Monthly Labor Review

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March 2016

Expect 25 years of rapid change

Editor's note: This essay is part of a series being published to help commemorate the Monthly Labor Review's centennial (July 1915–July 2015). The essays—written by eminent authorities and distinguished experts in a broad range of fields—cover a variety of topics pertinent to the Review and the work of the Bureau of Labor Statistics. Each essay is unique and comprises the words and opinion of the author. We've found these essays to be enlightening and inspirational. We hope you do as well.

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It seems almost impossible to imagine, but it was only about 25 years ago that the first web page was published on the World Wide Web. Looking ahead from today, then, it is clear that the pace of technological change is so rapid that many core characteristics of the economy of 2040 are impossible to predict. Above all, this unpredictability is a key characteristic of the modern world that challenges scholars and workers alike.

What shifts are predictable? What will be the labor market's drivers, challenges, and opportunities in 2040? Looking ahead, we see several key factors that will revolutionize the workplace and challenge the writers and analysts of the *Monthly Labor Review*.

Let's start with an easy one: Workers will live and work longer, perhaps much, much longer. If you subscribe to the lump of labor fallacy, then you would think that these older workers would take jobs away from younger workers. But we doubt that will happen—older workers will have more income, consume more goods and services, drive up demand, and create more jobs for younger workers in the process.

But all may not be well. Twenty-five years from now, there may be a good number of workers in their 50s waiting for their 75-year-old boss to retire so they can advance to the next level of their career. What will this do to morale? What will it do to the internal culture of organizations for jobs to become permanent?

We expect the second factor that is relatively easy to predict will partially mitigate any negative effects of "permanent" careers: the workplace itself will be less and less relevant to the organization of society. Applications such as Uber have already made it much easier for workers to be matched to those who demand their services in real time and on their terms.

You might set an income target for yourself: "I want to make $50,000 dollars this year." One day you sell your labor as a taxi driver. The next day, you wake up and decide you'd like to do some programming, so you log onto a job board and bid on a project. You work on that project for a month, and then decide to take 2 weeks off. When you feel like working again, you pick another task.

Task is the key word here. You perform tasks, and you receive income. But you work for yourself.

The third factor that is sure to transform the workplace is the robot. Today a robot can deposit your checks and give you cash. Next year a robot will be able to pilot your car down the highway. Twenty-five years from now, what might robots be able to do? Perhaps much, much more. Today, rudimentary robots, such as the VGo, allow individuals to remotely interact with distant places. Some scientists have already attended academic conferences remotely via robot.

Intelligent robots will likely take over many everyday tasks. Your heart surgeon will still have a beating heart—though she will likely be assisted by a tin man. The same will likely be somewhat less true of lower paying occupations. Today robots can't clean office buildings after hours, but in the year 2040 they might be able to.

And in the year 2040 we will probably still be on what economists call a "transition path." Technology will still be destroying and creating occupations at an unusually rapid clip. The winners in this process will win big, and the losers will face much hardship. A central challenge for public policy will be mitigating the damage and helping individuals to build the skills needed in the new economy. But these advancements mean that machines will offer increasingly abundant and inexpensive labor. Society will, accordingly, be much wealthier than it is even today. If all goes according to plan, there should be plenty of resources to assure that lesser skilled workers are not left behind.

Fifty years ago, you went to a job and remained until you retired. You left with a gold watch and a pension. Twenty-five years ago, you started your career, hopped from job to job, maybe took a break for additional schooling, had no expectation of a defined-benefit pension, and had a relatively weak relationship with any individual employer. Twenty-five years from now, the workplace will still exist in some industries but will be a distant memory in others.

Charting that distance will be a key challenge for economists in the quarter century to come.

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I, robot?

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J.D. Foster

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A worker retiring at age 66 in 2015 likely joined the workforce sometime between 1968 and 1975. Over that period, cutting-edge technology advanced from gee-whiz hand calculators to wristband devices with as much communications and computing power as the Space Shuttle, while cars have become advanced computer networks that happen to have wheels, an engine, and bucket seats. Assuming technology continues its exponential growth, what technologies will today's hyper social-media-savvy job market entrants need to master to remain productive 25 years from now or when they retire in 2050 or beyond, and how will they manage—and how can the *Monthly Labor Review* help?

The good news is the accelerating advance of technology lowers costs, creates whole new product categories, and generally works to increase labor productivity and income. The disquieting news is that tomorrow's workers will have to be perpetual students to keep up, while lesser skilled workers will find themselves increasingly marginalized and sometimes, ultimately, replaced by technology in some form or fashion. Productive capital requires constant maintenance and upgrades to remain productive. Increasingly, human capital will be no different. But culturally, we're not ready.

Perpetual student workers likely will not mean permanent night-school attendance. Keeping up with technology's advances generally occurs naturally in the workplace—but not always. In any event, staying on top of technology may involve new policy paradigms; will probably require a national conversation led by business, education, and political leaders; and above all will certainly require new personal and cultural attitudes toward career-centered lifelong learning.

Go to school, learn some skills, get a job, advance with experience, retire—this traditional model for American workers is obviously obsolete, but culturally many Americans still retain much of this traditional perspective as life's template. The cultural change necessary to adapt to the new job realities will be as fundamental as was the shift from a mainly agricultural workforce to an industrial one during the 19th century.

Economic data generally, and Bureau of Labor Statistics (BLS) data specifically, will likely prove ineffective causal agents for changing cultural attitudes favoring career-centered lifelong learning, but they can help in important ways to lay the groundwork. The professionals at BLS need to be thinking about how new data sources may be developed to highlight the importance of career-centered lifelong learning and the relevant efficacy of different approaches thereto.

The task ahead is even tougher and more important than it first appears. Consider those segments of society most and least likely to be receptive to the needed change in cultural attitudes toward lifelong learning. The high skilled and the learned are naturally receptive to further learning, while the less skilled and the lightly educated are largely self-selected to be less receptive. Anyone concerned about income inequality, growing or otherwise, should take this issue very seriously.

Go into a fast-food or moderately priced restaurant today, and as likely or not you will be greeted by a computer tablet screen. A server may seat you and bring water and drinks, but your order is placed via a series of interactive screens. When your meal is finished, your bill is not presented by a server but rather comes up on the same screen on which you ordered and on which you then swipe a card and leave.

