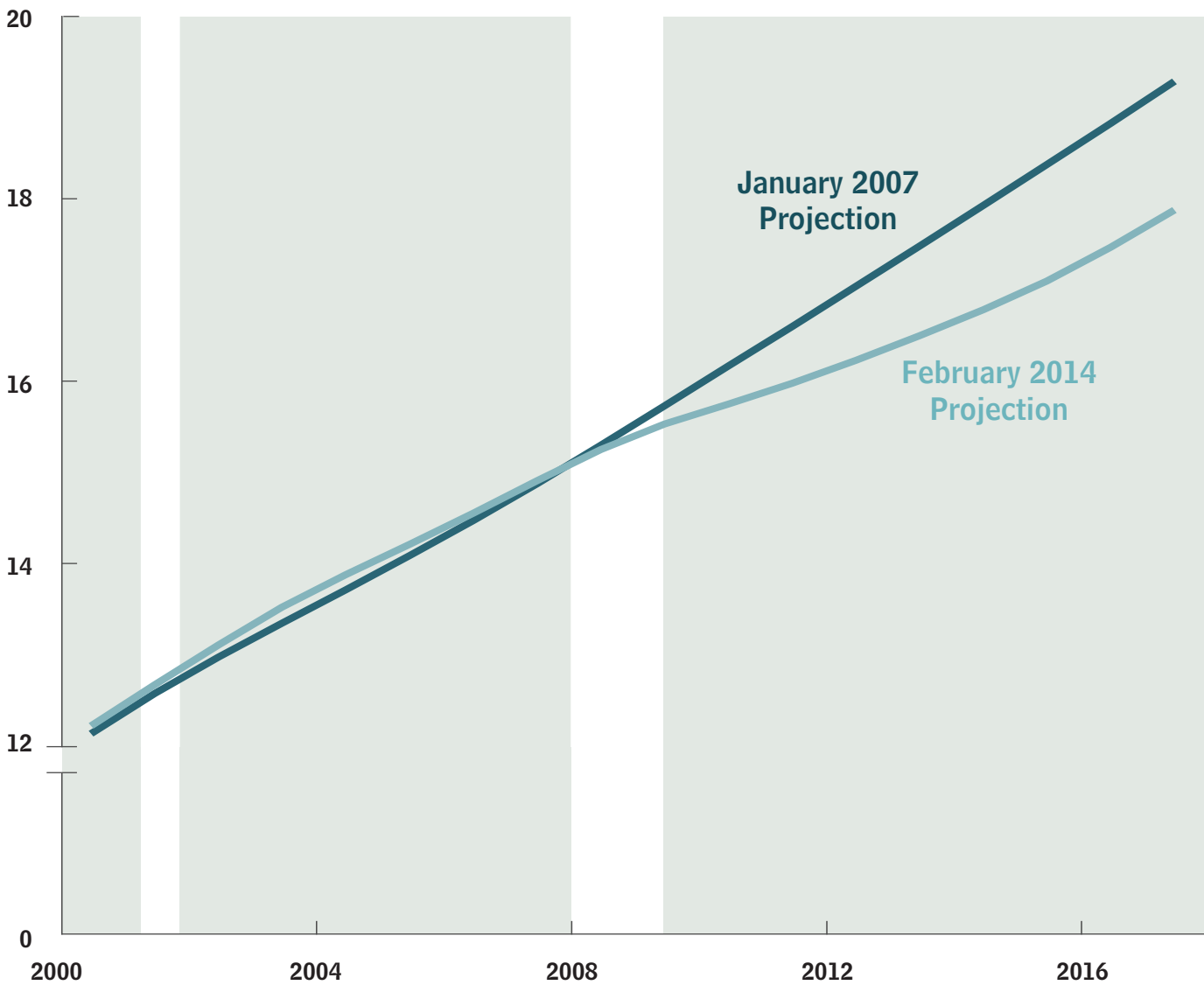


# CBO

## Revisions to CBO's Projection of Potential Output Since 2007

Trillions of 2009 Dollars



Real Potential Gross Domestic Product

FEBRUARY 2014

---

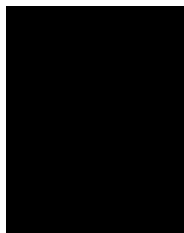
## Notes

All years are calendar years.

Numbers in the text and table may not add up to totals because of rounding.

White vertical bars in the figures indicate periods of recession. (A recession extends from the peak of a business cycle to its trough.)

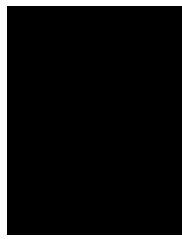
---



# Contents

<b>Summary</b>	1
How Does CBO Use Estimates of Potential Output?	1
How Does CBO Estimate Potential Output?	1
Why Has CBO Revised Its Projection of Potential Output?	1
How Did CBO Account for Revisions to the National Income and Product Accounts?	3
<b>Methodology for Projecting Potential Output</b>	3
Calculation of Growth Rates	4
Estimation for the Nonfarm Business Sector	4
Estimation for Other Sectors	5
<b>Reasons for Revising the Projection of Potential Output</b>	5
<b>The Recession and Weak Recovery</b>	5
Effects on Potential Labor Hours in the Nonfarm Business Sector	6
Effects on Capital Services in the Nonfarm Business Sector	7
Effects on Potential TFP in the Nonfarm Business Sector	8
<b>Reassessment of Trends</b>	8
Effects on Potential Labor Hours in the Nonfarm Business Sector	9
Effects on Capital Services in the Nonfarm Business Sector	9
Effects on Potential TFP in the Nonfarm Business Sector	10
<b>Revisions to Historical Data</b>	11
Effects on Potential Labor Hours in the Nonfarm Business Sector	12
Effects on Capital Services in the Nonfarm Business Sector	12
Effects on Potential TFP in the Nonfarm Business Sector	12
Effects on Other Sectors	12
<b>Effects of Federal Fiscal Policy and Other Factors</b>	12
<b>Appendix: CBO's Method for Projecting Potential Hours in the Nonfarm Business Sector</b>	15
<b>List of Tables and Figures</b>	20
<b>About This Document</b>	21





# Revisions to CBO's Projection of Potential Output Since 2007

## Summary

As part of its economic and budgetary projections, the Congressional Budget Office (CBO) estimates past and future potential output—also called potential gross domestic product (GDP), and defined as the maximum sustainable amount of real (inflation-adjusted) output that the economy can produce. For various reasons, CBO's projections for potential GDP in a specific year can change over time. This report examines a change in CBO's projections of potential output for the year 2017, comparing the projection it published in January 2007 with the one it released in February 2014.<sup>1</sup> From the earlier projection to the more recent, CBO's projection for potential output in 2017 declined by 7.3 percent (see Figure 1).

## How Does CBO Use Estimates of Potential Output?

CBO uses potential output to guide its projection of actual output. CBO's projections of economic activity in the later years of the standard 10-year projection periods are based not on forecasts of cyclical fluctuations in the economy but on the assumption that actual output will gradually approach potential output. For example, in *The Budget and Economic Outlook: 2014 to 2024*, CBO projects that actual economic output will return to its historical relationship with potential output in 2017 and later years. Because of the central role that projections of potential output play in forming the baseline projections of economic activity and income, projections

of potential output also play a critical role in CBO's baseline projections of federal revenue and spending.

## How Does CBO Estimate Potential Output?

CBO makes its estimates of potential output on the basis of data on capital, labor, productivity, and actual GDP; statistical and other modeling methods for assessing cyclical influences and long-term trends in the economy; and analyses of the economic effects of federal tax and spending policies. In general, CBO's projections for 10-year periods are based on its estimates of economic trends during the most recent full business cycle and in the as-yet-incomplete, current cycle. CBO's projections also incorporate predictions of the effects of federal tax and spending policies embodied in current law.

## Why Has CBO Revised Its Projection of Potential Output?

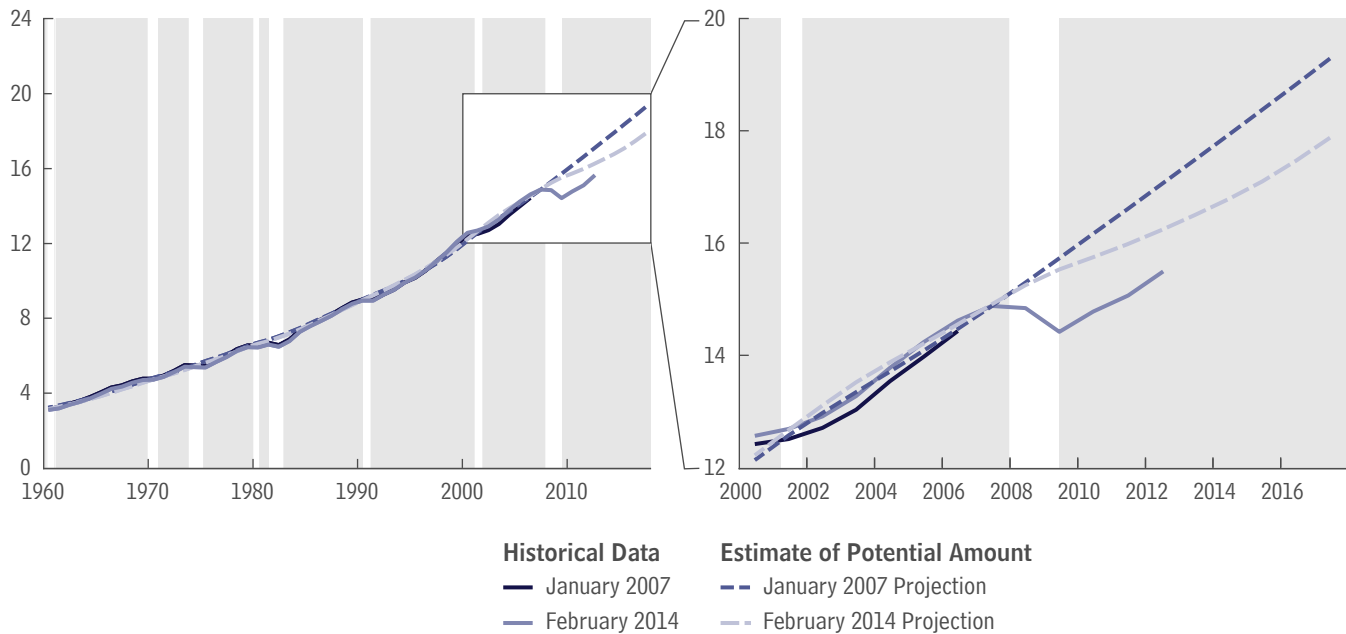
CBO revises projections of potential output with each semiannual economic forecast to take into consideration changes in current law, revised and new data, and new analysis and improvements in its methods of estimation. To assess the role of the most recent recession in those revisions, this report focuses on the change between the projections that CBO published in January 2007 and in February 2014 for 2017, the last projection year they had in common. From the earlier projection to the later one, CBO reduced by 7.3 percent the amount it projects for potential GDP in 2017. That calculation excludes changes in CBO's projection that arise from the recent revisions (described below) to the definition of GDP by the Commerce Department's Bureau of Economic Analysis (BEA).

