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Long-Term Economic Growth and Budget Projections

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Brian W. Cashell
Specialist in Quantitative Economics
Government and Finance Division

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Summary

The federal budget affects, and is affected by, the performance of the economy. Because of the effects of the economy on the budget, policy decisions regarding the overall levels of spending and taxes require some idea of how the economy is likely to perform. For this reason, both the Congressional Budget Office (CBO) and the Office of Management and Budget (OMB) prepare, twice a year, a set of economic projections on which to base consideration of budget policy.

Economic growth affects both spending and taxes. Faster economic growth means higher tax receipts, because of the interaction of higher incomes with progressive personal income tax rates. Faster economic growth reduces outlays because the debt, and interest payments on that debt, are smaller than otherwise would be the case. In the short run, faster economic growth also means lower rates of unemployment, and thus reduced income support payments.

The long-run growth rate of the economy is primarily determined by the growth rate of the labor force, and the rate of growth of productivity. Labor force growth can be estimated from data regarding the age distribution of the population and is fairly straightforward. Projecting productivity growth is more difficult.

Economists have an incomplete understanding of the factors that contribute to productivity growth. Past variations in productivity growth have yet to be fully explained. Many economic models take productivity growth as a given, something that is determined outside of the models themselves. Often, projections of productivity are simply extrapolations of recent trends, which may be adjusted to reflect the relative optimism or pessimism of the forecaster.

This paper examines the accuracy of past forecasts of economic growth by OMB, CBO, and the *Blue Chip Economic Indicators*, beginning with 1985. For the most part, the three forecasts did about equally well. CBO and the Blue Chip forecasts tended to be slightly pessimistic, on average, but there was no evidence of a statistically significant bias in any of the forecasts. Neither was there any tendency for errors to increase the further into the future the forecasts go.

Slower expected economic growth reduces projected revenues and increases projected outlays. The effect on revenues is substantially larger than the effect on outlays, but over five years, just 0.1% slower growth increases the cumulative projected deficits by $38 billion. This report will be updated annually.

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The federal budget affects, and is affected by, the performance of the economy. Because of the effects of the economy on the budget, policy decisions regarding the overall levels of spending and taxes require some idea of how the economy is likely to perform. For this reason, both the Congressional Budget Office (CBO) and the Office of Management and Budget (OMB) prepare, twice a year, a set of economic projections on which to base consideration of budget policy.

Economic growth affects both spending and taxes. Slower economic growth means lower tax receipts, because of both lower incomes and progressive personal income tax rates. Slower economic growth increases outlays because the debt, and interest payments on that debt, are larger than otherwise would be the case. In the short-run, slower economic growth also means higher rates of unemployment, and thus increased income support payments.

Because the conduct of fiscal policy depends on the outlook for the economy, these forecasts are important. This report examines the accuracy of both CBO and OMB's projections of real economic growth over successive five-year periods, beginning in 1985. Specifically, the projections are those that are released at the beginning of each calendar year to coincide with the release of the President's proposed budget. Those forecasts are compared to a private forecast, the *Blue Chip Economic Indicators*. The Blue Chip forecast is an average of about 50 private economic forecasts. Because it is a "consensus" forecast, it is a good standard against which to assess the accuracy of the CBO and OMB forecasts. The Blue Chip forecasts here were released in March of each of the years examined.

The projections examined here are of year-over-year growth in real economic output. For the years 1985 through 1991, the projections refer to real gross national product (GNP). For 1992 and thereafter, they refer to real gross domestic product (GDP). Measures of both GNP and GDP have been subject to multiple revisions over the years, which presents the problem of which vintage of data should be used to assess the accuracy of the forecasts. The actual data used in this analysis are the most recent available as published by the Bureau of Economic Analysis of the Department of Commerce.

Projecting Long-Run Growth Rates

As a rule, when OMB and CBO make long-term projections of economic growth, they do not attempt to predict the ups and downs associated with the business cycle. If the economy is at full employment at the time of the forecast, then the projection is based on an estimate of the likely long-term trend rate of economic growth. This is the rate of growth believed to be consistent with stable inflation and

full employment. If the economy is less than fully employed, then the projection typically shows the economy gradually achieving full employment and then continuing at the estimated long-run trend rate of growth.

