

CBO



CBO's Economic Forecasting Record: 2010 Update

July 2010



CONGRESSIONAL BUDGET OFFICE
SECOND AND D STREETS, S.W.
WASHINGTON, D.C. 20515





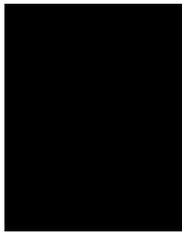
CBO's Economic Forecasting Record: 2010 Update

July 2010

Notes

Unless otherwise noted, all years referred to in this report are calendar years.

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



Preface

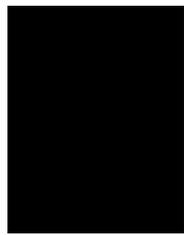
The Congressional Budget Office (CBO) regularly evaluates the accuracy of its economic forecasts by comparing them with the economy's actual performance and with others' forecasts. Such evaluations help guide CBO's efforts to improve the quality of its forecasts and are also intended to assist Members of Congress in their use of the agency's estimates.

This report was prepared by Holly Battelle of CBO's Macroeconomic Analysis Division, with assistance from Robert Arnold and under the direction of Robert Dennis and Kim Kowalewski. Priscila Hammett provided research assistance. John Skeen edited the report, Sherry Snyder proofread it, and Jeanine Rees prepared it for publication. The report, along with earlier ones on the topic, is available on CBO's Web site (www.cbo.gov).



Douglas W. Elmendorf
Director

July 2010



Contents

Choice of Forecasts for the Evaluation	1
Measuring the Quality of Forecasts	2
Statistical Bias	2
Accuracy	2
Alternative Measures of Forecast Quality	2
Limitations of Forecast Evaluations	2
The Effects of Business Cycles, Changes in the Trend Rate of Productivity Growth, and Oil Price Shocks	3
CBO's Forecasting Record	5
Two-Year Forecasts	6
Five-Year Projections	9
Appendix: Historical and Forecast Data	39

Tables

1. Summary Measures of Performance for Two-Year Average Forecasts	11
2. Summary Measures of Performance for Five-Year Average Projections	12
3. CBO's, <i>Blue Chip's</i> , and the Administration's Forecasts of Two-Year Average Growth Rates for Real Output	14
4. Comparison of CBO's, <i>Blue Chip's</i> , and the Administration's Forecasts of Two-Year Average Growth Rates for Nominal Output	16
5. CBO's, <i>Blue Chip's</i> , and the Administration's Forecasts of Two-Year Average Inflation in the Consumer Price Index	18
6. CBO's, <i>Blue Chip's</i> , and the Administration's Forecasts of Two-Year Average Nominal Interest Rates on Three-Month Treasury Bills	20
7. CBO's, <i>Blue Chip's</i> , and the Administration's Forecasts of Two-Year Average for Nominal Long-Term Interest Rates	23
8. CBO's, <i>Blue Chip's</i> , and the Administration's Forecasts of Two-Year Average Real Interest Rates on Three-Month Treasury Bills	24
9. Comparison of CBO's, <i>Blue Chip's</i> , and the Administration's Projections of the Difference Between Two-Year Average Inflation in the CPI and in the GDP Price Index	26
10. CBO's and the Administration's Forecasts of the Two-Year Change in Wages and Salaries	28
11. CBO's and the Administration's Forecasts of the Two-Year Change in Wages and Salaries as a Share of Output	29
12. CBO's, <i>Blue Chip's</i> , and the Administration's Projections of Five-Year Average Growth Rates for Real Output	30
13. CBO's, <i>Blue Chip's</i> , and the Administration's Projections of Five-Year Average Growth Rates for Nominal Output	32
14. Comparison of CBO's, <i>Blue Chip's</i> , and the Administration's Projections of the Difference Between Five-Year Average Inflation in the CPI and in the GDP Price Index	34
15. CBO's and the Administration's Projections of the Five-Year Change in Wages and Salaries	36
16. CBO's and the Administration's Projections of the Five-Year Change in Wages and Salaries as a Share of Output	37

Figure

1. Oil Price Fluctuations, 1967 to 2009	5
---	---

Box

1. How Data Revisions Can Affect the Interpretation of Forecasting Errors	4
---	---



CBO's Economic Forecasting Record: 2010 Update

Since publishing its first macroeconomic forecast in 1976, the Congressional Budget Office (CBO) has compiled a forecasting track record that is comparable in quality with that of the Administration and that of the *Blue Chip* consensus.¹ In particular, the accuracy of CBO's two-year forecasts between 1982 and 2008 paralleled that of the forecasts published by the *Blue Chip* consensus and the Administration over the same period (see Table 1 on page 11). The accuracy of CBO's five-year projections also generally corresponded to that of other forecasters' (see Table 2 on page 12). Comparing CBO's forecasts with those of the *Blue Chip* consensus suggests that when the agency's predictions of the economy's performance missed by the largest margin, those errors probably reflected difficulties shared by other forecasters in predicting turning points in the business cycle.

CBO's forecasting record provides a measure of the uncertainty underlying forecasts under normal circumstances.² However, the current degree of economic dislocation exceeds that of any previous period in the past half-century, so the uncertainty inherent in current forecasts probably exceeds the historical average.

-
1. The *Blue Chip* consensus is an average of approximately 50 private-sector forecasts that is published periodically as the *Blue Chip Economic Indicators*.
 2. For a discussion of forecasting errors and qualitative assessments of the range of possible outcomes, see David Reifschneider and Peter Tulip, *Gauging the Uncertainty of the Economic Outlook from Historical Forecasting Errors*, Finance and Economic Discussion Series Working Paper No. 2007-60 (Washington, D.C.: Board of Governors of the Federal Reserve, November 2007).

Choice of Forecasts for the Evaluation

The data used for this evaluation were compiled from forecasts published in the early months of the years 1976 through 2008. (Two-year average forecasts published in early 2009 could not be included because the latest full-year historical data do not extend beyond 2009.) For all years except 1981, CBO's evaluation was based on calendar year forecasts that the agency published early in the year (or, for some variables in some years, on unpublished forecasts) and on forecasts shown in the Administration's annual budget documents.³ The *Blue Chip* consensus forecasts that CBO relied on for this evaluation were those published as close as possible to the publication date of CBO's forecasts. Although the *Blue Chip* publishes forecasts monthly, in only two months of the year—March and October—do forecasts extend beyond two years. Those longer-term forecasts are published, on average, three months after CBO completes its forecast. The *Blue Chip's* two-year forecasts have a shorter history than CBO's and a narrower scope, which somewhat limits the analysis. (The *Blue Chip's* forecasts were first published in 1982 and do not include several series, most notably wages and salaries, that are vital for budget projections.) The appendix to this report gives further details on the choice of historical time-series data and on the sources of forecast data for the comparisons.

-
3. For 1981, the Administration's forecast came from the Reagan Administration's revisions to President Carter's last budget, and the corresponding CBO forecast came from its published analysis of President Reagan's budget proposals.

Measuring the Quality of Forecasts

As with CBO's earlier studies of economic forecasts, this evaluation focuses on two indicators of quality: statistical bias and accuracy. Other desirable characteristics—such as the efficiency with which a forecast uses available information—are harder to assess definitively and would require a larger sample than is available for CBO's forecasts.

Statistical Bias

Statistical bias indicates the tendency of a forecast to be pessimistic or optimistic. To measure statistical bias, CBO used the mean error—the arithmetic average of the forecasting errors, which is the simplest and most widely used measure—in its evaluation. Because it is a simple average, however, underestimates and overestimates offset one another. Therefore, the mean error imperfectly measures the quality of a forecast: A small mean error would result if all of the errors were small or if all of the errors were large but the overestimates and underestimates balanced one another.

Accuracy

The accuracy of a forecast is the degree to which its values are narrowly dispersed around actual outcomes. Measures of accuracy more clearly reflect the usual meaning of forecast quality than does the mean error because overestimates and underestimates do not offset one another in those measures. CBO used two measures of accuracy in its evaluation: The mean absolute error—the average of the forecasts' errors without regard to arithmetic sign—is a commonly used measure of accuracy. It indicates the average difference between forecasts and actual values without allowing individual forecasts that are too high to offset other forecasts that are too low. The root-mean-square error (calculated by first squaring the errors, then taking the square root of the arithmetic average of the squared errors) also shows the size of the error without regard to sign, but it gives greater weight to larger errors. Because small errors typically are inconsequential, the root-mean-square error usually gives the best indication of accuracy.

Alternative Measures of Forecast Quality

Studies conducted by analysts outside CBO have used measures that are somewhat more elaborate than the mean error to test for statistical bias in CBO's forecasts. Those studies have generally concluded, as does this evaluation, that CBO's short-term economic forecasts do not contain a statistically significant bias.⁴

Other methods have been developed to evaluate a forecast's "efficiency," or the extent to which a particular forecast could have been improved by information that was available but not used when the forecast was made.⁵ The *Blue Chip* consensus forecast represents a variety of economic forecasts and thus reflects a broader blend of sources and methods than can be expected from any single forecaster. As such, that consensus forecast may produce better forecasts than any single forecaster. In this evaluation, the *Blue Chip's* predictions can serve as a proxy for an efficient forecast.⁶ The fact that CBO's forecasts are about as accurate as the *Blue Chip's* is a rough indication of their efficiency.

Limitations of Forecast Evaluations

Statistical measures do not necessarily produce reliable indicators of a forecast's quality when the sample of observations is small, as with CBO's relatively limited set—33 in all—of two-year forecasts. Small samples reduce the reliability of statistical tests, because a few particular errors can have an unduly large influence on the measures. Moreover, historical track records only weakly indicate the possible direction or size of forecasting inaccuracies in the future.

4. One such alternative approach to testing a forecast for bias is based on linear regression analysis of actual values against forecast values. For details of that method, see Jacob A. Mincer and Victor Zarnowitz, "The Evaluation of Economic Forecasts," in Jacob A. Mincer, ed., *Economic Forecasts and Expectations: Analysis of Forecasting Behavior and Performance* (Cambridge, Mass.: National Bureau of Economic Research, 1969). That approach is not used here because of the small size of the sample. However, studies that have used it to evaluate forecasts published by CBO and the Administration have not been able to reject the hypothesis that short-term forecasts are unbiased. See, for example, George A. Krause and James W. Douglas, "Institutional Design Versus Reputational Effects on Bureaucratic Performance: Evidence from U.S. Government Macroeconomic and Fiscal Projections," *Journal of Public Administration Research and Theory*, vol. 15, no. 2 (April 2005), pp. 281–306; J. Kevin Corder, "Managing Uncertainty: The Bias and Efficiency of Federal Macroeconomic Forecasts," *Journal of Public Administration Research and Theory*, vol. 15, no. 1 (January 2005), pp. 55–70; and Michael T. Belongia, "Are Economic Forecasts by Government Agencies Biased? Accurate?" *Review*, vol. 70, no. 6 (Federal Reserve Bank of St. Louis, November/December 1988), pp. 15–23. For a more elaborate study of forecast bias that included CBO's forecasts among a sizable sample, see Corder, "Managing Uncertainty," and David Laster, Paul Bennett, and In Sun Geoum, *Rational Bias in Macroeconomic Forecasts*, Staff Report No. 21 (Federal Reserve Bank of New York, March 1997).

Apart from these general caveats, there are several reasons for viewing this evaluation of CBO's forecasts with particular caution:

- When preparing forecasts, CBO, unlike private forecasters and the Administration, does not assume any future changes in fiscal policy.⁷ The various Administration forecasts normally include the projected economic effects of their respective policy proposals. The various private forecasters included in the *Blue Chip* survey often do not state their assumptions about fiscal policy, but they probably incorporate their own assumptions about policy changes; that freedom, however, does not seem to translate into a better forecasting record for the *Blue Chip* forecasters.
- The purpose of CBO's economic forecasts—along with the procedures used to develop them—has changed over the past three decades. In the late 1970s, CBO produced its five-year projections by extending the assumptions about short-term growth that the Congress adopted in its budget resolutions. Consequently, instead of being forecasts—or the best estimates of the future path of the economy—those projections are better characterized as objectives or goals. CBO now considers its medium-term

projections to be indicators of what will prevail, on average, if the economy continues to reflect historical trends and if current laws remain in place.

- Inaccuracies in a forecast generally increase when the economy is more volatile and when economic trends change. All three forecasters—CBO, the *Blue Chip* consensus, and the Administration—made relatively large forecasting errors for periods that included turning points in the business cycle and for the late 1990s, when the sustainable growth rate of the economy increased because of faster growth in labor productivity.
- The common practice of revising statistical data could mean that forecasters make predictions about one concept and the statistical agencies that compile those data ultimately report a materially different concept. A quantitatively important case in point was the addition of software expenditures to business fixed investment—and hence to gross domestic product (GDP)—in October 1999, when the Bureau of Economic Analysis (BEA) made comprehensive revisions to the national income and product accounts (NIPAs). Such revisions will contribute to the economic forecasting errors reported here, but they are unlikely to imply corresponding errors in budget projections because the revisions did not affect historical data for components of the budget such as federal receipts and spending. As a result, the models used to project those budget concepts needed to be recalibrated to the revised data, but subsequent budget projections are likely to be largely unaffected. (See Box 1.)

-
5. For studies that have examined the relative efficiency of CBO's economic forecasts, see Belongia, "Are Economic Forecasts by Government Agencies Biased?"; and S.M. Miller, "Forecasting Federal Budget Deficits: How Reliable Are U.S. Congressional Budget Office Projections?" *Applied Economics*, vol. 23 (December 1991), pp. 1789–1799. Although both studies identify information that might have been used to make CBO's forecasts more accurate, they rely on statistics that assume a larger sample than is available. Moreover, although statistical tests can identify sources of inefficiency in a forecast after the fact, they generally do not indicate how such information could be used to improve forecasts when the forecasts are being made.
 6. See, for example, Andy Bauer and others, "Forecast Evaluation with Cross-Sectional Data: The *Blue Chip* Surveys," *Economic Review*, vol. 88, no. 2 (Federal Reserve Bank of Atlanta, 2003), pp. 17–31; and Henry Townsend, "A Comparison of Several Consensus Forecasts," *Business Economics* (January 1996); and Robert Clemen, "Combining Forecasts: A Review and Annotated Bibliography," *International Journal of Forecasting*, vol. 11, no. 4 (1989).
 7. The role of current-policy or current-law assumptions in CBO's economic forecasts is explored in Congressional Budget Office, *What Is a Current-Law Economic Baseline?* Issue Brief (June 2, 2005).