---

1. See Congressional Budget Office, *The Budget and Economic Outlook: 2014 to 2024* (February 2014), [www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010); Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* (January 2007), [www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291).

**Figure 1.****Real Gross Domestic Product**

(Trillions of 2009 dollars)



Sources: Congressional Budget Office; Bureau of Economic Analysis.

Notes: Real gross domestic product is the total market value of goods and services produced by labor and capital in the United States during a given period, adjusted to remove the effects of inflation.

Data are annual. Historical data originally published in *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* ([www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291)) are plotted through 2005. Historical data originally published in *The Budget and Economic Outlook: 2014 to 2024* ([www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010)) are plotted through 2012. Projections are plotted through 2017.

Four main sources account for that 7.3 percent reduction, in CBO's judgment, of its projection of potential GDP for 2017 (see Table 1):

- The impact of cyclical weakness in the economy accounts for just 1.8 percentage points, or about one-fourth, of the difference from the 2007 projection, even though the downward revision to potential GDP coincided with the severe recession of 2007–2009 and the subsequent slow recovery.
- Reassessments of economic trends that were in process before the recession began account for 4.8 percentage points, or about two-thirds, of the revision. For example, after the National Bureau of Economic Research designated the fourth quarter of 2007 as a business cycle peak, CBO concluded that trend rates of growth in the 2000s had generally been lower than they were in the 1990s.
- Revisions to historical data for the period before the recent recession lowered the projection of potential

output by 0.1 percentage points, a very small share of the revision.

- The effects of changes in federal tax and spending policies, higher federal deficits, changes in the relative size of various sectors of the economy, and other factors after 2007 apart from cyclical conditions account for the remaining 0.7 percentage-point reduction, or about one-tenth of the revision.

Most of the total downward adjustment in potential GDP is in the nonfarm business sector; other sectors of the economy account for smaller portions.

This accounting of the sources of the revision is rough and subject to considerable uncertainty. In particular, because the factors that affect potential GDP interact with one another in complex ways, it is difficult to separate their various effects. For example, CBO estimates that increases in federal spending and decreases in federal tax revenues that led to the surge in federal debt over the period from 2007 to 2014 moderated the negative effects

**Table 1.**

### Contributions to the Revision of CBO's Projection of Potential Output for 2017 Between 2007 and 2014

(In percentage points)

	Recession and Weak Recovery	Reassessment of Trends	Revisions to Prerecession Data	Fiscal Policy and Other Factors	All Sources
Nonfarm Business Sector					
Potential labor hours <sup>a</sup>	-0.7	-3.0	-0.3	1.2	-2.7
Capital services <sup>b</sup>	-0.6	-0.7	0.2	-1.3	-2.4
Potential total factor productivity <sup>c</sup>	-0.5	-0.7	-0.6	0.4	-1.4
Other Sectors	n.a.	-0.3	0.7	-1.0	-0.7
<b>Total (Percent)</b>	<b>-1.8</b>	<b>-4.8</b>	<b>-0.1</b>	<b>-0.7</b>	<b>-7.3</b>

Source: Congressional Budget Office.

Notes: The contributions to the revision reported in the table exclude changes in CBO's projection that are the result of the revised definition of gross domestic product presented in the comprehensive revision to the national income and product accounts released by the Bureau of Economic Analysis in July 2013. See Stephanie H. McCulla, Alyssa E. Holdren, and Shelly Smith, "Improved Estimates of the National Income and Product Accounts: Results of the 2013 Comprehensive Revision," *Survey of Current Business*, vol. 93, no. 9 (September 2013), pp. 14–45, <https://bea.gov/scb/toc/0913cont.htm>.

n.a. = not applicable.

- Potential labor hours are labor hours adjusted for cyclical conditions.
- Capital services is a measure of the flow of services from the stock of capital goods that is available for production.
- Total factor productivity is average output (adjusted for inflation) per unit of combined labor and capital services. Potential total factor productivity is total factor productivity adjusted for cyclical conditions.

of the weak economy on potential GDP. In this analysis, however, that increase in debt is counted solely as having led to a reduction in capital investment and hence to a reduction in the growth of services from capital assets such as equipment, structures, inventories, and land.

#### How Did CBO Account for Revisions to the National Income and Product Accounts?

CBO's current projections incorporate data from the comprehensive revision to the national income and product accounts (NIPAs) released by BEA in July 2013. That revision expanded the definition of GDP, raising its values relative to those used by CBO in 2007. The most notable change was in the measure of investment, which now includes new categories for intellectual property products and an expanded set of ownership transfer costs for home purchases. Overall, BEA raised its estimates of nominal GDP in each year between 1950 and 2012 by an average of about 3.2 percent. In addition, BEA's revision changed the reference year for prices and real output: BEA now reports prices in each year relative to prices in 2009, and real output is reported in 2009 dollars; previously, BEA had used 2005 as its reference year.<sup>2</sup>

To account for the revision to the measure of real output and to facilitate comparisons between its current and previous estimates of potential output, CBO adjusted the earlier projections presented in this analysis in two ways. First, to account roughly for the change in the definition of GDP—to put GDP in the previous and latest projections on a consistent basis—CBO adjusted its previous projections of nominal output upward by about 3.2 percent for all years. Second, CBO adjusted the reference year for the calculation of inflation-adjusted values in its previous projections to 2009, so that earlier projections of real potential output are presented here in 2009 dollars.

#### Methodology for Projecting Potential Output

CBO uses variants of the standard Solow growth model to estimate and project potential output in the economy's

- For information on the revisions to GDP, see Stephanie H. McCulla, Alyssa E. Holdren, and Shelly Smith, "Improved Estimates of the National Income and Product Accounts: Results of the 2013 Comprehensive Revision," *Survey of Current Business*, vol. 93, no. 9 (September 2013), pp. 14–45, <https://bea.gov/scb/toc/0913cont.htm>.

five sectors.<sup>3</sup> At the core of the model for the nonfarm business sector (which historically accounts for just over three-quarters of all economic activity) is a production function, an equation that relates potential output in that sector to three factor inputs. Other models are used to estimate and project potential output for the four smaller sectors—agriculture and forestry, households, nonprofit organizations serving households, and government—on the basis of estimates of potential employment in those sectors or, in the case of the household sector, on the basis of the size of the owner-occupied residential housing stock.<sup>4</sup>

### Calculation of Growth Rates

For many of the inputs used to project potential output in those various sectors, CBO develops its projection by estimating a trend growth rate for the input during the most recent full business cycle and the current, as-yet-incomplete, cycle, and then extending that estimate into the future. That is, the projected trend for those inputs is essentially the trend estimated over recent history.<sup>5</sup>

CBO determines trend growth rates by attempting to remove the influence of the business cycle and then using the remaining changes in the variables to estimate time trends with constant growth rates over at least one business cycle.<sup>6</sup> The agency assesses the cyclical component of variables by estimating the relationships between those variables and a measure of the unemployment rate gap—namely, the gap between the actual unemployment rate and CBO's estimate of the underlying long-term rate of unemployment. The underlying long-term rate is the

3. For additional information, see *CBO's Method for Estimating Potential Output: An Update* (August 2001), [www.cbo.gov/publication/13250](http://www.cbo.gov/publication/13250). The agency uses data from a variety of sources, including BEA's NIPA reports and information produced by the Bureau of Labor Statistics about the labor force.
4. Most of the output of the household sector is imputed rent for owner-occupied housing.
5. The dates of business cycle peaks and troughs are conventionally determined by the Business Cycle Dating Committee of the National Bureau of Economic Research, which defines a recession as "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales." For more information, see National Bureau of Economic Research, "US Business Cycle Expansions and Contractions" (accessed February 26, 2014), [www.nber.org/cycles.html](http://www.nber.org/cycles.html).

rate that occurs for reasons other than the business cycle and short-term structural factors that affect the unemployment rate. For example, CBO estimates that this underlying rate was 5 percent throughout most of the first decade of the 2000s but that it has risen in the past several years because of changes in long-term structural factors. Actual total factor productivity (or TFP, the maximum sustainable average real output per unit of combined labor and capital services) tends to exceed (or fall below) its potential level when the actual rate of unemployment falls below (or exceeds) the underlying long-term rate. An important implication of CBO's methodology is that recessions typically have little effect on historical estimates of potential output because the methodology aims to exclude cyclical effects.