The long-run growth rate of the economy is primarily determined by the growth rate of the labor force, and the rate of growth of productivity. Labor force growth can be estimated from data regarding the age distribution of the population and is fairly straightforward. Projecting productivity growth is more difficult.

Economists have an incomplete understanding of the factors that contribute to productivity growth. Past variations in productivity growth have yet to be fully explained. Many economic models take productivity growth as a given, something that is determined outside of the models themselves. Often, projections of productivity are simply extrapolations of recent trends, which may be adjusted to reflect the relative optimism or pessimism of the forecaster.

Some events that may have both short- and long-term economic consequences simply can not be predicted, such as the oil shocks of the 1970s, the Asian financial crisis, terrorism, and the war in Iraq. Thus, while some forecasting error may be attributable to a less than perfect understanding of the economy, some error will always be due to the events that can never be fully anticipated.

Measures of Forecast Error

In order to compare the accuracy of the three forecasts over an extended period of time, three "summary measures of error" are calculated. These measures attempt to characterize the relative accuracy of the forecasts in an individual statistic. The three measures are mean error, mean absolute error, and root mean squared error. Individual errors are calculated by subtracting the actual data from the forecast. A positive error indicates excessive optimism, and a negative error indicates excessive pessimism.

Mean error is the simple arithmetic average of all the individual errors. Because positive and negative errors tend to offset one another, a large mean error could be indicative of a tendency towards overly optimistic or pessimistic forecasts. Mean absolute error is the average of the absolute values of each of the individual errors. Taking the absolute values of the individual errors before averaging them prevents positive and negative errors from offsetting one another, and indicates how far off a forecast tended to be, whether it was too high or too low. Root mean squared error is calculated by taking the square root of the average of the squares of the individual errors. Squaring the errors prevents positive and negative errors from offsetting one another. It also places a larger weight on larger errors. This measure helps to indicate those forecasters who, when wrong, tended to miss by a lot.

Table 1 shows these summary measures of error for each of the three forecasters. The statistics are broken down by year. Separate error measures are shown for 1-, 2-, 3-, 4-, and 5-year out forecasts. The "year 1" forecast is for the calendar year following the year in which the forecast was published. In other words, for the forecast released in early 1985, "year 1" refers to the forecast for 1986, "year 2" refers to the forecast for 1987, and so on. Year 1 forecasts include those released

as recently as 2004. All forecasts for which actual data are available are included in the summary measures of error.

Table 1. Summary Measures of Error in Forecasts of Economic Growth, 1985-2004

	Year 1	Year 2	Year 3	Year 4	Year 5
Mean error					
OMB	-0.07	-0.01	-0.05	-0.11	-0.12
CBO	-0.22	-0.31	-0.38	-0.43	-0.44
Blue Chip	-0.32	-0.46	-0.35	-0.28	-0.25
Mean absolute error					
OMB	1.20	1.06	1.04	1.13	1.19
CBO	1.21	1.03	1.04	1.16	1.24
Blue Chip	1.15	1.12	0.99	1.03	1.09
Root mean squared error					
OMB	1.48	1.37	1.45	1.44	1.50
CBO	1.51	1.28	1.38	1.39	1.52
Blue Chip	1.41	1.39	1.40	1.31	1.41

Sources: Office of Management and Budget; Congressional Budget Office; Blue Chip Economic Indicators; Department of Commerce, Bureau of Economic Analysis; Calculations by CRS.

The figures indicate that, for the most part, the three forecasts did about equally well. CBO and the Blue Chip forecasts tended to be slightly pessimistic, on average, but there was no evidence of a statistically significant bias in any of the forecasts. Neither was there any tendency for errors to increase the farther into the future the forecasts go.

Mean absolute errors ranged between 1.03 and 1.24 percentage points.[1] Thus, when not taking into account whether the forecasts were too high or too low, they were consistently off by over a percentage point. Interestingly, the mean absolute errors in the first year were about the same as in the fifth year, for all three forecasters. The root mean squared errors were larger, but were similar for each of

[1] Mean absolute errors are the averages of the absolute values of the errors. That is, mean absolute error indicates how far off a forecast tended to be, regardless of whether it was too optimistic or too pessimistic.

the three forecasters.[2] Based on these statistics, it would be hard to argue that one of the forecasters did significantly better than either of the others.

