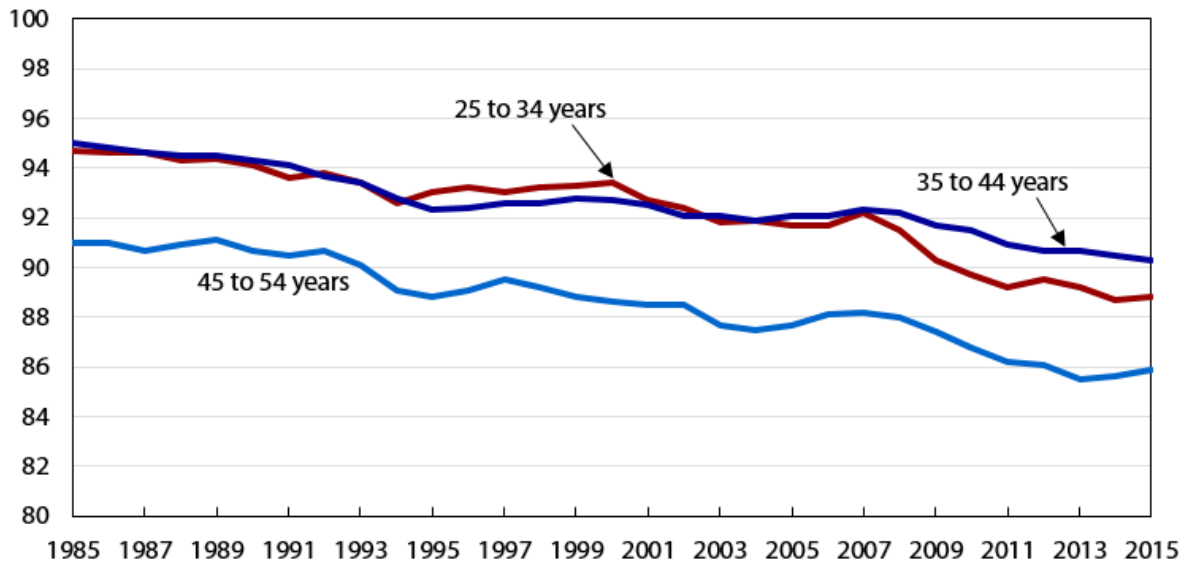
Source: U.S. Bureau of Labor Statistics, Current Population Survey.

Men 25–54 years

A noteworthy development in the labor force over the past six decades has been the slow decline in the labor force participation rate of men 25–54 years.[11] After peaking at 97.4 percent in the mid-1950s, the participation rate of men 25–54 years fell to about 88 percent in 2015. (See figure 6.) The rate fell by an average of 1.2 percentage points per decade between 1960 and 1990, and it declined more rapidly between 1990 and 2015. The rate decreased by 1.8 percentage points between 1990 and 2000 and by 2.3 percentage points between 2000 and 2010. From 2010 to 2015, the participation rate of men 25–54 years edged down by 1.0 percentage point.

Within the 25- to 54-year age group, men 45–54 years were less likely to participate in the labor force than those in the 25- to 34-year and 35- to 44-year age groups. The labor force participation rate of each 10-year age group declined between 2000 and 2015. (See figure 10.)

Figure 10. Labor force participation rates of men in selected 10-year age groups, annual averages, 1985–2015



Source: U.S. Bureau of Labor Statistics, Current Population Survey.

In 2000, among those 25–54 years, the participation rate of Black men was 84.4 percent; in contrast, the rates for Asians, Whites, and Hispanics were in the low 90s. (See table 1.) The participation rate of men in each of the major race and ethnicity groups declined between 2000 and 2015. The declines were somewhat larger for White and Black men (–3.2 percent and –3.5 percent, respectively). In 2015, the participation rate of Black men, at 80.9 percent, remained considerably lower than the rates of men in the other major race and ethnicity groups.

