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Slow Growth in the Current U.S. Economic Expansion

Updated June 24, 2016

Congressional Research Service
https://crsreports.congress.gov
R44543

CRS REPORT
Prepared for Members and
Committees of Congress

Summary

Between 2008 and 2015, economic growth has been, depending on the indicator, one-quarter to one-half the long-term average since World War II. Economic performance has been variable throughout the post-war period, but recent growth is markedly weaker than previous low growth periods, such as 1974 to 1995. Initially, slow growth was attributed to the financial crisis and its aftermath. But even after the recession ended and financial conditions normalized, growth has remained below average in the current economic expansion. The current expansion has already lasted longer than average, but growth has not picked up at any point during the expansion. By some indicators, growth began to slow during the 2001 to 2007 period, while other indicators suggest that the slowdown is more recent and abrupt. Although this report focuses on the U.S. economy, the same pattern has occurred across other advanced economies.

Economists have offered a number of explanations at various points for the relatively slow recovery. These explanations are not necessarily mutually exclusive, and some economists combine elements from more than one in their diagnoses.

Slow growth in the immediate aftermath of the crisis could be attributed to **deleveraging** (debt reduction) by firms and households and **financial disruptions** caused by the crisis, but those problems were of a temporary nature. There is historical evidence that recoveries are slower after financial crises.

Permanent damage from the crisis, called **hysteresis**, would affect the subsequent recovery. For example, if long-term unemployment resulting from the crisis eroded workers' skills, it could be more difficult for them to find a job when the labor market has recovered. This factor was of greater importance early in the recovery and of waning importance as the recovery continues because it would be expected to leave the level of GDP permanently lower, but should not affect the long-term growth rate.

Subsequent shocks to the economy during the expansion, called **headwinds**, could also be temporarily holding back growth. Headwinds identified at various points in the expansion include high energy prices, the European economic crisis, the emerging market slowdown, fiscal contraction, and fiscal policy uncertainty. Headwinds can be easy to identify after the fact, but there has been little systematic attempt to determine whether there have also been offsetting tailwinds or whether recent headwinds have been relatively larger than in the past.

Secular stagnation is an explanation for the slowdown of a more long-lasting nature that posits, atypically, this expansion cannot generate a healthy pace of economic activity on its own, even with the help of aggressive monetary stimulus. This explanation has focused on persistently low interest rates and low inflation as keys to understanding what has held back growth. This explanation struggles to explain the recent return to nearly full employment, however.

An explanation based on **structural factors** would suggest a more permanent slowdown. This explanation looks at long-term shifts in the sources of long-term growth—growth in labor supply and quality, investment, and productivity. For example, the aging of the population has reduced the growth rate of the labor supply. While it is unlikely that slow growth is being driven solely by structural factors—that would imply the timing of the financial crisis and onset of the growth slowdown was purely coincidental—the longer that slow growth persists, the more it can be attributed to structural factors.

As the duration of the slowdown persists, explanations based on temporary factors become less compelling and permanent factors become more compelling—particularly as the labor market approaches full employment.

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Following the housing crash and financial crisis that began to unfold in 2007, the United States experienced the longest and deepest recession since the Great Depression. The "Great Recession" that began in December 2007 could be explained after the fact based on the disruptions to the financial system caused by the crisis. What has followed since the economy returned to expansion in June 2009, however, posed a greater surprise. The standard macroeconomic model, consistent with the general economic record since World War II, predicted that the large decline in gross domestic product (GDP) that the United States experienced during the Great Recession would be offset by rapid catch-up growth in the subsequent expansion that began in June 2009, leaving the average growth rate unchanged in the long run.[1] Instead, the current expansion has featured the lowest growth rate of any post-war expansion. The growth rate since the crisis has averaged one-quarter to one-half the average since World War II, depending on the measure used. Nor does this slower growth appear to be a transient blip of no greater relevance, as the current expansion is already longer than average[2] and has not experienced a period of growth acceleration at any point in the expansion.[3] Nor is the relatively slow growth unique to the United States—all major advanced economies have had a similar experience since 2007.

This report summarizes the U.S. economic growth record and reviews a number of explanations forwarded by economists for why this expansion has featured slow growth.[4] Some explanations focus on short-term factors that would not be expected to persist, while others focus on long-term changes to the economy. The report will not discuss labor market conditions, except in the context of how they contribute to the pace of GDP growth.

Determinants of Growth

Given the important influence economic growth has on living standards, economists have devoted considerable amounts of research to identify the determinants of growth. The determinants of growth differ depending on the time scale policymakers are concerned with. In the short term, the growth of the U.S. economy is largely dependent on the business cycle—fluctuating between periods of high and low growth over a matter of months and years.[5] The business cycle's influence on growth is mainly manifested through changes in the level of total spending in the economy. Recessions coincide with a decline in total spending below the productive capacity of the economy. In expansions, total spending rises until spending matches the economy's productive capacity, called "full employment." External "shocks" to the economy—some positive, some negative, some large enough to cause recessions or short-term expansions—also play a large role in determining growth from quarter to quarter. For example, large movements in energy prices can influence consumer spending, which can translate to short-term changes in overall output.

[1] While this is the standard view, for evidence that it does not typically occur, see http://www.federalreserve.gov/econresdata/ifdp/2015/files/ifdp1145.pdf.

[2] The average expansion since 1945 has lasted less than five years (58.4 months).

[3] National Bureau of Economic Research, *U.S. Business Cycle Expansions and Contractions*, at http://www.nber.org/cycles/cyclesmain.html.

[4] Slow growth is defined as average annual growth in GDP, GDP per capita, and output per hour that is below the post-World War II historical average.

[5] For more information, see CRS In Focus IF10411, *Introduction to U.S. Economy: The Business Cycle and Growth*, by Jeffrey M. Stupak.

While inadequate spending was the defining feature of the "Great Recession" and influenced the shape of the recovery (as will be discussed below), that factor is of waning importance as the expansion continues. At this point, the unemployment rate has rapidly declined since 2013 and is now close to many economists' estimate of full employment (although other labor market indicators suggest some slack remains).[6]

In the longer run, these short-term business cycle fluctuations smooth to reveal long-term trends, and growth in output depends on growth in the resources and knowledge used to produce output. Economists typically place the main sources of long-term growth into one of three categories: increases in physical capital, increases in the quality and quantity of labor employed (human capital and labor supply), and improvements in productivity. The link between these factors and growth is discussed at length in the **Appendix**. Research indicates that the degrees to which these three factors contribute to long-term growth differ, sometimes significantly, over time. While changes in the long-term sources of growth are typically of a lesser concern during recessions, over long enough time horizons they become dominant.

Before returning to analyze in more detail how these short-term and long-terms factors may explain why the current expansion is relatively weak, the next section provides a review of the growth record of the U.S. economy since World War II.

The Growth Record

To study the U.S. growth record, the analysis below examines data on three different measures of (real) economic activity: GDP, GDP per capita, and output per hour (labor productivity).[7] These terms are defined in the following text box.

Measuring Growth

GDP growth is a common measure of economic growth that measures the change in the total value of all goods and services produced in a country from year to year. While this is a beneficial statistic and can provide a general sense of how the economy is performing, many other factors besides actual changes in the productive capacity of the economy can impact GDP growth, such as changes in the population or in the number of hours worked.

An alternative measure of economic performance is GDP per capita, which is simply a country's GDP divided by its population. For comparisons over time or across countries, the growth rate of GDP per capita is an improved measure of economic growth because it accounts for differences in population. For example, the GDP of a country will generally increase as its population grows, but if its GDP and population grow by the same percentage, then GDP per capita will be unchanged.

Growth in GDP per capita can increase because workers increase their hours worked or because the underlying productive capacity of the economy has increased. A measure that isolates the latter effect is the growth rate of output per hour. Output per hour, often referred to as labor productivity, further corrects for cyclical changes in the economy by dividing the total output of a country by the total number of hours worked. Changes in output per hour over time provide a sense of how efficiently the economy is utilizing its resources, or how the economy's productive capacity is growing.

Economic growth is often used as a proxy for changes in individual living standards. As the economy grows faster, there is more economic output available to individuals in the economy. More economic activity means there are more (or better) goods and services, and greater incomes directed toward individuals.[8] Overall economic growth

[6] For example, the current unemployment rate is lower than the Federal Reserve's estimate of the longer-run unemployment rate. See Federal Reserve, *Economic Projections*, March 16, 2016, http://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20160316.pdf.