Budget Implications

These errors can translate into substantial effects on projections of the budget. CBO has published estimates of the effects on projected budget totals of changing the underlying economic projections. These estimates may also give a rough indication of how much the actual budget might change if the economy does better, or worse, than the economic forecast on which the projected budget is based.

Table 2 shows CBO's most recent estimates of the sensitivity of budget projections to changes in the underlying economic assumptions. The table shows how much projected outlays, revenues, and the unified budget surplus would change if real economic growth were to be 0.1% slower than the current baseline projection. This assumes a reduction in the trend rate of economic growth and not a cyclical decline. In other words, it is attributable to slower productivity growth.

Table 2. Estimated Effect of 0.1% Slower Economic Growth on the Budget
(all figures in billions of dollars)

Fiscal year	Change in Revenues	Change in Outlays	Total change in budget surplus (or reduction in the deficit)
2006	-1	a	-1
2007	-4	a	-4
2008	-6	a	-7
2009	-10	1	-11
2010	-13	2	-15

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2007-2016*, Jan. 2006.

a. Between -$500 million and $500 million.

Slower projected economic growth reduces projected revenues and increases projected outlays. The effect on revenues is substantially larger than the effect on outlays, but over five years, just 0.1% slower growth increases the cumulative projected budget deficits by $38 billion.

[2] Root mean squared error emphasizes larger errors. Thus it can be used to identify a forecast which, when it missed, tended to miss by a lot.

Appendix

The table that follows presents past five-year economic growth projections of CBO, OMB, and the *Blue Chip Economic Indicators*, as well as the actual historical growth rates.

Table A1. Forecast and Actual Economic Growth

(percent change)

1984 forecast of real GNP growth					
	1985	1986	1987	1988	1989
OMB	4.1	4.0	4.0	4.0	3.9
CBO	4.1	3.5	3.5	3.4	3.3
Blue Chip	3.3	1.7	3.2	3.9	3.5
Actual	3.8	3.2	3.3	4.2	3.5
1985 forecast of real GNP growth					
	1986	1987	1988	1989	1990
OMB	4.0	4.0	4.0	3.9	3.6
CBO	3.2	3.3	3.4	3.4	3.4
Blue Chip	2.6	3.1	3.7	3.6	3.3
Actual	3.2	3.3	4.2	3.5	2.0
1986 forecast of real GNP growth					
	1987	1988	1989	1990	1991
OMB	4.0	4.0	3.9	3.6	3.5
CBO	3.1	3.3	3.5	3.5	3.2
Blue Chip	3.1	3.4	2.9	3.1	3.1
Actual	3.3	4.2	3.5	2.0	-0.3
1987 forecast of real GNP growth					
	1988	1989	1990	1991	1992
OMB	3.5	3.6	3.6	3.5	3.4
CBO	3.0	3.0	3.1	2.7	2.5
Blue Chip	3.3	2.4	2.5	2.7	3.0
Actual	4.2	3.5	2.0	-0.3	3.3
1988 forecast of real GNP growth					
	1989	1990	1991	1992	1993
OMB	3.1	3.5	3.4	3.3	3.2
CBO	2.6	2.6	2.6	2.7	2.7
Blue Chip	2.2	2.0	2.9	3.1	2.8
Actual	3.5	2.0	-0.3	3.3	2.7