As was the case with women, men with more education were more likely to participate in the labor force. In 2015, participation rates ranged from 79.5 percent for men with less than a high school diploma to 93.9 percent for men with at least a bachelor's degree. (See table 3.) The largest declines in participation between 2000 and 2015 were among men with a high school diploma and no college (–5.9 percentage points) and those with some college but no degree (–4.6 percentage points). By comparison, from 2000 to 2015, the decreases in the labor force participation rate of men with an associate's degree and those with at least a bachelor's degree were smaller (–2.3 and –1.9 percentage points, respectively).[12]

One reason for the large decline in participation among men who did not attend college could be that the types of jobs available to this group might have become less desirable and lower paying. Among men, inflation-adjusted wages for those with less than a high school diploma and those with a high school diploma (no college) fell over the 2000–15 period by 6.8 and 6.6 percent, respectively; by contrast, inflation-adjusted wages for those with at least a bachelor's degree edged up by 1.2 percent over this period.[13] Researchers have suggested that employment opportunities of less-educated men have deteriorated in part because technology has changed and globalization increased.[14]

Researchers have suggested that an increase in the number of people receiving Social Security disability insurance (SSDI) benefits has contributed to the decline in labor force participation among both men and women.[15] The SSDI program was enacted into law in 1956 and was meant to provide income for people with severe disabilities who are unable to work.[16] Over time, changes in eligibility requirements for SSDI benefits may

have increased the number of beneficiaries.[17] The number of men 25–54 years who received SSDI benefits rose from 1.6 million (or 2.7 percent of men in this age group) in 2000 to 2.0 million (or 3.2 percent) in 2014.[18] The decline in labor force participation of men over this period coincided with the increase in disability recipients.[19]

In addition, researchers have suggested that expansion of the Department of Veterans Affairs disability compensation program might have contributed to the decrease in labor force participation among male veterans.[20] From 2003 to 2015, the veterans supplement to the CPS showed an increase in the incidence of disability. The number of male veterans 25–54 years who reported a service-connected disability rose from 726,000 (or 9.3 percent of this population) in 2003 to 1.5 million (or 24.1 percent) in 2015. The number who reported a severe disability increased from 134,000 (or 1.7 percent) in 2003 to 492,000 (or 7.9 percent) in 2015.[21] In 2015, the labor force participation rate of male veterans 25–54 years was 86.0 percent, compared with 88.5 percent for male nonveterans. However, between 2000 and 2015, the drop in the labor force participation rate of veterans (from 89.5 to 86.0 percent) was similar to that of nonveterans (from 92.1 to 88.5 percent).

Women 55 years and older

The labor force participation rate of women 55 years and older increased slightly during the early 1950s before remaining in a range of about 23–25 percent over the next four decades. (See figure 6.) In 1997, the participation rate began to rise again, and in 2000, the pace of the increase accelerated. The rate rose from 26.1 percent in 2000 to 34.7 percent in 2009. From 2009 to 2015, the participation rate of women 55 years and older remained around 35 percent.[22]

As mentioned earlier, the oldest baby boomers turned age 55 in 2001, 62 in 2008, and 65 in 2011. Labor force participation trends closely track age requirements for receiving Social Security earnings benefits.[23] Data show that participation fell substantially when individuals reach age 62 (the age they first become eligible for Social Security benefits) and again at age 65 (the age they become eligible for full Social Security benefits). In 2015, the rate for women fell by 4.6 percentage points at age 62 and by 4.8 percentage points at age 65. (See table 4.) For men, the decreases at age 62 and age 65 were 7.3 percentage points and 6.5 percentage points, respectively. The rise in the number of baby boomers eligible to receive Social Security benefits may have slowed the increase in participation of women 55 years and older.[24]

Table 4. Labor force participation rates of persons ages 55 years and older, by single years of age and gender, annual averages, 2000 and 2015