### Estimation for the Nonfarm Business Sector

Potential output for the nonfarm business sector is determined on the basis of three inputs:

- Potential labor used in the sector (that is, the maximum sustainable number of hours of work for those employed in the sector),
- Services from the sector's stock of capital, and
- The sector's potential TFP.<sup>7</sup>

The first key input to potential output is potential labor hours. CBO projects the size of the potential labor force

6. Because the trends in potential labor inputs and total factor productivity typically vary from one business cycle to the next, CBO generally estimates a separate trend for each cycle, from one peak to the next. Occasionally, however, the agency estimates a single trend over two or more cycles. CBO estimates trends essentially as the average percentage changes over periods of time—specifically, how the natural logarithm of a variable is related to a linear time trend.
7. Because growth in TFP reflects growth in output that is not directly attributable to growth in hours of labor or capital services, it is the residual in the production function. Economists typically attribute growth in TFP to technological change, but a variety of factors not included in the model can affect TFP if they cause output to increase more quickly or more slowly than do the measured inputs of potential output. Those factors include changes in the rate at which capital is used, in the quality of labor or the amount of human capital (which CBO does not account for separately), or in businesses' organization or culture; spillovers from investments in capital; or errors in the measurement of output, labor supply, or capital services.



using its projections of the size of the working-age population and of potential rates of participation in the labor force by people in different age groups and by sex. The agency then projects aggregate potential employment by multiplying the number of people in the potential labor force by the estimated underlying long-term rate of unemployment and subtracting that from the potential labor force. The agency separately estimates and projects trends in employment in the four smaller sectors of the economy—agriculture and forestry, households, nonprofits serving households, and government—as well as self-employment in nonfarm business. Potential employment in the nonfarm business sector is calculated as the difference between the agency's estimates of aggregate employment and employment in the smaller sectors. CBO also estimates and projects potential average weekly hours per worker in the nonfarm business sector and combines the result with its estimate of potential employment in the sector to calculate the sector's total potential labor hours. The projection of total potential hours in the nonfarm business sector is thus made on the basis of projections of the potential labor force, the underlying long-term rate of unemployment, trends in employment in other sectors, and trends in average hours per worker in the nonfarm business sector. (The full sequence of employment calculations is described in the appendix.)

Another key input to potential output is capital services. CBO bases its estimates and projections of capital services in the nonfarm business sector on the estimated and projected values of the nonfarm business capital stock. The agency does not cyclically adjust capital services because those services are defined to equal the maximum sustainable flow of services that could be provided if the entire capital stock was being used. The projection of the capital stock reflects the agency's projections of business investment, which are consistent with the amount of labor that businesses are projected to employ, factors determining the cost of capital, and other aspects of economic conditions.

The third key input to potential output is total factor productivity. For the nonfarm business sector, the agency removes business cycle effects from historical TFP using the relationship between TFP and the unemployment rate gap, and then it projects potential TFP by extending the recent trend (sometimes with adjustments to account for specific factors not reflected in recent history).

### **Estimation for Other Sectors**

CBO estimates and projects potential output in the four smaller sectors of the economy using simpler production functions. For agriculture and forestry and for nonprofits serving households, potential output is projected using trends in labor productivity in those sectors. For the household sector, potential output is projected as a flow of services from the owner-occupied housing stock, which is projected on the basis of forecasts of household formation and income. For the government sector, potential output is projected using trends in labor productivity and depreciation of government capital.

### **Reasons for Revising the Projection of Potential Output**

CBO regularly updates its estimates and projections of potential GDP to account for newly released data, revisions to existing data, and new legislation. As necessary, the agency also reviews and revises its methods of estimating the determinants of potential output by recalculating trends in inputs, reassessing the persistence of economic developments, and refining the equations in its models.

Particularly significant changes in CBO's estimates of potential output can occur after the economy reaches a new business cycle peak, an event that usually leads CBO to change the period over which it estimates various trends. Typically, a trend is considered to extend from at least one previous business cycle through the most recent quarter of data (because the peak of the current cycle is not known at the time of a forecast). Thus, according to the data available in early 2007, the United States was in the midst of a business cycle that had begun in the first quarter of 2001 but had not yet peaked; the last full peak-to-peak business cycle had begun in the third quarter of 1990 and ended in early 2001. As a result, the historical trends used at the time to project future potential employment began in the third quarter of 1990. After the National Bureau of Economic Research determined that a peak had occurred in the final quarter of 2007, CBO introduced new trends that began at the peak in the first quarter of 2001 and were distinct from the trends estimated for the 1990–2001 business cycle.

### **The Recession and Weak Recovery**

CBO estimates that the severe recession and ensuing weakness in the economy lowered projected potential

output in 2017 by 1.8 percent, thus explaining about one-quarter of the total downward revision since 2007. The nonfarm business sector accounts for most of that revision. CBO lowered its projection of potential labor hours and potential TFP because of the recession and weak recovery; most of the reduction in projected capital services attributable to the recession and weak recovery is a consequence of the reductions in those other variables.

A typical recession has little effect on CBO's estimates of potential output because those estimates are intended to exclude the effects of the business cycle on labor hours and TFP, as described above. However, CBO has explicitly adjusted its projections of potential output over the past few years and for the coming decade to reflect both the unusual severity of the recent recession and the unusual sluggishness of the subsequent recovery. International experience shows that downturns in the wake of housing booms and financial crises tend to last longer than other downturns do and that they tend to be followed by protracted periods of recovery. Research also shows that such recessions—even more than other types of recessions—dampen investment, raise the rate and average duration of unemployment, and reduce the number of hours that people work. Those recessions tend not only to reduce output to something less than it would have been otherwise but also to reduce the economy's potential to produce output—even after all available resources are reemployed.<sup>8</sup>

### Effects on Potential Labor Hours in the Nonfarm Business Sector

CBO estimates that the weak economic conditions of the past several years have been depressing potential labor hours by dampening potential labor force participation

8. See, for example, Carmen M. Reinhart and Kenneth S. Rogoff, *Recovery from Financial Crises: Evidence from 100 Episodes*, Working Paper 19823 (National Bureau of Economic Research, January 2014), [www.nber.org/papers/w19823](http://www.nber.org/papers/w19823); Michael D. Bordo and Joseph G. Haubrich, *Deep Recessions, Fast Recoveries, and Financial Crises: Evidence From the American Record*, Working Paper 12-14 (Federal Reserve Bank of Cleveland, June 2012), <http://tinyurl.com/nryjky9>; Greg Howard, Robert Martin, and Beth Anne Wilson, *Are Recoveries From Banking and Financial Crises Really So Different?* International Finance Discussion Paper 1037 (Board of Governors of the Federal Reserve System, November 2011), <http://go.usa.gov/Wg94>; and Carmen M. Reinhart and Kenneth S. Rogoff, "The Aftermath of Financial Crises," *American Economic Review*, vol. 99, no. 2 (May 2009), pp. 466–472, <http://tinyurl.com/ml9kchv>.

(because the adverse conditions in labor markets have led some people to leave the labor force permanently) and by raising the underlying long-term rate of unemployment (because the greatly elevated rate of long-term unemployment is likely to have a persistent effect on the unemployment rate).<sup>9</sup> Those effects influence CBO's interpretation of the recent weakness in labor markets as well as its projections of potential hours worked in the nonfarm business sector.

During periods of cyclical economic weakness, more people than usual are likely to stay in school than to seek work and some others may give up looking for work because of a lack of opportunities. Many people in both groups are likely to return to the labor force once the economy improves. However, the particularly acute shortage of jobs since the end of the last recession, reflected in part in the unusually high rate of long-term unemployment and the very slow growth of labor compensation, has led some people to retire earlier than they might have otherwise or induced them to leave the labor force permanently in other ways.<sup>10</sup> CBO projects that the rate of potential labor force participation will be 0.4 percentage points lower in 2017 than it would have been in the absence of the recession and slow recovery.

In addition, long-term unemployment (lasting more than 26 weeks) has led to subsequent difficulties for many affected people. First, the stigma of being out of work for an extended period tends to worsen employment

9. For more information on how the recession and slow recovery have affected the labor market, see Congressional Budget Office, *The Slow Recovery of the Labor Market* (February 2014), [www.cbo.gov/publication/45011](http://www.cbo.gov/publication/45011).

10. In particular, some of the people who left the labor force because of the recession applied for and were granted Social Security Disability Insurance (DI), which pays benefits to nonelderly adults who have held jobs but who are judged to be unable to perform "substantial" work because of a disability. In CBO's view, the difficulty in finding work during the past several years made it worthwhile for some unemployed people with moderate disabilities to apply for DI rather than to search for employment that accommodates those disabilities. Indeed, the number of applications for DI averaged 2.8 million per year between 2009 and 2013, up from an annual average of 2.2 million during the previous five years—a larger increase than can be explained by the aging of the population or by other indicators of workers' health. Once in the DI program, very few recipients return to the labor force. For a more detailed discussion of DI, see Congressional Budget Office, *Policy Options for the Social Security Disability Insurance Program* (July 2012), [www.cbo.gov/publication/43421](http://www.cbo.gov/publication/43421).

prospects, as some employers infer that someone who has been unemployed for a long time is not a valuable worker. Second, long-term unemployment often leads to erosion of work skills.<sup>11</sup>

CBO estimates that the combination of the two factors has led to an increase in the underlying long-term rate of unemployment in recent years, with the increment for 2017 amounting to 0.5 percentage points. Thus, in 2007, CBO estimated that the underlying rate would remain at 5.0 percent for the next decade and beyond, but CBO currently projects that it will be 5.5 percent at the end of 2017. Beyond 2017, the people who have remained unemployed for a long time will suffer from a continued erosion of skills, which would tend to increase the underlying long-term rate of unemployment, CBO estimates. However, an increasing number of people who have been unemployed for a long time during this business cycle will reach retirement age or another point at which they would be expected to leave the labor force even without the recession and slow recovery, which would tend to decrease the underlying long-term rate of unemployment. On balance, CBO expects that the reduction in potential output from the effect of long-term unemployment on potential hours worked will fade to about 0.25 percent by 2024.

After accounting for those estimated effects of the recession and the weak recovery on potential labor force participation and the underlying long-term rate of unemployment, the remaining movements in hours worked during the past several years—relative to CBO's estimates of potential hours worked, which incorporate long-term trends such as retirement of members of the baby-boom generation—have been roughly in line with

experience during previous recessions and recoveries. That is, the remaining decline in hours since the recession began can largely be explained by the weakness in the labor market as measured by the difference between the elevated unemployment rate and CBO's 2007 estimate of the underlying long-term rate of unemployment.

To illustrate that point, CBO produced an alternative intermediate estimate for potential hours that includes separate trends for the 1990–2001 and 2001–2007 business cycles and incorporates the most recent revised data for the period up to 2007, but excludes any data from 2007 onward (see Figure 2). That alternative projection shows a sizable downward revision in potential hours for 2017 relative to the projection made in 2007. Indeed, that revision is nearly as large as CBO's total revision to potential hours, which also includes both the effect of more recent data and the upward revision to the underlying long-term unemployment rate discussed above. The small difference between that alternative projection of potential hours and CBO's actual projection illustrates the small revision to the projection of potential hours that is attributable solely to the weakness in actual hours since 2007. That revision is small because CBO's methodology attributes most of the decline in actual hours since 2007 to cyclical weakness and does not let that decline have a significant effect on the estimated trend in potential hours—even though CBO raised its estimate of the underlying rate of unemployment since 2007, which suggests a smaller unemployment rate gap and thus suggests that more of the recent weakness in labor markets reflects longer-term trends.