The Effects of Business Cycles, Changes in the Trend Rate of Productivity Growth, and Oil Price Shocks

Forecasters collectively have tended to make the largest errors during periods that included either turning points in the business cycle or significant shifts in the trend rate of growth of labor productivity. Large changes in oil prices—apart from their role in precipitating business cycles—also cause errors in forecasts of inflation.

The difficulty of forecasting business-cycle turning points explains why most forecasters overestimated the economy's future growth rate in the forecasts they made just

Box 1.**How Data Revisions Can Affect the Interpretation of Forecasting Errors**

Sometimes, what appear to be inaccuracies in forecasts result not because of forecasting errors but because of post-forecast revisions to historical data. Such “misses” related to revisions should be interpreted with care because they do not necessarily translate into corresponding errors in budget projections. For example, the Bureau of Economic Analysis (BEA) made comprehensive revisions to the national income and product accounts (NIPAs) in October 1999, which increased the reported growth of real (inflation-adjusted) gross domestic product (GDP) over most of the period since World War II. That increase stemmed largely from BEA’s redefinition of spending on software as investment and from its adoption of new price series for various categories of consumption. The treatment of software spending and improved inflation measures in the NIPAs are essentially irrelevant to federal budget projections because they do not affect historical data for components of the budget such as spending or revenues.

Nevertheless, such revisions do affect the data used to assess the accuracy of economic forecasts, distorting the reliability of the statistical measures of accuracy for many of the concepts described here. In particular, the 1999 revisions to the NIPAs added about 0.4 percentage points to reported annual real growth on average for the period from 1992 to 1998 and, to a similar degree, lessened the growth of the GDP price index. Forecasts made before 1999 did not, of course, anticipate those revisions. Revisions released in July 2008 had the opposite effect, reducing the reported growth of real GDP for the period from

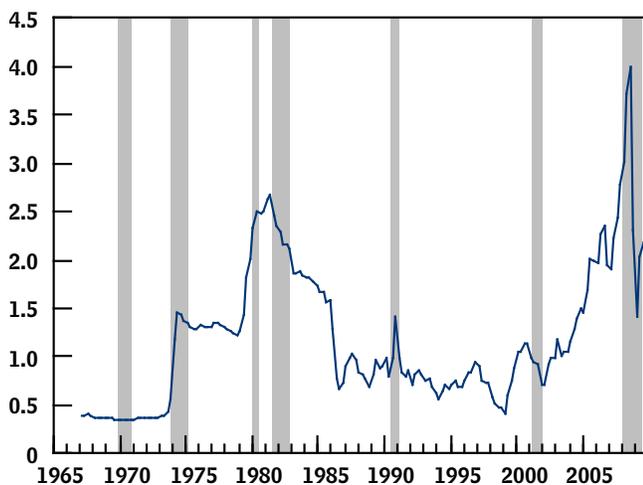
2005 through 2007 but increasing the reported growth of the GDP price index by a smaller amount. The July 2009 revisions increased real GDP growth by 0.3 percentage points from 1998 through 2002, whereas the growth of the GDP price index was revised downward 0.1 percentage point for the same period.

Projections of income are particularly important to budget projections because they help determine how much the government can expect to collect in revenues. There, too, apparent inaccuracies in income forecasts must be interpreted carefully because they do not necessarily translate directly into errors in budget projections if they result from data revisions. The Congressional Budget Office, like other forecasters, bases its revenue models on income and tax collection data available at the time projections are made. After-the-fact revisions to income typically require recalibration of the revenue models, but such changes do not imply errors in the original projections, which may have implicitly assumed a revision to income data on the basis of recent tax collections.

Some of the series examined here—the consumer price index and nominal interest rates—are not revised. Moreover, not every revision to estimates of GDP has consequences. For example, BEA’s comprehensive revisions to the NIPAs in December 2003 and December 2006 did not significantly affect the historical pattern of any of the variables used in this analysis.

Figure 1. Oil Price Fluctuations, 1967 to 2009

(Index, 2000 = 1)



Source: Congressional Budget Office.

Notes: The figure shows the ratio of the price index for petroleum imports divided by the core price index for personal consumption (the price index excluding energy and food prices). The data are annual and are plotted through 2009.

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

before the two back-to-back recessions of the early 1980s. That pattern was repeated in the forecasts made just before the recessions that began in 1990, 2001, and late 2007.

Changing productivity trends have also affected the quality of forecasts. The growth of productivity during the 1970s and 1980s turned out to be significantly lower than that during the 1950s and 1960s. Because forecasters in the 1970s assumed that the productivity trend of the previous decades would prevail, their forecasts of real (inflation-adjusted) output in the mid- to late 1970s turned out to be too optimistic. Partly for the same reason, forecasters repeatedly underestimated inflation in the late 1970s.

For forecasts of productivity, the late 1990s were a mirror image of the experience of the late 1970s. Partially because forecasters underestimated the trend rate of productivity growth beginning in 1996, they underpredicted

the economy's growth rate and overpredicted inflation for several consecutive years.⁸ As the economy continued to outperform expectations, analysts put more effort into investigating the possible causes of the increase in productivity growth. Those investigations initially focused on the possible contribution of the so-called new economy, especially technological progress that improved and quickened the flow of information among producers and between producers and consumers. Using revised data on production and inputs to production, however, CBO now estimates that an increase in the amount of capital (buildings, equipment, and software) per worker—sometimes called capital deepening—was the primary source of the faster growth in productivity in the late 1990s.⁹

For forecasts of inflation, large, unexpected movements in oil prices have been a proximate cause of many sizable errors (see Figure 1). Unexpected jumps in oil prices caused both CBO and the Administration to underpredict the growth of the consumer price index (CPI) in the forecasts they made early in 1979, 1980, 1990, 2000, and 2003 through 2008. By contrast, sharp and unexpected declines in oil prices in 1986, 1998, 2001, and again in 2009 led forecasters to overestimate the two-year rate of price inflation.

CBO's Forecasting Record

This analysis evaluates CBO's macroeconomic forecasts over two-year and five-year periods.¹⁰ The two-year period is important because the budget reports that CBO and the Administration publish every winter focus on projections for the fiscal year that begins the following October. An economic forecast that is accurate not only

8. See Spencer Krane, "An Evaluation of Real GDP Forecasts: 1996–2001," *Economic Perspectives*, vol. 27, no. 1 (Federal Reserve Bank of Chicago, 2003), pp. 2–21; and Scott Schuh, "An Evaluation of Recent Macroeconomic Forecast Errors," *New England Economic Review* (Federal Reserve Bank of Boston, January/February 2001), pp. 35–56.

9. See Congressional Budget Office, *Labor Productivity: Developments Since 1995* (March 2007).

10. In another publication—Congressional Budget Office, *The Uncertainty of Budget Projections: A Discussion of Data and Methods* (March 2006)—CBO analyzed the overall uncertainty of its budget projections, which depend in part on the accuracy of its economic projections. That analysis was updated in *The Budget and Economic Outlook* (January 2008), Chapter 1.

for the months leading up to that year but also for the budget year itself will provide the basis for a more accurate projection of the budget's bottom line (the annual deficit or surplus) on a current-law basis. The five-year period is used to examine the accuracy of longer-term projections of several variables that are important for CBO's budget projections. In CBO's forecasting record, the average errors in projecting real output are greater over the two-year horizon than over the five-year horizon.

Two-Year Forecasts

Historically, CBO's two-year forecasts, as measured by the root-mean-square error, have been about as accurate as those by the Administration and the *Blue Chip* consensus forecasts. Those forecasts typically focus on various measures of the economy's performance, including growth in real and nominal output, inflation in the CPI, fluctuations in nominal short- and long-term interest rates and in real short-term interest rates, the difference between the growth of the CPI and the GDP price index, and rates of growth of taxable income.

Growth in Real Output. The accuracy of CBO's forecasts closely matched that of the *Blue Chip* consensus for the 27 two-year forecasts made between 1982 and 2008 (see Table 3 on page 14). CBO's root-mean-square error was 1.4 percentage points, as was that for the *Blue Chip* consensus. The two sets of errors were highly positively correlated; when CBO's error was relatively large, the *Blue Chip's* error also was large and in the same direction. In addition, CBO was closer to the actual value in eight of the forecasts in which the forecasting errors differed by more than 0.1 percentage point, and the *Blue Chip* was closer in seven other forecasts. (CBO's forecasts, which were published in the same month as the *Blue Chip* forecasts with which they were compared, were normally completed about six weeks earlier to provide time for the budget projections to be prepared. Overall, the Administration's forecasts were about as accurate as those of CBO, although the Administration's forecasts were prepared even earlier.)

Forecasting errors tend to be larger at turning points in the business cycle and when shifts occur in major economic trends. That tendency can be clearly seen in forecasts of growth in real output by comparing the errors made from 1979 to 1983—when the economy went through a very turbulent recessionary period—with the smaller errors recorded during the years from 1985 to

1987, when the economy was in the middle of a cyclic expansion. More recently, the recession of 2001 and the slow recovery in 2002 accounted for the overpredictions made by all three forecasters in 2000 and 2001. Similarly, the recession that began in late 2007 explains much of the overpredictions in forecasts published in 2007 and 2008.

All three forecasters underpredicted two-year growth in real GDP in every year between 1992 and 1999, with very large errors for the two-year forecasts made between 1996 and 1999. About one-fourth of that apparent pessimism resulted from subsequent revisions to the NIPAs, which included important definitional changes. Those data revisions aside, the significant underpredictions made between 1996 and 1999 reflect the failure of analysts to foresee important economic developments—in particular, the investment boom of the late 1990s, which increased the capital stock and thereby boosted labor productivity and real output.

Growth in Nominal Output. The records of CBO and the *Blue Chip* consensus in forecasting two-year growth in nominal output are also quite similar overall (see Table 4 on page 16). The two forecasts' accuracy for the entire period, as measured by the root-mean-square error, was identical at 1.4 percentage points. The two forecasts are positively correlated: Of the 27 forecasts made between 1982 and 2008, the *Blue Chip's* error was smaller than CBO's (by more than 0.1 percentage point) 7 times; CBO had the smaller error 5 times; and the two forecasts recorded virtually identical errors 15 times.

The Administration's projections of nominal output were about as accurate as those of CBO over the longer interval between 1976 and 2008. However, the accuracy of CBO's projections over the period after 1982 was slightly better.

In both 2004 and 2005, all three forecasters overpredicted the two-year growth rate of real output but underpredicted inflation in the GDP price index to an even greater degree. Hence, all three forecasters underpredicted the growth rate of nominal output. In 2006, 2007, and 2008, all three forecasters still overpredicted the two-year growth rate of real output and underpredicted inflation in the GDP price index, but the errors on output were larger than those on prices, so that all three forecasters overpredicted the growth rate of nominal output.

Inflation in the CPI. CBO's success matched that of the *Blue Chip* in forecasting two-year average growth in the consumer price index (see Table 5 on page 18). CBO was more than 0.1 percentage point closer to the actual value in nine of the 27 periods, the *Blue Chip* was closer in 5 periods, and the errors of the two forecasters were essentially the same in 13 periods.

The variability of oil prices was a key factor causing CBO and the *Blue Chip* to err in forecasting inflation. Both forecasters overestimated future inflation for the 1982–1986 period and for the 1997–1998 period, partly because of the rapid drop in oil prices early in 1986 and between 1997 and 1998. Conversely, sharp increases in oil prices in 2000 and persistently rapid growth in oil prices between 2003 and mid-2008 caused both to underestimate inflation in the two-year forecasts they published in early 1999 and 2000 as well as those published from 2004 to 2007. After peaking in mid-2008, oil prices fell sharply in the second half of the year to well below the January level, which caused both forecasters to overestimate inflation for 2008 and 2009.

The accuracy of CBO's forecasts of inflation was virtually the same as the Administration's.

Nominal Short- and Long-Term Interest Rates. For the forecasts of nominal short-term interest rates produced between 1982 and 2008, CBO's record was almost the same as the *Blue Chip*'s, as measured by the root-mean-square error (see Table 6 on page 20). Both CBO and the *Blue Chip* consensus tended to slightly overestimate rates on three-month Treasury bills (the mean error for both over that period was 0.6 percentage points). CBO was more than 0.1 percentage point closer to the actual value in 9 of the 27 periods, and the *Blue Chip* was closer 6 times. For long-term interest rates, the overall accuracy of CBO's forecasts for the years between 1984 and 2008 was very close to that of the *Blue Chip* consensus (see Table 7 on page 23). CBO was more than 0.1 percentage point closer to the actual value in 6 of the 25 periods, the *Blue Chip* was closer in 6 periods, and the two forecasters had essentially identical errors in 13 periods.

CBO's forecasts of long-term interest rates were slightly more accurate than those of the Administration, but errors for short-term rates were similar.

Real Short-Term Interest Rates. The *Blue Chip* and CBO had similar forecasting errors for inflation-adjusted short-

term interest rates for the 1982–2008 period (see Table 8 on page 24). CBO's forecasts were closer to the actual value in 3 of the 27 periods, the *Blue Chip*'s were closer in 15, and the two registered similar errors in 9 periods.

CBO had slightly smaller forecasting errors than the Administration for real short-term interest rates for the full 1976–2008 period and similar accuracy since 1982.