Age (years)	Men			Women		
	2000	2015	Change 2000–15	2000	2015	Change 2000–15
Total, 55 and older	40.1	45.9	5.8	26.1	34.7	8.6
55	79.8	80.6	.8	65.2	70.2	5.0
56	79.7	78.0	–1.7	64.9	67.6	2.7
57	77.9	77.5	–.4	61.8	67.2	5.4
58	75.6	76.5	.9	58.4	64.3	5.9
59	71.0	72.4	1.4	55.6	62.1	6.5
60	66.2	70.3	4.1	51.5	57.6	6.1
61	65.9	67.8	1.9	46.4	54.7	8.3
62	53.0	60.5	7.5	38.7	50.1	11.4

See footnotes at end of table.

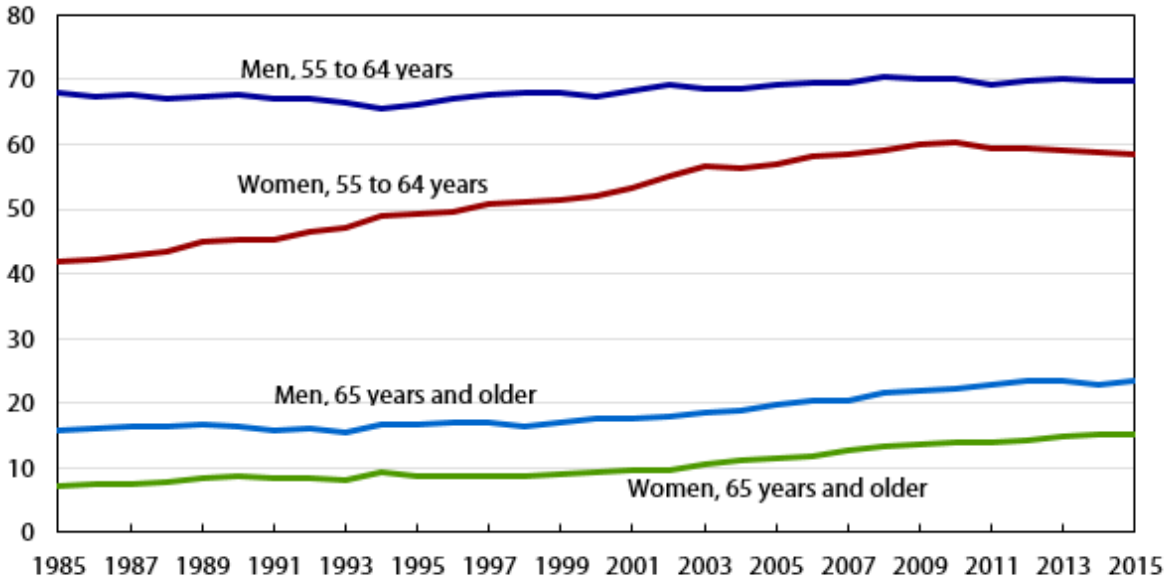
Table 4. Labor force participation rates of persons ages 55 years and older, by single years of age and gender, annual averages, 2000 and 2015

Age (years)	Men			Women		
	2000	2015	Change 2000–15	2000	2015	Change 2000–15
63	44.0	55.6	11.6	33.6	44.6	11.0
64	43.2	51.3	8.1	29.9	40.4	10.5
65	35.9	44.8	8.9	23.2	35.6	12.4
66	32.7	39.6	6.9	21.6	30.0	8.4
67	30.3	35.2	4.9	19.3	26.7	7.4
68	28.1	32.6	4.5	16.6	24.4	7.8
69	23.8	29.7	5.9	16.4	21.3	4.9
70	20.2	27.3	7.1	10.9	18.7	7.8
71	18.0	25.3	7.3	11.6	16.2	4.6
72	18.5	22.7	4.2	10.8	13.9	3.1
73	18.7	20.3	1.6	9.6	12.8	3.2
74	14.1	16.8	2.7	7	11.9	4.9
75 and older	8.1	11.2	3.1	3.6	6.0	2.4

Source: U.S. Bureau of Labor Statistics, Current Population Survey.