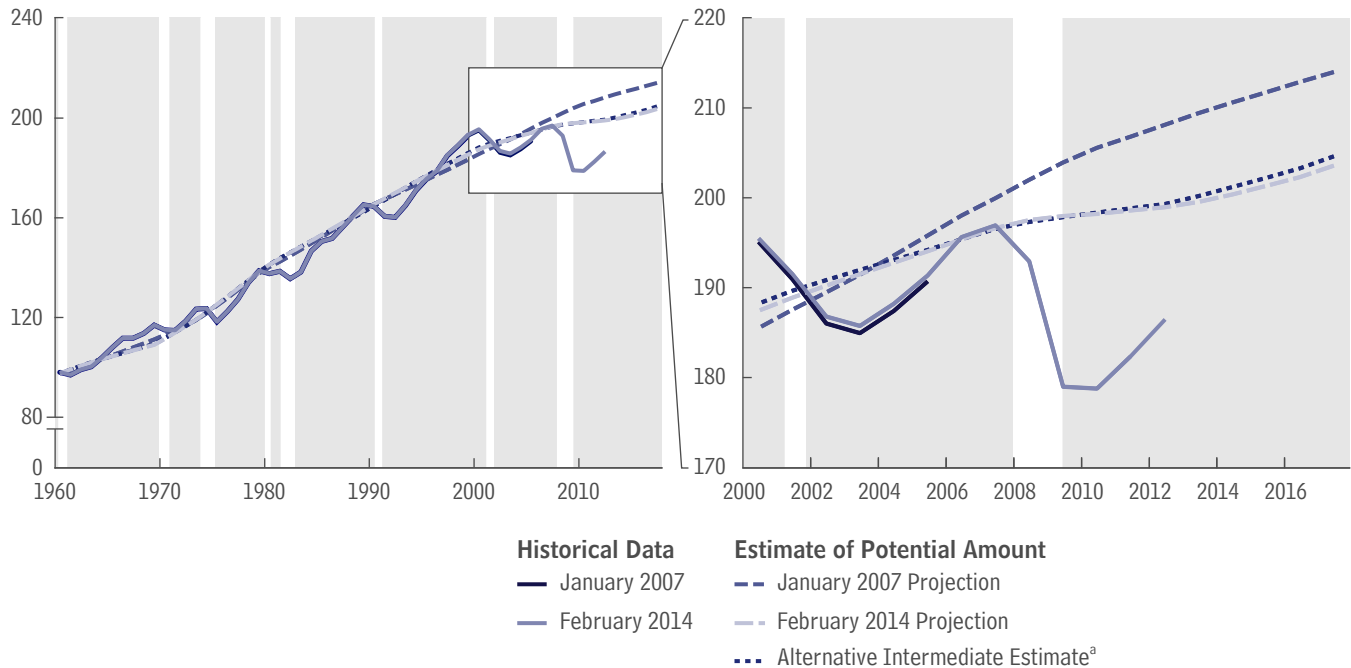
### Effects on Capital Services in the Nonfarm Business Sector

CBO projects that, by 2017, the primary effect of the recession and the weak recovery on capital services will occur through the number of workers and TFP: Fewer workers require proportionately less capital, all else being equal, and lower TFP tends to reduce investment as well. In addition, in CBO's assessment, economic weakness affected the amount of productive capital because of the plunge in business investment during the recession: Investment fell when the cost of financing spiked, the demand for goods and services fell, and uncertainty increased. CBO expects that businesses will eventually make up for the investment forgone during the period but that the recovery in investment will not be complete by 2017.

11. One study indicates that employers were much less likely to respond to a résumé from an applicant who had been unemployed for more than six months than to an otherwise identical résumé from an applicant who had not been out of work for that long. See Rand Ghayad, "The Jobless Trap" (draft, 2013), <http://tinyurl.com/ob6laqz> (PDF, 733 KB). Earlier research also suggests that long-term unemployment leads to subsequent difficulties. See, for example, Marianne Bertrand, Claudia Goldin, and Lawrence F. Katz, "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors," *American Economic Journal: Applied Economics*, vol. 2, no. 3 (July 2010), pp. 228–255, <http://tinyurl.com/nh94ysq>; and Martin Biewen and Susanne Steffes, "Unemployment Persistence: Is There Evidence for Stigma Effects?" *Economics Letters*, vol. 106, no. 3 (March 2010), pp. 188–190, <http://tinyurl.com/pwumhpl>.

**Figure 2.****Nonfarm Business Hours**

(Billions of hours)



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: Nonfarm business hours are the total hours worked by all persons in the nonfarm business sector.

Data are annual. Historical data originally published in *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* ([www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291)) are plotted through 2005. Historical data originally published in *The Budget and Economic Outlook: 2014 to 2024* ([www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010)) are plotted through 2012. Projections are plotted through 2017.

- a. Estimated using 2014 methods and 2014 historical data, but using data only through 2006 and CBO's projection of underlying long-term unemployment as of 2007.

### Effects on Potential TFP in the Nonfarm Business Sector

By CBO's assessment, the recession hampered growth in potential total factor productivity by delaying the reallocation of resources to their most productive uses, slowing the rate at which workers gained new skills as technology evolved, and curtailing businesses' spending on improvements in production methods. In CBO's view, the recession lowered the growth rate of potential TFP during the 2010–2014 period by 0.1 percentage point per year, thus reducing the projected level of TFP by about one-half of a percent thereafter.

### Reassessment of Trends

CBO estimates that it has revised downward its projection of potential output in 2017 by 4.8 percent

since 2007 because of a reassessment of long-term trends that, although already in progress before the business cycle peaked in 2007, did not become apparent until after that peak had been identified. Based on that estimate, this factor explains about two-thirds of the total downward revision to the agency's projection of potential output for 2007. CBO's 2007 projection of potential GDP was based on its extrapolation of trends in the components of potential output from the previous business cycle of the 1990s. After the National Bureau of Economic Research designated the fourth quarter of 2007 as a business cycle peak, CBO concluded that trend rates of growth in the 2000s had generally been lower than they were in the 1990s, and the agency estimated new trends between the business cycle peaks in 2001 and 2007. In addition, in a few important instances, CBO changed the way that it projects trends altogether, and those changes

ended up reducing the projection of potential output as well. A partly offsetting upward revision came from the somewhat stronger recent trend in capital services that is suggested by BEA's comprehensive revision of the NIPAs.<sup>12</sup> Nearly all of the revisions to trends affected CBO's projections of potential output in the nonfarm business sector; relatively minor reassessments of trends in the rest of the economy had little net effect on CBO's estimates of potential output.

### **Effects on Potential Labor Hours in the Nonfarm Business Sector**

About 3.0 percentage points (roughly 40 percent) of the downward adjustment in CBO's projection of potential output for 2017 is estimated to be directly attributable to a reassessment of the trend of potential hours worked in the nonfarm business sector (see Figure 2). That revision, which accounts for more than half of the revision attributable to the reassessment of trends, is the result of changes in the historical estimates of and projections for several underlying labor market variables: the potential labor force, potential employment in different sectors, and potential average hours worked in nonfarm business (see the appendix). For the most part, those changes involved a reassessment of labor market trends during the 2000s, taking into account a substantial shift from earlier trends that did not become fully apparent until the 2007 business cycle peak was recognized.

In early 2007, CBO's estimate of the trend in potential hours worked in the nonfarm business sector was strongly influenced by data from the late 1990s, when job growth was unusually strong and the unemployment rate was very low. Following its general practice of estimating trends on the basis of the most recent business cycle and

the as-yet-incomplete current cycle, CBO projected that the trend in hours worked during the preceding 17 years would continue for several more years until the retirement of the baby-boom generation began to slow the growth of the labor force. The data available in early 2007 appeared consistent with that interpretation: Actual hours worked were growing considerably more rapidly than were estimated potential hours, and actual hours were approaching their estimated potential in a manner that was reminiscent of the mid-1990s. Those conditions suggested that robust growth in hours might well continue for some time.

Once the 2007 business cycle peak was recognized, however, CBO determined that the conditions of the 1990s had not persisted into the 2000s and that the trends it had previously estimated for labor market variables were too strong by a considerable amount. Following its usual method, CBO introduced additional time trends beginning in 2001, the start of the last now-complete business cycle, into its analysis of the components of labor hours. On the basis of those estimated trends in hours from 2001 to 2007, actual hours worked were above, rather than below, potential hours in early 2007. In addition, CBO has interpreted some of the decreases in labor force participation in recent years as suggesting weaker trend growth in participation that is not a consequence of the recession or the weakness of the ensuing recovery. Those changes and others (see the appendix) resulted in a much lower estimate of the recent trend growth rate in hours in the nonfarm business sector and a lower projection of potential hours based on that trend.