[7] The term "real" indicates that a figure has been adjusted for inflation. All data in this report are presented in real terms unless otherwise noted.

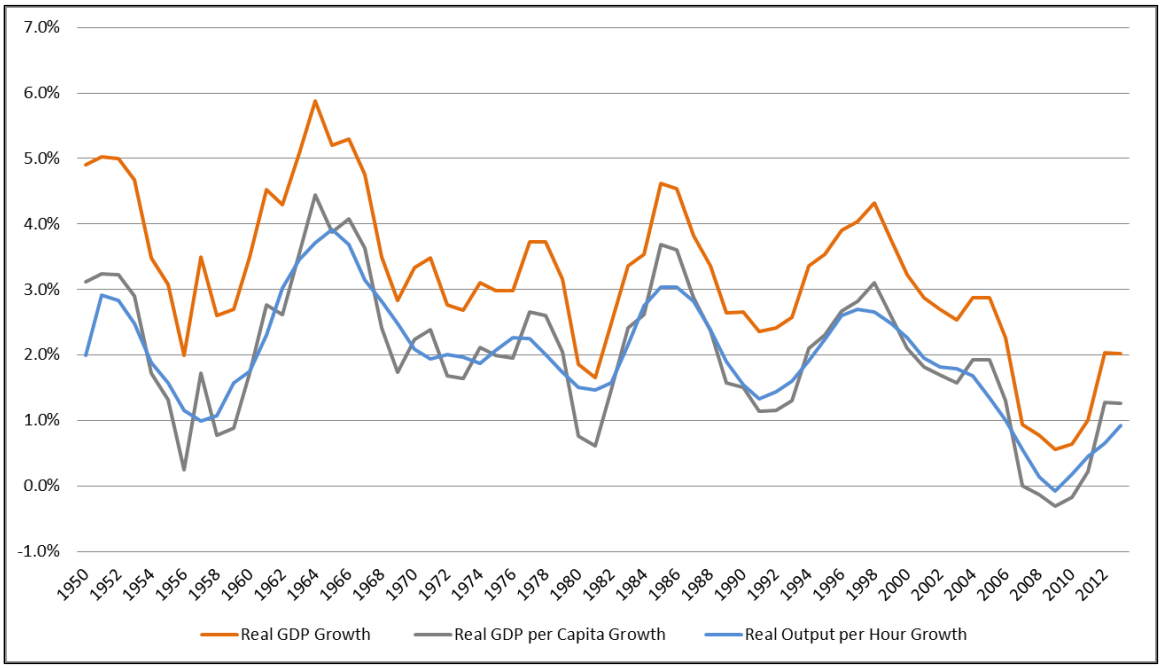
[8] By accounting identity, GDP is equal to national income, so national income cannot increase unless GDP increases.

is generally associated with improved living standards on average, but it is important to remember that these measures of economic growth do not take into consideration how economic activity is distributed among individuals, nonmarket production, changes in leisure time, the quality of new goods, and harmful side effects from growth.

Figure 1 shows the average annual growth rate of U.S. GDP, GDP per capita, and output per hour over each five-year period spanning 1948 to 2015 (the average is shown for the midpoints of these periods, which cover 1950 to 2013). While the recent lower-than-average economic performance is partly attributable to the financial crisis, it has persisted into the current expansion. As shown in **Figure 1**, growth has declined by all three measures since the five-year period centered on 1998 and troughed during the financial crisis. As shown in **Figure 1**, even in the most recent five-year period, which excludes the financial crisis and the Great Recession, growth was still relatively low compared to the rest of the post-war period. Only two other periods were comparably slow to the latest period—the five-year periods centered on 1956 and 1981. Both periods included deep recessions, and in both cases, growth bounced back quickly, in contrast to the current situation.

Figure 1. United States Economic Growth, 1948-2015

Five-Year Moving Average



Source: CRS calculations using data from BLS and BEA.

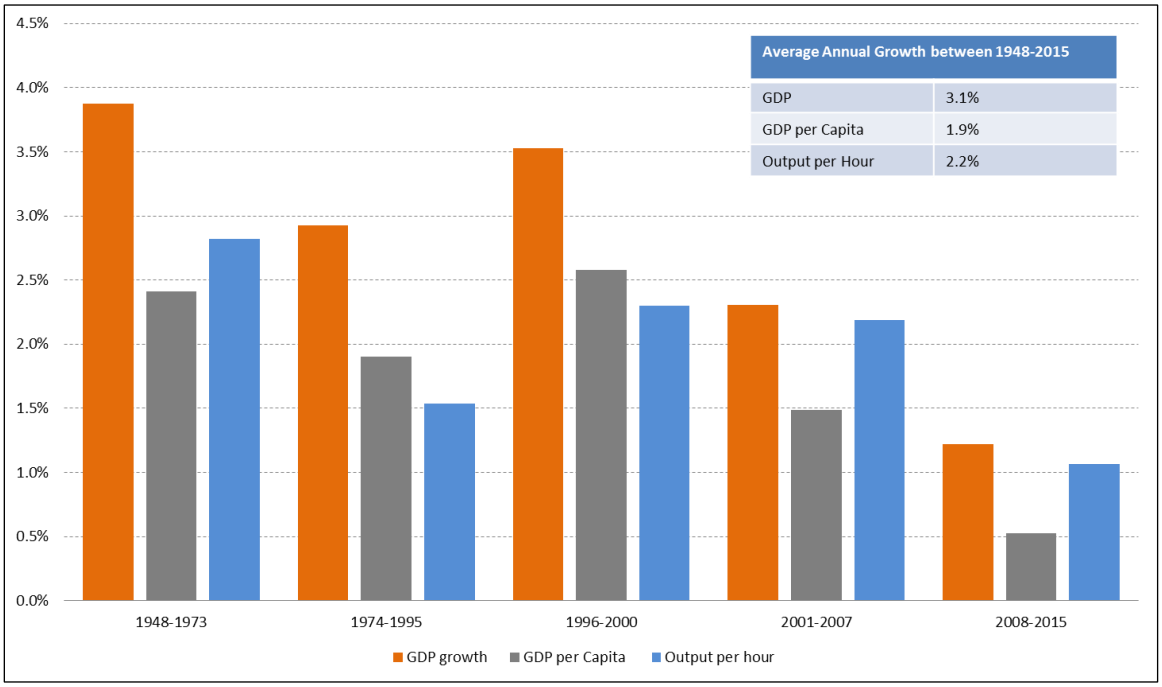
Note: The value for each year in the Figure represents the five-year average centered on the midpoint year of that period. For example, the value for 2013 represents the average growth rate for the 2011 to 2015 period.

In line with existing research on economic growth, this section examines the performance of the economy from 1948 to 2015 across the following distinct time periods: 1948 to 1973, 1974 to

Personal income (the portion of national income accruing to individuals) comprises about 86% of national income in 2015.

1995, 1996 to 2000, 2001 to 2007, and 2008 to 2015.[9] Because the focus of the report is on slow growth since 2008, more recent data are divided into shorter time periods than earlier data to highlight recent developments. It should be noted that some of the more recent time periods utilized may be too short to fully smooth out the effects of the business cycle, which could have temporarily boosted or suppressed average growth for the period (an issue that will be discussed in greater detail later in the report).[10] The two earliest periods, by contrast, span multiple business cycles. While the difference in length makes for something of an "apples to oranges" comparison, dividing the data into these periods is useful for telling a straightforward story. By all measures, average growth was relatively high from 1948 to 1973 and relatively low from 1974 to 1995. It was high again from 1995 to 2000, and depending on the measure did or did not return to a slow growth period from 2001 to 2007. Then, since 2008, growth has been markedly lower than in any other period since 1948.

Figure 2. United States Economic Growth, 1948-2015



Source: CRS calculations using data from BLS and BEA.

Notes: In some of the periods used, productivity growth is greater than GDP growth; this is a result of how the BLS measures changes in productivity growth where certain sectors of the economy are left out of their measures. For further information on the BLS measure of productivity refer to http://www.bls.gov/lpc/lpcmethods.htm.

[9] The time periods used in **Figure 2** are standard across macroeconomic research. See, for example, Federal Reserve, *Monetary Policy Report to Congress*, February 10, 2016, Figure 5, at http://www.federalreserve.gov/monetarypolicy/mpr_20160210_part1.htm , Charles Jones, "The Facts of Economic Growth," National Bureau of Economic Research, *NBER Working Paper Series*, no. 21142, May 2015, and Dale Jorgenson, "Information Technology and the U.S. Economy," *The American Economic Review*, vol. 91, no. 1 (March 2001), pp. 1-32.