As just mentioned, labor force participation tends to fall when people turn 65. In 2015, the rate for women 55–64 years was 58.5 percent, compared with 15.3 percent for women 65 years and older. (See figure 11.) From 1985 to 2009, the participation rate for women 55–64 years rose steadily, but since 2009, the rate for this group has been flat (around 59 percent). The participation rate for women 65 years and older increased slightly during the late 1980s before holding steady near 9 percent during the 1990s. The rate increased from 8.9 percent in 1999 to 15.3 percent in 2015.[25]

Figure 11. Labor force participation rates of selected age and gender groups, annual averages, 1985–2015



Source: U.S. Bureau of Labor Statistics, Current Population Survey.

Between 2000 and 2015, the labor force participation rate of women 55 years and older differed by race and ethnicity. (See table 1.) In 2000, the participation rate ranged from 24.0 percent for Hispanic women to 29.2 percent for Asian women. Between 2000 and 2015, the participation rate of women in each of the four major race and ethnicity groups increased. In 2015, the labor force participation rate ranged from 33.3 percent for Hispanic women to 37.6 percent for Asian women.

From 2000 to 2015, labor force participation of women 55 years and older was greater at higher levels of education. (See table 5.) Between 2000 and 2015, participation rates rose for women in each of the educational attainment categories, but the increases were larger for women with more education. In 2015, the participation rate of women 55 years and older ranged from 16.0 percent for those with less than a high school diploma to 47.1 percent for those with at least a bachelor's degree.

Table 5. Labor force participation rates of people ages 55 years and older, by gender and educational attainment, annual averages, 2000 and 2015

Characteristic	2000	2015	Change, 2000–15
Men			
Total, 55 years and older	40.1	45.9	5.8
Less than a high school diploma	25.3	30.1	4.8
High school graduates, no college	38.8	41.2	2.4
Some college, no degree	44.6	46.4	1.8
Associate's degree	46.9	50.6	3.7
Bachelor's degree and higher	52.6	55.3	2.7
Women			
Total, 55 years and older	26.1	34.7	8.6
Less than a high school diploma	12.7	16.0	3.3

See footnotes at end of table.

Table 5. Labor force participation rates of people ages 55 years and older, by gender and educational attainment, annual averages, 2000 and 2015

Characteristic	2000	2015	Change, 2000–15
High school graduates, no college	25.7	28.8	3.1
Some college, no degree	31.9	36.8	4.9
Associate's degree	35.7	43.3	7.6
Bachelor's degree and higher	41.4	47.1	5.7

Source: U.S. Bureau of Labor Statistics, Current Population Survey.

Men 55 years and older

One of the most striking labor market trends during the second half of the 20th century was the steep decline in labor force participation among men 55 years and older. The labor force participation rate of older men decreased from 70.6 percent in 1948 to 37.7 percent in 1993. (See figure 6.) After remaining flat during 1994–95, the participation rate began to rise in 1996, and in 2000, the pace of the increase accelerated. The participation rate of older men rose from 40.1 percent in 2000 to 46.8 percent in 2012. Since 2012, the participation rate of older men has held steady (around 46 percent). As mentioned previously, the oldest baby boomers recently reached the age required to receive Social Security retirement benefits, which might have slowed the increase in labor force participation among men 55 years and older.

Men 55–64 years had much higher participation rates than men 65 years and older. (See figure 11.) From 1985 to 2001, the rate for men 55–64 years held in a narrow range of 66–68 percent; then, during 2001–08, the participation rate edged up to 70 percent and remained flat through 2015. From 1985 to 1998, the participation rate for men 65 years and older hovered around 16 percent. However, since 1998, the rate increased gradually and reached 23.4 percent in 2015.