### **Effects on Capital Services in the Nonfarm Business Sector**

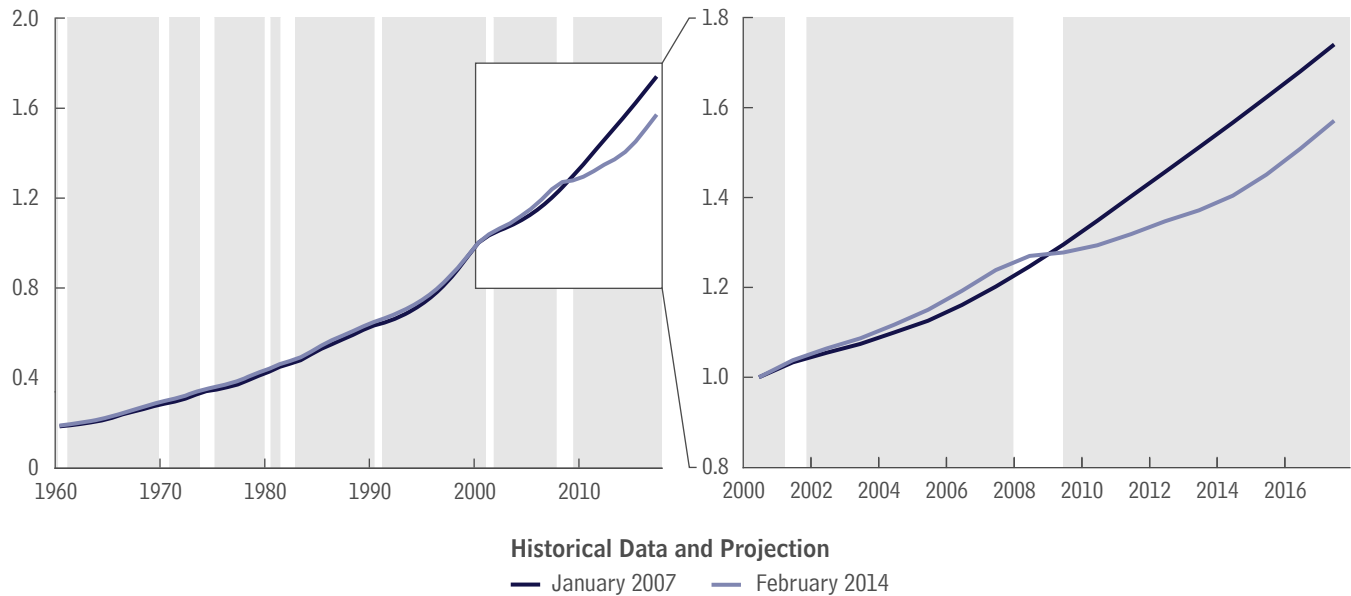
Since 2007, a reassessment of prerecession trends has led CBO to revise downward its estimate of the contribution to potential output of capital services in the nonfarm business sector in 2017 by an estimated 0.7 percentage points (see Figure 3).

BEA's recent comprehensive revision of the NIPAs, which revised estimates of the capital stock as it previously had been defined and introduced estimates of new components of the capital stock, suggested a slightly stronger trend in capital services after the end of the recession than CBO had previously estimated. By itself, that information would have pushed up projected capital services in 2017. Moreover, the identification of a new peak in the business cycle did not directly result in a reassessment of

12. That upward revision excludes the effects of BEA's recent revisions to the definition of GDP, but it includes the effects of other revisions BEA made to the NIPAs, including revisions to inflation and a change in the reference year from 2005 to 2009 for prices and real output. The choice of reference year can influence the computed revisions to CBO's projections of the inputs to potential output in 2017. When 2009 is the reference year—which is consistent with CBO's most recent economic projections—the effect on potential output in 2017 of the reassessment of trends between 2007 and the most recent forecast partly reflects revisions to the path of inflation between 2009 and 2017. If the reference year was 2000 (as was true when the 2007 projection was published), the revision to potential output in 2017 would partly reflect revisions to the path of inflation between 2000 and 2017.

**Figure 3.****Nonfarm Business Capital Services**

(Index, 2000 = 1.00)



Source: Congressional Budget Office.

Notes: Nonfarm business capital services is a measure of the flow of services available for production from the stock of capital goods in the nonfarm business sector. Growth in capital services differs from growth in the capital stock because different types of capital goods (such as equipment, structures, inventories, or land) contribute to production in different ways.

Data are annual. Historical data originally published in *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* ([www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291)) are plotted through 2005. Historical data originally published in *The Budget and Economic Outlook: 2014 to 2024* ([www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010)) are plotted through 2012. Projections are plotted through 2017.

historical trends in capital services because—as described above, and in contrast to the agency’s methodology for estimating potential labor hours and TFP—CBO does not make a cyclical adjustment in its calculations of capital services.

Nevertheless, CBO’s reassessments of historical trends in hours worked and in productivity (discussed later) changed projections of those trends and thereby reduced the amount of investment projected by the agency for the nonfarm business sector. Trends for hours and productivity affect investment for two reasons. First, businesses with fewer workers generally need less capital, all else being equal. Second, lower TFP implies lower output and income, which tends to reduce investment. As a consequence, although CBO expects the annual growth of capital services to increase during the next several years and even to exceed the rates projected in 2007 in some years as businesses make up for some investment forgone during the past several years, CBO nonetheless

anticipates that the cumulative growth of capital services between 2007 and 2017 will be below its 2007 projections, so capital services will not have fully returned by 2017 to the value CBO previously projected for that year.

### Effects on Potential TFP in the Nonfarm Business Sector

Various reassessments of prerecession trends have led CBO to lower slightly its projection for growth in potential total factor productivity in the nonfarm business sector, reducing the contribution of potential TFP to potential output in 2017 by about 0.7 percentage points relative to the agency’s 2007 projection (see Figure 4).

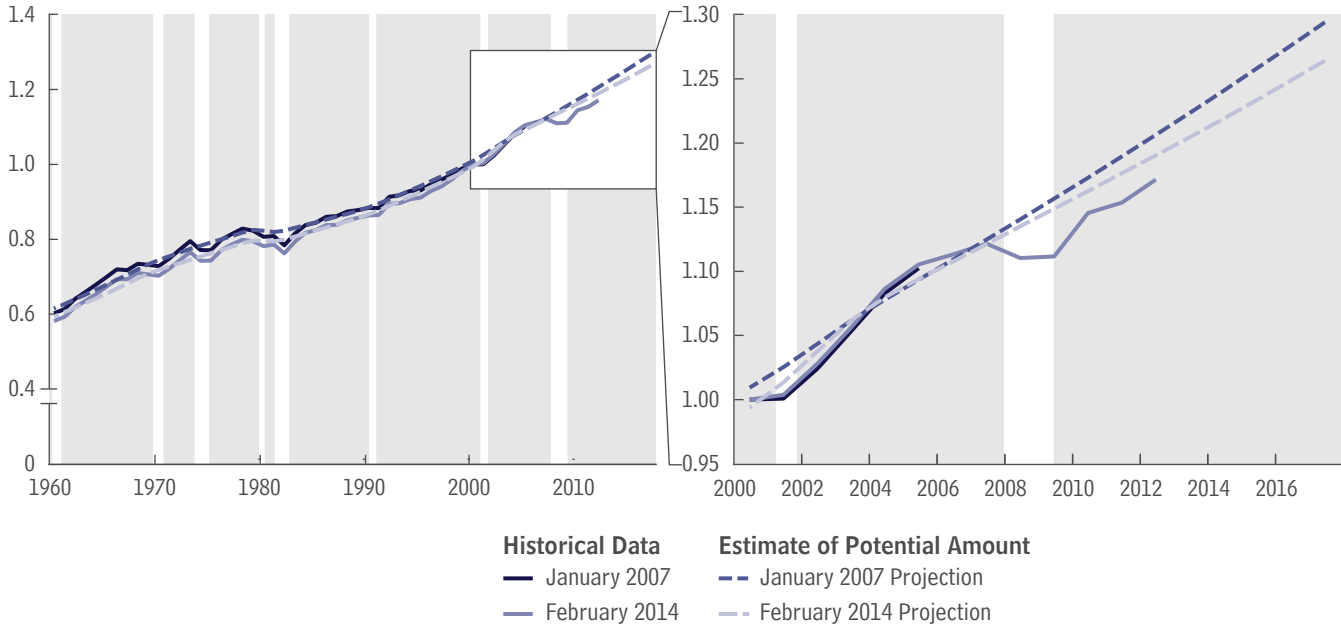
Underlying trends in TFP are particularly difficult to discern. Economists generally interpret TFP as a measure of technological progress, but they lack good theories and evidence to explain or forecast the evolution of technology. Therefore, economists typically project growth in potential TFP on the basis of historical trends, but a



**Figure 4.**

**Nonfarm Business Total Factor Productivity**

(Index, 2000 = 1.00)



Source: Congressional Budget Office.

Notes: Nonfarm business total factor productivity is average real output per unit of combined labor hours and capital services in the nonfarm business sector. The growth of total factor productivity is defined as the growth of real output that is not explained by the growth of labor hours and capital services.

Data are annual. Historical data originally published in *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* ([www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291)) are plotted through 2005. Historical data originally published in *The Budget and Economic Outlook: 2014 to 2024* ([www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010)) are plotted through 2012. Projections are plotted through 2017.

particularly irregular path for growth in actual TFP since the early 1990s has complicated that exercise. After steady but modest growth in the 1980s, TFP accelerated strongly during the 1990s; although economists have worked hard to identify the sources of that increase, it is difficult to reach firm conclusions. Between 2001 and 2007, growth in TFP was modest in most years but surged around 2003, and economists have struggled to determine the reason. Between its 2007 and 2014 projections, CBO concluded that the 2003 jump in TFP reflected a mostly temporary change in the rate of TFP growth but a permanent change in the level of the series.

In addition, as with its estimate of the trend in potential labor hours, CBO revised its estimate of potential TFP to incorporate a new trend for the 2001–2007 business cycle after the 2007 peak had been identified. As a result, the trend for TFP that CBO now projects no longer reflects the relatively strong growth of the 1990s.

However, given the difficulty of projecting TFP, it is virtually impossible to disentangle the effects of reassessing the prerecession trend from the effects of incorporating the recession, so the estimate of a 0.7 percentage-point revision to projected potential output arising from reassessments is only a rough guide.

**Revisions to Historical Data**

Since 2007, revisions to various data for the period before the 2007–2009 recession have had largely offsetting effects on CBO’s estimate of potential output in 2017, reducing that figure by an estimated 0.1 percent. For the nonfarm business sector, the revisions to prerecession data have led to downward revisions to the contributions to potential output of potential labor hours and potential TFP and upward revisions to the contribution of capital services; for other sectors, the revisions to prerecession data have led to upward revisions to potential output. Analysis of the revisions to the contributions of TFP

and capital services is complicated by the comprehensive revision of the NIPAs, which changed the definition of the capital stock and output, so CBO's estimate of the magnitude of those effects should be viewed as an approximation.