The Difference Between Growth Rates of the CPI and the GDP Price Index. The difference in the growth rates that are forecast for the two major price indexes—the CPI and the GDP price index—is important for budget projections. The growth of the GDP price index is a critical determinant in forecasting the growth of nominal GDP and, therefore, the growth of income subject to federal taxes. All else being equal, the faster the projected growth of the GDP price index, the faster the projected growth of revenues will be. The growth in the consumer price index affects forecasts of outlays because a number of federal programs are indexed to the CPI. The projection of the CPI also affects projections of revenues because elements of the personal tax code, such as tax brackets, are indexed to the CPI. In general, the faster the growth of the CPI, the faster the growth of outlays will be and the slower the growth of revenues will be. Therefore, if the GDP price index is forecast to grow more slowly than the CPI, all else being equal, the projection of the deficit will be larger than if the GDP price index is forecast to grow at about the same rate as or faster than the CPI.

CBO's forecast of the difference between the two growth rates two years ahead was about as accurate as that of the *Blue Chip* consensus (see Table 9 on page 26). CBO was more accurate than the *Blue Chip* (by more than 0.1 percentage point) in 5 of the 27 periods, the *Blue Chip* was more accurate in 3 periods, and the two forecasters had essentially identical errors in 19 periods. The Administration's forecasts were slightly worse than CBO's for both the 1982–2008 period and the 1976–2008 period.

The persistent apparent underprediction of the difference in the two growth rates in the years before 1999 (averaging 0.3 percentage points from 1985 to 1998 for CBO, 0.3 percentage points for the *Blue Chip*, and 0.5 percentage points for the Administration) is somewhat misleading. In part, it reflects a conceptual and methodological change to the NIPAs in 1999, when business spending on software was added to investment and therefore to GDP

(previously, spending for business software was considered to be purchasing an intermediate good). Because the price index for software purchases grew much less rapidly than other prices, on average, the change in the classification of software spending caused a downward revision of the historical data for the growth of the GDP price index. Hence, the forecasts made before 2000 were based on a pattern of historical growth in the GDP price index that was higher than is currently reported. That difference probably accounted for about 0.2 percentage points—or two-thirds—of the apparent forecast bias in that period.

Between 2001 and 2006, the actual difference between the growth of the CPI and the GDP price index was less than the historical difference in the two rates. That change in the relationship between the two price indexes reflects an increase in the growth rate of the prices of some investment goods (particularly those involved in business, residential, and government structures) that are not included in the CPI, as well as faster growth in the price index for military compensation. Those developments were not generally anticipated, so forecasters overestimated the difference between the CPI and the GDP price index.

Wages and Salaries. One important source of error in budget projections involves the forecasting of wages and salaries, one of the major components of taxable income.¹¹ Forecasts of both the growth rate of wages and salaries and their relationship to nominal GDP are discussed in this section. Because the *Blue Chip* does not report wages and salaries, CBO's forecasting record cannot be compared with that of the private-sector survey in that respect.

CBO and the Administration had similar errors in predicting the two-year changes in wages and salaries (see Table 10 on page 28). CBO was more than 0.1 percentage point closer to the actual value in 12 of the 29 periods, the Administration was closer in 6 periods, and the two forecasters had essentially identical errors in

11 periods. The directions of the errors in forecasting the growth of wages and salaries were similar to those for the nominal GDP forecasts, indicating that the errors stemmed in part from overpredictions or underpredictions of real growth and the growth of the price index.

To isolate the errors that were unique to the wage and salary forecast, CBO also compiled the errors in forecasts for wages and salaries as a share of GDP (see Table 11 on page 29). The accuracy of CBO's and the Administration's forecasts for that measure—the two-year changes in wages and salaries as a share of GDP—were also similar. CBO was more accurate than the Administration (by more than 0.1 percentage point) in 11 of the 29 periods, the Administration was more accurate in 10 periods, and the two forecasters had essentially identical errors in 8 periods. The pattern of errors has also been parallel: Both forecasters had a string of overpredictions from 1988 to 1994, followed by smaller underpredictions from 1995 to 2000, large overpredictions from 2001 to 2005, and overpredictions in the recent forecasts in 2007 and 2008.

Three factors contributed to that series of underpredictions and overpredictions. First, wages and salaries as a share of GDP grew extraordinarily fast between 1997 and 2000 and then declined just as quickly from 2000 to 2005. That pattern seems to have stemmed largely from changes in the prevalence of employee stock options (which, when exercised, count as wage and salary income in the NIPAs). The increase and decrease in the wage and salary share of GDP mimics the rise and fall in the stock market in those years.

Second, and perhaps related to the first factor, was the unusual behavior of the “statistical discrepancy” in the NIPAs—the difference between measures of total income and total product. In principle, those two measures should be equal and the discrepancy should be zero, but in practice it is not because BEA must use different primary sources to estimate income on the one hand and product on the other. The discrepancy is difficult to forecast because it reflects errors in estimating.

Between 1994 and 2000, estimates of total income grew faster than estimates of total product—that is, the statistical discrepancy fell and became negative, leading to underpredictions of income. With the onset of the recession in 2001, the statistical discrepancy then reversed sharply and, according to the latest data from BEA, was

11. In past editions of this report, CBO included an analysis of its forecast of the sum of wages and salaries and corporate book profits. That sum has been dropped from the analysis because legislative changes to the tax rules affecting corporations can affect book profits and have increasingly done so. Thus legislative changes, rather than economic forecasting errors, affect the accuracy of projections of book profits. The projection of wages and salaries is not directly affected by legislation.

positive again before the end of 2002. That swing led to overpredictions of income. From that time through the end of 2006, the discrepancy swung from a positive value to negative \$195 billion, as income once again grew faster than product, and forecasts of income shares tended to be underpredicted. Since 2007, the discrepancy has swung once again toward the positive.

A third source of difficulty in forecasting wages and salaries is the recent variability in the portion of labor income not subject to taxation. Throughout most of the post-World War II period, the nontaxable portion of labor income as a share of total labor compensation rose because employers and employees preferred to substitute untaxed noncash, or fringe, benefits (such as employer-paid insurance premiums and pension contributions) for taxable wages and salaries. But between 1994 and 1999, that trend reversed. The share of total labor compensation that was not taxed declined, while the share of compensation that was taxed increased. That turnaround stemmed from changes in health insurance and from the rise in the stock market (which reduced the necessity for employers to contribute to defined-benefit pension plans).

During 2001 and 2002, however, the nontaxable share of labor income again rose sharply. According to the latest data through 2009, that share has remained roughly constant since 2002, even though during some of that period it would have been expected to fall, as legislative changes temporarily reduced the payments that firms would otherwise have been required to make to fund defined-benefit pensions.¹²

Five-Year Projections

CBO's five-year economic projections were about as accurate as those of the *Blue Chip* consensus and the Administration for all the series examined (see Table 2 on page 12). The *Blue Chip's* five-year economic projections (which are issued twice a year) are generally published about three months after CBO's forecasts. Although CBO's projections are constrained by the mandate that no change in fiscal policy be assumed, and the

Administration's forecasts generally assume that the Administration's proposals will be enacted, the *Blue Chip* forecasters are free to make their best projections for future fiscal policy. That freedom and the additional months of data do not seem to translate into a forecasting edge, however.

Real Output. CBO's projections of medium-term growth in real output have been about as accurate as the *Blue Chip's* in the period since 1979 (see Table 12 on page 30). As with the errors in the two-year forecasts, the errors in the five-year projections were highly positively correlated, with both forecasters posting similarly large errors for some projections made in the same years (1979, 1994 through 1998, and 2004 through 2005). In the five-year projections made between 1992 and 1999, both CBO and the *Blue Chip* underpredicted medium-term growth because of the surprisingly strong economy of the late 1990s and, to a lesser extent, the upward revisions to BEA's estimates of growth rates. Conversely, the five-year projections made in 2004 and 2005 turned out to be high because of the recent recession. The accuracy of CBO's five-year projections of real output also has been similar to that of the Administration's.

Nominal Output. The accuracy of CBO's, the *Blue Chip's*, and the Administration's forecasts of the growth of nominal output has been similar for the period since 1982 (see Table 13 on page 32). The accuracy of forecasts made since 1992 for the growth of nominal output is generally better than that for real output, in part because errors in forecasting inflation partially offset errors in forecasting real growth.

Differences in Inflation Measures. All three forecasters' five-year projections of the difference in the growth of the CPI and the GDP price index were too low in virtually every year from 1983 to 1999 and too high in virtually every year since 1999 (see Table 14 on page 34). The underprediction between 1983 and 1998 averaged 0.4 percentage points for CBO, 0.4 percentage points for the *Blue Chip* consensus, and 0.5 percentage points for the Administration.

However, about 0.2 percentage points of the apparent forecast bias between 1985 and 1998 resulted from the downward revision in the growth of the GDP price index. That revision resulted from conceptual changes in the NIPAs when they were revised in 1999. After adjusting for the effect of those revisions, a small downward

12. The implications for CBO's baseline forecasts of subsequent legislative changes are discussed in Congressional Budget Office, *What Is a Current-Law Economic Baseline?* Further details about the treatment of contributions to defined-benefit pension plans are outlined in Congressional Budget Office, *The Budget and Economic Outlook: An Update* (August 2005), Box 2-2, pp. 32–33.

bias remained for that period for all three forecasters. That bias indicates that projections of the relationship between those two inflation measures tended to contribute to more favorable budget projections (for reasons discussed earlier).

The actual differences between the growth rates of the CPI and the GDP price index were smaller over the 2001–2006 period than in previous years. Five-year projections for that period were influenced by the historical record and overestimated the difference between the price indexes.

Wages and Salaries. The final five-year projection records examined here are those for the change in wages and salaries and the change in wages and salaries expressed as a share of output. Again, CBO and the Administration had similar errors (see Tables 15 and 16 on pages 36 and 37).

As with some other variables, the errors that both CBO and the Administration made in projecting the five-year

change in wages and salaries as a share of output show alternating periods of overestimates and underestimates and are positively correlated. From 1982 to 1986, both forecasts were underestimates, whereas forecasts from 1987 to 1993 were too high. From 1994 to 1997, CBO and the Administration underestimated the five-year change in wages and salaries as a share of output. More recently, from 1998 onward, both forecasters overestimated the five-year change in wage and salary disbursements as a share of output.

Difficulties in projecting the statistical discrepancy and the nontaxable component of labor income are major sources of errors in the five-year projections as well as in the two-year forecasts. (Those factors were discussed above in the context of the two-year horizon.) Moreover, as the errors for the five-year periods encompassing the 2001 recession indicate, the difficulty in forecasting turning points in the business cycle also complicates forecasts of income shares.

Table 1.**Summary Measures of Performance for Two-Year Average Forecasts**

(Percentage points)

	CBO	<i>Blue Chip</i> ^a	Administration
Growth Rate for Real Output (1982-2008)			
Mean error	-0.2	-0.2	0
Mean absolute error	1.1	1.1	1.2
Root-mean-square error	1.4	1.4	1.5
Growth Rate for Nominal Output (1982-2008)			
Mean error	0.1	0.2	0.3
Mean absolute error	1.1	1.0	1.2
Root-mean-square error	1.4	1.4	1.6
Inflation in the Consumer Price Index (1982-2008)			
Mean error	0.2	0.3	0.1
Mean absolute error	0.7	0.7	0.7
Root-mean-square error	0.9	0.9	0.9
Nominal Interest Rate on Three-Month Treasury Bills (1982-2008)			
Mean error	0.6	0.6	0.3
Mean absolute error	1.1	1.1	1.1
Root-mean-square error	1.4	1.3	1.4
Nominal Long-Term Interest Rate (1984-2008)			
Mean error	0.4	0.4	0.1
Mean absolute error	0.7	0.7	0.8
Root-mean-square error	0.7	0.7	0.9
Real Interest Rate on Three-Month Treasury Bills (1982-2008)			
Mean error	0.4	0.3	0.1
Mean absolute error	1.1	1.0	1.0
Root-mean-square error	1.3	1.2	1.4
Difference Between Inflation in the CPI and in the GDP Price Index (1982-2008)			
Mean error	-0.1	-0.1	-0.2
Mean absolute error	0.3	0.4	0.4
Root-mean-square error	0.4	0.4	0.5
Wage and Salary Disbursements (1980-2008)			
Mean error	0.5	*	0.6
Mean absolute error	1.4	*	1.5
Root-mean-square error	1.9	*	2.0
Change in Wage and Salary Disbursements as a Share of Output (1980-2008)			
Mean error	0.2	*	0.2
Mean absolute error	0.8	*	0.8
Root-mean-square error	0.9	*	1.0

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Commerce, Bureau of Economic Analysis.

Notes: The values reported here are derived from Tables 3 through 11. Errors are forecast values minus actual values; thus, a positive error is an overestimate.

CPI = consumer price index; GDP = gross domestic product; * = not applicable.

a. The *Blue Chip* consensus is the average of approximately 50 private-sector forecasters.

Table 2.**Summary Measures of Performance for Five-Year Average Projections**

(Percentage points)

	CBO	<i>Blue Chip</i> ^a	Administration
Growth Rate for Real Output (1979-2005)			
Mean error	-0.1	-0.1	0.1
Mean absolute error	0.7	0.7	0.9
Root-mean-square error	1.0	1.0	1.0
Growth Rate for Nominal Output (1982-2005)			
Mean error	0.3	0.5	0.4
Mean absolute error	0.8	0.8	0.8
Root-mean-square error	1.0	1.0	1.0
Difference Between Inflation in the CPI and in the GDP Price Index (1983-2005)			
Mean error	-0.1	-0.2	-0.3
Mean absolute error	0.4	0.4	0.5
Root-mean-square error	0.4	0.4	0.5
Wage and Salary Disbursements (1980-2005)			
Mean error	0.1	*	0
Mean absolute error	0.9	*	0.9
Root-mean-square error	1.1	*	1.2
Change in Wage and Salary Disbursements as a Share of Output (1980-2005)			
Mean error	0.4	*	0
Mean absolute error	1.6	*	1.5
Root-mean-square error	1.8	*	1.7

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Commerce, Bureau of Economic Analysis.

