

How Many Jobs? Details behind the Jobs Calculator

The number of jobs an economy supports, the number of people who want jobs but don't have one, the number of people willing to work...these are all factors that define the state of the labor market. The purpose of this page is to explain what is behind the Jobs Calculator.

On the first Friday of every month, the U.S. Bureau of Labor Statistics (BLS) reports statistics that define the condition of the U.S. labor market. The two statistics superstars—the ones that get the most attention—are the payroll employment numbers and the unemployment rate. The question that seems to be on everyone's mind is, how many new jobs does the economy need to create each month to reduce the unemployment rate to some specific level? The purpose of the Jobs Calculator is to allow the user to answer that very question, based on certain assumptions (some of which the user can adjust).

The payroll employment numbers and the unemployment rate are estimated by the BLS from responses to two separate surveys.

Establishment Survey

Through the [Current Employment Statistics](#) (CES) program, the BLS surveys approximately 141,000 nonfarm businesses, covering about 486,000 worksites, asking employers about employment, hours, and earnings of their workers. This survey of establishments is commonly referred to as the Payroll Survey.

The total employment number that is reported from the Payroll Survey reflects an estimate of the number of people in the United States who received a paycheck for work during the pay period that includes the 12th day of the month. This count is considered to most accurately give the total number of jobs in the United States at a given point in time.

Household Survey

The BLS also surveys about 60,000 households every month to obtain estimates of employment and nonemployment activity, total income, and demographics of the population of the United States (those 16 years and older). The reference period for activity is the same week as the Payroll Survey: the week that includes the 12th day of the month. This survey is called the [Current Population Survey](#) (CPS).

From responses to the Household Survey, the BLS calculates the total labor force, the labor force participation rate, and the unemployment rate. While the user should consult the official [BLS Handbook of Methods](#) for complete definitions of these terms, here are the basic concepts and formulas:

Employed (E): A person who has a job for pay, is temporarily absent from work, or works unpaid in a family business.

Unemployed (U): A person who does not have a job, is available to work, and has looked for work during the previous four weeks.

Labor Force (LF): The sum of everyone who is employed and unemployed (restricted to noninstitutionalized civilians).

Labor Force Participation Rate (LFPR): The labor force divided by the population (POP).

$$LFPR = \frac{LF}{POP}$$

Unemployment Rate (UR): The number unemployed divided by the labor force.

$$UR = \frac{U}{LF}$$

How the Jobs Calculator works

As the formulas above show, in order to calculate how many new jobs are needed to move the UR from one number to another, one needs to make an assumption about the growth in the labor force. The labor force can grow as people enter or return to the labor market (for example, people graduating high school or college and looking for a first job, or new immigrants looking for work upon arrival to the United States). The labor force can also shrink based on people leaving the labor force (for example, to retire, return to school, or care for household members). It's not easy to predict how changes in demographics or behavior will change the size of the labor force (see several papers on this subject in the additional reading section below).

As an example, suppose that total employment in one month (period 1) is E_1 and the unemployment rate in the same month is UR_1 . Suppose we want to know how many new jobs ($E_2 - E_1$) will be needed in order to reduce the unemployment rate to some level in period 2, UR_2 . This number is determined by the following formula:

$$E_2 - E_1 = [(1 - UR_2) * LF_2] - E_1$$

This formula is derived by the following manipulation of the formula for the unemployment rate:

$$UR_2 = \frac{U_2}{LF_2} = \frac{LF_2 - E_2}{LF_2}. \text{ Solving for } E_2 \text{ and subtracting the first period's employment level, } E_1,$$

produces the formula above.

It's clear that an assumption about what the labor force looks like in period 2 is crucial; the greater the increase in the labor force, the greater the increase in employment required to attain a particular unemployment rate, UR_2 . The Jobs Calculator allows the user to investigate the impact a different growth rate in the labor force has on the number of jobs that needed to attain a certain unemployment rate by changing assumptions about the labor force participation rate and the monthly population growth rate. The higher the labor force participation rate (for a given population growth), the greater the growth in the labor force. The higher the population growth rate (for a given labor force participation), the greater the growth in the labor force.

Translating the number of jobs from the Household Survey to the Payroll Survey:

One might expect that the employment estimate produced by the Payroll and Household Surveys would be the same number. Theoretically, they both claim to estimate the number of jobs in the economy. However, they are different for several reasons.

The Payroll Survey estimates the number of jobs for which a paycheck was written in the United States during a particular pay period, whereas the Household Survey is a measure of employment *activity*. For example, if one person holds two jobs, the Payroll Survey will count the two jobs, but the Household Survey counts one person employed.

In addition—and the main source of the difference—is that the scope of the Household Survey is broader than the Payroll Survey. The Household Survey includes the self-employed, unpaid family workers, agricultural workers, and private household workers—all of these workers are excluded from the establishment survey.

Since the headline jobs number refers to the Payroll Survey and the unemployment rate comes from the Household Survey, the Jobs Calculator makes a simple transformation to the household employment calculation to produce the estimate of the number of payroll jobs needed.

Default assumptions

The Jobs Calculator makes three assumptions, two of which the user can adjust. The default monthly population growth is set so that it equals the average monthly population growth during the previous 12 months (excluding months that contain Census population adjustments). The default labor force participation rate is set so that it equals the current month's labor force participation rate. The default CES/CPS multiplier (which is not adjustable by the user) is the current month's ratio of payroll employment to household employment.

Additional reading

Fallick, Bruce, and Jonathan Pingle. "[A Cohort-Based Model of Labor Force Participation](#)." Federal Reserve Board, Divisions of Research & Statistics and Monetary Affairs, Finance and Economics Discussion Series #2007-09.

Hall, Robert E. "[Labor Market Frictions and Employment Fluctuations](#)." NBER Working Paper no. 6501 (April 1998).

Hotchkiss, Julie L. "[Changes in the Aggregate Labor Force Participation Rate](#)." *Federal Reserve Bank of Atlanta Economic Review* 94(4) 2009: 1–6.

———. "[Changes in Behavioral and Characteristic Determination of Female Labor Force Participation, 1975–2005](#)." *Federal Reserve Bank of Atlanta Economic Review* Q2 2006: 1–20.

———. "[Employment Growth and Labor Force Participation: How Many Jobs Are Enough?](#)" *Federal Reserve Bank of Atlanta Economic Review* Q1 2005:1–13

Juhn, Chinhui, and Simon Potter. "[Explaining the Recent Divergence in Payroll and Household Employment Growth](#)." Federal Reserve Bank of New York *Current Issues in Economics and Finance* 5(16) (December 1999): 1–6.

Wu, Tao. "[Two Measures of Employment: How Different Are They?](#)" *Federal Reserve Bank of San Francisco Economic Letter* (August 27, 2004).