[10] For more information on the business cycle's impact on economic growth refer to CRS In Focus IF10411, *Introduction to U.S. Economy: The Business Cycle and Growth*, by Jeffrey M. Stupak.

Pre-Crisis

The Great Depression was the worst economic downturn in the history of the United States, beginning shortly after the stock market crash in 1929. The economy only completely recovered from the Depression in the build up to World War II (WWII). After the war, the United States entered into one of the fastest periods of growth in U.S. history between 1948 and 1973. As shown in **Figure 2**, during this period output per hour grew at a pace of 2.8% per year on average, 0.6 percentage points faster than the average rate between 1948 and 2015. Additionally, as shown in **Figure 2**, between 1948 and 1973, GDP and GDP per capita grew at above-average rates of 3.9% and 2.4%, respectively. Growth was more volatile during this period, with more frequent recessions, but on average was higher. The rapid economic growth between 1948 and 1973 was largely the result of new technologies, production processes, and increased labor force participation.[11]

The oil crisis of the early 1970s marked the beginning of a period of below-average economic growth between 1974 and 1995. The oil crisis, among other factors, created significant contractionary pressure in the economy leading to a recession, followed by persistently slow economic growth. An additional oil crisis occurred in the late 1970s. As shown in **Figure 2**, between 1974 and 1995 GDP per capita growth slowed significantly to 1.9% per year on average, and GDP growth fell to 2.9%. Output per hour growth also slowed significantly from an average 2.7% between 1948 and 1973 to 1.5% between 1974 and 1995. This slowdown in economic and productivity growth is thought to be largely due to the exceptionally high and persistent inflation experienced during this period.[12]

The growth slowdown of the 1970s continued through the next two decades until 1996, when the computer age began to spur faster economic growth. As shown in **Figure 2**, between 1996 and 2000, output per hour grew slightly faster than average, growing at 2.3% per year on average. GDP and GDP per capita also grew at above-average paces of 3.5% and 2.6% respectively between 1996 and 2000, as shown in **Figure 2**. Beginning in the early 1990s, firms increased their investment significantly and began fully incorporating new information technology into their firms, especially computer technology. The large investment in new capital inputs (i.e., computers and information technology) alongside improved use and practices with these technologies has been credited for much of the increased economic growth between 1996 and 2000.[13] The above-average pace of growth during this period may have been an anomaly; a relatively short period of quick growth due to the introduction of new and very powerful technology.

As the United States transitioned into the 21st century, economic growth slowed again. As shown in **Figure 2**, between 2001 and 2007, GDP and GDP per capita growth decreased to 2.3% and 1.5% respectively. Productivity growth slowed modestly during this period, decreasing to 2.2%. There are competing hypotheses as to why growth slowed in this period, ranging from decreasing

[11] Gordon C. Bjork, *The Way It Worked and Why It Won't* (Westport, CT: Praeger, 1999), pp. 68-69, Alexander J. Field, *A Great Leap Forward: 1930s Depression and U.S. Economic Growth* (Yale University, 2011), and Daron Acemoglu, David H. Autor, and David Lyle, "Women, War, and Wages: The Effect of Female Labor Supply on the Wage Structure at Midcentury," *Journal of Political Economy* , vol. 112, no. 3 (2004), p. 499.

[12] For more on the effects of inflation on economic growth, see Robert J. Barro, "Inflation and Economic Growth," *Annals of Economics and Finance*, vol. 14, no. 1 (May 2013), pp. 85-109 and Brian Motley, "Growth and Inflation: A Cross-Country Study," *Economic Review*, 1998, pp. 15-16.

[13] Bradford De Long, Arman Mansoorian, and Leo Michelis, "The Reality of Economic Growth: History and Prospect," in *Macroeconomics* (McGraw-Hill Professional Publishing, 2003), p. 131.

returns to investment in information technology, structural characteristics of the economy, or simply a return to normal after the speculative bubble burst in 2000.[14] This period stands out as the only one in which the relative performance of productivity diverged from GDP and GDP per capita, making it difficult to discern whether economic performance in this period belongs with the late 1990s growth acceleration period (as the productivity data suggest) or the current growth slowdown (as the GDP data suggest). This, in turn, makes it harder to ascertain the cause of the current slowdown.

As discussed earlier, the three final periods shown in **Figure 2** are relatively short, and therefore may not completely remove the cyclical impact of business cycles from the growth measures.

Post-Crisis

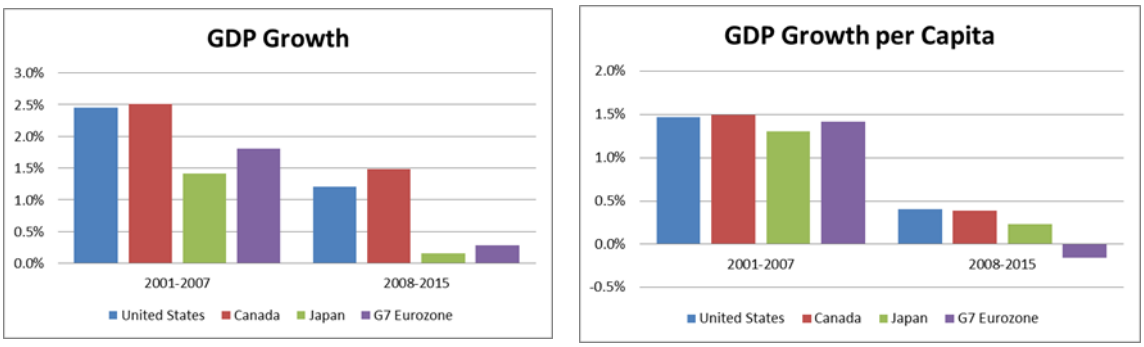
The financial crisis of 2007-2008 brought on the deepest and longest recession in U.S. history since the Great Depression. The crisis was the result of a speculative bubble bursting in the housing sector. The bubble was fueled by a number of factors, including both public and private policies and actions. As the bubble burst, the value of assets held by firms and individuals decreased dramatically, pushing them to decrease investment and consumption spending, which shrank real GDP.

In the post-financial crisis economy, economic growth and productivity growth showed deceleration, growing slower than in any of the other periods in recent history. As shown in **Figure 2**, between 2008 and 2015, GDP grew at a rate of 1.2% per year on average, which was about 2 percentage points lower than the average rate between 1948 and 2015. This deceleration is likely not being driven solely by the Great Recession—GDP growth has not shown sustained acceleration at any point, remaining below 3% in each calendar year of the current expansion. Similarly, GDP per capita grew at a pace of 0.5% annually on average, compared to an average of 1.9% over the full period. Output per hour also fell to an annual growth rate of 1.1% on average between 2008 and 2015, which is even slower than the productivity growth rate seen during the slowdown of the 1970s, as shown in **Figure 2**.

The current economic slowdown is not unique to the United States. Most advanced economies have struggled to return to pre-crisis growth rates in recent years, as is the case for all of the G7 countries (see **Figure 3**). In terms of GDP and GDP per capita growth, the United States has remained in the middle of the pack with respect to other advanced economies. As shown in **Figure 3**, GDP growth in the United States outpaced the G7 Eurozone countries (France, Germany, Italy, and the United Kingdom) and Japan between 2008 and 2015, with Canada growing at a faster pace. In terms of GDP per capita growth, the United States grew faster than Canada, Japan, and the G7 Eurozone countries between 2008 and 2015.

[14] John Fernald, "Productivity and Potential Output Before, During, and After the Great Recession," *National Bureau of Economic Research,* Working Paper No. 20248, June 2014, Robert J. Gordon, "The Demise of U.S. Economic Growth: Restatement, Rebuttal, and Reflections," *National Bureau of Economic Research,* Working paper No. 19895 2014, and Larry Summers, "Reflections on the New Secular Stagnation Hypothesis," in *Secular Stagnation: Facts, Causes, and Cures,* ed. By Coen Tuelings and Richard Baldwin, CEPR Press: 2014, p. 31, at http://www.voxeu.org/sites/default/files/Vox_secular_stagnation.pdf.

Figure 3. Economic Growth Abroad, 2001-2015



Source: CRS calculations using data from International Monetary Fund, World Economic Outlook Database, April 2016.