Notes: The values reported here are derived from Tables 12 through 16. Errors are forecast values minus actual values; thus, a positive error is an overestimate.

CPI = consumer price index; GDP = gross domestic product; * = not applicable.

a. The *Blue Chip* consensus is the average of approximately 50 private-sector forecasters.

Table 3.**CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Growth Rates for Real Output**

(Percent, by calendar year)

	Actual			Chain-Type Annual- Weighted Index	CBO		<i>Blue Chip</i> ^e		Administration	
	1972 Dollars ^a	1982 Dollars ^b	1987 Dollars ^c		Forecast	Error ^d	Forecast	Error ^d	Forecast	Error ^d
Real GNP										
1976-1977	6.7	4.8	4.8	5.1	6.2	1.1	*	*	5.9	0.9
1977-1978	5.2	5.0	4.7	5.1	5.5	0.4	*	*	5.1	0.1
1978-1979	3.9	3.9	3.8	4.5	4.7	0.3	*	*	4.7	0.3
1979-1980	1.3	1.1	1.1	1.6	2.7	1.2	*	*	2.9	1.3
1980-1981	1.1	0.9	0.5	1.0	0.5	-0.5	*	*	0.5	-0.5
1981-1982	0.2	-0.3	-0.4	0.2	2.1	1.9	*	*	2.6	2.4
1982-1983	0.7	0.5	0.7	1.2	2.1	0.9	2.0	0.8	2.7	1.4
1983-1984	5.2	5.2	4.9	5.7	3.4	-2.3	3.5	-2.2	2.6	-3.1
1984-1985	*	5.1	4.4	5.4	4.7	-0.7	4.3	-1.1	4.7	-0.7
1985-1986	*	3.0	2.8	3.5	3.3	-0.2	3.2	-0.3	3.9	0.4
1986-1987	*	3.1	2.9	3.2	3.1	0	3.0	-0.2	3.7	0.5
1987-1988	*	3.9	3.5	3.7	2.9	-0.8	2.8	-0.8	3.3	-0.4
1988-1989	*	3.5	3.3	3.9	2.4	-1.4	2.1	-1.7	3.0	-0.9
1989-1990	*	1.7	2.0	2.8	2.5	-0.3	2.2	-0.6	3.2	0.4
1990-1991	*	*	0.3	0.8	2.0	1.2	1.9	1.1	2.8	2.0
1991-1992	*	*	0.7	1.5	1.6	0.1	1.2	-0.3	1.4	-0.1
Real GDP ^f										
1992-1993	*	*	2.7	3.1	2.6	-0.5	2.3	-0.8	2.2	-0.9
1993-1994	*	*	3.6	3.5	2.9	-0.6	3.0	-0.4	2.9	-0.6
1994-1995	*	*	*	3.3	2.8	-0.5	2.8	-0.4	2.9	-0.3
1995-1996	*	*	*	3.1	2.4	-0.7	2.6	-0.5	2.6	-0.5
1996-1997	*	*	*	4.1	1.9	-2.1	2.1	-2.0	2.2	-1.8
1997-1998	*	*	*	4.4	2.1	-2.3	2.2	-2.2	2.1	-2.3
1998-1999	*	*	*	4.6	2.3	-2.2	2.4	-2.2	2.2	-2.4
1999-2000	*	*	*	4.5	2.0	-2.5	2.3	-2.1	2.2	-2.3
2000-2001	*	*	*	2.6	3.2	0.6	3.3	0.7	3.0	0.4
2001-2002	*	*	*	1.4	2.9	1.5	3.0	1.6	3.2	1.8
2002-2003	*	*	*	2.2	2.4	0.3	2.2	0	2.2	0.1
2003-2004	*	*	*	3.0	3.0	0	3.2	0.2	3.2	0.2
2004-2005	*	*	*	3.3	4.5	1.2	4.1	0.8	4.0	0.7
2005-2006	*	*	*	2.9	3.7	0.9	3.5	0.6	3.5	0.7
2006-2007	*	*	*	2.4	3.5	1.1	3.2	0.8	3.3	0.9
2007-2008	*	*	*	1.3	2.6	1.4	2.7	1.4	2.9	1.6
2008-2009	*	*	*	-1.0	2.3	3.3	2.4	3.5	2.9	3.9

Continued

Table 3.

Continued

CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Growth Rates for Real Output

(Percent, by calendar year)

	Actual				CBO		<i>Blue Chip</i> ^e		Administration	
	1972	1982	1987	Chain-Type Annual- Weighted Index	Forecast	Error ^d	Forecast	Error ^d	Forecast	Error ^d
	Dollars ^a	Dollars ^b	Dollars ^c							
Statistics for 1976-2008										
Mean error	*	*	*	*	*	0	*	*	*	0.1
Mean absolute error	*	*	*	*	*	1.1	*	*	*	1.1
Root-mean-square error	*	*	*	*	*	1.3	*	*	*	1.5
Statistics for 1982-2008										
Mean error	*	*	*	*	*	-0.2	*	-0.2	*	0
Mean absolute error	*	*	*	*	*	1.1	*	1.1	*	1.2
Root-mean-square error	*	*	*	*	*	1.4	*	1.4	*	1.5

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Commerce, Bureau of Economic Analysis (BEA).

Notes: Actual values are for the two-year growth rates for real (inflation-adjusted) GNP and GDP that were last reported by BEA, not the first reported values. Forecast values are for the average annual growth of real GNP or GDP over the two-year period. All of the forecasts were issued in the first half of the initial year of the period or in December of the preceding year.

CPI = consumer price index; GNP = gross national product; GDP = gross domestic product; * = not applicable.

- a. Data for GNP and GDP that are based on 1972 dollars are available only through the third quarter of 1985.
- b. Data for GNP and GDP that are based on 1982 dollars are available only through the third quarter of 1991.
- c. Data for GNP and GDP that are based on 1987 dollars are available only through the second and third quarters, respectively, of 1995.
- d. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate. The chain-type annual-weighted index of actual GNP or GDP was used to calculate the errors.
- e. Two-year forecasts for the *Blue Chip* consensus were not available until 1982.
- f. With BEA's 1992 benchmark revision, GDP replaced GNP as the central measure of national output.

Table 4.**Comparison of CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Growth Rates for Nominal Output**

(Percent, by calendar year)

	Actual	CBO		<i>Blue Chip</i> ^b		Administration	
		Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
GNP							
1976-1977	11.5	13.1	1.7	*	*	12.3	0.8
1977-1978	12.1	10.8	-1.3	*	*	11.2	-1.0
1978-1979	12.5	10.9	-1.6	*	*	11.2	-1.3
1979-1980	10.4	11.0	0.6	*	*	10.4	0
1980-1981	10.4	9.7	-0.7	*	*	9.5	-0.8
1981-1982	8.0	12.1	4.1	*	*	11.9	4.0
1982-1983	6.3	9.7	3.4	9.5	3.2	9.8	3.5
1983-1984	9.8	8.2	-1.6	9.0	-0.9	8.0	-1.8
1984-1985	9.0	9.9	0.9	9.6	0.6	9.6	0.6
1985-1986	6.2	7.6	1.4	7.4	1.2	8.2	1.9
1986-1987	5.8	7.1	1.3	6.7	0.9	7.7	1.8
1987-1988	7.0	6.5	-0.5	6.4	-0.5	6.9	-0.1
1988-1989	7.6	6.3	-1.4	6.1	-1.5	6.8	-0.9
1989-1990	6.7	6.8	0.1	6.6	-0.1	7.1	0.4
1990-1991	4.6	6.1	1.5	6.0	1.4	7.1	2.5
1991-1992	4.5	5.7	1.2	5.2	0.7	5.6	1.1
GDP ^c							
1992-1993	5.5	5.7	0.2	5.5	0.1	5.4	-0.1
1993-1994	5.7	5.3	-0.4	6.0	0.4	5.3	-0.4
1994-1995	5.5	5.6	0.1	5.6	0.2	5.7	0.2
1995-1996	5.2	5.2	0	5.7	0.6	5.6	0.4
1996-1997	6.0	4.7	-1.3	4.5	-1.5	5.1	-0.9
1997-1998	5.9	4.6	-1.4	4.6	-1.3	4.7	-1.2
1998-1999	6.0	4.5	-1.5	4.5	-1.4	4.2	-1.8
1999-2000	6.4	3.9	-2.4	4.1	-2.3	4.0	-2.3
2000-2001	4.9	4.9	0	5.1	0.2	4.9	0
2001-2002	3.4	5.2	1.7	5.1	1.7	5.4	2.0
2002-2003	4.1	4.2	0.1	4.0	-0.1	4.2	0.1
2003-2004	5.6	4.8	-0.8	5.0	-0.6	4.7	-0.9
2004-2005	6.5	5.6	-0.9	5.7	-0.8	5.3	-1.2
2005-2006	6.3	5.5	-0.7	5.5	-0.7	5.6	-0.7
2006-2007	5.5	5.7	0.2	5.6	0.1	5.7	0.2
2007-2008	3.8	4.6	0.8	4.9	1.1	5.4	1.6
2008-2009	0.6	4.1	3.5	4.6	4.0	4.9	4.2

Continued

Table 4.

Continued

Comparison of CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Growth Rates for Nominal Output

(Percent, by calendar year)

	Actual	CBO		<i>Blue Chip</i> ^b		Administration	
		Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
Statistics for 1976-2008							
Mean error	*	*	0.2	*	*	*	0.3
Mean absolute error	*	*	1.2	*	*	*	1.2
Root-mean-square error	*	*	1.5	*	*	*	1.6
Statistics for 1982-2008							
Mean error	*	*	0.1	*	0.2	*	0.3
Mean absolute error	*	*	1.1	*	1.0	*	1.2
Root-mean-square error	*	*	1.4	*	1.4	*	1.6

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Commerce, Bureau of Economic Analysis (BEA).

Notes: Actual values are for the two-year growth rates for GNP and GDP that were last reported by BEA, not the first reported values. Forecast values are for the average annual growth of GNP or GDP over the two-year period. All of the forecasts were issued in the first half of the initial year of the period or in December of the preceding year.

GNP = gross national product; GDP = gross domestic product; * = not applicable.

- Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.
- Two-year forecasts for the *Blue Chip* consensus were not available until 1982.
- With BEA's 1992 benchmark revision, GDP replaced GNP as the central measure of national output.

Table 5.**CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Inflation in the Consumer Price Index**

(Percent, by calendar year)

	Actual		CBO		<i>Blue Chip</i> ^b		Administration	
	CPI-U	CPI-W	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
1976-1977	6.1	6.1	7.1	1.0	*	*	6.1	0
1977-1978	7.0	7.0	4.9	-2.1	*	*	5.2	-1.8
1978-1979	9.4	9.5	5.8	-3.7	*	*	6.0	-3.5
1979-1980	12.4	12.5	8.1	-4.3	*	*	7.4	-5.0
1980-1981	11.9	11.9	10.1	-1.8	*	*	10.5	-1.4
1981-1982	8.2	8.1	10.4	2.1	*	*	9.7	1.6
1982-1983	4.6	4.5	7.2	2.6	7.2	2.6	6.6	2.1
1983-1984	3.8	3.3	4.7	1.0	4.9	1.1	4.7	1.5
1984-1985	3.9	3.5	4.9	1.0	5.2	1.3	4.5	1.0
1985-1986	2.7	2.5	4.1	1.4	4.3	1.6	4.2	1.7
1986-1987	2.8	2.6	3.8	1.2	3.8	1.0	3.8	1.2
1987-1988	3.8	3.8	3.9	0.1	3.6	-0.2	3.3	-0.5
1988-1989	4.4	4.4	4.7	0.3	4.3	-0.1	4.2	-0.2
1989-1990	5.1	5.0	4.9	-0.1	4.7	-0.4	3.7	-1.3
1990-1991	4.8	4.6	4.1	-0.7	4.1	-0.7	3.9	-0.7
1991-1992	3.6	3.5	4.2	0.6	4.4	0.8	4.6	1.1
1992-1993	3.0	2.9	3.4	0.4	3.5	0.5	3.1	0.1
1993-1994	2.8	2.7	2.8	0.1	3.3	0.6	2.8	0.1
1994-1995	2.7	2.7	2.8	0.1	3.0	0.3	3.0	0.3
1995-1996	2.9	2.9	3.2	0.4	3.4	0.6	3.1	0.3
1996-1997	2.6	2.6	2.9	0.3	2.8	0.2	2.9	0.3
1997-1998	1.9	1.8	2.9	1.0	2.9	1.0	2.7	0.8
1998-1999	1.9	1.8	2.3	0.5	2.4	0.5	2.1	0.3
1999-2000	2.8	2.8	2.5	-0.2	2.2	-0.6	2.2	-0.5
2000-2001	3.1	3.1	2.4	-0.6	2.5	-0.6	2.5	-0.6
2001-2002	2.2	2.1	2.8	0.6	2.5	0.3	2.6	0.4
2002-2003	1.9	1.8	2.1	0.2	2.0	0.1	2.0	0.1
2003-2004	2.5	2.4	2.2	-0.2	2.2	-0.2	2.1	-0.3
2004-2005	3.0	3.1	1.6	-1.4	1.9	-1.1	1.4	-1.6
2005-2006	3.3	3.4	2.1	-1.2	2.4	-0.9	2.3	-1.0
2006-2007	3.0	3.0	2.5	-0.5	2.6	-0.4	2.7	-0.3
2007-2008	3.3	3.5	2.1	-1.2	2.1	-1.2	2.0	-1.3
2008-2009	1.7	1.7	2.2	0.4	2.6	0.9	2.2	0.4

Continued

Table 5.