Highly skilled individuals designed, built, and tested these new surrogate restaurant server systems. Those individuals also tend to be highly paid, and their efforts are eliminating other jobs at restaurants, at checkout counters, at airports, and so on. There is nothing to lament here. This transition toward capital and technology and higher skilled labor is inevitable and ultimately is income increasing.

While not lamentable, this evolution is a clear threat to those at risk of being left behind—those whose jobs are especially dangerous or relatively low skilled or too highly paid compared with their worker-competitors overseas or their robot-competitors on the shop floor. Such displacement is not a new experience but threatens to increase rapidly. How American workers through policies and cultural evolution adapt to facilitate finding new gainful employment will depend significantly on how successful the workers become at relentlessly climbing the learning curve. Much will be required for these transitions to proceed as smoothly as possible. An essential element of what will be required is information about labor skills and training—perhaps the most important direction the BLS can explore in the years ahead.

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Current Employment Statistics data and their contributions as key economic indicators

To help mark the Monthly Labor Review's centennial, the editors invited several producers and users of BLS data to take a look back at the last 100 years. This article highlights the important role of the Current Employment Statistics (CES) survey as a key source of economic information for data users seeking to obtain a timely and broad view of the U.S. labor market. The CES program publishes first estimates of employment, hours, and earnings each month, approximately 3 weeks after the week including the 12th of the month. CES estimates, widely used on their own, also serve as important inputs to other closely watched economic indicators. Among the users of CES data are government agencies, private businesses, and research organizations.

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The Current Employment Statistics (CES) survey was first conducted in October 1915 for four manufacturing industries—boots and shoes, cotton goods, cotton finishing, and hosiery and underwear. The first CES data release, published in the January 1916 issue of the *Monthly Review*, indicated that it would be useful to employers in these industries, as well as to workers, the unemployed, and policymakers:

> The amount of authoritative data concerning the ebb and flow of industrial employment in the United States is limited. The necessity for figures on this subject is apparent. Every successful employer must know his own business, and to continue successful [sic] he needs to know the condition of the industry of which his establishment is a part, for so closely are industrial affairs related that the prosperity of any establishment may be affected materially by the conditions of the industry as a whole. To the workingmen, the unemployed, and those seeking to relieve unemployment such figures are also of service.[1]

Over the past 100 years, the CES survey has evolved considerably. In 2015, CES published more than 900 national employment series for nonfarm and government industries. Two sets of estimates of hours and earnings for private sector employees also were produced—one for all employees and one for production employees in goods-producing industries and nonsupervisory employees in private service-providing industries. Further, numerous additional series were derived from basic estimates. CES also has expanded to produce estimates, by industry, for all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and about 450 metropolitan areas and divisions.

CES data serve as one of the first available monthly economic indicators for evaluating the health of the U.S. economy. Each month, the U.S. Bureau of Labor Statistics (BLS) publishes estimates of employment, hours, and earnings from the CES survey. The Employment Situation, a news release combining national estimates from the CES survey and labor force data from the Current Population Survey (CPS), is published about 3 weeks after the week that includes the 12th of the month. The reference period for CES respondents is the pay period that includes the 12th of the month. BLS releases CES estimates for states and metropolitan areas about 2 weeks after the release of national estimates.

Because of their breadth of industry detail, geographic scope, and timeliness, CES data are followed closely by a wide array of economic data users—policymakers, government agencies and entities, major news media, financial market analysts in the United States and around the world, and other business and academic analysts, researchers, and forecasters. This article highlights the strengths of CES data and their important contributions as economic indicators.

Why follow CES?

The breadth and quality of CES data help one understand why data users choose to follow them. The CES survey, also known as the payroll or establishment survey, is a monthly survey of approximately 146,000 businesses and government agencies representing about 623,000 worksites throughout the United States. Using data from this sample, BLS produces and publishes estimates of employment, hours, and earnings for the nation, states, and metropolitan areas, by detailed industry. The CES survey produces over 27,000 data series for the nation and about 23,000 series for states and areas.[2]

CES employment series include all employees, production and nonsupervisory employees (referred to in this article as production employees),[3] and women employees. Monthly employment estimates for major industry sectors and some detailed industries begin as early as 1939, but all employment series generally begin no later than 1990.

BLS also produces estimates of average hourly earnings, average weekly hours, and, for manufacturing industries, average weekly overtime hours. Hours and earnings estimates cover private sector workers in two employee sets —all employees and production employees. Since 1964, monthly estimates of hours and earnings for production employees have been produced for all private industry sectors. The hours and earnings estimates for all employees start in 2006.

BLS also derives other series, such as average weekly earnings and diffusion indexes, from the basic series of employment, hours, and earnings. Each month, CES publishes real earnings (a Principal Federal Economic

Indicator) in conjunction with the release of the Consumer Price Index (CPI). Average hourly and average weekly earnings are deflated by the CPI to provide information on the real buying power of consumers.

Industry classification. All data on employment, hours, and earnings for the nation, states, and metropolitan areas are classified in accordance with the North American Industry Classification System, developed under the auspices of the Office of Management and Budget.[4] The United States, Canada, and Mexico share this classification system, which allows a direct comparison of economic data across the three countries.[5]

Revisions. Because not all respondents report their payroll data by the initial release of employment, hours, and earnings, CES estimates are considered preliminary when first published each month. BLS continues to collect payroll data and revises estimates twice before the annual benchmark update (discussed below). For a given month, BLS publishes second preliminary estimates 1 month after the initial release and final sample-based estimates 2 months after the initial release. The estimates published with the second and third (final) releases incorporate additional data from respondents and corrected data. With each new monthly observation and the revisions to previous months' estimates, BLS recalculates CES seasonal adjustment factors, which also can contribute to revisions in the seasonally adjusted estimates.[6]

Benchmarking. On an annual basis, BLS recalculates nearly 2 years of CES data in a process known as benchmarking. The process corrects for sampling and modeling error by reanchoring sample-based estimates for March of each year to nearly complete employment counts based primarily on unemployment insurance tax records.[7] Historically, benchmark revisions of total nonfarm employment have been relatively small, averaging 0.3 percent (in absolute terms) from March 2005 through March 2015.[8]

Seasonality. CES data are available both seasonally adjusted and not seasonally adjusted. To reveal underlying economic trends, the seasonal adjustment process removes from the data the effects of normal employment variation, which results from recurring events within a year (such as holidays and weather changes). BLS uses a concurrent seasonal adjustment methodology for national CES estimates that incorporate estimates up through the current month's data.