### **Effects on Potential Labor Hours in the Nonfarm Business Sector**

Data revisions for the precession period have reduced the estimated contribution to potential output of potential labor hours in the nonfarm business sector by 0.3 percentage points in 2017. Part of that revision occurred because total employment reported in the NIPAs has been, on balance, reduced (see the appendix). That change led CBO to revise its projected trend in total NIPA employment, a revision that filtered through to its projection of nonfarm business hours. The other part of the revision to potential labor hours occurred because BEA made a slight downward revision to its estimate of the total number of hours worked in the nonfarm business sector, further suggesting weaker future growth of such hours than CBO had previously anticipated.

### **Effects on Capital Services in the Nonfarm Business Sector**

Revisions to the data on capital stocks indicate that the contribution to potential GDP from capital services in the nonfarm business sector was slightly greater before the recession began than CBO had previously estimated. According to CBO's analysis, the revisions BEA made to the NIPAs before the comprehensive revision resulted in an increase in the contribution of capital services to potential output. However, the effect was offset somewhat by the effect of the comprehensive revision of the NIPAs, which pointed to a downward revision in the contribution of capital services in the nonfarm business sector to the growth of real potential output in years before the recession (in 2009 dollars).

### **Effects on Potential TFP in the Nonfarm Business Sector**

The revisions to the data for nonfarm business output, labor hours, and capital services for the years before the recession began yielded a modest downward adjustment to TFP in that sector, reducing the projection for the contribution of TFP to potential output in 2017 by 0.6 percentage points. On balance, CBO estimates, the comprehensive NIPA revision lowered real potential

output in the years before the recession (in 2009 dollars), in part because of a smaller contribution from TFP.

### **Effects on Other Sectors**

Revisions to the data for the economy outside the nonfarm business sector indicate that real services from the residential housing stock were higher than previously recognized in the years leading up to the recession. Data revisions produced only small changes to other sectors' contributions to potential output. Overall, revisions to data for the parts of the economy outside nonfarm business have increased the contribution to CBO's estimate of potential output in 2017 by about 0.7 percentage points.

### **Effects of Federal Fiscal Policy and Other Factors**

The combined effects of changes in federal tax and spending policies, higher federal deficits, changes in the relative size of various sectors of the economy, and other factors have led CBO to reduce its projection of potential output for 2017 by about 0.7 percent relative to the projections made in 2007. That estimated reduction is a combination of upward revisions to potential labor hours and potential TFP in the nonfarm business sector, downward revisions to capital services in the nonfarm business sector, and downward revisions to potential output in other sectors. Those revisions reflect the effects of higher deficits (and associated effects on investment) and of lower tax rates, but they do not reflect any contribution of federal fiscal policy to moderating the economic weakness of the past several years. CBO's analysis of the economic effects of fiscal policy shows that reductions in federal taxes and increases in federal spending have raised output and employment since 2007 relative to what they would have been otherwise. Those policies—some automatic and some legislated—have thus limited the effects of the recession and the slow recovery on potential output. However, tracing the effects of those policies on potential output through all of those channels is beyond the scope of this report.

Federal budget deficits since 2007 have been much larger than CBO anticipated at that time, and projected future deficits under current law are larger as well. Those higher deficits reflect legislated changes in taxes and spending along with the reductions in tax collections and increases in benefit payments that occur automatically without legislative action (which are known as automatic stabilizers) when the economy is weak. After output



returns close to its potential, the additional federal debt that has accumulated (relative to CBO's previous projections) will reduce national savings and "crowd out" some domestic capital because some of the savings of households that would otherwise fund private investment are instead used to hold federal debt. That reduction in the capital stock relative to what it would have been otherwise lowers potential output directly; it also lowers wages and thus labor force participation, further reducing potential output.

The effects of changes in incentives that are attributable to changes in specific federal tax and spending provisions since 2007 have had modest effects, on balance, on CBO's projections of the supply of labor in 2017. According to the agency's estimates, the permanent extension of many of the tax cuts implemented in the early 2000s and the revenue and spending provisions of the Affordable Care Act will have roughly offsetting effects on labor force participation in 2017.<sup>13</sup> In addition, bonus depreciation allowances encouraged investment by allowing businesses to deduct new investment from taxable income more rapidly than was possible under typical tax law.

According to CBO's analysis, both the automatic stabilizers and the legislated changes in federal tax and spending policies moderated the severity of the 2007–2009 recession and its aftermath.<sup>14</sup> Specifically, CBO estimates that reductions in taxes on income from labor and capital, increases in transfers to households, and increases in

federal spending on goods and services strengthened the overall demand for goods and services and thereby boosted output and employment—relative to what would have occurred in the absence of the automatic stabilizers and legislative action. All of those effects are reflected in economic outcomes between 2007 and 2013. Consequently, to the degree that those effects have checked weakness in labor hours, capital services, and productivity by, for example, moderating the increase in the long-term rate of unemployment, CBO has projected a smaller negative effect on potential output from the recession and slow recovery.<sup>15</sup> However, those positive effects on potential output are extremely difficult to disentangle from other economic developments, and CBO has not attempted to estimate them separately.

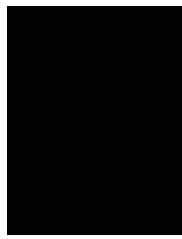
Finally, the remaining portion of this category consists of the effects on potential output that CBO does not attribute to the recession and weak recovery, the reassessment of trends, revisions to prerecession data, or federal fiscal policy. Those other effects are generally small and largely offsetting, having little net impact on CBO's projection of potential output in 2017.

13. As referred to in this report, the Affordable Care Act comprises the Patient Protection and Affordable Care Act; the health care provisions of the Health Care and Education Reconciliation Act of 2010; and the effects of subsequent related judicial decisions, statutory changes, and administrative actions. For further discussion of the effects of the Affordable Care Act on labor markets, see Congressional Budget Office, *The Budget and Economic Outlook: 2014 to 2024* (February 2014), Appendix C, [www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010).

14. For further discussion, see Congressional Budget Office, *The Budget and Economic Outlook: 2014 to 2024* (February 2014), Appendix E, [www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010); Congressional Budget Office, *Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output in 2013* (February 2014), [www.cbo.gov/publication/45122](http://www.cbo.gov/publication/45122); and Felix Reichling and Charles Whalen, *Assessing the Short-Term Effects on Output of Changes in Federal Fiscal Policies*, Working Paper 2012-08 (Congressional Budget Office, May 2012), [www.cbo.gov/publication/43278](http://www.cbo.gov/publication/43278).

15. For a discussion of the channels through which cyclical weakness can lower potential output, see Dave Reifschneider, William Wascher, and David Wilcox, *Aggregate Supply in the United States: Recent Developments and Implications for the Conduct of Monetary Policy*, Finance and Economics Discussion Series 2013-77 (Board of Governors of the Federal Reserve, November 2013), <http://go.usa.gov/BPAF>.





# Appendix: CBO's Method for Projecting Potential Hours in the Nonfarm Business Sector

**T**he downward revision between 2007 and 2014 in the Congressional Budget Office's (CBO's) projection of potential labor hours in the nonfarm business sector in 2017 resulted from a combination of effects of the recession and the weak recovery, reassessments of trends, revisions to prerecession data, and federal fiscal policy and other factors. Those effects are incorporated in various places in the five steps that CBO follows to estimate and project potential labor hours in the nonfarm business sector:

1. Estimate and project the potential labor force, drawing on data published by the Bureau of Labor Statistics (BLS).
2. Estimate and project the underlying long-term rate of unemployment to derive potential employment consistent with data from BLS.
3. Estimate and project potential employment in the nonfarm business sector and other sectors of the economy, drawing on data published by the Bureau of Economic Analysis (BEA) in its national income and product accounts.
4. Estimate and project the potential average weekly hours of potential workers in the nonfarm business sector.
5. Estimate and project the trend growth in total potential hours in the nonfarm business sector.

## Potential Labor Force

Substantial analysis of the many influences on labor force participation has led CBO to reduce modestly its

projection of the potential labor force in 2017 since 2007. On the one hand, CBO's projection has been revised downward as a result of five factors: the agency's reassessment of trends in the age composition of the workforce, its reassessment of people's responses to changes in tax rates, its estimate of the effects of the recession and the slow recovery, the enactment of the Affordable Care Act, and the weakness in labor force participation among some demographic groups in the past few years that appears to be unrelated to labor demand.<sup>1</sup> On the other hand, CBO has revised its projection upward as a result of three other factors: the agency's reassessment of trends in immigration, mortality, and age-specific rates of participation in the labor force; revisions to prerecession data; and the permanent extension of many of the tax cuts enacted in the early 2000s.

## Potential Employment

Since 2007, CBO has made a downward revision to its projection of the estimate of potential employment that is consistent with BLS's employment measure. Figure A-1 illustrates the trends in employment that CBO projected in 2007 and 2014 and shows an intermediate trend that CBO would project if it used data only for the period through 2006 (as it did in 2007) but accounted for revisions to prerecession data, for the 2001–2007 business cycle peak, and for the downward revision to the potential labor force. That intermediate trend yields a projection of employment for 2017 that is close to the 2014 projection, which shows that the negative effects on