Continued

CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Inflation in the Consumer Price Index

(Percent, by calendar year)

	Actual		CBO		<i>Blue Chip</i> ^b		Administration	
	CPI-U	CPI-W	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
Statistics for 1976-2008								
Mean error	*	*	*	-0.1	*	*	*	-0.2
Mean absolute error	*	*	*	1.0	*	*	*	1.0
Root-mean-square error	*	*	*	1.4	*	*	*	1.4
Statistics for 1982-2008								
Mean error	*	*	*	0.2	*	0.3	*	0.1
Mean absolute error	*	*	*	0.7	*	0.7	*	0.7
Root-mean-square error	*	*	*	0.9	*	0.9	*	0.9

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Labor, Bureau of Labor Statistics (BLS).

Notes: Values are for the average annual growth of the CPI over the two-year period. Before 1978, BLS published only one CPI series, now known as the CPI-W (CPI for urban wage earners and clerical workers). In January 1978, the bureau began publishing a second, broader consumer price index series, the CPI-U (CPI for all urban consumers). For most years since 1979, CBO forecast the CPI-U; from 1986 through 1989, however, CBO forecast the CPI-W. The Administration forecast the CPI-W until 1992, when it switched to the CPI-U. The *Blue Chip* consensus forecast the CPI-U for the entire period. All of the forecasts were issued in the first half of the initial year of the period or in December of the preceding year.

CPI = consumer price index; * = not applicable.

- a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.
- b. Two-year forecasts for the *Blue Chip* consensus were not available until 1982.

Table 6.

CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Nominal Interest Rates on Three-Month Treasury Bills

(Percent, by calendar year)

	Actual		CBO		<i>Blue Chip</i> ^b		Administration	
	New Issue	Secondary Market	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
1976-1977	5.1	5.1	6.2	1.1	*	*	5.5	0.4
1977-1978	6.2	6.2	6.4	0.2	*	*	4.4	-1.8
1978-1979	8.6	8.6	6.0	-2.6	*	*	6.1	-2.5
1979-1980	10.8	10.7	8.3	-2.4	*	*	8.2	-2.6
1980-1981	12.8	12.7	9.5	-3.2	*	*	9.7	-3.1
1981-1982	12.4	12.3	13.2	0.9	*	*	10.0	-2.4
1982-1983	9.7	9.6	12.6	3.0	11.3	1.6	11.1	1.4
1983-1984	9.1	9.1	7.1	-2.0	7.9	-1.2	7.9	-1.1
1984-1985	8.5	8.5	8.7	0.3	9.1	0.5	8.1	-0.4
1985-1986	6.7	6.7	8.5	1.8	8.5	1.8	8.0	1.3
1986-1987	5.9	5.9	6.7	0.9	7.1	1.2	6.9	1.0
1987-1988	6.2	6.2	5.6	-0.6	5.7	-0.5	5.5	-0.7
1988-1989	7.4	7.4	6.4	-0.9	6.1	-1.2	5.2	-2.1
1989-1990	7.8	7.8	7.5	-0.3	7.5	-0.3	5.9	-1.9
1990-1991	6.5	6.4	7.0	0.6	7.1	0.7	6.0	-0.4
1991-1992	4.4	4.4	6.8	2.4	6.4	2.0	6.2	1.8
1992-1993	3.2	3.2	4.7	1.5	4.6	1.4	4.5	1.3
1993-1994	3.6	3.6	3.4	-0.2	3.8	0.2	3.4	-0.2
1994-1995	4.9	4.9	3.9	-1.0	3.6	-1.3	3.6	-1.3
1995-1996	5.3	5.2	5.9	0.7	6.1	0.9	5.7	0.4
1996-1997	5.0	5.0	4.8	-0.2	5.0	0	4.7	-0.3
1997-1998	4.9	4.9	5.0	0.1	5.1	0.2	4.8	-0.1
1998-1999	4.7	4.7	5.2	0.5	5.1	0.4	4.9	0.2
1999-2000	5.2	5.2	4.5	-0.7	4.3	-0.9	4.2	-1.0
2000-2001	4.6	4.6	5.5	0.9	5.6	1.0	5.2	0.6
2001-2002	2.5	2.5	4.8	2.4	5.4	2.9	5.8	3.4
2002-2003	1.3	1.3	3.3	2.0	2.7	1.4	2.8	1.5
2003-2004	1.2	1.2	2.4	1.3	2.2	1.1	2.4	1.3
2004-2005	2.3	2.3	2.1	-0.1	1.9	-0.3	1.8	-0.4
2005-2006	3.9	3.9	3.4	-0.5	3.4	-0.5	3.1	-0.8
2006-2007	4.6	4.5	4.5	0	4.5	0	4.2	-0.3
2007-2008	2.9	2.8	4.6	1.8	4.8	2.0	4.6	1.8
2008-2009	0.8	0.8	3.7	2.9	3.6	2.9	3.8	3.0

Continued

Table 6.**Continued**

CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Nominal Interest Rates on Three-Month Treasury Bills

(Percent, by calendar year)

	Actual		CBO		<i>Blue Chip</i> ^b		Administration	
	New Issue	Secondary Market	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
Statistics for 1976-2008								
Mean error	*	*	*	0.3	*	*	*	-0.1
Mean absolute error	*	*	*	1.2	*	*	*	1.3
Root-mean-square error	*	*	*	1.5	*	*	*	1.6
Statistics for 1982-2008								
Mean error	*	*	*	0.6	*	0.6	*	0.3
Mean absolute error	*	*	*	1.1	*	1.1	*	1.1
Root-mean-square error	*	*	*	1.4	*	1.3	*	1.4

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and the Board of Governors of the Federal Reserve.

Notes: Values are for the geometric averages of the three-month Treasury-bill rates for the two-year period. The actual values are published by the Federal Reserve Board as the rate on new issues (reported on a bank-discount basis) and the secondary-market rate. CBO forecast the secondary-market rate; the Administration forecast the new-issue rate before 2001 but, since that time, the secondary-market rate. The *Blue Chip* consensus alternated between the two rates, forecasting the new-issue rate from 1982 to 1985, the secondary-market rate from 1986 to 1991, the new-issue rate again from 1992 to 1997, and the secondary-market rate since that time. All of the forecasts were issued in the first half of the initial year of the period or in December of the preceding year.

* = not applicable.

- a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.
- b. Two-year forecasts for the *Blue Chip* consensus were not available until 1982.

Table 7.**CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average for Nominal Long-Term Interest Rates**

(Percent, by calendar year)

	Actual		CBO		<i>Blue Chip</i>		Administration	
	10-Year Note	Corporate Aaa Bond	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
1984-1985	11.5	12.0	11.9	-0.1	12.2	0.2	9.7	-1.8
1985-1986	9.1	10.2	11.5	1.3	11.8	1.7	10.6	1.5
1986-1987	8.0	9.2	8.9	0.9	9.9	0.8	8.7	0.7
1987-1988	8.6	9.5	7.2	-1.4	8.7	-0.8	6.6	-2.0
1988-1989	8.7	9.5	9.4	0.7	9.8	0.3	7.7	-1.0
1989-1990	8.5	9.3	9.1	0.6	9.5	0.3	7.7	-0.8
1990-1991	8.2	9.0	7.7	-0.5	8.7	-0.3	7.2	-1.0
1991-1992	7.4	8.5	7.8	0.4	8.7	0.3	7.3	-0.1
1992-1993	6.4	7.7	7.1	0.7	8.4	0.7	6.9	0.5
1993-1994	6.5	7.6	6.6	0.2	8.2	0.6	6.6	0.2
1994-1995	6.8	7.8	5.9	-0.9	7.1	-0.7	5.8	-1.0
1995-1996	6.5	7.5	7.3	0.8	8.6	1.1	7.5	1.0
1996-1997	6.4	7.3	6.2	-0.2	6.2	-0.1	5.4	-0.9
1997-1998	5.8	6.9	6.2	0.4	6.4	0.6	6.0	0.2
1998-1999	5.5	6.8	6.0	0.6	5.9	0.5	5.8	0.4
1999-2000	5.8	7.3	5.2	-0.6	5.0	-0.8	4.9	-0.9
2000-2001	5.5	7.4	6.3	0.8	6.3	0.8	6.1	0.6
2001-2002	4.8	6.8	5.1	0.3	5.4	0.6	5.8	1.0
2002-2003	4.3	6.1	5.2	0.9	5.3	1.0	5.1	0.8
2003-2004	4.1	5.6	4.8	0.7	4.8	0.7	4.6	0.5
2004-2005	4.3	5.4	5.0	0.7	5.0	0.8	4.8	0.5
2005-2006	4.5	5.4	5.1	0.6	5.0	0.5	4.9	0.4
2006-2007	4.7	5.6	5.1	0.4	4.9	0.2	5.2	0.5
2007-2008	4.1	5.6	4.9	0.8	4.9	0.8	5.0	0.9
2008-2009	3.5	5.5	4.6	1.1	4.5	1.1	4.8	1.3
Statistics for 1984-2008								
Mean error	*	*	*	0.4	*	0.4	*	0.1
Mean absolute error	*	*	*	0.7	*	0.7	*	0.8
Root-mean-square error	*	*	*	0.7	*	0.7	*	0.9

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and the Board of Governors of the Federal Reserve.

Notes: Actual values are for the geometric averages of the 10-year Treasury-note rates or Moody's Aaa corporate-bond rates for the two-year period as reported by the Board of the Federal Reserve. CBO forecast the 10-year Treasury-note rate in all years except 1984 and 1985, when it forecast the Aaa corporate-bond rate. The Administration forecast the 10-year-note rate, but the *Blue Chip* consensus forecast the Aaa corporate-bond rate through 1995 and then switched to the 10-year Treasury-note rate. Data are only available beginning in 1984 because not all of the forecasters published long-term rate projections before then. All of the forecasts were issued in the first half of the initial year of the period or in December of the preceding year.

* = not applicable.

a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.

Table 8.**CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Real Interest Rates on Three-Month Treasury Bills**

(Percent, by calendar year)

	Actual				CBO		<i>Blue Chip</i> ^b		Administration	
	New Issue Rate		Secondary Market		Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
	Discounted by		Rate Discounted by							
	CPI-U	CPI-W	CPI-U	CPI-W						
1976-1977	-0.9	-0.9	-0.9	-0.9	-0.8	0.1	*	*	-0.6	0.3
1977-1978	-0.8	-0.7	-0.8	-0.7	1.5	2.2	*	*	-0.8	-0.1
1978-1979	-0.7	-0.8	-0.7	-0.8	0.2	1.0	*	*	0.1	0.9
1979-1980	-1.4	-1.5	-1.4	-1.5	0.2	1.7	*	*	0.7	2.2
1980-1981	0.8	0.9	0.7	0.8	-0.5	-1.2	*	*	-0.7	-1.6
1981-1982	3.8	4.0	3.7	3.9	2.6	-1.2	*	*	0.3	-3.7
1982-1983	4.8	4.9	4.7	4.9	5.0	0.3	3.8	-1.0	4.2	-0.8
1983-1984	5.1	5.7	5.1	5.6	2.2	-2.9	2.9	-2.3	3.1	-2.6
1984-1985	4.4	4.9	4.4	4.8	3.6	-0.8	3.6	-0.8	3.4	-1.4
1985-1986	3.9	4.1	3.9	4.1	4.2	0.3	4.0	0.1	3.6	-0.4
1986-1987	3.1	3.2	3.0	3.2	2.8	-0.4	3.2	0.1	3.0	-0.3
1987-1988	2.3	2.4	2.3	2.3	1.7	-0.7	2.0	-0.3	2.1	-0.2
1988-1989	2.8	2.9	2.8	2.9	1.7	-1.2	1.8	-1.0	1.0	-1.9
1989-1990	2.6	2.6	2.6	2.6	2.5	-0.1	2.7	0.2	2.1	-0.6
1990-1991	1.6	1.7	1.5	1.7	2.8	1.2	2.9	1.3	2.0	0.3
1991-1992	0.8	0.9	0.7	0.9	2.5	1.8	1.9	1.2	1.5	0.6
1992-1993	0.2	0.4	0.2	0.3	1.3	1.1	1.1	0.8	1.3	1.1
1993-1994	0.8	0.9	0.8	0.9	0.5	-0.3	0.5	-0.4	0.6	-0.3
1994-1995	2.1	2.2	2.1	2.1	1.0	-1.1	0.5	-1.6	0.6	-1.5
1995-1996	2.3	2.3	2.3	2.3	2.6	0.3	2.6	0.3	2.5	0.1
1996-1997	2.3	2.4	2.3	2.4	1.8	-0.5	2.1	-0.3	1.7	-0.6
1997-1998	2.9	3.1	2.9	3.1	2.0	-0.9	2.1	-0.8	2.1	-0.9
1998-1999	2.8	2.9	2.8	2.9	2.8	0	2.6	-0.1	2.7	-0.1
1999-2000	2.4	2.3	2.4	2.3	1.9	-0.5	2.1	-0.3	2.0	-0.4
2000-2001	1.5	1.5	1.5	1.5	3.0	1.5	3.0	1.6	2.6	1.1
2001-2002	0.3	0.5	0.3	0.4	2.0	1.7	2.8	2.5	3.1	2.8
2002-2003	-0.6	-0.5	-0.6	-0.5	1.2	1.8	0.7	1.3	0.8	1.5
2003-2004	-1.3	-1.2	-1.3	-1.2	0.2	1.5	0	1.3	0.3	1.6
2004-2005	-0.7	-0.8	-0.7	-0.8	0.5	1.2	0	0.8	0.4	1.1
2005-2006	0.6	0.5	0.6	0.5	1.2	0.6	1.0	0.4	0.7	0.1
2006-2007	1.5	1.5	1.5	1.5	2.0	0.5	1.8	0.3	1.5	0
2007-2008	-0.4	-0.5	-0.5	-0.6	2.5	3.0	2.6	3.1	2.5	3.0
2008-2009	-0.9	-0.9	-1.0	-0.9	1.5	2.4	1.0	2.0	1.6	2.5

Continued

Table 8.