Uses and users of CES data

CES data as inputs to other important economic indicators. While CES estimates, on their own, serve as important economic indicators for analyzing the health of the U.S. economy, they also serve as inputs to other economy-wide indicators. Total nonfarm employment and aggregate weekly hours (the product of employment and average weekly hours) are considered coincident economic indicators. In other words, employment and aggregate hours are indicative of the current state of the economy and tend to move in sync with U.S. business cycles, reaching peaks and troughs at about the same time as the cycle. In fact, the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) uses CES employment data to determine turning points in the U.S. business cycle.

Table 1 shows the relationship between turning points in the U.S. business cycle, as determined by NBER, and turning points in CES employment. Eight out of 11 peak months in CES employment coincided within 3 months of the NBER peak months. Eight out of the 11 trough months coincided within 3 months of the NBER trough months. However, this coincident pattern for identifying business cycle troughs (i.e., ending points of recessions) broke down after the last two recessions. CES employment continued to decline for 21 months after the end of the 2001

recession and for 8 months after the June 2009 business cycle trough. For both recessions, NBER found that business cycle peak dates coincided with the peaks in CES employment, whereas the central indicators—real gross domestic product and real gross domestic income—gave mixed signals about the peak dates.[9]

Table 1. Turning points in the U.S. business cycle and CES employment

NBER turning points		CES employment turning points		Months lead (lag)	
Peak month	Trough month	Peak month	Trough month	Peak month	Trough month
November 1948	October 1949	September 1948	October 1949	2	0
July 1953	May 1954	July 1953	August 1954	0	(3)
August 1957	April 1958	April 1957	June 1958	4	(2)
April 1960	February 1961	April 1960	February 1961	0	0
December 1969	November 1970	March 1970	November 1970	(3)	0
November 1973	March 1975	July 1974	April 1975	(8)	(1)
January 1980	July 1980	(1)	(1)	(1)	(1)
July 1981	November 1982	July 1981	December 1982	0	(1)
July 1990	March 1991	June 1990	May 1991	1	(2)
March 2001	November 2001	February 2001	August 2003	1	(21)
December 2007	June 2009	January 2008	February 2010	(1)	(8)

Notes:

(1) No peak or trough month declared for CES data because period of decline did not meet criteria. For information on how peaks and troughs are identified in CES data, see https://www.bls.gov/ces/cespeaktrough.htm.

Note: CES data are subject to annual benchmarking and reseasonal adjustment.

Sources: U.S. Bureau of Labor Statistics and National Bureau of Economic Research.

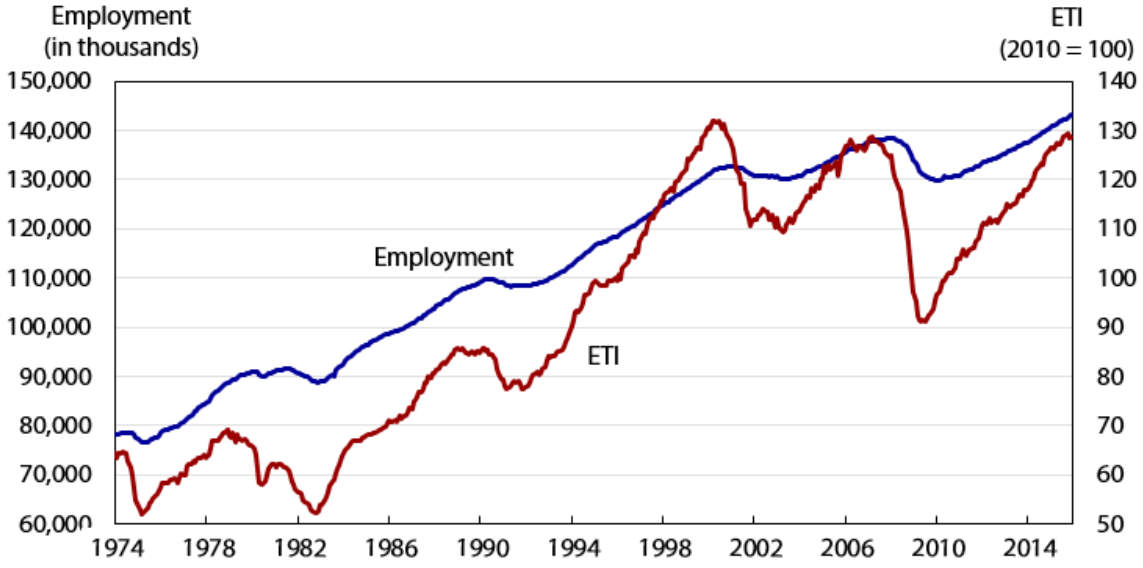
The Federal Reserve uses aggregate weekly hours in manufacturing, mining and logging, electric and gas utilities, and publishing industries to calculate industrial production indexes (IPIs), which measure real output in those industries.[10] Investors use IPIs to analyze growth in these industries. Growth in month-over-month IPIs for a particular industry signals that companies within that industry are performing well.[11]

The Bureau of Economic Analysis uses aggregate weekly earnings (the product of average hourly earnings, average weekly hours, and employment) for all private sector jobs to estimate wages and salaries for personal income, a coincident economic indicator.[12]

The Conference Board combines various statistics to produce its composite leading and coincident economic indexes. These indexes are designed to signal peaks and troughs in the U.S. business cycle and to summarize and reveal common turning-point patterns in economic data by smoothing out some of the volatility of individual economic series. The Coincident Economic Index provides information on the current state of the economy. CES employment is a direct input into the index, whereas aggregate weekly earnings for all private industries and aggregate weekly hours of production employees in selected industries are indirect inputs (through personal income and industrial production, respectively).

The Conference Board's Leading Economic Index is used to predict the direction of the economy's movements in months to come. The manufacturing workweek from the CES survey, also useful as a short-term predictor of changing economic trends, is a direct input into the index.[13]

Figure 1. Total nonfarm employment and Employment Trend Index (ETI), 1974–2015



Sources: U.S. Bureau of Labor Statistics and The Conference Board.