Among those 55 years and older in 2000, the labor force participation rate was lowest among Black men (36.0 percent) and highest among Asian men (46.6 percent). (See table 1.) From 2000 to 2015, the participation rate of men 55 years and older increased in each of the major race and ethnic groups. In 2015, the participation rate ranged from 39.9 percent for Black men to 51.2 percent for Hispanic men.

As seen in other demographic groups, men 55 years and older with more education were more likely to participate in the labor force. In 2000, the participation rate ranged from 25.3 percent for men with less than a high school diploma to 52.6 percent for men with at least a bachelor's degree. (See table 5.) The participation rate of older men in each educational attainment category rose from 2000 to 2015. In 2015, the participation rate ranged from 30.1 percent for men with less than a high school diploma to 55.3 percent for men with at least a bachelor's degree.

Some possible explanations for the rise in labor force participation among older men and women since the mid-1990s are well documented.[26] These explanations include changes to Social Security laws, changes to private retirement plans, increased life expectancy, rising healthcare costs, and increased educational attainment of older adults.[27]

Conclusion

After rising steadily for more than three decades, the overall labor force participation rate peaked at 67.3 percent in early 2000 and subsequently fell to 62.7 percent by mid-2016. In recent years, the movement of the baby-boom population into age groups that generally exhibit low labor force participation has placed downward pressure on the overall participation rate.

From 2000 to 2015, the decline in participation occurred across most of the major demographic groups. Teenagers experienced the steepest drop in participation, which coincided with a rise in their school enrollment rate. Yet, labor force participation rates of both teenagers enrolled and not enrolled in school fell since 2000. Adults 20–24 years showed a decrease in labor force participation that was less steep than that of teenagers. The young adults least likely to participate in the labor force were those without a high school diploma, in particular young women, especially mothers.

The labor force participation of women 25–54 years also declined from 2000 to 2015. This decrease was most pronounced for women who did not attend college. Women with a college degree experienced a much smaller reduction in labor force participation. Since 2000, labor force participation of mothers with children under 18 years old has receded; the declines were larger among less-educated mothers.

The labor force participation of men 25–54 years continued to decline from 2000 to 2015. The decrease in participation among men with less education was greater than that of men with more education.

The labor force participation of men and women 55 years and older rose from 2000 to 2009 and subsequently leveled off. This plateau could be attributed partially to the fact that the oldest baby boomers reached age 62 in 2008 and became eligible for Social Security retirement benefits.

SUGGESTED CITATION

Steven F. Hipple, "Labor force participation: what has happened since the peak?," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, September 2016, https://doi.org/10.21916/mlr.2016.43.

NOTES

1 The data in this article are based on information collected in the Current Population Survey (CPS), a monthly sample survey of about 60,000 households nationwide, that the U.S. Census Bureau conducts for the U.S. Bureau of Labor Statistics. The labor force is defined as the sum of the employed and unemployed. In the CPS, people are considered employed if they did any work for pay or profit during the survey reference week (that is, the Sunday to Saturday that includes the 12th day of the month). People are classified as unemployed if they do not have a job, actively looked for work in the prior 4 weeks, and are currently available to work. (Workers expecting to be recalled from temporary layoff are counted as unemployed whether or not they have engaged in a specific job-seeking activity.) Actively looking for work may consist of activities such as contacting an employer directly or having a job interview, contacting a public or private employment agency, contacting friends or family about a job, and contacting a school or university employment center. Other active job search methods include submitting resumes or filling out applications, placing or answering job advertisements, and checking union or professional registers.