Continued

CBO's, *Blue Chip's*, and the Administration's Forecasts of Two-Year Average Real Interest Rates on Three-Month Treasury Bills

(Percent, by calendar year)

	Actual				CBO		<i>Blue Chip</i> ^b		Administration	
	New Issue Rate Discounted by		Secondary Market Rate Discounted by		Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
	CPI-U	CPI-W	CPI-U	CPI-W						
Statistics for 1976-2008										
Mean error	*	*	*	*	*	0.4	*	*	*	0.1
Mean absolute error	*	*	*	*	*	1.1	*	*	*	1.1
Root-mean-square error	*	*	*	*	*	1.3	*	*	*	1.5
Statistics for 1982-2008										
Mean error	*	*	*	*	*	0.4	*	0.3	*	0.1
Mean absolute error	*	*	*	*	*	1.1	*	1.0	*	1.0
Root-mean-square error	*	*	*	*	*	1.3	*	1.2	*	1.4

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and the Board of Governors of the Federal Reserve.

Notes: Values are for the appropriate three-month Treasury-bill rate discounted by the respective forecast for inflation as measured by the change in the CPI. CBO forecast the secondary-market rate, whereas the Administration forecast the new-issue rate. The *Blue Chip* consensus alternated between the two rates, forecasting the new-issue rate from 1982 to 1985, the secondary-market rate from 1986 to 1991, and the new-issue rate again beginning in 1992. Moreover, for most years since 1979, CBO forecast the CPI-U; from 1986 through 1989, however, CBO forecast the CPI-W. The Administration forecast the CPI-W until 1992, when it switched to the CPI-U. The *Blue Chip* consensus forecast the CPI-U for the entire period. All of the forecasts were issued in the first half of the initial year of the period or in December of the preceding year.

CPI = consumer price index; CPI-W = consumer price index for urban wage earners and clerical workers; CPI-U = consumer price index for all urban consumers; * = not applicable.

- a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.
- b. Two-year forecasts for the *Blue Chip* consensus were not available until 1982.

Table 9.

Comparison of CBO's, *Blue Chip's*, and the Administration's Projections of the Difference Between Two-Year Average Inflation in the CPI and in the GDP Price Index

(Percent, by calendar year)

	Actual Inflation in		CBO		<i>Blue Chip</i> ^b		Administration	
	CPI-U	CPI-W						
	Minus GDP Price Index	Minus GDP Price Index	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
1976-1977	0.1	0.1	0.6	0.5	*	*	0.2	0.1
1977-1978	0.3	0.3	-0.1	-0.5	*	*	-0.5	-0.8
1978-1979	1.8	1.8	-0.1	-1.9	*	*	-0.1	-1.9
1979-1980	3.7	3.7	0.1	-3.6	*	*	0.2	-3.5
1980-1981	2.7	2.6	1.0	-1.7	*	*	1.6	-1.1
1981-1982	0.5	0.4	0.7	0.1	*	*	0.6	0.3
1982-1983	-0.4	-0.5	-0.2	0.2	-0.1	0.3	-0.3	0.2
1983-1984	-0.1	-0.6	0.1	0.2	-0.4	-0.3	-0.5	0.2
1984-1985	0.6	0.1	0.1	-0.5	0.1	-0.4	-0.2	-0.3
1985-1986	0.1	-0.1	0	-0.1	0.2	0.1	0.1	0.2
1986-1987	0.2	0	-0.1	-0.1	0.2	0	0	-0.1
1987-1988	0.7	0.6	0.4	-0.2	0.2	-0.5	-0.1	-0.8
1988-1989	0.8	0.8	1.0	0.2	0.4	-0.4	0.5	-0.2
1989-1990	1.3	1.2	0.7	-0.5	0.4	-0.9	0	-1.2
1990-1991	1.1	0.9	0.2	-0.9	0.2	-0.9	-0.2	-1.1
1991-1992	0.7	0.5	0.2	-0.5	0.4	-0.3	0.4	-0.1
1992-1993	0.7	0.6	0.4	-0.3	0.4	-0.3	0	-0.7
1993-1994	0.6	0.5	0.5	-0.1	0.4	-0.2	0.5	-0.1
1994-1995	0.6	0.6	0.2	-0.4	0.3	-0.3	0.3	-0.3
1995-1996	0.9	0.9	0.5	-0.3	0.4	-0.4	0.3	-0.6
1996-1997	0.8	0.7	0.3	-0.5	0.5	-0.4	0.1	-0.7
1997-1998	0.5	0.3	0.5	0	0.6	0.1	0.1	-0.4
1998-1999	0.6	0.5	0.3	-0.3	0.3	-0.3	0.2	-0.4
1999-2000	1.0	1.0	0.6	-0.3	0.5	-0.5	0.4	-0.5
2000-2001	0.9	0.9	0.8	0	0.8	-0.1	0.7	-0.2
2001-2002	0.3	0.1	0.6	0.3	0.5	0.2	0.6	0.3
2002-2003	0.1	-0.1	0.4	0.4	0.3	0.2	0.1	0
2003-2004	0	-0.1	0.6	0.6	0.5	0.5	0.7	0.8
2004-2005	-0.1	0	0.6	0.7	0.4	0.4	0.2	0.2
2005-2006	0	0.1	0.5	0.4	0.4	0.4	0.4	0.4
2006-2007	0	0	0.4	0.4	0.4	0.4	0.4	0.4
2007-2008	0.8	1.0	0.3	-0.6	0	-0.8	-0.4	-1.2
2008-2009	0.1	0	0.3	0.3	0.5	0.4	0.2	0.1

Continued

Table 9.

Continued

Comparison of CBO's, Blue Chip's, and the Administration's Projections of the Difference Between Two-Year Average Inflation in the CPI and in the GDP Price Index

(Percent, by calendar year)

	Actual Inflation in		CBO		<i>Blue Chip</i> ^b		Administration	
	CPI-U Minus GDP Price Index	CPI-W Minus GDP Price Index	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
Statistics for 1976-2008								
Mean error	*	*	*	-0.3	*	*	*	-0.4
Mean absolute error	*	*	*	0.5	*	*	*	0.6
Root-mean-square error	*	*	*	0.8	*	*	*	0.9
Statistics for 1982-2008								
Mean error	*	*	*	-0.1	*	-0.1	*	-0.2
Mean absolute error	*	*	*	0.3	*	0.4	*	0.4
Root-mean-square error	*	*	*	0.4	*	0.4	*	0.5

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Labor, Bureau of Labor Statistics (BLS).

Notes: Values are for the difference between the average annual growth of the CPI and the average annual growth of the GDP price index over the two-year period. The GNP price index is used for data before 1993, and the GDP price index is used thereafter. Before 1978, BLS published only one CPI series, now known as the CPI-W. In January 1978, the bureau began to publish a second, broader CPI series, the CPI-U. For most years since 1979, CBO forecast the CPI-U; from 1986 through 1989, however, CBO forecast the CPI-W. The Administration forecast the CPI-W until 1992, when it switched to the CPI-U. The *Blue Chip* consensus forecast the CPI-U for the entire period. The forecasts were issued in the first half of the initial year of the period or in December of the preceding year.

CPI = consumer price index; GDP = gross domestic product; CPI-W = consumer price index for urban wage earners and clerical workers; CPI-U = consumer price index for all urban consumers; * = not applicable.

- a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.
- b. Two-year forecasts for the *Blue Chip* consensus were not available until 1982.

Table 10.**CBO's and the Administration's Forecasts of the Two-Year Change in Wages and Salaries**

(Percent, by calendar year)

	Actual	CBO		Administration	
		Forecast	Error ^a	Forecast	Error ^a
1980-1981	9.8	9.8	0	9.8	-0.1
1981-1982	7.5	10.6	3.1	11.4	3.9
1982-1983	5.4	8.4	3.0	8.5	3.2
1983-1984	7.8	6.9	-0.9	6.8	-1.0
1984-1985	8.7	8.8	0.1	8.1	-0.6
1985-1986	6.8	6.7	0	7.0	0.2
1986-1987	6.7	7.1	0.4	7.0	0.4
1987-1988	7.7	6.5	-1.2	6.9	-0.8
1988-1989	7.0	6.5	-0.5	6.3	-0.7
1989-1990	6.0	7.0	1.0	6.9	0.9
1990-1991	4.4	6.4	2.0	7.3	2.9
1991-1992	4.2	5.6	1.4	5.5	1.4
1992-1993	4.6	5.6	1.1	5.6	1.1
1993-1994	4.2	5.2	1.0	5.3	1.0
1994-1995	5.4	6.3	0.9	5.7	0.3
1995-1996	5.8	5.4	-0.4	5.0	-0.8
1996-1997	6.5	4.8	-1.7	5.4	-1.1
1997-1998	7.5	4.3	-3.2	4.8	-2.8
1998-1999	7.3	5.1	-2.2	4.7	-2.6
1999-2000	7.4	4.9	-2.5	4.5	-3.0
2000-2001	5.4	5.3	-0.1	5.1	-0.2
2001-2002	1.7	5.6	3.9	5.5	3.8
2002-2003	1.9	4.2	2.4	4.0	2.2
2003-2004	4.2	4.8	0.6	5.4	1.2
2004-2005	5.3	5.3	0	5.6	0.3
2005-2006	5.8	5.8	0	5.8	0.1
2006-2007	6.0	5.6	-0.4	6.0	0
2007-2008	3.9	4.9	1.1	5.9	2.1
2008-2009	-1.0	4.5	5.5	4.5	5.5
Statistics for 1980-2008					
Mean error	*	*	0.5	*	0.6
Mean absolute error	*	*	1.4	*	1.5
Root-mean-square error	*	*	1.9	*	2.0

Sources: Congressional Budget Office (CBO); Office of Management and Budget; Department of Commerce, Bureau of Economic Analysis.

Notes: The forecasts were issued in the first half of the initial year of the period or in December of the preceding year. The *Blue Chip* does not forecast wages and salaries.

* = not applicable.

a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.

Table 11.**CBO's and the Administration's Forecasts of the Two-Year Change in Wages and Salaries as a Share of Output**

(Percent, by calendar year)

	Actual	CBO		Administration	
		Forecast	Error ^a	Forecast	Error ^a
1980-1981	-0.5	0.1	0.6	0.2	0.7
1981-1982	-0.4	-1.3	-0.9	-0.5	-0.1
1982-1983	-0.9	-1.2	-0.3	-1.2	-0.3
1983-1984	-1.8	-1	0.5	-1.1	1.0
1984-1985	-0.3	-1.0	-0.7	-1.3	-1.1
1985-1986	0.5	-0.8	-1.2	-1.1	-2.0
1986-1987	0.7	0	-0.8	-0.6	-1.3
1987-1988	0.7	0	-0.7	0	-0.6
1988-1989	-0.6	0.2	0.8	-0.4	0.2
1989-1990	-0.6	0.2	0.8	-0.2	0.4
1990-1991	-0.2	0.2	0.4	0.2	0.4
1991-1992	-0.3	-0.1	0	-0.1	0.2
1992-1993	-0.8	-0.1	0.7	0.2	1.0
1993-1994	-1.3	-0.1	1.2	-0.1	1.2
1994-1995	0	0.6	0.7	0.0	0.0
1995-1996	0.5	0.2	-0.4	-0.5	-1.0
1996-1997	0.4	0.1	-0.3	0.3	0
1997-1998	1.4	-0.2	-1.6	0	-1.4
1998-1999	1.2	0.6	-0.6	0.4	-0.7
1999-2000	1.0	0.9	0	0	-0.5
2000-2001	0.5	0.4	-0.1	0.2	-0.2
2001-2002	-1.6	0.4	2.0	0.1	1.7
2002-2003	-2.0	0	2.1	-0.2	1.8
2003-2004	-1.2	0	1.3	0.6	1.9
2004-2005	-1.0	-0.3	0.7	0.2	1.2
2005-2006	-0.4	0.2	0.6	0.2	0.6
2006-2007	0.4	-0.1	-0.5	0.3	-0.1
2007-2008	0	0.3	0.3	0.5	0.5
2008-2009	-1.4	0	1.5	-0.3	1.1
Statistics for 1980-2008					
Mean error	*	*	0.2	*	0.2
Mean absolute error	*	*	0.8	*	0.8
Root-mean-square error	*	*	0.9	*	1.0

Sources: Congressional Budget Office (CBO); Office of Management and Budget; Department of Commerce, Bureau of Economic Analysis.

Notes: The forecasts were issued in the first half of the initial year of the period or in December of the preceding year. For the forecasts made between 1980 and 1991, GNP was used to calculate the shares; for the forecasts made in 1992 and later, GDP was used. The *Blue Chip* consensus does not forecast wages and salaries.

GNP = gross national product; GDP = gross domestic product; * = not applicable.

a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.