Changes in employment trends of the temporary help services industry typically lead employment changes for the overall U.S. economy. Therefore, The Conference Board uses temporary help employment from the CES survey as an input in calculating the Employment Trend Index. This index aggregates eight separate economic indicators and offers a short-term, forward look at potential changes in employment trends.[14] (See figure 1.)

CES data used in other BLS programs. CES data are used as inputs to other BLS data, in programs such as the Local Area Unemployment Statistics (LAUS) program, which produces statistics on the labor force by state and metropolitan area. LAUS uses CES state and area employment estimates as primary inputs to its employment estimates for states and metropolitan areas. LAUS data are based on place of residence, whereas CES estimates are based on location of work. Therefore, LAUS adjusts its estimates with U.S. Census Bureau data, to "residency-adjust" the CES employment inputs.

The National Compensation Survey program, another user of CES data, produces statistics on employer cost levels (Employer Costs of Employee Compensation (ECEC) estimates), changes in employer labor costs (Employment Cost Index), and employee healthcare and retirement benefits. ECEC estimates are weighted by current employment derived from CES employment estimates and from the Quarterly Census of Employment and Wages program.

The Job Openings and Labor Turnover Survey (JOLTS) uses CES employment as a monthly benchmark. A gauge of labor shortages and churn, data collected by JOLTS include estimates of job openings, hires, and separations. JOLTS weighted employment is ratio adjusted to match CES employment each month, and the resulting ratio is then applied to these estimates. JOLTS also aligns estimates of hires and separations to closely track CES over-the-month employment changes.

The Office of Productivity and Technology produces measures of labor productivity (output per hour), unit labor costs, and multifactor productivity (output per unit of combined inputs) for major U.S. economic sectors and industries. The labor hours measure underlying the productivity series is based primarily on CES employment and

average weekly hours data, supplemented with CPS hours data (adjusted to an hours-worked concept) for self-employed and unpaid family workers. Productivity and related cost measures may be used to analyze and forecast changes in prices, wages, production, and technology.

BLS also produces employment projections for 10 years into the future. CES estimates of employment by industry, supplemented with data from the CPS survey, serve as the base-year employment from which projections are made. Employment projections are widely used by policymakers and other officials to make decisions about education and training policy, funding, and program offerings. In addition, federal agencies, researchers, and academia use employment projections to understand potential future trends in the economy and the labor market.[15]

Uses of CES data in formulating monetary and fiscal policy. Policymakers closely follow CES data for their depth of coverage—geographic and industry detail—and for their timely release each month. The Federal Reserve uses CES data to gauge economic conditions in the U.S. labor market when formulating monetary policy. Federal, state, and local government officials use CES employment and aggregate earnings data to forecast tax revenues and plan budgets. Thus, CES data are useful in determining both monetary and fiscal policy.

Other uses of CES data. Each year, CES data are used by a broad spectrum of researchers, including BLS economists, to analyze the economy, labor markets, and industries. For example, Lawrence Mishel and colleagues used various CES statistics in analyzing the economic experience of workers and their families in the United States.[16]

CES data also are used in the private sector by firms, labor unions, universities, trade associations, and research organizations to study economic conditions and to develop plans for the future. Firms, for example, may use CES employment, hours, and earnings data for planning business activity. A manufacturer could choose to set up factories in an area with a strong manufacturing sector and a skilled workforce. Likewise, a retail chain may decide to open an upscale store or an economy store on the basis of average earnings in an area. Businesses use CES data for forecasting and economic analysis of the labor market and the overall U.S. economy. Every month, national and local news media report results from the CES news releases. Also, trade association journals, the labor press, and general reference works regularly republish CES data in summary form or for specific industries or areas.

Conclusion

The CES program produces employment, hours, and earnings estimates for approximately 900 industries for the nation, states, and areas. National CES estimates represent some of the earliest economic indicators of the U.S. economy. CES data, important not only on their own, serve as inputs into other key economic indicators. The data also provide an important source of information for businesses, major news media, researchers, and students.

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NOTES

1 “Amount of employment in certain industries in October and November, 1915,” *Monthly Review*, vol. II, no. 1, January 1916, pp. 11–12.

2 See “Current Employment Statistics—CES (national)” (U.S. Bureau of Labor Statistics), https://www.bls.gov/ces/.

3 Production employees are defined differently depending on the industry. Production and nonsupervisory employees include production employees in mining and logging and manufacturing, construction employees in construction, and nonsupervisory employees in private service-providing industries.

4 For more information on the North American Industry Classification System, see “Introduction to NAICS” (U.S. Census Bureau), https://www.census.gov/eos/www/naics/.

5 For example, a recent article on bilateral trade directly compares CES estimates of U.S. industry employment with similar estimates for Mexico and Canada; see Christopher E. Wilson, “Working together: economic ties between the United States and Mexico” (Washington, DC: Mexico Institute, Woodrow Wilson International Center for Scholars, November 2011), https://www.wilsoncenter.org/sites/default/files/Working%20Together%20Full%20Document.pdf.

6 See “Revisions,” in *Technical notes for the Current Employment Statistics survey* (U.S. Bureau of Labor Statistics, February 5, 2016), https://www.bls.gov/web/empsit/cestn.pdf.

7 Unemployment insurance tax records are collected, reviewed, and edited through the BLS Quarterly Census of Employment and Wages program, https://www.bls.gov/cew/.

8 For more information on the benchmark process, see the latest CES national benchmark article at https://www.bls.gov/web/empsit/cesbmart.pdf.

9 “The NBER’s business cycle dating procedure: frequently asked questions” (Cambridge, MA: National Bureau of Economic Research), http://www.nber.org/cycles/recessions_faq.html.

10 “Industrial production and capacity utilization—G.17” (Board of Governors of the Federal Reserve System), http://www.federalreserve.gov/releases/g17/About.htm.

11 “Industrial Production Index—IPI,” *Investopedia*, http://www.investopedia.com/terms/i/ipi.asp.

12 The latest news release for personal income from the Bureau of Economic Analysis is available at https://www.bea.gov/newsreleases/national/pi/pinewsrelease.htm.

13 “Global business cycle indicators” (The Conference Board), https://www.conference-board.org/data/bcicountry.cfm?cid=1.

14 “The Conference Board Employment Trend Index (ETI)” (The Conference Board), https://www.conference-board.org/data/eti.cfm.

