



## **CRS Report for Congress**

# **Long-Term Economic Growth: Sustainable Goals**

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### **Summary**

Gross domestic product (GDP) can be expressed as the product of five factors: the total population; the share of the overall population that is in the labor force; the share of the labor force that is employed; average labor hours per employee; and GDP divided by labor hours, which is labor productivity. Over long periods of time, the employment (unemployment) rate has had little to do with variations in the rate of economic growth, while the growth rate of the population has been gradually declining. At times the effect of declining population growth has been offset by surges in the share of the population that is in the labor force, as well as by increases in productivity growth. So far in the 2000s, overall economic growth can be mostly accounted for by just two variables, population and productivity growth. Growth in the labor force between now and 2050 is expected to be an average of about 0.6% per year. That, combined with current productivity growth trends, suggests future long-run economic growth somewhere between 2.1 and 2.4%.

If there is any one goal of economic policy that has generally been considered paramount, it is improving living standards. Traditionally, achieving that goal has meant increasing the quantity of goods and services produced and the income generated as a result of that production.

The size of the economy has a considerable effect on economic policy. Economists generally believe that economic policy can influence the rate of economic growth in the short run, but over long periods of time they have less confidence that policy can make a significant difference. Even if there is doubt about the ability of policy to influence the long-run rate of economic growth, there is no doubt that the long-run rate of growth influences policy, especially the overall levels of spending and taxes. The rate at which the economy grows may also influence the degree to which policymakers seek to affect how income is distributed.

This report discusses how the level of gross domestic product (GDP) can be accounted for by the various factors that contribute to it. In some cases, these factors vary

in predictable ways, and that reduces the difficulty of projecting long-term economic growth.

## Accounting for Economic Output

GDP can be expressed as the product of a number of variables that reflect the relationship between the overall population and the amount of work done. GDP obviously depends on the population, but the relationship can be decomposed in a way that may shed some further light. The following equation shows the decomposition of GDP. The equation shows that GDP can be expressed as the product of five factors: the total population; the share of the overall population that is in the labor force; the share of the labor force that is employed; labor hours per employee; and GDP divided by labor hours, which is labor productivity.

$$GDP = Population \times \frac{LaborForce}{Population} \times \frac{Employees}{LaborForce} \times \frac{Hours}{Employee} \times \frac{GDP}{Hours}$$

From a purely arithmetical standpoint, it would seem that neither population, the size of the labor force, the number of employees, nor the number of hours worked could have any effect on GDP. If the population increased while the other variables remained unchanged, the labor force-to-population ratio would fall by an offsetting proportion, leaving GDP unchanged. Similarly, an increase in the size of the labor force would raise the labor force-to-population ratio, but absent other changes, the employees-to-labor force ratio would fall.

The equation allows for an accounting of GDP, but it doesn't make clear that the variables themselves are interdependent. For example, it is unlikely that an increase in the population would have no effect on GDP. Only if an increase in the population had no effect on the size of the labor force or on any of the other variables would the increase in population not result in more output. Similarly, an increase in the labor force would tend to result in more output unless all of the additional labor remained unemployed.

Just as the level of GDP can be explained as the product of the variables shown above, its growth rate can be explained as the sum of the growth rates of those same variables. If, for example, the rate of population growth increases and that growth doesn't affect the proportion that is in the labor force, then the rate of growth of GDP would be expected to rise. If the rate of population growth rises because of an increase in fertility however, it would be likely to cause the share of the population in the labor force to drop temporarily, until the boom reached working age. It should also be kept in mind that only if GDP grows faster than the population will average living standards rise.

**Population Growth.** Population growth depends on three factors: the birth rate, the death rate, and net immigration. Variations in the birth rate have generally been the most important cause of changes in the U.S. population growth rate. The baby boom, comprising those born between 1946 and 1964, contributed to a rise in the population growth rate to about 1.8% in the mid-1950s. It fell to less than 1% during much of the 1970s and 1980s, only to rise again to 1.3% in the early 1990s due to what has been described as an "echo" of the baby boom. In 2001, the population growth rate again fell below 1%.