Notes: G7 Eurozone countries are France, Germany, Italy, and the United Kingdom.

While U.S. growth has always bounced back in the past, Japan serves as a warning that a return to average growth after a large disruption to the economy is not inevitable. From the end of World War II to 1990, Japan experienced what was called an "economic miracle," featuring an extended period of rapid economic growth that enabled it to approach U.S. standards of living. Then, Japan experienced a housing and stock market bubble that ended in a precipitous crash in 1990; this marked a turning point in its economic performance. Beginning in 1992, Japan experienced markedly lower levels of economic growth and several years of price deflation (overall falling prices of goods and services). Popularly referred to as a "lost decade," this period of low growth has now persisted for over 20 years, with little sign of improvement. Japan's economic growth rate has averaged 0.8% since 1992, compared to an annual average of 4.5% from 1980 to 1991.[15] Most economists believe that policy errors (although they disagree on what those policy errors were) prolonged and contributed to Japan's slow growth.[16] The widespread growth slowdown across advanced economies with different policies suggests that Japan's slowdown can probably not be attributed solely to policy errors, however.

One might assume that this slowdown can be explained by the financial crisis, but the Great Recession officially ended in June 2009 in the United States. GDP has continued to grow at a slower-than-average pace of 1.7% between 2010 and 2015. The slow pace of the recovery has confounded economists, as there is generally a period of above-average growth shortly after a recession. For example, after the 1980 recession GDP growth jumped to a high of 7.3% in 1984.[17] In fact, the Great Recession is the only recession in U.S. history which has not had a period of 4% or faster "catch-up" growth in GDP in any year of the subsequent expansion.[18] Even during the preceding period of slow growth, 1974-1995, there were multiple years of rapid growth spread throughout the period. This fact has led some economists to question whether the financial crisis and subsequent recession damaged the economy in a more enduring manner than previous

[15] CRS calculations based on data from International Monetary Fund data, at http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/index.aspx.

[16] See Masazumi Wakatabe, "Turning Japanese? Lessons from Japan's Lost Decade to the Current Crisis," Center on Japanese Economy and Business, working paper no. 309, December 2012, at https://core.ac.uk/download/files/292/27294736.pdf.

[17] BEA, *National Income and Product Accounts Tables*, at http://www.bea.gov/iTable/index_nipa.cfm.

[18] Ibid.

recessions, or if the U.S. economy has entered into another long-term period of low growth due to other structural factors. Explanations for the slowdown are examined in the next section.

What Has Caused Slow Growth Since 2008?

As the expansion nears completion of its seventh year since the recession and continues to experience slower-than-average growth, economists have offered a number of explanations for the relatively slow recovery. Slow growth in the immediate aftermath of the crisis could be attributed to **deleveraging and financial disruptions** caused by the crisis, but those problems were of a temporary nature. Permanent damage from the crisis, called **hysteresis**, would be expected to leave the level of GDP permanently lower, but should not affect the long-term growth rate. Subsequent shocks to the economy during this expansion, called **headwinds**, could also be temporarily holding back growth, but over time, there is no reason to think that unlucky events would continually outweigh lucky ones. **Secular stagnation** is an explanation for the slowdown of a more long-lasting nature, but is distinct from an explanation based on changes in the **structural factors** that are the sources of long-term growth. An explanation based on structural factors would suggest a more permanent slowdown. As the duration of the slowdown persists, explanations based on temporary factors become less compelling and permanent factors become more compelling—particularly as the labor market approaches full employment.

It should be noted that while this report presents these explanations as distinct and contrasting, they are not mutually exclusive, and some economists combine elements from more than one in their diagnoses. All of the following explanations are discussed in the context of the U.S. economy, but as the growth slowdown is prevalent throughout advanced economies, these explanations may be equally relevant abroad. Further, the fact that the slowdown is global dampens demand for U.S. exports, making it harder for the U.S. economy to escape its own slowdown.

Role of the Financial Crisis/Deleveraging

Explanations for slow growth early in the recovery focused on the contraction in credit following the financial crisis.[19] There is evidence that recessions caused by financial crises typically are deeper and take longer to recover from than normal recessions.[20] When households or businesses increase their borrowing relative to their income or assets, it is referred to as leveraging. The decline in debt following the financial crisis has been referred to as "deleveraging." In the long run, deleveraging may improve the economy's capacity for sustainable growth, but in the short run, it can be disruptive and self-reinforcing. Businesses and households depend on the ready availability of credit to finance a normal stream of spending; if some businesses and households lose access to credit or voluntarily decrease borrowing, spending can contract. At an aggregate level, deleveraging ended in 2011 for nonfinancial businesses, 2012 for households,[21] and 2013

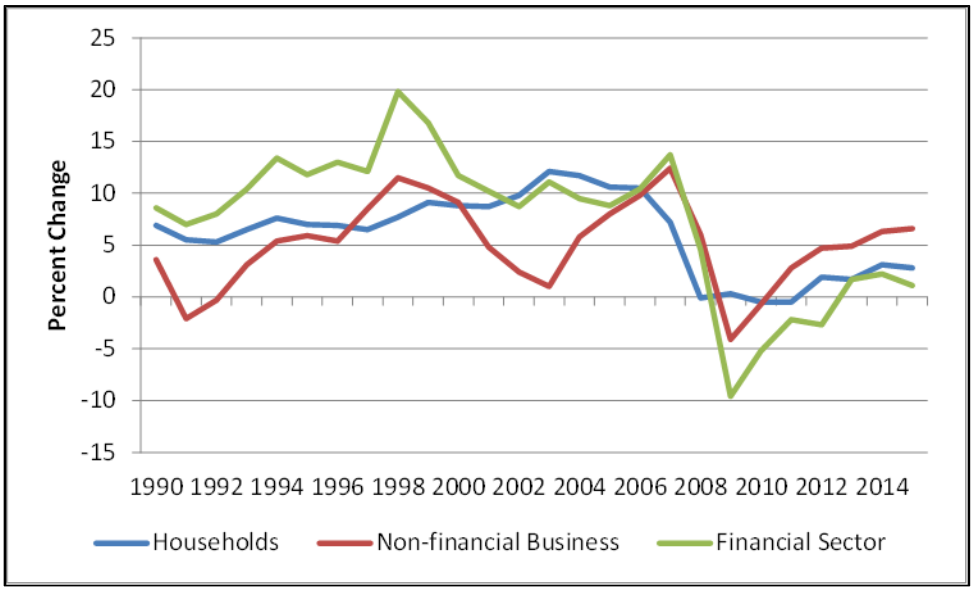
[19] Atif Mian and Amir Sufi, *House of Debt*, University of Chicago Press, Chicago: 2014. Stephanie Lo and Kenneth Rogoff, "Secular Stagnation, Debt Overhang, and Other Rationales for Sluggish Growth, Six Years On," Bank for International Settlements, working paper no. 482, January 2015, p. 8, http://www.bis.org/publ/work482.pdf; Richard Koo, "Balance Sheet Recession is the Reason for Secular Stagnation," in *Secular Stagnation: Facts, Causes, and Cures*, eds. Coen Tuelings and Richard Baldwin, CEPR Press: 2014, p. 131, at http://www.voxeu.org/sites/default/files/Vox_secular_stagnation.pdf.

[20] See, for example, Carmen Reinhart and Kenneth Rogoff, "The Aftermath of Financial Crises," *American Economic Review*, vol. 99, no. 2, 2009, p. 466.

[21] The largest share of household debt, mortgage debt, has been relatively flat since 2012 and below its pre-recession

for financial firms, as shown in **Figure 4**. Since then, debt levels have not grown as rapidly as they did before the crisis or in the 1990s, but they have increased annually.

Figure 4. Annual Growth Rate of Debt, 1990-2015



Source: Federal Reserve, *Financial Accounts of the United States*, Table D.1, 2015:Q4, at http://www.federalreserve.gov/releases/z1/current/z1.pdf.

Notes: Data are not adjusted for inflation.

Aggregate debt can decline because of a decline in the supply of credit (lenders make less credit available to households and businesses) or demand for credit (the desired amount of borrowing by households and businesses declines). The supply of credit could have been reduced by disruptions to the normal functioning of financial markets caused by the financial crisis. After financial markets have returned to normalcy, longer-lasting changes affecting the supply of credit could include behavioral changes in response to risk aversion (investors have less appetite for funding business investments) and regulatory changes that make risk taking relatively more expensive (e.g., higher capital requirements). On the demand side, to the extent that credit expansion was driven by speculation surrounding the housing bubble before the financial crisis, the demand for credit could be permanently lower after the bubble burst.