1989 forecast of real GNP growth					
	1990	1991	1992	1993	1994
OMB	3.2	3.3	3.2	3.2	3.2
CBO	2.1	2.2	2.2	2.3	2.3
Blue Chip	1.7	2.4	3.1	2.9	2.7
Actual	2.0	-0.3	3.3	2.7	4.0
1990 forecast of real GNP growth					
	1991	1992	1993	1994	1995
OMB	3.2	3.2	3.1	3.1	3.0
CBO	2.4	2.5	2.5	2.5	2.4
Blue Chip	2.4	2.8	2.7	2.4	2.6
Actual	-0.3	3.3	2.7	4.0	2.5
1991 forecast of real GNP growth					
	1992	1993	1994	1995	1996
OMB	2.5	3.5	3.3	3.1	3.0
CBO	3.3	2.9	2.8	2.7	2.7
Blue Chip	3.1	2.8	2.6	2.2	2.5
Actual	3.3	2.7	4.0	2.5	3.7
1992 forecast of real GDP growth					
	1993	1994	1995	1996	1997
OMB	3.0	3.0	3.0	2.9	2.8
CBO	3.6	2.7	2.5	2.6	2.6
Blue Chip	3.1	3.0	2.3	2.4	2.2
Actual	2.7	4.0	2.5	3.7	4.5
1993 forecast of real GDP growth					
	1994	1995	1996	1997	1998
OMB	3.0	2.9	2.7	2.4	2.0
CBO	3.0	2.9	2.7	2.4	2.0
Blue Chip	3.1	2.8	2.6	2.3	2.5
Actual	4.0	2.5	3.7	4.5	4.2
1994 forecast of real GDP growth					
	1995	1996	1997	1998	1999
OMB	2.8	2.7	2.6	2.6	2.5
CBO	2.7	2.7	2.7	2.6	2.5
Blue Chip	2.8	2.6	2.5	2.4	2.8
Actual	2.5	3.7	4.5	4.2	4.5
1995 forecast of real GDP growth					
	1996	1997	1998	1999	2000
OMB	2.5	2.5	2.5	2.5	2.5
CBO	1.8	2.4	2.3	2.3	2.3
Blue Chip	2.2	2.0	2.3	2.9	2.8
Actual	3.7	4.5	4.2	4.5	3.7

1996 forecast of real GDP growth					
	1997	1998	1999	2000	2001
OMB	2.3	2.3	2.3	2.3	2.3
CBO	2.0	2.1	2.2	2.2	2.2
Blue Chip	2.1	1.9	2.0	2.4	2.3
Actual	4.5	4.2	4.5	3.7	0.8
1997 forecast of real GDP growth					
	1998	1999	2000	2001	2002
OMB	2.0	2.2	2.3	2.3	2.3
CBO	2.0	2.2	2.1	2.1	2.1
Blue Chip	2.1	2.1	2.5	2.4	2.3
Actual	4.2	4.5	3.7	0.8	1.6
1998 forecast of real GDP growth					
	1999	2000	2001	2002	2003
OMB	2.0	2.0	2.2	2.4	2.4
CBO	2.0	1.9	2.0	2.1	2.3
Blue Chip	2.2	2.2	2.2	2.4	2.5
Actual	4.5	3.7	0.8	1.6	2.7
1999 forecast of real GDP growth					
	2000	2001	2002	2003	2004
OMB	2.0	2.0	2.2	2.4	2.4
CBO	1.7	2.2	2.4	2.4	2.4
Blue Chip	2.2	2.3	2.5	2.5	2.6
Actual	3.7	0.8	1.6	2.7	4.2
2000 forecast of real GDP growth					
	2001	2002	2003	2004	2005
OMB	2.7	2.5	2.5	2.8	3.0
CBO	3.1	2.8	2.6	2.6	2.7
Blue Chip	3.1	2.8	2.8	3.3	3.3
Actual	0.8	1.6	2.7	4.2	3.5
2001 forecast of real GDP growth					
	2002	2003	2004	2005	2006
OMB	3.3	3.2	3.2	3.1	3.1
CBO	3.4	3.3	3.0	3.0	3.0
Blue Chip	3.4	3.5	3.4	3.4	3.4
Actual	1.6	2.7	4.2	3.5	—
2002 forecast of real GDP growth					
	2003	2004	2005	2006	2007
OMB	3.8	3.7	3.6	3.2	3.1
CBO	4.1	3.7	3.2	3.2	3.2
Blue Chip	3.6	3.4	3.3	3.2	3.1
Actual	2.7	4.2	3.5	—	—

2003 forecast of real GDP growth					
	2004	2005	2006	2007	2008
OMB	3.6	3.5	3.3	3.2	3.1
CBO	3.6	3.4	3.3	3.2	3.1
Blue Chip	3.4	3.3	3.1	3.1	3.1
Actual	4.2	3.5	—	—	—
2004 forecast of real GDP growth					
	2005	2006	2007	2008	2009
OMB	3.6	3.4	3.3	3.2	3.1
CBO	4.2	3.2	2.7	2.8	2.8
Blue Chip	3.8	3.4	3.2	3.1	3.1
Actual	3.5	—	—	—	—

Sources: Office of Management and Budget; Congressional Budget Office; Blue Chip Economic Indicators; Department of Commerce, Bureau of Economic Analysis.