Table 12.**CBO's, *Blue Chip's*, and the Administration's Projections of Five-Year Average Growth Rates for Real Output**

(Percent, by calendar year)

	Actual			Chain-Type Annual- Weighted Index	CBO		<i>Blue Chip</i> ^e		Administration	
	1972	1982	1987		Forecast	Error ^d	Forecast	Error ^d	Forecast	Error ^d
	Dollars ^a	Dollars ^b	Dollars ^c							
Real GNP										
1976-1980	4.2	3.4	3.3	3.7	5.7	1.9	*	*	6.2	2.4
1977-1981	3.1	2.8	2.6	3.1	5.3	2.2	*	*	5.1	2.0
1978-1982	1.6	1.4	1.2	1.8	4.8	3.0	*	*	4.8	3.0
1979-1983	1.3	1.0	1.1	1.6	3.8	2.2	3.1	1.5	3.8	2.2
1980-1984	2.1	1.9	1.7	2.3	2.4	0.1	2.5	0.2	3.0	0.8
1981-1985	*	2.6	2.4	3.1	2.8	-0.3	3.0	-0.1	3.8	0.7
1982-1986	*	2.7	2.6	3.3	3.0	-0.3	2.7	-0.5	3.9	0.6
1983-1987	*	4.0	3.7	4.3	3.6	-0.7	3.5	-0.9	3.5	-0.9
1984-1988	*	4.1	3.7	4.3	4.0	-0.3	3.5	-0.8	4.3	0
1985-1989	*	3.3	3.1	3.6	3.4	-0.2	3.4	-0.2	4.0	0.4
1986-1990	*	2.8	2.7	3.2	3.3	0.1	3.1	-0.1	3.8	0.5
1987-1991	*	*	2.0	2.5	2.9	0.4	2.7	0.1	3.5	0.9
1988-1992	*	*	1.9	2.5	2.6	0	2.5	0	3.2	0.7
1989-1993	*	*	1.7	2.3	2.3	0.1	2.6	0.3	3.2	0.9
1990-1994	*	*	1.9	2.4	2.3	-0.1	2.4	0	3.0	0.6
1991-1995	*	*	*	2.5	2.3	-0.1	2.0	-0.4	2.5	0.1
Real GDP ^f										
1992-1996	*	*	*	3.3	2.6	-0.7	2.5	-0.8	2.7	-0.6
1993-1997	*	*	*	3.5	2.8	-0.8	2.8	-0.7	2.8	-0.8
1994-1998	*	*	*	3.8	2.7	-1.1	2.8	-1.0	2.8	-1.1
1995-1999	*	*	*	4.0	2.4	-1.6	2.5	-1.5	2.6	-1.4
1996-2000	*	*	*	4.3	2.0	-2.3	2.1	-2.2	2.3	-2.0
1997-2001	*	*	*	3.8	2.1	-1.6	2.3	-1.4	2.2	-1.6
1998-2002	*	*	*	3.2	2.1	-1.1	2.3	-0.9	2.2	-1.0
1999-2003	*	*	*	2.9	2.2	-0.7	2.6	-0.3	2.2	-0.7
2000-2004	*	*	*	2.6	2.9	0.3	3.2	0.6	2.8	0.1
2001-2005	*	*	*	2.4	3.0	0.6	3.1	0.7	3.2	0.8
2002-2006	*	*	*	2.7	3.0	0.3	3.1	0.4	3.0	0.3
2003-2007	*	*	*	2.8	3.2	0.4	3.2	0.4	3.3	0.5
2004-2008	*	*	*	2.4	3.5	1.2	3.6	1.3	3.6	1.2
2005-2009	*	*	*	1.2	3.5	2.4	3.6	2.5	3.3	2.2

Continued

Table 12.

Continued

CBO's, *Blue Chip's*, and the Administration's Projections of Five-Year Average Growth Rates for Real Output

(Percent, by calendar year)

	Actual			Chain-Type Annual- Weighted Index	CBO		<i>Blue Chip</i> ^e		Administration	
	1972 Dollars ^a	1982 Dollars ^b	1987 Dollars ^c		Forecast	Error ^d	Forecast	Error ^d	Forecast	Error ^d
Statistics for 1976-2005										
Mean error	*	*	*	*	*	0.1	*	*	*	0.4
Mean absolute error	*	*	*	*	*	0.9	*	*	*	1.0
Root-mean-square error	*	*	*	*	*	1.2	*	*	*	1.3
Statistics for 1979-2005										
Mean error	*	*	*	*	*	-0.1	*	-0.1	*	0.1
Mean absolute error	*	*	*	*	*	0.7	*	0.7	*	0.9
Root-mean-square error	*	*	*	*	*	1.0	*	1.0	*	1.0

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Commerce, Bureau of Economic Analysis (BEA).

Notes: Actual values are for the five-year growth rates for real (inflation-adjusted) GNP and GDP that were last reported by BEA, not the first reported values. Projected values are for the average annual growth of real GNP or GDP over the five-year period. All of the projections were issued in the first quarter of the initial year of the period or in December of the preceding year.

GNP = gross national product; GDP = gross domestic product; * = not applicable.

- Data for GNP and GDP that are based on 1972 dollars are available only through the third quarter of 1985.
- Data for GNP and GDP that are based on 1982 dollars are available only through the third quarter of 1991.
- Data for GNP and GDP that are based on 1987 dollars are available only through the second and third quarters, respectively, of 1995.
- Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate. The chain-type annual-weighted index of actual GNP or GDP was used to calculate the errors.
- Five-year projections for the *Blue Chip* consensus were not available until 1979.
- With BEA's 1992 benchmark revision, GDP replaced GNP as the central measure of national output.

Table 13.**CBO's, *Blue Chip's*, and the Administration's Projections of Five-Year Average Growth Rates for Nominal Output**

(Percent, by calendar year)

	Actual	CBO		<i>Blue Chip</i> ^b		Administration	
		Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
GNP							
1976-1980	11.3	12.3	1.0	*	*	12.0	0.6
1977-1981	11.4	10.6	-0.8	*	*	10.5	-0.9
1978-1982	9.9	10.7	0.8	*	*	10.6	0.7
1979-1983	9.1	11.3	2.2	*	*	9.6	0.6
1980-1984	8.9	11.3	2.5	*	*	11.3	2.5
1981-1985	8.5	11.8	3.3	*	*	11.3	2.8
1982-1986	7.2	9.8	2.6	9.7	2.4	9.7	2.5
1983-1987	7.6	8.2	0.6	9.0	1.4	8.5	0.9
1984-1988	7.5	9.0	1.5	9.1	1.6	8.9	1.4
1985-1989	6.8	7.7	0.9	7.8	1.0	8.1	1.3
1986-1990	6.6	7.5	0.9	7.0	0.4	7.4	0.8
1987-1991	6.1	6.9	0.8	6.6	0.5	6.9	0.8
1988-1992	6.0	6.6	0.6	6.6	0.6	6.7	0.7
1989-1993	5.5	6.6	1.1	6.9	1.4	6.5	0.9
1990-1994	5.2	6.3	1.1	6.4	1.2	6.9	1.7
1991-1995	5.0	6.1	1.1	5.9	0.9	6.4	1.4
GDP ^c							
1992-1996	5.5	5.8	0.3	5.9	0.4	6.0	0.5
1993-1997	5.6	5.1	-0.5	6.0	0.4	5.1	-0.5
1994-1998	5.7	5.4	-0.3	5.8	0.1	5.7	0
1995-1999	5.7	5.2	-0.5	5.6	-0.2	5.5	-0.2
1996-2000	6.1	4.8	-1.3	4.5	-1.6	5.1	-1.0
1997-2001	5.6	4.7	-0.9	4.9	-0.7	4.9	-0.7
1998-2002	5.0	4.4	-0.6	4.7	-0.3	4.3	-0.7
1999-2003	4.8	4.3	-0.6	4.5	-0.4	4.2	-0.6
2000-2004	4.9	4.6	-0.3	5.2	0.4	4.8	-0.1
2001-2005	4.9	5.1	0.2	5.3	0.4	5.4	0.5
2002-2006	5.4	4.9	-0.5	5.1	-0.4	4.9	-0.5
2003-2007	5.8	5.2	-0.6	5.2	-0.6	4.9	-0.9
2004-2008	5.3	5.0	-0.3	5.4	0.1	5.2	-0.1
2005-2009	3.7	5.3	1.6	5.4	1.6	5.5	1.7

Continued

Table 13.

Continued

CBO's, *Blue Chip's*, and the Administration's Projections of Five-Year Average Growth Rates for Nominal Output

(Percent, by calendar year)

	Actual	CBO		<i>Blue Chip</i> ^b		Administration	
		Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
Statistics for 1976-2005							
Mean error	*	*	0.5	*	*	*	0.5
Mean absolute error	*	*	1.0	*	*	*	1.0
Root-mean-square error	*	*	1.2	*	*	*	1.2
Statistics for 1982-2005							
Mean error	*	*	0.3	*	0.5	*	0.4
Mean absolute error	*	*	0.8	*	0.8	*	0.8
Root-mean-square error	*	*	1.0	*	1.0	*	1.0

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Commerce, Bureau of Economic Analysis (BEA).

Notes: Actual values are for the five-year growth rates for GNP and GDP that were last reported by BEA, not the first reported values. Projected values are for the average annual growth of nominal GNP or GDP over the five-year period. All of the projections were issued in the first half of the initial year of the period or in December of the preceding year.

GNP = gross national product; GDP = gross domestic product; * = not applicable.

- Errors (which are in percentage points) are projected values minus actual values; thus, a positive error is an overestimate.
- Five-year projections for the *Blue Chip* consensus were not available until 1982.
- With BEA's 1992 benchmark revision, GDP replaced GNP as the central measure of national output.

Table 14.

Comparison of CBO's, *Blue Chip's*, and the Administration's Projections of the Difference Between Five-Year Average Inflation in the CPI and in the GDP Price Index

(Percent, by calendar year)

	Actual Inflation in		CBO		<i>Blue Chip</i> ^b		Administration	
	CPI-U	CPI-W	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
	Minus GDP Price Index	Minus GDP Price Index						
1976-1980	1.6	1.6	0.2	-1.4	*	*	0	-1.6
1977-1981	1.8	1.8	0	-1.8	*	*	-0.3	-2.1
1978-1982	1.8	1.7	0	-1.7	*	*	-0.1	-1.8
1979-1983	1.5	1.4	0	-1.4	*	*	0.1	-1.3
1980-1984	1.0	0.7	0.4	-0.6	*	*	0.6	-0.1
1981-1985	0.3	0	0.4	0.1	*	*	-0.1	-0.1
1982-1986	0	-0.3	0.1	0.1	*	*	-0.2	0.1
1983-1987	0.1	-0.1	0	-0.1	-0.1	-0.3	-0.2	-0.1
1984-1988	0.4	0.2	0	-0.4	0.1	-0.3	-0.1	-0.2
1985-1989	0.5	0.4	0	-0.5	0.1	-0.5	0.1	-0.4
1986-1990	0.7	0.6	0.1	-0.5	-0.1	-0.8	0	-0.6
1987-1991	0.9	0.8	0.3	-0.6	0.2	-0.7	-0.1	-0.9
1988-1992	0.9	0.8	0.6	-0.2	0.3	-0.6	0.2	-0.6
1989-1993	0.9	0.8	0.5	-0.3	0.2	-0.7	0	-0.8
1990-1994	0.8	0.7	0.3	-0.5	0.2	-0.6	-0.1	-0.8
1991-1995	0.7	0.6	0.1	-0.5	0.4	-0.2	0.2	-0.4
1992-1996	0.7	0.7	0.4	-0.3	0.4	-0.4	0	-0.8
1993-1997	0.7	0.7	0.5	-0.2	0.4	-0.3	0.5	-0.2
1994-1998	0.6	0.6	0.4	-0.3	0.3	-0.3	0.4	-0.3
1995-1999	0.7	0.6	0.6	-0.1	0.4	-0.3	0.2	-0.4
1996-2000	0.8	0.7	0.2	-0.6	0.4	-0.4	0.1	-0.7
1997-2001	0.7	0.6	0.4	-0.3	0.5	-0.2	0.1	-0.6
1998-2002	0.6	0.5	0.3	-0.2	0.2	-0.4	0.1	-0.4
1999-2003	0.5	0.5	0.6	0	0.4	-0.1	0.3	-0.2
2000-2004	0.3	0.3	0.8	0.5	0.6	0.2	0.6	0.3
2001-2005	0.1	0.1	0.6	0.5	0.5	0.4	0.6	0.5
2002-2006	0	-0.1	0.5	0.5	0.5	0.5	0.4	0.4
2003-2007	0	0	0.5	0.5	0.5	0.5	0.6	0.6
2004-2008	0.3	0.4	0.5	0.2	0.3	0	0.3	0

Continued

Table 14.

Continued

Comparison of CBO's, *Blue Chip's*, and the Administration's Projections of the Difference Between Five-Year Average Inflation in the CPI and in the GDP Price Index

(Percent, by calendar year)

	Actual Inflation in		CBO		<i>Blue Chip</i> ^b		Administration	
	CPI-U Minus GDP Price Index	CPI-W Minus GDP Price Index	Forecast	Error ^a	Forecast	Error ^a	Forecast	Error ^a
Statistics for 1976-2005								
Mean error	*	*	*	-0.3	*	*	*	-0.4
Mean absolute error	*	*	*	0.5	*	*	*	0.6
Root-mean-square error	*	*	*	0.7	*	*	*	0.8
Statistics for 1983-2005								
Mean error	*	*	*	-0.1	*	-0.2	*	-0.3
Mean absolute error	*	*	*	0.4	*	0.4	*	0.5
Root-mean-square error	*	*	*	0.4	*	0.4	*	0.5

Sources: Congressional Budget Office (CBO); Office of Management and Budget; *Blue Chip Economic Indicators* (Aspen Publishers, Inc.); and Department of Labor Statistics (BLS).

Notes: Values are for the difference between the average annual growth of the CPI and average annual growth of the GNP or GDP price index over the five-year period. The GNP price index is used for data before 1993, and the GDP price index is used thereafter. Before 1978, BLS published only one CPI series, now known as the CPI-W. In January 1978, the bureau began to publish a second, broader consumer price index series, the CPI-U. For most years since 1979, CBO forecast the CPI-U; from 1986 through 1989, however, CBO forecast the CPI-W. The Administration forecast the CPI-W until 1992, when it switched to the CPI-U. *Blue Chip* consensus forecast the CPI-U for the entire period. The forecasts were issued in the first half of the initial year of the period or in December of the preceding year.

CPI = consumer price index; GNP = gross national product; GDP = gross domestic product; CPI-W = consumer price index for urban wage earners and clerical workers; CPI-U = consumer price index for all urban consumers; * = not applicable.

a. Errors (which are in percentage points) are projected values minus actual values; thus, a positive error is an overestimate.

b. Five-year projections for the *Blue Chip* consensus were not available until 1983.