Furthermore, if borrowing during the bubble was driven by higher asset prices, when the bubble burst and asset prices fell, it left households and investors overextended, and a low-borrowing/high-saving retrenchment period would become necessary after the crisis to return to sustainable net debt levels. For example, if households were financing consumption by "withdrawing" equity when house prices were increasing (e.g., via home equity loans), some of

peak, but non-housing debt, particularly student loans and auto loans, has grown. See Federal Reserve Bank of New York, *Quarterly Report on Household Debt and Credit*, February 2016, at https://www.newyorkfed.org/medialibrary/interactives/householdcredit/data/pdf/HHDC_2015Q4.pdf.

that equity was subsequently eliminated when house prices fell.[22] Average household net housing wealth fell from $221,000 in 2007 to $159,400 in 2013.[23]

Thus, the recent decline in debt could be driven mainly by credit market disruptions or a desire by borrowers to deleverage. Some of the decline in debt growth may be voluntary (households desiring to rebuild lost wealth), but for some households it may be involuntarily caused by "liquidity constraints"—consumers being rejected for mortgages, credit cards, and other forms of consumer credit. For example, mortgage lending to borrowers who have lower credit scores has been reduced following the crisis.[24]

In addition to causing the financial crisis, the housing bubble may have also temporarily contributed to the subsequent growth slowdown. While residential investment (house building) is counted as investment in GDP accounts, it arguably plays a smaller role in promoting growth than business investment—unlike, say, equipment and machinery, housing generally does not increase the productive capacity of the U.S. economy. Furthermore, since the bubble represented an overinvestment in housing, it led to more residential investment than was needed, which presumably crowded out some other more productive business investment. This detracts from post-bubble growth because less residential investment is needed until the "overhang" of extra housing is eliminated and because the crowding out of business investment left the United States with a smaller capital stock. Another recent study argued that the housing bubble also reduced growth by shifting labor into a low productivity sector that was "temporarily bloated."[25]

Although it may take longer to recover from a financial crisis than a normal recession, economic weakness associated with disruptions to the financial system or deleveraging should not be permanent.[26] After financial linkages are repaired and debt levels are rebalanced, growth should resume at a normal pace. As the United States moves further in time away from the financial crisis, these factors explain less of the continued growth slowdown. The fact that debt levels have been rising again for several years suggests that much of the rebalancing may have largely already taken place.

Hysteresis

The effects of the financial crisis offer an explanation of why growth was initially slow during the economic expansion, but provide no explanation for why that initial slow growth would not be

[22] For estimates of equity withdrawal and its effects on consumption before the financial crisis, see Alan Greenspan and James Kennedy, "Sources and Uses of Equity Extracted from Homes," Federal Reserve, Finance and Economics Discussion Series, no. 2007-20, March 2007, at https://www.federalreserve.gov/pubs/feds/2007/200720/200720pap.pdf.

[23] Net housing wealth measures the difference between the value of residential housing and residential mortgage debt. Federal Reserve, *Change in U.S. Family Finances from 2010 to 2013*, September 2014, Box 8, at http://www.federalreserve.gov/pubs/bulletin/2014/pdf/scf14.pdf.

[24] Federal Reserve Bank of New York, *Quarterly Report on Household Debt and Credit*, February 2016, at https://www.newyorkfed.org/medialibrary/interactives/householdcredit/data/pdf/HHDC_2015Q4.pdf.

[25] Claudio Borio, Enisse Kharroubi, Christian Upper and Fabrizio Zampolli, "Labour reallocation and productivity dynamics: financial causes, real consequences," Bank for International Settlements, BIS Working Papers, No. 534, December 2015, at https://www.bis.org/publ/work534.pdf.

[26] Jason Furman, Chairman of the Council of Economic Advisers, sees the recent slowdown as being concentrated in fixed investment, and therefore likely a temporary factor related to disruption to the financial system and deleveraging. Jason Furman, "Productivity Growth in the Advanced Economies: The Past, the Present, and Lessons for the Future," Remarks at the Peterson Institute for International Economics, July 9, 2015, at https://www.whitehouse.gov/sites/default/files/docs/20150709_productivity_advanced_economies_piie.pdf.

canceled out by fast growth later, leaving GDP ultimately unchanged. In the standard macroeconomic model, a recession should not affect the long-term growth rate—any losses in output during downturns should be made up for by more rapid "catch-up" growth in the subsequent recovery. This pattern has not occurred during the current recovery, leading to increasing support among economists for a theory called "hysteresis"—the idea that deep recessions can have a long-term impact on output and employment in the following expansion. In other words, the U.S. economy is still suffering from a "hangover" from the Great Recession.

The idea of hysteresis was first raised in relation to the labor market in Western Europe in the 1980s, where unemployment did not fall back down to pre-recession rates during the subsequent expansion. One explanation for hysteresis was an erosion of skills that occurs when workers experience prolonged periods of unemployment, making these workers less employable when demand for labor picks up.[27]

The lower labor force participation rate that has prevailed since the financial crisis provides some evidence of labor market hysteresis in the United States.[28] But until the financial crisis, there was little concern among economists that output might also suffer from hysteresis (beyond the contribution from labor force effects). Now, many economists believe that a significant amount of potential output was lost, and will never be regained, as a result of the financial crisis. A weakness of the output hysteresis theory is that most economists believe it has not occurred in other post-World War II recessions.[29] This may be because the Great Recession was the only one deep enough to trigger hysteresis.

Economists estimate potential output to measure what GDP would be if the economy were operating at full employment. In other words, it tries to strip cyclical effects out of GDP. It is a useful proxy to capture hysteresis effects because it can be used to observe, after stripping out cyclical effects, whether the trend of output growth was permanently altered by the financial crisis.

The potential impact of hysteresis on GDP can be illustrated by comparing the Congressional Budget Office's (CBO's) projection of potential output in January 2007 to the current outlook, as shown in **Figure 5**.[30] In 2015, actual GDP was still an estimated 2.2% below potential GDP, but potential GDP was 8.7% lower than CBO projected before the financial crisis. In other words, based on these data, a projected 2.2% of GDP could still be recovered as the economy returns to full employment, but 8.7% has been permanently lost.[31] While projection error could account for

[27] In the European context, hysteresis was also explained in terms of structural frictions in those labor markets that impeded market adjustment, such as policies that discouraged hiring and impeded firing.

[28] For more information, see CRS Report R43476, *Returning to Full Employment: What Do the Indicators Tell Us?*, by Marc Labonte.