15 See “Employment projections” (U.S. Bureau of Labor Statistics), https://www.bls.gov/emp/.

16 Lawrence Mishel, Josh Bivens, Elise Gould, and Heidi Shierholz, *The state of working America*, 12th ed. (Ithaca, NY: Cornell University Press, 2012).

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Growing up in high-poverty areas can affect your employment

Eleni X. Karageorge

A recent working paper titled Childhood environment and gender gaps in adulthood (National Bureau of Economic Research working paper no. 21936, January 2016) examines the relationship, by gender, between childhood environment and economic well-being in adulthood. The researchers—Raj Chetty, Nathaniel Hendren, Frina Lin, Jeremy Majerovitz, and Benjamin Scuderi—found that men who experienced poverty as children suffered greater economic consequences than women who grew up in poverty.

Using tax records, the researchers examined gender gaps—that is, whether one gender was affected more than the other—at age 30 in employment, income, and college enrollment (between ages 18 and 23) for 10 million individuals born between 1980 and 1982. These factors were then assessed on the basis of the incomes of these individuals' parents and where these individuals lived when they were children. Differences in these factors between men and women varied depending on the income and marital status of their parents.

Gender differences in employment rates varied. Among people whose parents were in the bottom fifth of income distribution when they were young, the 30-year-old men were less likely to have a job than were the women. This was especially true among boys who were raised by a single parent. But for all other income groups, the opposite case was true; specifically, men were employed at higher rates.

The authors found that employment rates increased with parental incomes for both genders and that the increase was more pronounced for men. However, at the lowest income quintile, the trend was even more evident, with men experiencing lower rates of employment than women. The effect on employment rates was most apparent among men raised in single-parent households. Men have higher earnings than women across the parent-income distribution, but the difference was less pronounced in the lowest income quintile. Men were also less likely to attend college compared with women across the parent-income distribution, with the greatest disparity observed among men from lower income families.

The authors also explain how the employment gender gap varies geographically. They looked at these patterns across "commuting zones," which are clusters of counties that act like local labor markets because they are connected by transit, and found substantial differences among them. According to the authors' analysis, the areas where men are less likely than women to have a job are those with a concentration of minority residents, single-parent households, and high racial segregation. The authors note that the gap is only 3 percentage points for low-income boys from New York City, while the gap is 12 percentage points for Charlotte, North Carolina. These two areas are representative of the large variation across local labor markets in the United States.

Gender differences, particularly related to employment, varied significantly across geographic areas. Men who grew up in low-income families living in high-poverty, racially segregated areas were significantly less likely to be employed as adults than their female peers. Higher crime rates were observed in these same geographies, leading the researchers to wonder if males growing up in these places are more likely to resort to criminal activities as a substitute for employment.

The authors conclude that growing up in a low-income, single-parent household or in a neighborhood with high levels of economic and racial inequality has a disproportionately negative impact on men when they reach adulthood. The authors suggest that these findings could shed new light on the recent decline of male participation in the U.S. labor force, which is often attributed to an aging population, structural changes in the economy, and globalization.

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A new approach to work-hour instability

Serah Hyde

Before the 1938 enactment of the Fair Labor Standards Act (FLSA), workers often faced subsistence wages and untenably long work hours. The FLSA was created to ensure a basic standard of living for all workers. The approach was twofold: a minimum wage was established so workers could earn livable wages, and overtime pay was mandated to help guard against exploitatively long work hours. In "Underwork, work-hour insecurity, and a new approach to wage and hour regulation" (*Industrial Relations*, October 2015), authors Charlotte Alexander and Anna Haley-Lock juxtapose the workplace conditions the FLSA was designed to address with the challenges faced by hourly or low-wage workers in today's labor force. Alexander and Haley-Lock find the FLSA only partially addresses the needs of today's workers, many of whom have work hours that are too few, too variable, and too unpredictable.

Alexander and Haley-Lock focus on hourly or low-wage workers who are subject to "just-in-time scheduling," meaning they can be sent home before the end of a scheduled shift when there is a lag in customer traffic. This phenomenon, which is also known as "early send home," is a function of an employer's goal to reduce or eliminate labor costs. Workers in these situations cannot predict their earnings or plan ahead, and worklife balance for them is tenuous.

Some unions, some private employers, and some states have attempted to address the problem of work-hour insecurity. Analyzing data on New York City retail workers and data from the Current Population Survey, the authors assess the efficacy of state reporting-pay or "show-up pay" laws, which disincentivize sending workers home early and help to stabilize work hours and earnings. The laws require employers to pay for a minimum number of hours of an employee's scheduled shift, whether worked or not. Different variations of reporting laws have been enacted in seven states and the District of Columbia.

The authors find that employer noncompliance with reporting-pay laws along with only modest financial penalties for reporting-pay violations reduce the positive impact of these laws. Moreover, some employers react by shortening the lengths of shifts they schedule or classifying more workers as contractors. According to Alexander and Haley-Lock, the FLSA is still necessary for workplace rights, but it needs to be revised or new legislation needs to be enacted to provide protection for workers facing work-hour instability. The authors call for a more robust national reporting-pay law that "would require payment of the required minimum hours at a higher rate than a worker's regular rate of pay, would not be linked to a worker's scheduled shift length, and would contain greater penalties for violation."

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Comparing the Consumer Price Index with the gross domestic product price index and gross domestic product implicit price deflator

The Consumer Price Index (CPI) and the gross domestic product (GDP) price index and implicit price deflator are measures of inflation in the U.S. economy. The CPI measures price changes in goods and services purchased out of pocket by urban consumers, whereas the GDP price index and implicit price deflator measure price changes in goods and services purchased by consumers, businesses, government, and foreigners, but not importers. Thus, which one to use in a given scenario depends on one's purpose.

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Inflation can be defined as a consistent increase in an economy's "price level," or the price component of total expenditures on a set of goods and services, over a given period. The Consumer Price Index (CPI), a product of the Bureau of Labor Statistics (BLS), is perhaps the most widely used measure of inflation in the United States. The CPI measures the average change over time in the prices paid by urban consumers in the United States for a market basket of goods and services.