**Labor Force Participation.** The ratio of the labor force to the population is known as the labor force participation rate. The labor force consists of those who are employed and those who are actively looking for work. The share of the population that is in the labor force can vary with the age distribution of the population, the share of the population that is of working age, and also with the proportion of those of working age who want to work. Together with the growth rate of the population, the labor force participation rate determines the growth rate of the labor force. The long-term trend has been for the participation rate to rise. That rise can be traced to two developments in particular. First was the aging of the baby boom cohort. The end of the baby boom caused population growth to slow somewhat, but the aging of the baby boom caused the growth of the labor force to accelerate, pushing up the participation rate. Second was a surge in the labor force participation rate of women. Between 1950 and 2006, the participation rate of women rose from 34% to 59%, enough to more than offset the decline in the participation rate of men from 86% to 74% over the same period. Between 1950 and 2006, the overall participation rate rose from 59% to 66%.

**Employment Rate.** The ratio of employment to the labor force, the employment rate is simply the obverse of the unemployment rate. Most of the variations in the employment rate are cyclical in nature, but there are some longer run influences as well. The employment rate rises during economic expansions and falls during contractions. Over the long run, the economy tends towards full employment. Because of demographic changes in the labor force, however, and other occasional shifts in the labor market that may make it more or less difficult to match job vacancies with workers, the measure of what is considered by economists to be full employment may change somewhat over time.<sup>1</sup> There has been, however, no general trend up or down in the long run so that over long periods of time this factor has little effect on the growth rate.

**Hours Worked.** People work to be able to afford their consumption. Included in what people “consume” is leisure time. As wages rise over time, as they have tended to do in the long run, the rise in the return to labor has two offsetting effects. First, the increased return to labor is an incentive to work more hours. The increased return to labor, however, may also allow workers to put in fewer hours (more leisure) and earn the same income. It appears from the data that these factors do not completely offset one another — the average work week has tended to fall. Over the very long term, the decline has been dramatic, from a 70-hour work week in 1830 to a 41-hour work week in 2002.<sup>2</sup> Even in the more recent past the trend has been downward, although the decline has been very slow. Between 1964 and 1999, average weekly hours worked fell by just 0.5%. Part of the downward trend has been due to the rise of the service sector and the increased hours of retail establishments, increasing the demand for part-time workers.<sup>3</sup>

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<sup>1</sup> See CRS Report RL33734, *Economic Growth, Inflation, and Unemployment: Limits to Economic Policy*, by Brian W. Cashell.

<sup>2</sup> Jeremy Greenwood and Guillaume Vandenbroucke, *Hours Worked: Long-Run Trends*, NBER Working Paper 11629, September 2005, 17 pp.

<sup>3</sup> Katie Kirkland, “On the Decline in Average Weekly Hours Worked,” *Monthly Labor Review*, July 2000, pp.26-31.

**Productivity.** Productivity is measured as a ratio. The ratio compares production (GDP in the equation shown above) to the hours required to produce it. In the short run, over the course of the business cycle productivity growth tends to vary in predictable ways, but over the long term, changes in the trend rate of growth of productivity are less well understood. The two main contributors to growth in labor productivity are a rising capital-labor ratio, which makes it possible for each worker to produce more in a given period of time, and technological advances, which may mean new methods of production, new improved types of goods and services, or even new ways of organizing the production process. Growth in the capital stock tends to be fairly steady and parallels growth in the overall economy. What factors influence the rate of technological advance are poorly understood.<sup>4</sup>

## Historical Trends in Growth

**Table 1** presents a statistical breakdown of the factors accounting for economic growth since 1950. The time intervals shown are not associated with either business cycle turning points (i.e., the beginnings and ends of recessions) or shifts in productivity growth trends but, nonetheless, the figures allow several observations. The first is that over longer periods of time, the employment (unemployment) rate has had little to do with variations in the rate of economic growth. The second is that the growth rate of the population has been gradually declining. For that not to depress the overall economic growth rate over the long run, it must be offset by increases in either the share of the population working, the number of hours they work, or the rate of increase in productivity.