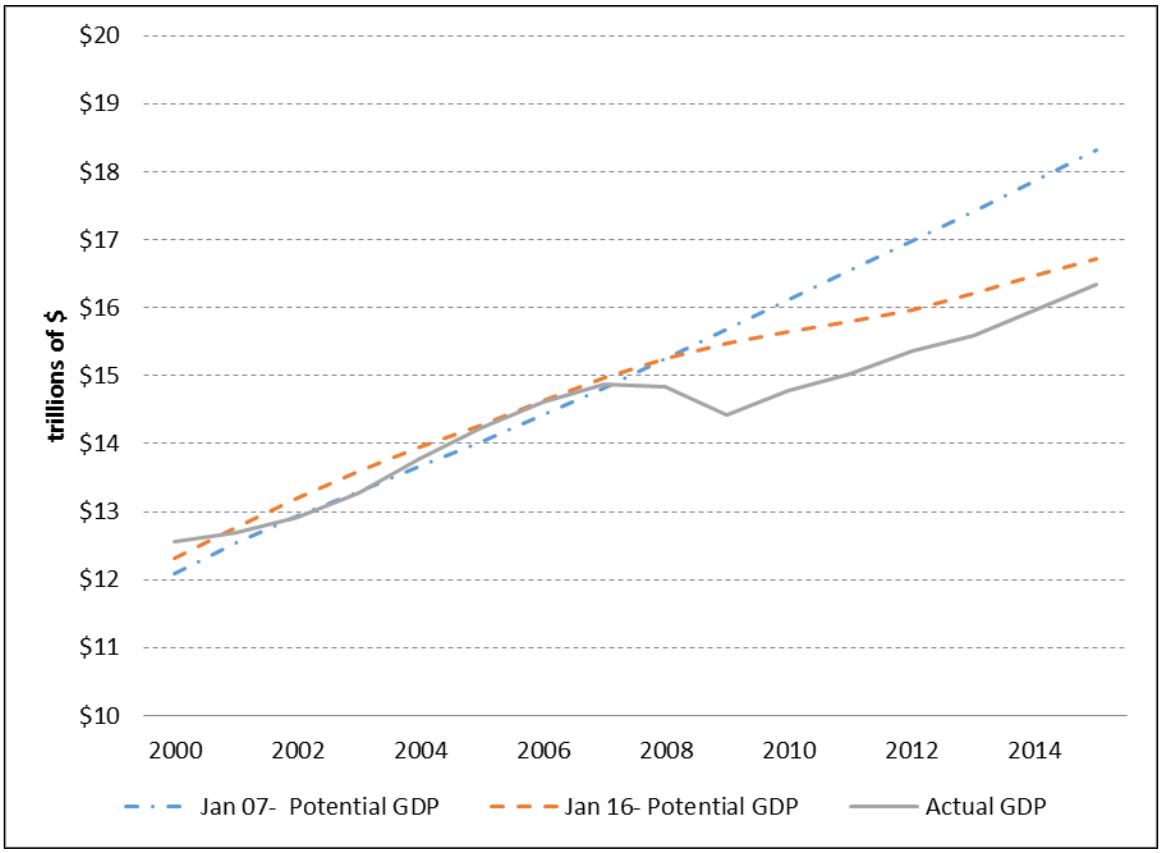
[29] For an alternative perspective—that output hysteresis following recessions is not uncommon in the United States or abroad—see Olivier Blanchard et al., *Inflation and Activity—Two Explorations and their Monetary Policy Implications*, International Monetary Fund, working paper WP/15/230, November 2015, p. 8, at https://www.imf.org/external/pubs/ft/wp/2015/wp15230.pdf; Robert Martin, et al., *Potential Output and Recessions: Are We Fooling Ourselves?*, Federal Reserve, International Finance Discussion Papers Number 1145, September 2015, at http://www.federalreserve.gov/econresdata/ifdp/2015/files/ifdp1145.pdf.

[30] In **Figure 5**, CRS updates Congressional Budget Office, *Revisions to CBO's Projection of Potential Output Since 2007*, February 2014, Figure 1, at https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/reports/45150-PotentialOutput.pdf, using more recent CBO data and the same methodology.

[31] Similarly, a 2013 study estimated the loss in potential output as equivalent to 6% of GDP at the beginning of 2013. See Dave Reifschneider, et al., *Aggregate Supply in the United States: Recent Developments and Implications for the Conduct of Monetary Policy*, Federal Reserve, Finance and Economics Discussion Series no. 2013-77, November 2013, at https://www.federalreserve.gov/pubs/feds/2013/201377/201377pap.pdf.

some of that reduction in potential output, the concurrent timing of the bend in potential GDP and the recession suggests that hysteresis may have played a major role in the lost potential output.[32]

Figure 5. Potential and Actual GDP, 2007 vs. 2016 Projections, 2000-2015



Source: CRS update of Congressional Budget Office, Revisions to CBO's Projection of Potential Output Since 2007, February 2014, Figure 1, using data from BEA and CBO, https://www.cbo.gov/about/products/budget_economic_data#4.

Hysteresis following the financial crisis could negatively affect labor supply, physical capital, and productivity.[33] The weak economy has resulted in an elevated percentage of workers who are either underemployed or who have left the labor market out of discouragement. Discouraged workers leaving the labor market can be problematic for economic growth for two principal reasons. First, with fewer workers helping to produce goods and services, per capita GDP will

[32] Potential GDP is estimated using economic models rather than directly observed; therefore, estimates depend on the assumptions and models used, and inaccurate assumptions or modeling would result in inaccurate estimates. In its 2014 analysis CBO believes that structural trends account for about three times more of the decline in potential output than hysteresis. In other words, CBO views the timing of the bend in the curve as mostly coincidental to the financial crisis. Congressional Budget Office, *Revpoisions to CBO's Projection of Potential Output Since 2007*, February 2014, at https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/reports/45150-PotentialOutput.pdf.

[33] See Dave Reifschneider, et al., *Aggregate Supply in the United States: Recent Developments and Implications for the Conduct of Monetary Policy*, Federal Reserve, Finance and Economics Discussion Series no. 2013-77, November 2013, at https://www.federalreserve.gov/pubs/feds/2013/201377/201377pap.pdf, http://www.federalreserve.gov/pubs/feds/2013/201377/201377pap.pdf. Robert E. Hall, "Quantifying the Lasting Harm to the U.S. Economy from the Financial Crisis," National Bureau of Economic Research working paper No. 20183, May 2014, at http://www.nber.org/papers/w20183.

generally suffer. Second, over time these individuals' skills will begin to deteriorate, or will fail to keep up with advances in the workplace. That is, the stock of human capital will depreciate, experiencing a one-time permanent decline that undercuts the economy's productive capabilities. The crisis could cause a one-time permanent decline in the labor supply if people who leave the labor market do not return when conditions improve.[34]

The crisis could also cause a temporary decline in private investment spending because of insufficient investment demand by businesses, an unwillingness to fund risky projects by investors, or disruptions to financial intermediation. If that lost investment was not made up for in the subsequent recovery, the level of the capital stock would be permanently lower. Additionally, the crisis could cause a temporary decline in productivity growth because innovations that would have occurred under normal economic conditions did not because they could not find funding and businesses that would have generated them were not created.[35]

To avoid hysteresis effects, all three factors would have had to temporarily grow at an above-average pace in the subsequent expansion to compensate for these lost opportunities. As documented below, none did. Hysteresis alone cannot explain why slow growth has persisted seven years after the recession, however, because hysteresis only predicts a permanent effect on the *level* of long-term output, not the *rate* of long-term growth. In other words, hysteresis should result in temporarily, but not permanently, lower growth. If hysteresis is the only explanation for the growth slowdown since 2008, then growth should rebound to its pre-crisis path in future years. But if **Figure 5** is correct, the projected rate of long-term growth also fell (i.e., the slope of potential GDP is lower) following the financial crisis.

While hysteresis may have been the dominant cause of weakness early in the recovery, the longer the growth slowdown persists, the less it can be explained by hysteresis. Alternatively, if growth is permanently lower, as some studies[36] have found, other explanations are needed.

Secular Stagnation

Larry Summers, former Treasury Secretary and director of the National Economic Council, has propounded an explanation for the growth slowdown called "secular stagnation."[37] This phrase

[34] There is evidence that some workers hastened their entry into retirement or long-term disability in response to the crisis, and economists are uncertain how many of those workers would return to the labor market when conditions improve. For more information, see CRS Report R43476, *Returning to Full Employment: What Do the Indicators Tell Us?*, by Marc Labonte.

[35] One recent study points out that this factor should not be taken for granted because recessions could have a countervailing force that raises productivity—"recessions breed Schumpeterian creative destruction, which strengthens the underlying economy." Stephanie Lo and Kenneth Rogoff, "Secular Stagnation, Debt Overhang, and Other Rationales for Sluggish Growth, Six Years On," Bank for International Settlements, working paper no. 482, January 2015, p. 4, at http://www.bis.org/publ/work482.pdf.

[36] For example, Ball finds that in countries hardest hit by the recession, there has also been a drop in the *growth* rate of potential GDP. In the United States, he estimates a loss in potential growth of 0.34 percentage points, much smaller than countries harder hit by the financial crisis, such as Spain and Greece. See Laurence Ball, *Long-Term Damage From the Great Recession in OECD Countries*, National Bureau of Economic Research, working paper no. 20185, May 2014, Table 1, http://www.nber.org/papers/w20185.pdf . See also Olivier Blanchard et al., *Inflation and Activity—Two Explorations and their Monetary Policy Implications*, International Monetary Fund, working paper WP/15/230, November 2015, at https://www.imf.org/external/pubs/ft/wp/2015/wp15230.pdf.

[37] Summers has a number of publications on secular stagnation available at http://larrysummers.com/category/secular-stagnation/.

was first used by economist Alvin Hansen in the late 1930s to warn of the possibility of a similar growth slowdown then (see text box).