The Personal Consumption Expenditures (PCE) price index, produced by the U.S. Bureau of Economic Analysis (BEA), is another measure of consumer inflation and is followed closely by the U.S. Board of Governors of the Federal Reserve System (the Federal Reserve). Despite differences in scope, weight, and methodology, the CPI and the PCE price index both measure inflation from the perspective of the consumer. However, one might be interested in an index that measures price change across a broader or narrower range of goods and services—for example, an index that measures price change across a set of goods and services that includes not just consumer goods and services, but also goods and services purchased by businesses, government, and other entities.

One such measure is the price index associated with the nation's gross domestic product (GDP). Each quarter, BEA releases data on the level of, and change in, GDP. These data include a breakdown of GDP into price and quantity indexes, as well as a GDP implicit price deflator. The GDP price index and implicit price deflator are derived from the measurement of GDP, giving rise to three main issues that distinguish the GDP price indexes

from other measures of inflation. The first issue is the scope of goods and services for which prices are collected and indexes are calculated. The second is the weight attached to prices for these goods and services. The third is the methodological details of price index calculation.

This article compares and contrasts BEA's GDP price index and implicit price deflator with the BLS CPI.[1]

The CPI

The CPI is a measure of the average change over time in the prices paid by urban consumers for a constant-quality market basket of goods and services—that is, a sample of goods and services that consumers purchase for day-to-day living. Produced monthly, the CPI weights the price of each item in the market basket on the basis of the amount of spending reported by a sample of families and individuals.

The CPI has two primary inputs: prices and expenditure weights. Data on prices are collected from the BLS Commodities and Services (C&S) Survey and Housing Survey. The C&S survey collects price data on approximately 80,000 goods and services per month in roughly 23,000 retail establishments in 87 urban areas around the United States. The Housing Survey collects approximately 6,000 rent quotes per month in the same 87 urban areas. Retail establishments for which price data are collected are selected primarily via a sampling process that uses data from the Telephone Point-of-Purchase Survey (TPOPS), administered quarterly by the U.S. Census Bureau on behalf of BLS. Once retail establishments are selected for price collection, field staff employed by BLS visit the establishments, select a unique item for pricing, and continue to collect the price data monthly or bimonthly, unless the item is no longer sold or a different retail establishment is selected in the next TPOPS rotation. Housing units are selected by means of a different survey process, one that relies on data from both the decennial census and the U.S. Census Bureau's American Community Survey for sampling.

The second primary input into the CPI, the expenditure weights, is based on Consumer Expenditure (CE) survey data collected by the U.S. Census Bureau for BLS. The CE survey identifies the dollar amount households spend on a broad range of goods and services. About 14,000 1-week diaries and 28,000 quarterly interviews are collected from the current CE survey sample each year.

Once price and expenditure data are collected, price indexes can be calculated with the use of price index formulas. The CPI uses a hybrid of geometric and arithmetic mean calculation, depending on whether "lower level" or "upper level" indexes are being constructed. Currently, the CPI measures price change for 211 item categories (e.g., breakfast cereal) in 38 geographic areas (e.g., Boston–Brockton–Nashua), forming 8,018 basic item–area index cells (211 × 38) that serve as the building blocks from which aggregate indexes are constructed. These building blocks are the so-called lower level indexes. Aggregate indexes constructed from them are the so-called upper level indexes. For example, the intermediate upper level index for cereals and cereal products is constructed from three item categories: (1) flour and prepared flour mixes; (2) breakfast cereal; and (3) rice, pasta, and cornmeal. The index for cereals and cereal products can be computed for the Boston–Brockton–Nashua metropolitan area, for a set of cities that make up the Northeast urban geographic area, or for all cities in which prices are collected. The last forms an index at the level of the U.S. city average. In total, the CPI consists of thousands of indexes that measure price change for narrow and broad categories of goods and services across multiple geographic areas. The result is a set of CPI indexes that measure the average change over time in the price paid specifically by urban consumers for a constant-quality market basket of goods and services.

The CPI uses an arithmetic mean (or Laspeyres) formula for all upper level index calculation, but employs a geometric mean for approximately 60 percent of all lower level indexes in terms of weight (a Laspeyres formula is used for the remaining 40 percent). The geometric mean formula allows the CPI to reflect changes in consumer spending patterns among goods and services within item–area combinations—changes that occur in response to changes in relative price. The formula assumes that the change in quantity is equal (in percentage terms), and inversely related, to the change in price. Thus, if the relative price of one brand of bananas in the Boston–Brockton–Nashua metropolitan area increases, then the quantity purchased of that brand is assumed to decrease percentagewise by the same amount. Similarly, if a pint of ice cream increases in (per-unit) price relative to a quart of ice cream, then the quantity purchased of a pint is assumed to decrease by a percentage reflective of the change in relative price.[2]

Unlike the geometric mean formula, the Laspeyres formula implemented in the CPI is an arithmetic mean of price relatives weighted by expenditures that implicitly contain information on quantity. Because expenditure data are updated every 2 years, the month-to-month changes in upper level CPI indexes reflect price change under the assumption that quantity remains fixed. This assumption means that the CPI does not account for real-time changes that may occur in expenditure shares across aggregate categories of goods and services, perhaps in response to changes in relative price across the same aggregate categories. In short, the Laspeyres formula introduces “consumer substitution bias” into the CPI; that is, it does not account for the possibility that consumers will switch to different products or shop in different outlets in response to increases in the price of close substitutes.

In sum, the CPI is a measure of price change across a set of goods and services purchased by urban consumers and is calculated with the use of a combination of geometric and arithmetic means that can capture some degree of consumer substitution limited to goods and services within item groups.

GDP price indexes

BEA is responsible for producing the National Income and Product Accounts (NIPAs). According to BEA, “The NIPAs are a set of economic accounts that provide information on the value and composition of output produced in the United States during a given period and on the types and uses of the income generated by that production.”[3] The NIPAs are one of the three major components of the U.S. national economic accounts. The others are the industry (input–output) accounts prepared by BEA and the financial (flow-of-funds) accounts prepared by the Federal Reserve.[4] Together, the national economic accounts present a macrolevel diagnosis of the health of the U.S. economy and encompass the full scope of economic activity in the nation.