**Table 1. Accounting for Economic Growth**

Interval	Percentage Change at Annual Rates in					
	Real GDP	Population	Participation Rate	Employment Rate	Labor Hours	Productivity
1950-1960	3.5	1.8	-0.6	0.0	0.3	2.1
1960-1970	4.2	1.3	0.5	0.1	0.3	2.1
1970-1980	3.2	1.0	1.5	-0.2	-0.6	1.4
1980-1990	3.3	1.0	0.6	0.2	-0.1	1.5
1990-2000	3.3	1.2	0.0	0.2	0.1	1.7
2000-2006	2.4	0.8	0.1	-0.1	-0.2	1.8

**Sources:** Department of Commerce, Bureau of Economic Analysis; Department of Labor, Bureau of Labor Statistics.

Growth in the share of the population in the labor force, the participation rate, contributed significantly to overall growth between 1960 and 1990, accounting for nearly half of economic growth during the 1970s. Some of that was offset by the effect of a decline in average labor hours due in part to an increase in part-time workers. Productivity growth also declined in the 1970s, but has since recovered somewhat. So

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<sup>4</sup> For more on productivity growth see CRS Report RL32456, *Productivity: Will the Faster Growth Rate Continue?*, by Brian W. Cashell.

far in the 2000s, overall economic growth can be mostly accounted for by just two variables, population and productivity growth.

## Looking Ahead

One reason for separating the different factors that account for economic growth is the hope that doing so will provide some insights into what rate of growth to expect in the future. Some of the factors examined above lend themselves to projection more than others. Over the long run, absent any dramatic structural changes in labor markets, it seems unlikely that the employment rate would have any significant effect on the overall growth rate. Neither would there seem to be any reason to anticipate a change in average labor hours that would have a substantial effect. That leaves population growth, the labor force participation rate, and productivity growth.

Population growth is projected by the Census Bureau, by matching assumptions about fertility and mortality rates to the age distribution of the population, and adding in projected net immigration. While life expectancy is projected to rise slowly, the death rate is also expected to rise because of the aging of the baby-boom cohort. The Census Bureau projects that, between now and 2050, the total population will grow an average of 0.8% per year.

Using the Census projection together with the current age distribution of the population and expected trends in labor force participation rates, the Bureau of Labor Statistics (BLS) projects growth in the labor force between now and 2050 to be an average of about 0.6% per year.<sup>5</sup> BLS expects the labor force participation rate of women to remain fairly steady, but they project a small decline in the participation rate of men. That, in combination with the aging of the baby-boom cohort, means the labor force is expected to grow more slowly than the overall population.

Of all the variables examined here, productivity is probably the most difficult to project. The sources of productivity are incompletely understood, and there is no consensus explanation for past variations in its growth rate. Part of productivity growth is attributable to a steady rate of investment and a rising stock of capital, but part is due to the rate of technological innovation. There is little on which to base a projection of the pace of technological innovation other than to assume that the current trend will continue.<sup>6</sup>

There are some variables that might affect the outlook for economic growth. One important one is what happens as the baby-boom generation ages. If the current household saving rate of near zero is any indication, they may be financially unprepared for retirement. If retirements are postponed, the participation rate would be slightly higher and so would economic growth. If there is a switch to part-time employment, however, then average hours might fall slightly. A continuation of the current productivity trend rate of growth in the 1.5% to 1.8% range, combined with labor force

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<sup>5</sup> Mitra Toossi, "A New Look at Long-Term Labor Force Projections to 2050," *Monthly Labor Review*, November 2006, pp. 19-39.

<sup>6</sup> CRS Report RL32456, *Productivity: Will the Faster Growth Rate Continue?*, by Brian W. Cashell.

growth of 0.6%, suggests that it would be reasonable to expect growth to average somewhere between 2.1% and 2.4% over the long run.