Hansen's Definition of Secular Stagnation

Hansen defined secular stagnation as "sick recoveries which die in their infancy and depressions which feed on themselves and leave a hard and seemingly immovable core of unemployment."[38] The current usage seems to be in the same spirit, but less dire. Hansen wrote at a time when the United States had just experienced a second recession, although the economy had not yet recovered from the recession which had started the Great Depression 10 years earlier. Hansen was wrong that the U.S. economy would remain stuck in secular stagnation—but he may have been wrong only because of the extraordinary circumstances surrounding the economic boom accompanying World War II. Hansen viewed the dearth of physical investment spending as inhibiting rapid economic growth and full employment. Hansen stressed the slowdown in population growth, the end of America's geographic expansion, anti-competitive policies and practices, and what he saw as an exhaustion of technological innovations and health improvements as the underlying causes of secular stagnation. Some of these causes have reappeared in current explanations for the growth slowdown. As is well known, the United States is currently experiencing a demographic shift associated with the retirement of the baby boomers. The supply-side explanation above stresses the possibility that technology and human capital will make limited contributions to future growth—factors which, arguably, are not the focus of most current secular stagnation explanations.

One economist described secular stagnation as "an economist's Rorschach Test. It means different things to different people."[39] With that caveat in mind, the idea seems to be describing a problem that is longer lasting than a cyclical problem, but not one that is permanent or caused by purely structural factors. Characteristics that have been used to define secular stagnation include the persistence of low economic growth, low inflation, low investment, negative real interest rates, and an inability to achieve full employment. As the unemployment rate has dropped rapidly since 2013, the inability to achieve full employment now receives less emphasis. This decrease in unemployment is problematic, because it is difficult to explain why the economy has been able to return to near full employment in spite of slow growth if the slow growth is caused by secular stagnation.

The emphasis among economists making the secular stagnation argument today is that real interest rates cannot fall low enough (because of the "zero lower bound")[40] for investment demand to equilibrate with the supply of savings available to finance it—a problem economists refer to as a "liquidity trap."[41] (Some believe this "savings glut" to be more of a global than domestic phenomenon that is holding back U.S. and world growth.)[42] In other words, the market-

[38] Alvin Hansen, "Economic Progress and Declining Population Growth," *American Economic Review*, vol. XXIX, No. 1, March 1939, p. 5.

[39] Barry Eichengreen, "Secular Stagnation: A Review of the Issues," in *Secular Stagnation: Facts, Causes, and Cures*, eds. Coen Tuelings and Richard Baldwin, CEPR Press: 2014, p. 41, at http://www.voxeu.org/sites/default/files/Vox_secular_stagnation.pdf.

[40] For more information, see Todd Keister, "Why is There a 'Zero Lower Bound' on Interest Rates?", Federal Reserve Bank of New York, *Liberty Street Economics*, November, 16, 2011, at http://libertystreeteconomics.newyorkfed.org/2011/11/why-is-there-a-zero-lower-bound-on-interest-rates.html#.V0YdgvlVhBc.

[41] For a rebuttal, see James D. Hamilton, et al., "The Equilibrium Real Funds Rate: Past, Present And Future," National Bureau Of Economic Research, Working Paper 21476, at http://www.nber.org/papers/w21476.pdf.

[42] Olivier Blanchard, et al., "A Prolonged Period of Low Real Interest Rates?," in *Secular Stagnation: Facts, Causes, and Cures*, eds. Coen Tuelings and Richard Baldwin, CEPR Press: 2014, p. 101, at http://www.voxeu.org/sites/default/files/Vox_secular_stagnation.pdf; Council of Economic Advisers, "Long-Term Interest Rates: A Survey," July 2015, p. 38, https://www.whitehouse.gov/sites/default/files/docs/interest_rate_report_final.pdf. The "global savings glut" hypothesis was originally posited by Ben Bernanke. See Ben Bernanke, "The Global Saving Glut and the U.S. Current Account Deficit," the Sandridge Lecture, Virginia Association of Economics, March 10, 2005. Bernanke provided an update on the global savings glut in Ben Bernanke, "Why Are Interest Rates So Low, Part 3?," Brookings Institute, Ben Bernanke's blog, April 1, 2015, at http://www.brookings.edu/blogs/ben-bernanke/posts/2015/04/01-why-interest-rates-

clearing interest rate has been below zero because of shifts in the demand for investment and supply of saving. They argue that this makes deflation a threat and makes it impossible to achieve healthy growth rates and return to potential GDP using conventional monetary policy—although they are divided on the preferred policy alternative. They argue that were it not for the dot com and housing bubbles, secular stagnation would have been noticeable before the financial crisis, and expansionary monetary policy risks inflating similar asset bubbles in the future.

By contrast, the structural explanation described below would not predict deflation or a liquidity trap. Those phenomena might feature in the hysteresis debate, but only temporarily—the secular stagnation argument seems to envision an inability to generate adequate growth over a time frame that is longer lasting.[43] If hysteresis can explain why the *level* of output would be permanently lower following the financial crisis, secular stagnation attempts to explain why the *rate* of growth would be lower for a prolonged period of time. But that time period would not be expected to be permanent.[44]

Temporary Headwinds

An alternative hypothesis is that there is no fundamental economic shift, but instead a number of temporary and mostly exogenous "headwinds" holding back growth in this expansion—in essence, a run of bad luck.[45] These headwinds include

- the rise in oil and other commodity prices from 2009 to 2011, which reduced real U.S. incomes for commodities of which the United States is a net consumer;
- the European economic crisis, beginning in 2009, which reduced demand for U.S. exports and caused financial instability abroad;
- more recently, the deterioration in financial conditions and lower or negative economic growth in emerging markets,[46] most notably China, which also has reduced demand for U.S. exports and caused the dollar to appreciate against most emerging currencies;
- fiscal contraction at both the state and federal level in the United States, which in GDP accounting terms reduced overall growth by about half a percentage point each year from 2011 to 2013, and did not start contributing to growth again until 2015;
- the effects of policy uncertainty on financial market volatility and consumer confidence, following events such as the 2011 debt limit impasse, the "fiscal

low-global-savings-glut.

[43] Paul Krugman, "Four Observations on Secular Stagnation," in *Secular Stagnation: Facts, Causes, and Cures*, eds. Coen Tuelings and Richard Baldwin, CEPR Press: 2014, p. 66, at http://www.voxeu.org/sites/default/files/Vox_secular_stagnation.pdf.

[44] Theory predicts that a liquidity trap should not be permanent because prices eventually adjust, but the "zero lower bound" problem slows down the adjustment process because nominal interest rates cannot be more than slightly negative.

[45] James D. Hamilton, et al., "The Equilibrium Real Funds Rate: Past, Present And Future," National Bureau Of Economic Research, Working Paper 21476, http://www.nber.org/papers/w21476.pdf.

[46] CRS Insight IN10366, *Emerging Markets: Is Slower Growth Temporary?*, by James K. Jackson.

cliff" at the end of 2012,[47] and the 2013 debt limit impasse/government shutdown;[48] and

- the effects of business and household deleveraging, discussed below.

According to this argument, growth would have been healthy in recent years, if some or all of these events had been avoided. Besides the emerging market slowdown, many of these factors have recently improved; if the headwinds hypothesis is correct and no new problems emerge, the expansion should now gain speed.

This explanation could be criticized on the grounds of *post-hoc, ergo propter-hoc*—after an unexpectedly bad growth outcome, economists have arbitrarily searched for an explanation for it. There is no systematic attempt to identify headwinds beforehand or search for positive "tailwinds" that might offset the headwinds. Looking back at the longer historical record, it appears that the economy has been almost continuously battered by headwinds in this narrative, making for a perhaps implausibly long run of bad luck.[49]

Structural Factors

The previous explanations are all of a temporary nature, albeit some longer lasting than others. As the economic expansion continues without any uptick in growth rates, these explanations become less compelling, and more weight may need to be given to long-term, structural explanations.[50]

The standard cause of a decline in long-term growth would be a decline in the growth of one or more of the inputs to growth—labor (the size or human capital of the labor supply), fixed capital investment, or productivity—as explained in the **Appendix**. The following discussion focuses on multifactor productivity (MFP), which is a measure of productivity that captures all sources of growth not attributable to either capital or labor. (When analyzing the U.S. growth record earlier in this report, productivity is measured differently in terms of output per hour.) As shown in **Table 1**, the growth rate of all three of these structural factors has declined in the 2008-2015 period. (Growth attributed to human capital did not slow, but growth in the labor supply did, so that, on net, labor contributed to the growth slowdown.) The data in **Table 1** are explained in the following text box.