2 A study by economists at the Council of Economic Advisers concluded that, since 2007, about one-half of the decrease in labor force participation was due to the aging of the population, about one-sixth of the decline was due to cyclical factors, and about one-third of the decrease was due to “other reasons.” See *The labor force participation rate since 2007: causes and policy implications* (Executive Office of the President of the United States, Council of Economic Advisers, July 2014), https://obamawhitehouse.archives.gov/sites/default/files/docs/labor_force_participation_report.pdf. Another study concluded that one-half to two-thirds of the decrease in labor force participation from late 2007 to early 2014 was due to the aging of the population; about one-third was due to the lagged influence of high, and especially long-term, unemployment. See William R. Cline (with Jared Nolan),

Demographic versus cyclical influences on U.S. labor force participation, Working Paper no. 14.4 (Washington, DC: Peterson Institute for International Economics), July 2014, http://www.iie.com/publications/wp/wp14-4.pdf. Economists at the Federal Reserve have published numerous papers on the recent behavior of the labor force participation rate. For instance, one study suggested that much of the drop in labor force participation since 2007 has been due to ongoing structural influences rather than pronounced cyclical weakness related to workers' discouragement over job prospects. See Stephanie Aaronson, Tomaz Cajner, Bruce Fallick, Felix Galbis-Reig, Christopher L. Smith, and William Wascher, *Labor force participation: recent developments and future prospects* (Board of Governors of the Federal Reserve System, Federal Reserve Bank of Cleveland, September 2014), http://www.federalreserve.gov/pubs/feds/2014/201464/201464abs.html. James Bullard of the Federal Reserve Bank of St. Louis also provided an overview of research on labor force participation; see *The rise and fall of labor force participation in the United States* (Federal Reserve Bank of St. Louis *Review*, First Quarter 2014, 96(1), pp. 1–12, http://research.stlouisfed.org/publications/review/2014/q1/bullard.pdf. For a detailed analysis of projected changes in the labor force from 2014 to 2024, see Mitra Toossi, "Labor force projections to 2024: the labor force is growing, but slowly," *Monthly Labor Review*, December 2015, https://www.bls.gov/opub/mlr/2015/article/labor-force-projections-to-2024.htm.

3 Julie L. Hotchkiss concluded that much of the decline in labor force participation during the 2000s could be explained by changing population shares. See her paper, *Decomposing changes in the aggregate labor force participation rate*, Working Paper no. 2009-6a (Federal Reserve Bank of Atlanta, July 2009), https://www.frbatlanta.org/research/publications/wp/2009/06.aspx. For more information on the impact of aging on labor supply, see Bruce Fallick, Charles Fleischman, and Jonathan Pingle, "The effect of population aging on the aggregate labor market," in Katharine G. Abraham, James R. Spletzer, and Michael Harper, eds., *Labor in the new economy* (Chicago, IL: University of Chicago Press, 2010), pp. 377–417, http://www.nber.org/books/abra08-1.

4 Participation rates of both male and female teenagers fell sharply from 2000 to 2015. The rate for male teenagers fell from 52.8 percent to 34.2 percent; the rate for female teenagers dropped from 51.2 percent to 34.4 percent.

5 Data on school enrollment are from the October monthly Current Population Survey. For more information on employment and school enrollment trends among youth during the summer and school year, see Teresa L. Morisi, "The early 2000s: a period of declining teen summer employment rates," *Monthly Labor Review*, May 2010, pp. 23–35, https://www.bls.gov/opub/mlr/2010/05/art2full.pdf; and Teresa L. Morisi, "Youth enrollment and employment during the school year," *Monthly Labor Review*, February 2008, pp. 51–63, https://www.bls.gov/opub/mlr/2008/02/art3full.pdf.

6 See Steven F. Hipple, "People who are not in the labor force: why aren't they working?" *Beyond the Numbers*, vol. 4, no. 15, December 2015, https://www.bls.gov/opub/btn/volume-4/people-who-are-not-in-the-labor-force-why-arent-they-working.htm.

7 See Aaronson et al., *Labor force participation*, pp. 23–26.

8 Ibid., p. 26.

9 The decrease in labor force participation from 2000 to 2015 was larger for young men than for young women. The rate for young men fell by 9.6 percentage points, whereas the rate for young women declined by 4.8 percentage points.