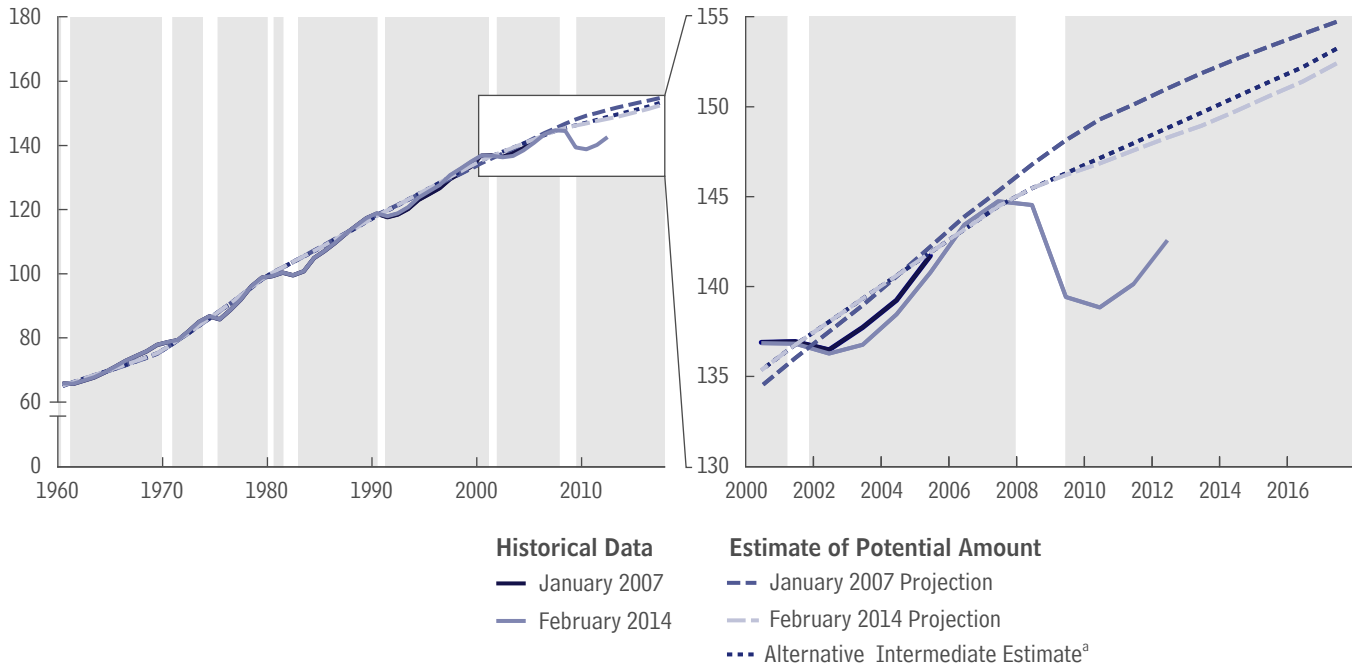
---

1. For further discussion of the ways in which labor supply responds to changes in tax rates, see Congressional Budget Office, *How the Supply of Labor Responds to Changes in Fiscal Policy* (October 2012), [www.cbo.gov/publication/43674](http://www.cbo.gov/publication/43674).

**Figure A-1.**

**Household Employment**

(Millions of people)



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: Household employment is the number of people who are employed, as estimated by the Bureau of Labor Statistics on the basis of the Census Bureau's Current Population Survey. In that survey, someone with more than one job is counted only once.

Data are annual. Historical data originally published in *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* ([www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291)) are plotted through 2005. Historical data originally published in *The Budget and Economic Outlook: 2014 to 2024* ([www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010)) are plotted through 2012. Projections are plotted through 2017.

a. Estimated using 2014 methods and 2014 historical data, but using data only through 2006 and CBO's projection of underlying long-term unemployment as of 2007.

employment of a higher unemployment rate during the recession and the ensuing recovery had comparatively little effect on CBO's 2014 projection of potential employment in 2017. Essentially all of the difference between the intermediate projection and the 2014 projection results from an increase in CBO's projection of the underlying long-term rate of unemployment for 2017 from 5.0 percent to 5.5 percent.

**Potential Employment by Sector**

To project potential employment by sector, CBO uses a measure of potential employment that is consistent with data from BEA. As a result, CBO maps its projection of potential employment that is consistent with data from BLS to a projection of potential employment that is consistent with data from BEA. That mapping allows CBO to use the most appropriate information from each source: BLS's employment data are consistent with

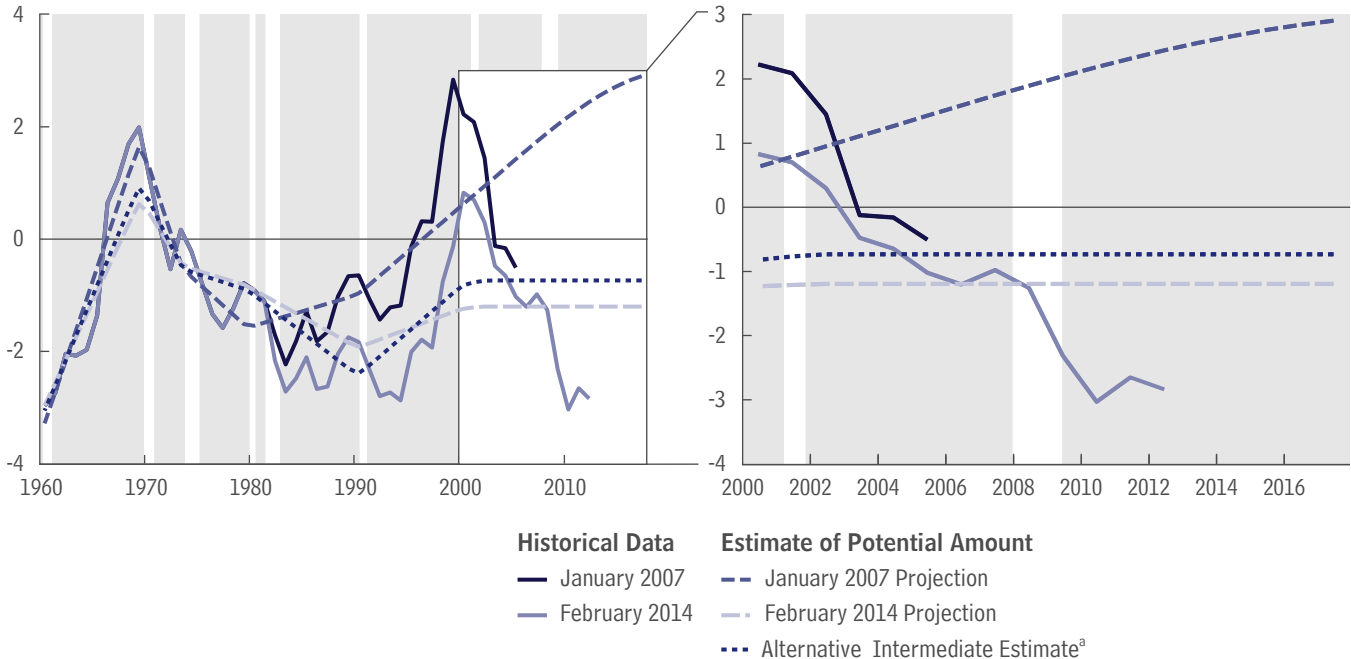
estimates of the underlying long-term rate of unemployment, and BEA's employment data are consistent with estimates of output by sector. Because employment as measured by BLS is decidedly different from employment as measured by BEA, CBO maps the BLS series into the BEA series by projecting the trend difference between the two.

Between 2007 and 2014, BEA lowered its historical estimates of total employment, on balance, which narrowed the average difference between its data and those of BLS. That revision indicates that the trend that CBO had previously estimated in potential employment as measured by BEA was too high, so CBO made a downward adjustment to the projected trend difference between employment as measured by BLS and BEA (see Figure A-2). (CBO also added a new trend to reflect the

**Figure A-2.**

**Difference Between Household and NIPA Measures of Employment**

(Millions of people)



Sources: Congressional Budget Office; Bureau of Labor Statistics; Bureau of Economic Analysis.

Notes: Data show the difference between the total number of people employed as recorded by the Bureau of Labor Statistics and the total number of full-time and part-time workers employed in domestic industries as identified by the Bureau of Economic Analysis in the NIPAs.

Data are annual. Historical data originally published in *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* ([www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291)) are plotted through 2005. Historical data originally published in *The Budget and Economic Outlook: 2014 to 2024* ([www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010)) are plotted through 2012. Projections are plotted through 2017.

NIPAs = national income and product accounts.

a. Estimated using 2014 methods and 2014 historical data, but using data only through 2006 and CBO's projection of underlying long-term unemployment as of 2007.

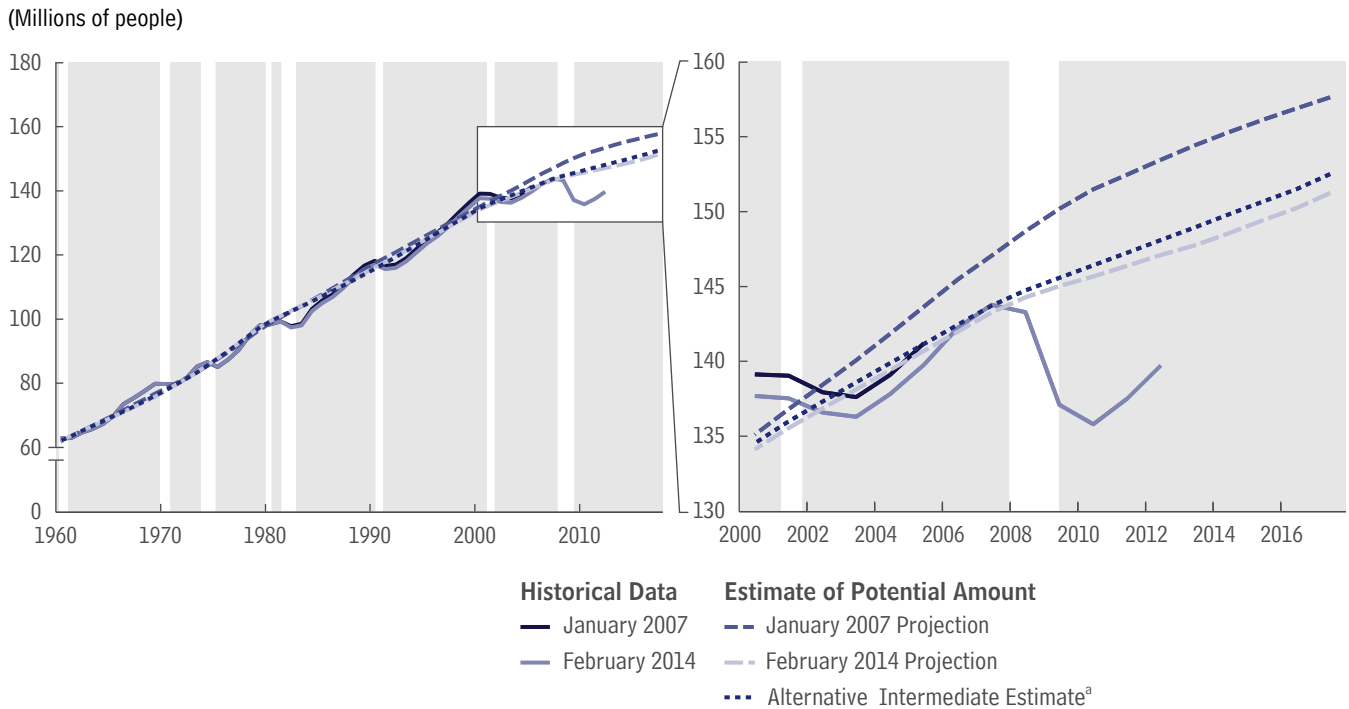
2001–2007 business cycle.) As a result, CBO revised downward its projection of potential employment for 2017 (which is consistent with BEA data) by a substantial amount (see Figure A-3).