Table 15.**CBO's and the Administration's Projections of the Five-Year Change in Wages and Salaries**

(Percent, by calendar year)

	Actual	CBO		Administration	
		Forecast	Error ^a	Forecast	Error ^a
1980-1984	10.9	11.7	0.8	11.3	0.4
1981-1985	9.8	11.2	1.4	10.6	0.8
1982-1986	8.4	8.9	0.5	8.8	0.3
1983-1987	8.0	7.4	-0.6	7.9	-0.1
1984-1988	7.6	8	0.7	8.4	0.8
1985-1989	6.8	7.2	0.3	7.8	1.0
1986-1990	7.3	7.3	0	6.9	-0.3
1987-1991	7.8	7.1	-0.7	6.8	-1.0
1988-1992	7.0	6.8	-0.2	6.6	-0.4
1989-1993	6.7	6.7	0	6.5	-0.1
1990-1994	6.0	6.5	0.5	7.0	1.0
1991-1995	5.7	6.3	0.6	6.5	0.8
1992-1996	4.7	5.9	1.2	6.1	1.0
1993-1997	4.6	5.1	0.5	5.1	0.5
1994-1998	4.5	5.6	1.1	5.7	1.2
1995-1999	5.1	5.2	0	5.2	0.1
1996-2000	5.4	4.8	-0.6	5.2	0
1997-2001	6.3	4.5	-1.9	4.8	-1.5
1998-2002	6.7	4.7	-1.9	4.6	-2.1
1999-2003	7.2	4.5	-2.7	4.3	-2.9
2000-2004	6.5	4.7	-1.8	4.7	-1.8
2001-2005	5.2	5.3	0.1	5.5	0.3
2002-2006	4.2	4.6	0.4	4.7	0.5
2003-2007	4.0	5.1	1.1	5.1	1.1
2004-2008	3.4	5.1	1.7	5.6	2.2
2005-2009	4.2	5.5	1.3	5.9	1.7
Statistics for 1980-2005					
Mean error	*	*	0.1	*	0
Mean absolute error	*	*	0.9	*	0.9
Root-mean-square error	*	*	1.1	*	1.2

Sources: Congressional Budget Office (CBO); Office of Management and Budget; Department of Commerce, Bureau of Economic Analysis.

Notes: For the projections made between 1980 and 1991, GNP was used to calculate the shares; for the projections made in 1992 and later, GDP was used. The *Blue Chip* consensus does not forecast wages and salaries. All of the projections were issued in the first half of the initial year of the period or in December of the preceding year.

GNP = gross national product; GDP = gross domestic product; * = not applicable.

a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.

Table 16.**CBO's and the Administration's Projections of the Five-Year Change in Wages and Salaries as a Share of Output**

(Percentage of GNP or GDP, by calendar year)

	Actual	CBO		Administration	
		Forecast	Error ^a	Forecast	Error ^a
1980-1984	-1.8	0.9	2.7	-0.1	1.7
1981-1985	-1.9	-1.3	0.7	-1.8	0.2
1982-1986	-0.9	-2.1	-1.2	-2.2	-1.4
1983-1987	-0.8	-1.9	-1.1	-1.4	-0.6
1984-1988	0.6	-1	-2.1	-0.9	-1.6
1985-1989	0.4	-1.2	-1.6	-0.7	-1.1
1986-1990	0.3	-0.3	-0.6	-1.1	-1.3
1987-1991	-0.2	0.4	0.6	-0.1	0.1
1988-1992	-0.8	0.4	1.2	-0.4	0.4
1989-1993	-1.7	0.3	2.0	0.2	1.9
1990-1994	-1.5	0.3	1.7	0.2	1.6
1991-1995	-1.1	0.3	1.4	0.3	1.4
1992-1996	-0.8	0.3	1.1	0.2	1
1993-1997	-0.4	0	0.4	0	0.4
1994-1998	1.4	0.5	-0.9	0.1	-1.3
1995-1999	2.1	-0.1	-2.2	-0.8	-2.8
1996-2000	2.4	0	-2.4	0.2	-2
1997-2001	2.0	-0.6	-2.6	-0.1	-2.1
1998-2002	0.4	0.6	0.2	0.6	0.1
1999-2003	-1.4	0.4	1.8	0	1.5
2000-2004	-2.0	0.4	2.4	-0.1	1.9
2001-2005	-3.4	0.3	3.7	0.3	3.7
2002-2006	-2.9	-0.8	2.0	-0.5	2.3
2003-2007	-1.4	-0.1	1.3	0.5	2.0
2004-2008	-0.8	0.1	0.9	0.8	1.6
2005-2009	-1.6	0.3	2.0	0.9	2.5
Statistics for 1980-2005					
Mean error	*	*	0.4	*	0
Mean absolute error	*	*	1.6	*	1.5
Root-mean-square error	*	*	1.8	*	1.7

Sources: Congressional Budget Office (CBO); Office of Management and Budget; Department of Commerce, Bureau of Economic Analysis.

Notes: For the projections made between 1980 and 1991, GNP was used to calculate the shares; for the projections made in 1992 and later, GDP was used. The *Blue Chip* consensus does not forecast wages and salaries. All of the projections were issued in the first half of the initial year of the period or in December of the preceding year.

GNP = gross national product; GDP = gross domestic product; * = not applicable.

a. Errors (which are in percentage points) are forecast values minus actual values; thus, a positive error is an overestimate.



Appendix: Historical and Forecast Data

This appendix offers an overview of the basic historical and forecast data used to evaluate the Congressional Budget Office's (CBO's) forecasting record. Those measures include growth in real (inflation-adjusted) and nominal output, inflation in the consumer price index (CPI), fluctuations in interest rates, and changes in wages and salaries.

Selection of Historical Data

The choice of historical data for the evaluation was determined by the availability of actual data and by the nature of the forecast variables examined. Although CBO, the Administration, and the *Blue Chip* consensus all published the same measure for real output growth, selecting a historical series was difficult because of periodic benchmark revisions to the actual data.¹ By comparison, not all of the forecasters published the same measures for CPI inflation and interest rates, but the selection of historical data for those series was clear cut.

Growth in Real and Nominal Output

Historical two-year averages of growth in real output were developed from calendar year averages of the quarterly chain-type annual-weighted indexes of real gross national product (GNP) and real gross domestic product (GDP) published by the Bureau of Economic Analysis (BEA). The fact that several real GNP and GDP series were discontinued because of periodic benchmark revisions meant that they were unsuitable historical series. For example, during the 1976–1985 period, the three

forecasters published estimates for a measure of growth in real GNP that was based on 1972 prices, which was the measure published by BEA at that time. In late 1985, however, BEA discontinued the 1972-dollar series and began to publish GNP on a 1982-dollar basis. As a result, an official series of values for GNP growth in 1972 dollars is not available for the years after 1984, and actual two-year average growth rates are not available to compare with the forecasts made in early 1984 and 1985.

From 1986 to 1991, forecasters published estimates of growth in real GNP based on 1982 prices. BEA revised the benchmark again in the second half of 1991: It discontinued the 1982-dollar GNP series and began to publish estimates of GNP on a 1987-dollar basis. Today, the historical annual series for 1982-dollar GNP is available only through 1990, and actual two-year average growth rates are not available to compare with the forecasts made in early 1990 and 1991. The forecasters then published estimates of growth in real GDP on a 1987-dollar basis until 1995, when BEA made another switch, late in the year, to a chain-weighted measure of GDP. Therefore, the historical annual series for 1987-dollar GDP ends with the 1994 annual value, and actual two-year average growth rates are not available to compare with the forecasts made in early 1994 and 1995.

By periodically updating the series to reflect more recent prices, BEA's benchmark revisions yield a measure of real output that is more relevant for analyzing contemporary movements in real growth. But the process of revision makes it difficult to evaluate forecasts of real growth produced over a period of years in series that are later discontinued. The comparison avoids the difficulties presented by periodic revisions of the data by using BEA's chain-

1. Before 1992, CBO, the Administration, and the *Blue Chip* consensus survey used gross national product to measure output. Beginning in early 1992, however, all three forecasters began to publish projections of gross domestic product instead.

type annual-weighted index of real GNP or GDP throughout the data series.² In the case of nominal GNP and GDP, historical two-year averages for growth were developed from calendar year averages of the quarterly values published by BEA.

CPI Inflation

CBO calculated two-year averages of inflation in the consumer price index from calendar year averages of monthly data published by the Bureau of Labor Statistics. Before 1978, the bureau published only one consumer price index series, now known as the CPI-W (the price index for urban wage earners and clerical workers). In January 1978, however, the bureau began to publish a second, broader consumer price index series, the CPI-U (the price index for all urban consumers), including its history.

Until 1992, the Administration published its forecasts for the CPI-W, the measure used to index most of the federal government's spending for entitlement programs. By contrast, for all but four of its forecasts since 1979—specifically, those published from 1986 to 1989—CBO based its inflation forecast on the CPI-U, the measure of inflation now used to index federal income tax brackets. The *Blue Chip* consensus has always included forecasts for the CPI-U. Although annual fluctuations in the CPI-U and CPI-W are virtually indistinguishable, the indexes differ in some years. For that reason, CBO used historical data for both series to evaluate the alternative forecasting records.

Interest Rates

CBO used monthly data published by the Board of Governors of the Federal Reserve System to calculate two-year averages of nominal short- and long-term interest rates.

The forecasts of short-term interest rates were compared using historical values for two measures of the interest rate on three-month Treasury bills: the new-issue rate and the secondary-market rate. Before 2001, the Administration forecast the new-issue rate, which corresponds to the price of three-month bills auctioned by the Department of the Treasury—that is, it reflects the interest actually paid on that debt. Since mid-2001, the Administration has forecast the secondary-market rate, which corresponds to the price of three-month bills traded outside

Treasury auctions. Such transactions occur continually in markets that involve many more traders than do Treasury auctions. Thus, the secondary-market rate provides an updated evaluation of short-term federal debt by the wider financial community.

CBO forecasts the secondary-market rate and, unlike the Administration, has never forecast the new-issue rate. The *Blue Chip* has alternated between the two rates: It published the new-issue rate from 1982 to 1985, switched to the secondary-market rate from 1986 to 1991, and then returned to the new-issue rate from 1992 to 1997. Since March 1997, the *Blue Chip* has forecast the secondary-market rate. Clearly, there is no reason to expect the rates to differ persistently; indeed, the differences between their calendar year averages are minuscule.

CBO likewise compared the various forecasts of long-term interest rates with historical values for two measures of long-term rates: the 10-year Treasury note rate and Moody's Aaa corporate bond rate. A comparison of forecasts is not possible before 1984 because not all of the forecasters published projections of long-term interest rates before then. For forecasts made in early 1984 and 1985, CBO projected the Aaa corporate bond rate. Beginning with its early 1986 forecast, however, CBO switched to the 10-year Treasury note rate. The Administration has always published projections for the 10-year Treasury note rate, but the *Blue Chip* forecast the Aaa corporate bond rate until January 1996, when it switched to the 10-year Treasury rate.

CBO calculated separate historical values for real short-term interest rates using the nominal short-term interest rate and the inflation rate appropriate for each forecaster. In each case, the two-year average nominal short-term interest rate was discounted by the two-year average rate of inflation. The resulting real short-term interest rates were similar among forecasts.

Wages and Salaries

Through its direct influence on projections of federal revenues, the forecast for taxable income plays a critical role in determining the accuracy of budget projections under current law. The income measure examined here—wage and salary disbursements—focuses on the source of income to which tax receipts are most sensitive. In addition, because some other types of income are not taxed (for instance, income derived from assets held in nontax-

2. For a discussion of that index, see Congressional Budget Office, *The Economic and Budget Outlook: An Update* (August 1995), Appendix B, pp. 71–73.

able accounts), the effective tax rate on wages and salaries exceeds the corresponding rate on other income.

Historical estimates of wages and salaries are subject to substantial statistical revisions. However, those revisions do not have much implication for projections of revenues as long as the revisions are carried forward into the forecast. The result is that the accuracy of projections of wages and salaries is measured by using the forecast change of wages and salaries as a share of GDP.

Sources of Forecast Data

For every measure except wages and salaries, this evaluation used the calendar year projections that CBO has published early each year since 1976, roughly coinciding with the publication of the Administration's annual budget proposals. The Administration's forecasts were taken from its budget in all but one case: The forecast made in early 1981 was based on the Reagan Administration's revisions of President Carter's last budget.

CBO's corresponding forecast was taken from the agency's published analysis of President Reagan's budget proposals. That CBO baseline forecast did not include the economic effects of the new Administration's fiscal policy proposals, but it did assume the continuation of the tax and spending policies of the Second Concurrent Resolution on the Budget for Fiscal Year 1981, including

accelerated depreciation of investment and a 10 percent cut in personal income taxes.³

The average two-year forecasts in the *Blue Chip* consensus survey, which are published monthly, were taken from those published in the same month as CBO's forecasts. Because the *Blue Chip* did not begin publishing its two-year forecasts until the middle of 1981, the first such forecast available for that comparison dates to early 1982. Average five-year projections, however, are included in the *Blue Chip* only twice a year and on a schedule that does not correspond to that necessary for compiling forecasts for federal budgeting. All but one of the five-year projections from the *Blue Chip* consensus that was used in this evaluation were published in March; the 1980–1984 projection of real output was published in May. The *Blue Chip*'s medium-term forecasts were prepared about three months after CBO made its medium-term projections.

Because CBO has published forecasts for wages and salaries on a regular basis only since 1985, some of the forecasts for wages and salaries that CBO produced and used for this evaluation were taken from the agency's files of unpublished forecasts.

3. Another exceptional case occurred in early 1993, when the Clinton Administration adopted CBO's economic assumptions as the basis for its budget. As a result, the errors from the early 1993 forecast are the same for CBO and the Administration.