10 Robert Drago, "The parenting of infants: a time-use study," *Monthly Labor Review*, October 2009, pp. 33–43, https://www.bls.gov/opub/mlr/2009/10/art3full.pdf.

11 A recent study by economists at the Council of Economic Advisers examined the long-term decline in labor force participation of men 25–54 years. See *The long-term decline in prime-age male labor force participation* (Executive Office of the President of the United States, Council of Economic Advisers, June 2016), https://obamawhitehouse.archives.gov/sites/default/files/page/files/20160620_cea_primeage_male_lfp.pdf.

12 The labor force participation rate of less-educated men has been falling for many years. From 1970 to 2015, the labor force participation rate of men 25–54 years with less than a high school diploma declined from 93.6 percent to 79.3 percent. The participation rate of men 25–54 years with a high school diploma and no college fell from 97.6 percent to 85.3 percent during this period. (Data for each year are from the March monthly Current Population Survey.)

13 Wages refer to median weekly earnings of men 25 years and older, in constant 2015 dollars. The change in wages occurred between 2000 and 2015.

14 See David H. Autor and Melanie Wasserman, *Wayward sons: the emerging gender gap in labor markets and education* (Washington, DC: Third Way, April 2013), http://economics.mit.edu/files/8754.

15 See Aaronson et al., *Labor force participation,* pp. 234–35; and Robert E. Hall, "Quantifying the lasting harm to the U.S. economy from the financial crisis," in Jonathan A. Parker and Michael Woodford, eds., *NBER Macroeconomics Annual 2014*, vol. 29 (Chicago, IL: University of Chicago Press), pp. 71–128.

16 For more information on the history of Social Security disability insurance programs, see *A history of the Social Security disability programs* (Social Security Administration, January 1986), https://www.ssa.gov/history/1986dibhistory.html.

17 The total number of disabled worker beneficiaries rose from 2.9 million (or 1.7 percent of the working-age population) in 1980 to 9.0 million (or 3.6 percent) in 2014. For an overview of the expansion of the Social Security disability insurance program, see David H. Autor, *The unsustainable rise of the disability rolls in the United States: causes, consequences, and policy options*, Working Paper no. 17697 (Cambridge, MA: National Bureau of Economic Research, December 2011), http://www.nber.org/papers/w17697.

18 The number of women 25–54 years who received Social Security disability insurance benefits increased from 1.2 million (or 2.0 percent of women in this age group) in 2000 to 1.9 million (or 3.0 percent) in 2014. See Office of Research, Evaluation, and Statistics, *Annual statistical report on the Social Security disability program, 2000* (Social Security Administration, September 2001) and *Annual statistical report on the Social Security Disability Program, 2014* (Social Security Administration, November 2015), https://www.ssa.gov/policy/docs/statcomps/di_asr/index.html.

19 From 2004 to 2014, there were increases in the percentages of men and women 25–54 years who were not in the labor force and who cited illness or disability as the main reason for not working. See Hipple, "People who are not in the labor force."

20 See Courtney Coile, Mark Duggan, and Audrey Guo, "Veterans' labor force participation: what role does the VA's disability compensation program play?" *American Economic Review*, vol. 105, no. 5, May 2015, pp. 131–36.

21 For more information on the Current Population Survey veterans supplement, see the U.S. Bureau of Labor Statistics news release, https://www.bls.gov/news.release/pdf/vet.pdf.

22 In a recent study, Alicia H. Munnell suggests that the average age of retirement for women and men has leveled off in recent years; see *The average retirement age—an update*, Issue Brief no. 15–4 (Boston, MA: Center for Retirement Research, March 2015), pp. 1–6, http://crr.bc.edu/wp-content/uploads/2015/03/IB_15-4_508_rev.pdf.