CBO projects potential employment in the nonfarm business sector by subtracting its estimates of potential employment in other sectors from its estimate of total potential employment and then adding an estimate of potential self-employment in the nonfarm business sector (which is not included in BEA's data). Between 2007 and 2014, CBO added trends for the 2001–2007 business cycle to its estimates of potential employment in other sectors of the economy, leading to a downward revision in the projection of total potential employment in those sectors. That net downward revision suggested a small

upward revision to the share of potential aggregate employment accounted for by potential employment in the nonfarm business sector. The combination of a substantial downward revision to total potential employment and a small downward revision to potential employment outside the nonfarm business sector left a downward revision to potential employment in nonfarm business (see Figure A-4 on page 19).<sup>2</sup>

2. The methodology described here differs somewhat from that used in 2007, when CBO estimated potential employment in the nonfarm business sector directly and estimated employment in other sectors as the difference between total potential employment and potential employment in the nonfarm business sector. However, that change in methodology had essentially no effect on the estimate of potential employment in the nonfarm business sector.

**Figure A-3.**  
**NIPA Employment**



Sources: Congressional Budget Office; Bureau of Economic Analysis.

Notes: NIPA employment is the total number of full-time and part-time workers employed in domestic industries as published by the Bureau of Economic Analysis in the NIPAs.

Data are annual. Historical data originally published in *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* ([www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291)) are plotted through 2005. Historical data originally published in *The Budget and Economic Outlook: 2014 to 2024* ([www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010)) are plotted through 2012. Projections are plotted through 2017.

NIPAs = national income and product accounts.

a. Estimated using 2014 methods and 2014 historical data, but using data only through 2006 and CBO's projection of underlying long-term unemployment as of 2007.

As with Figure A-1, Figures A-2, A-3, and A-4 illustrate CBO's projections in 2007 and 2014 and show an intermediate trend that CBO would project if it accounted both for the business cycle peak in 2007 and for revisions to prerecession data but ignored any data for the years since 2006. Those intermediate trends yield projections for 2017 that are close to the 2014 projection, which shows that those sources of information, taken together, account for almost all of the revision to CBO's projection of potential employment consistent with data from BEA for that year.

**Potential Average Weekly Hours per Worker**

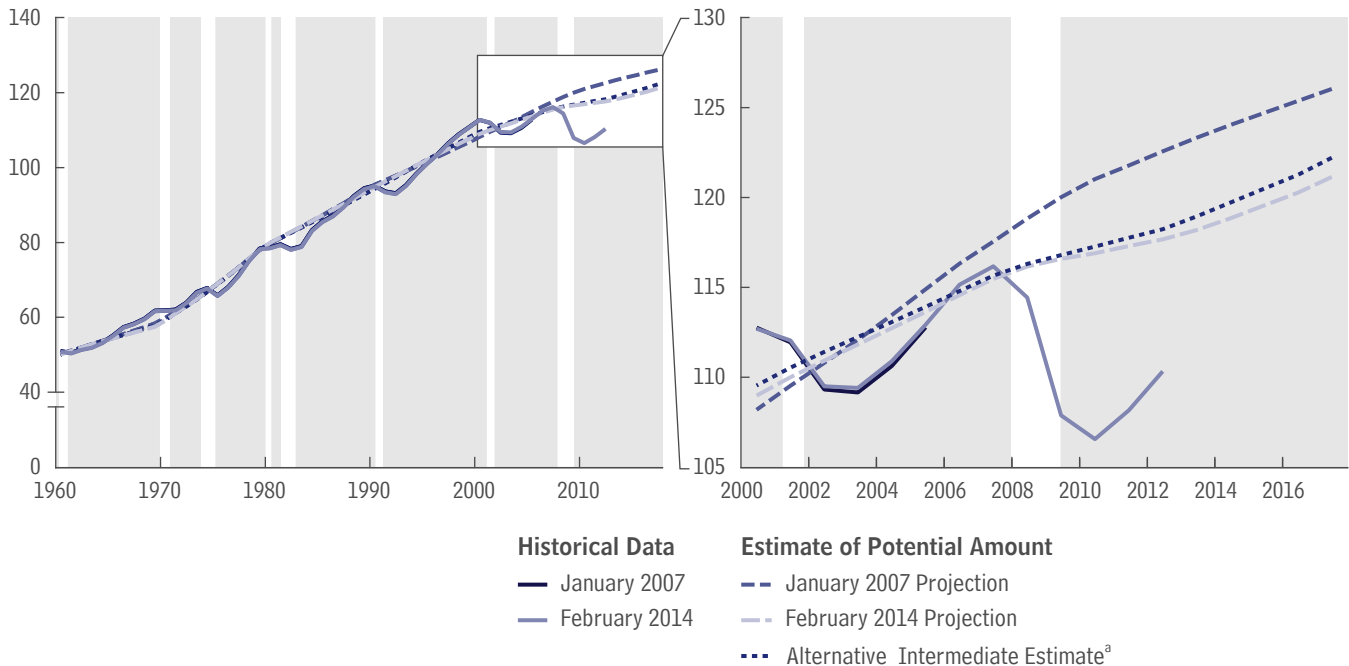
Between 2007 and 2014, CBO reassessed the trend in potential average weekly hours per worker in the nonfarm business sector, changed its methodology for making such estimates, and incorporated in its analysis the data on

average weekly hours for the past several years. Average weekly hours as reported by BEA have been declining gradually since the end of World War II, but before the 2007–2009 recession, CBO modified the trend estimated from historical data and projected potential average hours to stabilize after 2010. Over the following few years, it became increasingly evident that the downward trend in weekly hours was persisting at roughly the same historical rate as before, and CBO concluded that the trend was likely to continue longer than the agency had previously expected. (Because that revision constitutes a comparatively minor portion of the total revision to potential hours, no figure is shown.) In addition, CBO introduced the difference between the unemployment rate and the underlying long-term unemployment rate as an additional explanatory factor for average weekly hours, in order to capture the effect of cyclical conditions. Relative

**Figure A-4.**

**Nonfarm Business Employment**

(Millions of people)



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: Nonfarm business employment is the total number of full-time and part-time workers employed in the nonfarm business sector.

Data are annual. Historical data originally published in *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* ([www.cbo.gov/publication/18291](http://www.cbo.gov/publication/18291)) are plotted through 2005. Historical data originally published in *The Budget and Economic Outlook: 2014 to 2024* ([www.cbo.gov/publication/45010](http://www.cbo.gov/publication/45010)) are plotted through 2012. Projections are plotted through 2017.

a. Estimated using 2014 methods and 2014 historical data, but using data only through 2006 and CBO's projection of underlying long-term unemployment as of 2007.

to the trend in average weekly hours before the recession, that change in methodology leads CBO to attribute a portion of the recent decline in hours to cyclical weakness rather than to long-term trends. Combined with additional data for the years during and after the recession, that change contributed to a slightly steeper and more persistent downward trend in potential average weekly hours.

**Total Potential Hours**

CBO estimates total potential hours in the nonfarm business sector by combining its estimate of potential employment in the sector with its estimate of potential average weekly hours per worker in the sector. Between 2007 and 2014, CBO's adjustments to potential employment and potential average weekly hours (described above) reduced by nearly 5 percent the projected total

hours worked in the nonfarm sector for 2017 and accounted for nearly 3 percentage points of the reduction in potential output in that year (see Figure 2 on page 8).

In 2007, CBO estimated that the number of actual hours was below the number of potential hours, suggesting that the labor market had not yet fully recovered from the 2001 recession. Once the 2007 business cycle peak was recognized, however, CBO determined that the conditions of the 1990s had not persisted into the 2000s and that the trends it had previously estimated for labor market variables were too strong. After incorporating weaker trends that began in 2001, as described above, CBO estimated that the actual number of hours worked was above its estimate of potential hours in early 2007, suggesting that the rapid growth in actual hours in the preceding few years could not be sustained.

# List of Tables and Figures

## Table

- |  |   |
|--|---|
| 1. Contributions to the Revision of CBO's Projection of Potential Output for 2017<br>Between 2007 and 2014 | 3 |
|--|---|

## Figures

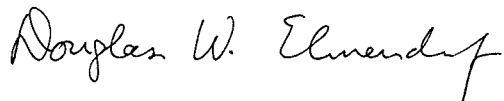
- |   |    |
|---|----|
| 1. Real Gross Domestic Product                                    | 2  |
| 2. Nonfarm Business Hours   | 8  |
| 3. Nonfarm Business Capital Services                              | 10 |
| 4. Nonfarm Business Total Factor Productivity                     | 11 |
| A-1. Household Employment   | 16 |
| A-2. Difference Between Household and NIPA Measures of Employment | 17 |
| A-3. NIPA Employment  | 18 |
| A-4. Nonfarm Business Employment                                  | 19 |



## About This Document

This Congressional Budget Office (CBO) report reflects research undertaken in support of the agency's baseline economic projections, which serve as the basis for its budget projections. The report was written by Robert Shackleton of CBO's Macroeconomic Analysis Division, with guidance from Wendy Edelberg, Kim Kowalewski, Robert Arnold, and Benjamin Page. David Brauer, Mark Lasky, and David Weiner of CBO offered comments. Alexander Arnon and Leah Loversky provided research assistance. In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

Kate Kelly edited the report, and Maureen Costantino and Jeanine Rees prepared it for publication. An electronic version is available on CBO's website ([www.cbo.gov/publication/45012](http://www.cbo.gov/publication/45012)).



Douglas W. Elmendorf  
Director

February 2014