The NIPAs measure, in particular, (1) domestic income and product (i.e., output), (2) private enterprise income, (3) personal income and outlays, (4) government receipts and expenditures, (5) foreign transactions, (6) the domestic capital account, and (7) the foreign transactions capital account. The NIPA domestic income and product account provides expenditure and income summaries of GDP. GDP is one of the most important and closely followed NIPA accounts and measures the market value of final goods and services produced by the U.S. economy over a given period.[5] The expenditure and income approaches reflect two of the three ways to calculate GDP: (1) as the sum of goods and services sold to final users (expenditures approach); and (2) as the sum of income payments and other costs incurred in the production of goods and services (income approach). The third approach calculates GDP as the sum of “value added” by all industries in the economy (the production approach).[6]

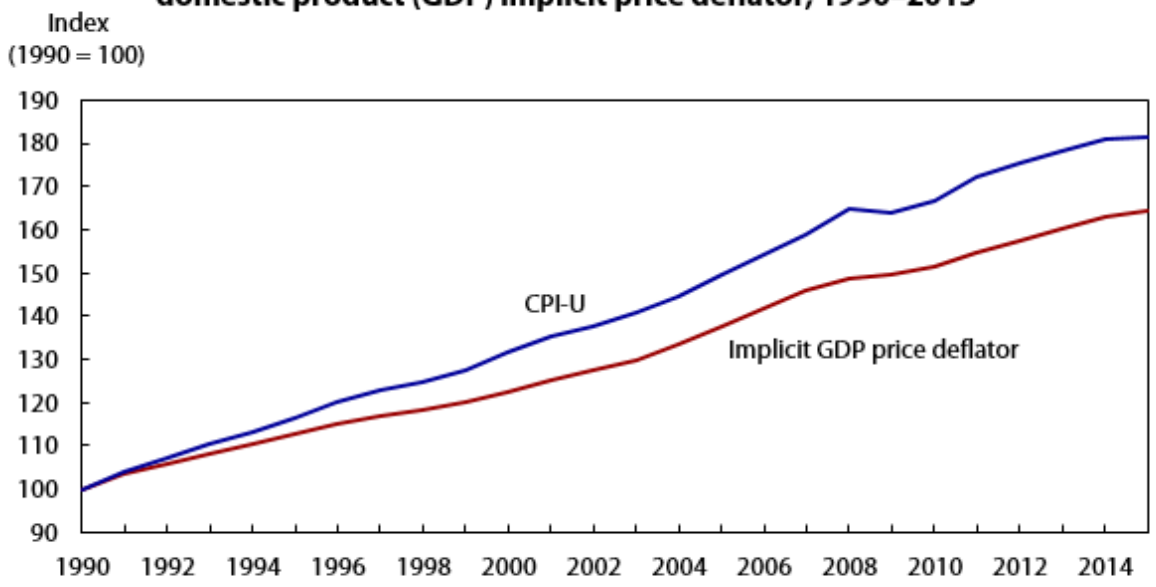
The expenditures approach “is used to identify the final goods and services purchased by persons, businesses, governments, and foreigners” and reflects a summation of personal consumption expenditures, gross private fixed investment, change in private inventories, net exports of goods and services, and government consumption expenditures and gross investment.[7] The expenditures approach is perhaps the most intuitive for illustrating the differences in scope between the CPI and the GDP price index. In this approach, the four basic categories of expenditures that contribute to GDP are expenditures made by consumers, businesses, government, and foreigners. BEA constructs a price index for each of these categories, and the various price indexes are aggregated into the overall GDP price index for the United States.

The GDP price index, like the CPI, measures price change for consumer goods and services, but also measures price change for goods and services purchased by businesses, governments, and foreigners. However, unlike the CPI, the GDP price index does not measure price change for imports.

Although the GDP price index and the CPI both measure changes in the prices of goods and services purchased by consumers, the GDP relies on the PCE price index as its measure of change in consumer prices. Also, whereas the CPI uses a Laspeyres formula, the PCE price index relies on a Fisher ideal price index calculation.[8] In addition, the CPI weights are derived from out-of-pocket expenditures by consumers, while the PCE weights are derived from out-of-pocket expenditures by consumers as well as third-party expenditures on behalf of consumers.[9] Finally, the actual goods and services for which prices are collected vary. (For example, the CPI for financial services includes only checking accounts and other bank services, as well as tax return preparation and other accounting fees, and has less than a 0.5-percent share in the CPI, whereas the PCE is more expansive and includes pension funds, regulated investment companies such as mutual funds, and securities commissions).[10]

The GDP price index is calculated with a Fisher ideal index formula, which is able to pick up changes in the allocation of expenditures by consumers across the broad categories of consumer goods and services covered by GDP. The GDP price index is similar in concept to the chained CPI-U, or CPI for All Urban Consumers.[11]

Figure 1. Consumer Price Index for All Urban Consumers (CPI-U) and gross domestic product (GDP) implicit price deflator, 1990–2015



Source: U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis.

The GDP implicit price deflator deflates the current nominal-dollar value of GDP by the chained-dollar value of GDP.[12] The chained-dollar value is derived by updating a base-period dollar value amount by the change in the GDP quantity index, which in turn is derived with the use of a Fisher ideal index formula that aggregates from component GDP quantity indexes. Once the component quantity indexes are calculated, the GDP quantity index can be derived and the GDP implicit price deflator calculated by dividing nominal GDP by real GDP. The change in the GDP implicit price deflator is roughly equal to the change in the GDP price index. As shown in figure 1, the GDP implicit price deflator has risen at a systematically lower rate than the CPI-U over time (2 percent annually for the GDP price index and implicit price deflator, versus 2.4 percent annually for the CPI-U), in part because the CPI-U employs a Laspeyres aggregation while the GDP implicit price deflator employs a Fisher ideal aggregation.

Summary

The CPI and the GDP price index and implicit price deflator are alternative measures of inflation in the U.S. economy. The choice of which one to use in a given scenario likely depends on the set of goods and services in which one is interested as a measure of price change. The CPI measures price change from the perspective of an urban consumer and thus pertains to goods and services purchased out of pocket by urban consumers. The GDP price index and implicit price deflator measure price change from the perspective of domestic production of good and services and thus pertain to goods and services purchased by consumers, businesses, government, and foreigners, but not importers. In addition, the formulas used to calculate these two measures differ.

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NOTES

[1] An earlier *Monthly Labor Review* article compares the *PPI* final demand indexes with other government indexes, including the GDP price indexes. See Jonathan Weinhagen, "Comparing new final-demand producer price indexes with other government price indexes," *Monthly Labor Review,* January 2014, https://www.bls.gov/opub/mlr/2014/article/comparing-new-final-demand-producer-price-indexes-with-other-government-price-indexes.htm.