23 Since the beginning of 2000, the normal retirement age for receiving Social Security benefits has gradually increased. Traditionally, retirement benefits are first available at age 62, with a reduction for each month that benefits are received before age 65, the age at which individuals are eligible for full Social Security benefits. The normal retirement age was raised as part of the 1983 Social Security reform legislation. The age rises gradually for individuals born in 1937 or later. Currently, the highest normal retirement age is 67 years, for those born in 1960 or later.

24 A recent study focused on the baby-boom generation and its impact on overall labor force participation. See Alicia H. Munnell, *The impact of aging baby boomers on labor force participation*, Issue Brief no. 14–4 (Boston, MA: Center for Retirement Research, February 2014), pp. 1–6, http://crr.bc.edu/briefs/the-impact-of-aging-baby-boomers-on-labor-force-participation/.

25 For more information on the reasons why women are working longer, see Claudia Goldin and Lawrence Katz, "Women working longer: facts and some explanations," in Claudia Goldin and Lawrence Katz, eds., *Women working longer* (University of Chicago Press, forthcoming), http://papers.nber.org/books/gold-12.

26 See Michael V. Leonesio, Benjamin Bridges, Robert Gesumaria, and Linda Del Bene, "The increasing labor force participation of older workers and its effect on the income of the aged," *Social Security Bulletin*, vol. 72, no. 1 (Office of Retirement and Disability Policy, 2012), pp. 59–77, https://www.ssa.gov/policy/docs/ssb/v72n1/v72n1p59.pdf.

27 For a discussion of the history and development of the Social Security program, see Patricia P. Martin and David A. Weaver, "Social Security: a program and policy history," *Social Security Bulletin*, vol. 66, no. 1 (Office of Retirement Policy, Office of Policy, November 2005), https://www.ssa.gov/policy/docs/ssb/v66n1/v66n1p1.html. For an analysis of the impact of Social Security (and Medicare) changes on the labor market, see "Raising the ages of eligibility for Medicare and Social Security," *Issue Brief* (Congressional Budget Office, January 2012), pp. 1–12, https://www.cbo.gov/publication/42683. For a discussion of changes to private pension plans and labor force participation of older adults, see Frank W. Heiland and Zhe Li, *Changes in labor force participation of older Americans and their pension structures: a policy perspective*, Working Paper no. 2012-18 (Center for Retirement Research at Boston College, August 2012), http://crr.bc.edu/working-papers/changes-in-labor-force-participation-of-older-americans-and-their-pension-structures-a-policy-perspective-2/. According to the National Center for Health Statistics, people 65 years in 1990 could expect to live another 17.2 years; life expectancy at 65 years increased to 17.6 years in 2000 and to 19.3 years in 2013, http://www.cdc.gov/nchs/ data/hus/hus14.pdf#016. In a recent study, researchers found evidence which suggests that older adults have substantial health capacity to work longer. See Courtney Coile, Kevin S. Milligan, and David A. Wise, "Health capacity to work at older ages: evidence from the U.S.," Working Paper no. 21940 (Cambridge, MA: National Bureau of Economic Research, January 2016), http://www.nber.org/papers/w21940. Rising healthcare costs might explain some of the rise in labor force participation among older adults because some older adults might have to continue to work to pay out-of-pocket expenses for healthcare. Over the past two decades, the cost of medical care has increased sharply. Between 1995 and 2015, the Consumer Price Index for all urban customers (CPI- U) for medical care rose at an annual rate of 3.6 percent, compared with a 2.3-percent annual rate of increase of the CPI-U for all items. Over the same period, the index for prescription drugs increased at an annual rate of 3.6 percent. For a discussion of labor force participation and work patterns of older women by educational attainment, see Elizabeth T. Hill, "The labor force participation of older women: retired? working? both?" *Monthly Labor Review*, September 2002, pp. 39–48, https://www.bls.gov/opub/mlr/2002/09/art4full.pdf.

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