[2] See Kenneth V. Dalton, John S. Greenlees, and Kenneth J. Stewart, "Incorporating a geometric mean formula into the CPI," *Monthly Labor Review,* October 1998, pp. 4–5, https://www.bls.gov/mlr/1998/10/art1full.pdf.

[3] *Concepts and methods of the U.S. National Income and Product Accounts* (U.S. Bureau of Economic Analysis, December 2015), chapters 1–4, p. 1-1, https://apps.bea.gov/national/pdf/chapters1-4.pdf.

[4] The industry accounts "trace the flow of goods and services among industries in the production process" and "show the value added by each industry and the detailed commodity composition of national output," while "[t]he financial accounts record the acquisition of nonfinancial and financial assets (and the incurrence of liabilities) throughout the U.S. economy, the sources of the funds used to acquire those assets, and the value of assets held and of liabilities owed" (*Concepts and methods of the U.S. National Income and Product Accounts*, chapters 1–4, p. 1-1).

[5] *Measuring the economy: a primer on GDP and the National Income and Product Accounts* (U.S. Bureau of Economic Analysis, December 2015), pp. 1-2, 8-13 https://www.bea.gov/national/pdf/nipa_primer.pdf. See also *Concepts and methods of the U.S. National Income and Product Accounts*, chapters 1–4, p. 2-7.

[6] *Concepts and methods of the U.S. National Income and Product Accounts*, chapters 1–4, pp. 2-7 to 2-11.

[7] The income approach "is used to examine the purchasing power of households and the financial status of businesses" and reflects a summation of employee compensation, taxes on production and imports, subsidies, net operating surplus (i.e., profits earned by private and government enterprises), and consumption of fixed capital. The production approach "is used to analyze the industrial composition of U.S. output." See *Concepts and methods of the U.S. National Income and Product Accounts*, chapters 1–4, pp. 2-7 to 2-10.

[8] The Fisher ideal formula is the geometric mean of a Laspeyres index and a Paasche index. In the Laspeyres index calculation, price relatives are weighted by quantity in a base period (i.e., some point in time in the past). In the Paasche index calculation, price relatives are weighted by quantity in the current period. In the case of price indexes, the Fisher ideal index allows for the measurement of real-time changes in quantity.

[9] Third parties are entities that make payments on behalf of consumers, such as health insurance companies when they pay a medical bill to meet their insurance obligation.

[10] Clinton P. McCully, Brian C. Moyer, and Kenneth J. Stewart, "A reconciliation between the Consumer Price Index and the Personal Consumption Expenditures price index" (U.S. Bureau of Economic Analysis and U.S. Bureau of Labor Statistics, September 2007), p. 12, https://www.bea.gov/papers/pdf/cpi_pce.pdf. See also Clinton P. McCully, "Trends in consumer spending and personal saving, 1959–2009," *Survey of Current Business* (U.S. Bureau of Economic Analysis, June 2011), pp. 14–23, especially pp. 17–18, https://www.bea.gov/scb/pdf/2011/06%20June/0611_pce.pdf.

[11] The chained CPI-U is a closer approximation to a cost-of-living index than the traditional CPI-U is. The chained CPI-U is designed to account for the product and outlet substitution bias that exists in the traditional CPI-U, which fails to capture changes in expenditures across consumer items (and the outlets where they buy them) in response to changes in price.

[12] As stated by BEA, an "implicit price deflator is the ratio of the current-dollar value of a series, such as gross domestic product (GDP), to its corresponding chained-dollar value, multiplied by 100." (See "What is an implicit price deflator and where can I find the GNP IPD?" in *Frequently asked questions* (U.S. Bureau of Economic Analysis), https://www.bea.gov/faq/index.cfm?faq_id=513.

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ANNOUNCEMENT

MARCH 2016

Nominations sought for 2016 Julius Shiskin Award

Nominations are invited for the annual Julius Shiskin Memorial Award for Economic Statistics. The award is given in recognition of unusually original and important contributions in the development of economic statistics or in the use of statistics in interpreting the economy. Contributions can be in statistical research, development of new statistical measures or statistical tools, use of economic statistics to analyze and interpret economic activity, management of statistical programs, or application of data production techniques. The award was established in 1980 by the Washington Statistical Society (WSS) and is now cosponsored by the WSS, the National Association for Business Economics, and the Business and Economics Statistics Section of the American Statistical Association (ASA). The 2015 award recipient was Brent Moulton, Associate Director for National Economic Accounts of the Bureau of Economic Analysis (BEA), for his leadership in implementing major innovations into the U.S. national accounts, international standards for national accounts, and expanded integration of U.S. statistical programs. He is also recognized for his work at the Bureau of Labor Statistics (BLS) in developing innovations that improved the reliability of the Consumer Price Index (CPI).

The award is in memory of Julius Shiskin, who had a varied and remarkable public service career. At the time of his death in 1978, "Julie" was the Commissioner for BLS. Earlier, he served as the Chief Statistician at the Office of Management and Budget (OMB) and the Chief Economic Statistician and Assistant Director of the Census Bureau. Throughout his career, he was known as an innovator. At Census, he was instrumental in developing an electronic computer method for seasonal adjustment. In 1961, he published *Signals of Recession and Recovery,* which laid the groundwork for the calculation of monthly economic indicators, and he developed the monthly Census report *Business Conditions Digest* to disseminate them to the public. In 1969, he was appointed Chief Statistician at OMB, where he developed the policies and procedures that govern the release of key economic indicators (Statistical Policy Directive Number 3) and originated a *Social Indicators* report. In 1973, he was selected to head BLS where he was instrumental in preserving the integrity and independence of BLS labor force data and directed the most comprehensive revision in the history of the CPI, which included a new CPI for all urban consumers.

Nominations for the 2016 award are now being accepted. Individuals and groups in the public or private sector from any country can be nominated. The award will be presented with an honorarium of $1,000 plus additional recognition from the sponsors.

For questions or more information, please contact Thomas Evans, Julius Shiskin Award Committee Secretary, by email at evans.thomas@bls.gov or call 202-691-6354.

Completed nominations must be received by March 31, 2016.

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