Growth Accounting

GDP can grow because hours worked increases or output per hour increases. The Bureau of Labor Statistics (BLS) decomposes the output per hour data found in **Figure 4** to determine how much growth can be attributed to each of the three sources of growth discussed in the "Determinants of Growth" section. **Table 1** displays the results of decomposing the average annual growth rate of output per hour into the three main components of growth since 1948. In the post-World War II period, output per hour has grown at 2.2% with over half of this growth being attributable to growth in multifactor productivity (52.8%), followed by growth in net capital investment (increases in the capital stock, 38.1%), and growth in labor quality (human capital, 8.6%). The fact that productivity increases are responsible for the majority of growth since 1948 has been documented by other

[47] CRS Report R42884, *The "Fiscal Cliff" and the American Taxpayer Relief Act of 2012*, coordinated by Mindy R. Levit.

[48] CRS Report R43292, *The FY2014 Government Shutdown: Economic Effects*, by Marc Labonte.

[49] For example, then-Fed Chair Alan Greenspan attributed slow economic growth during the previous expansion to headwinds. See Chair Alan Greenspan, "Risk and Uncertainty in Monetary Policy," Remarks at the Meetings of the American Economic Association, San Diego, California, January 3, 2004, at http://www.federalreserve.gov/BoardDocs/speeches/2004/20040103/default.htm.

[50] Structural explanations fall within the economic field of study known as "growth theory." For a more detailed discussion of how economists think about economic growth in the long term, see the **Appendix**.

researchers.[51] Multifactor productivity is measured as the residual remaining after changes in labor and capital have been accounted for, making the data noisy and trends hard to interpret.

Table 1 gives some insight into what has caused growth to fluctuate over time. From 1948 to 2007, differences in output per hour across periods were mainly driven by changes in productivity growth. Output per hour exhibited robust growth between 1948 and 1973, driven primarily by growth in productivity. The economy then experienced a slowdown in productivity (and growth) between 1974 and 1995. Economists have yet to form a consensus as to what led to the slowdown in productivity. Growth then returned to rates closer to those experienced in the 1950s and 1960s, before again slowing down with the onset of the Great Recession. Unlike previous periods, the growth slowdown since 2008 has been marked by a noticeable decline in both productivity and capital investment.

Table 1. Growth Accounting Decomposition, 1948-2015

Period	Output Per Hour	= Productivity	+ Human Capital	+ Physical Capital	Hours Worked
1948-2015	2.2%	1.1%	0.2%	0.8%	1.3%
1948-1973	2.8%	1.8%	0.2%	0.8%	1.4%
1974-1995	1.5%	0.6%	0.1%	0.7%	1.7%
1996-2000	2.2%	1.1%	0.2%	1.0%	2.1%
2001-2007	2.2%	1.3%	0.2%	0.7%	0.1%
2008-2015	1.1%	0.6%	0.2%	0.3%	0.1%

Source: BLS, Hours Worked data from *Labor Productivity and Costs*, http://www.bls.gov/lpc/; other data from *Historical Multifactor Productivity Measures*, http://www.bls.gov/mfp/mprdload.htm#Historical.

Note: All data are for non-farm private business sector.

In terms of *why* the growth rate of all three factors has declined, the key question is whether this pattern is caused by long-term structural factors that are independent of the financial crisis or whether their decline was caused by the financial crisis or some other demand-side phenomenon—implying that the growth rate of each will bounce back. This section will discuss "supply-side" (structural) explanations for why the growth rate of each has declined, while the other explanations have some "demand-side" (cyclical) elements.

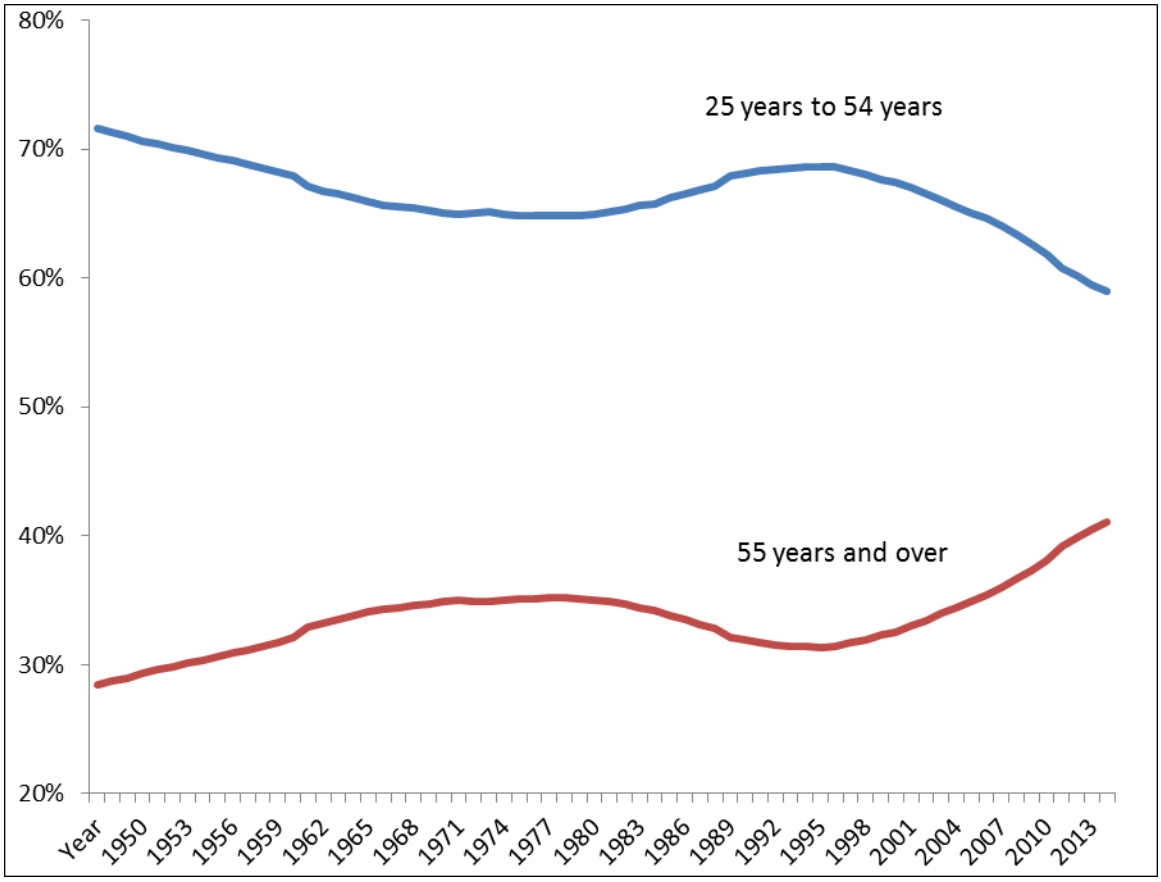
Labor Supply. As shown in **Table 1**, the annual growth in hours worked has fallen to 0.1% from 2008 to 2015, compared to over 1% from 1948 to 2000. Some of this decline is cyclical (i.e., a dearth of jobs available), but some is because of changes to the labor supply—as evidenced by the fact that the decline goes back to the 2001 to 2007 period.

The aging of the population is the most easily identifiable factor that can explain the slowdown in at least some of the growth in the labor supply. Beginning in the early 1970s, labor-force participation began to increase as baby-boomers and an increasing number of women began to enter the labor market. Labor-force participation remained high into the mid-1990s, providing a boost to per capita economic growth as more of the population was working. However, this trend has since reversed as the population has aged and the baby-boomers continue to retire and leave the labor market. **Figure 6**—which shows the percentage of the population aged 25 and older that is in its prime-age working years (25 to 54) and those approaching retirement age or already in retirement (55 and older)—highlights how the demographic shift has unfolded in recent years. Immigration could potentially offset some of the slowdown in the growth of the labor supply in

[51] See, for example, Charles Jones, "The Facts of Economic Growth," National Bureau of Economic Research, *NBER Working Paper Series*, no. 21142, May 2015.

the long run, but would require a significantly higher level of immigration than has occurred recently.

Figure 6. Percentage of the Population 25 Years and Older by Age Group



Source: CRS analysis of Bureau of Labor Statistics (BLS), Labor Force Statistics from the Current Population Survey, http://www.bls.gov/data/.

Notes: Population defined as noninstitutionalized, civilian population.

There has been speculation about whether the aging of the population could also contribute to a slowdown in productivity if older workers are less responsible for innovation, technological breakthroughs, entrepreneurship (e.g., small business startups), etc., but this relationship is less certain.

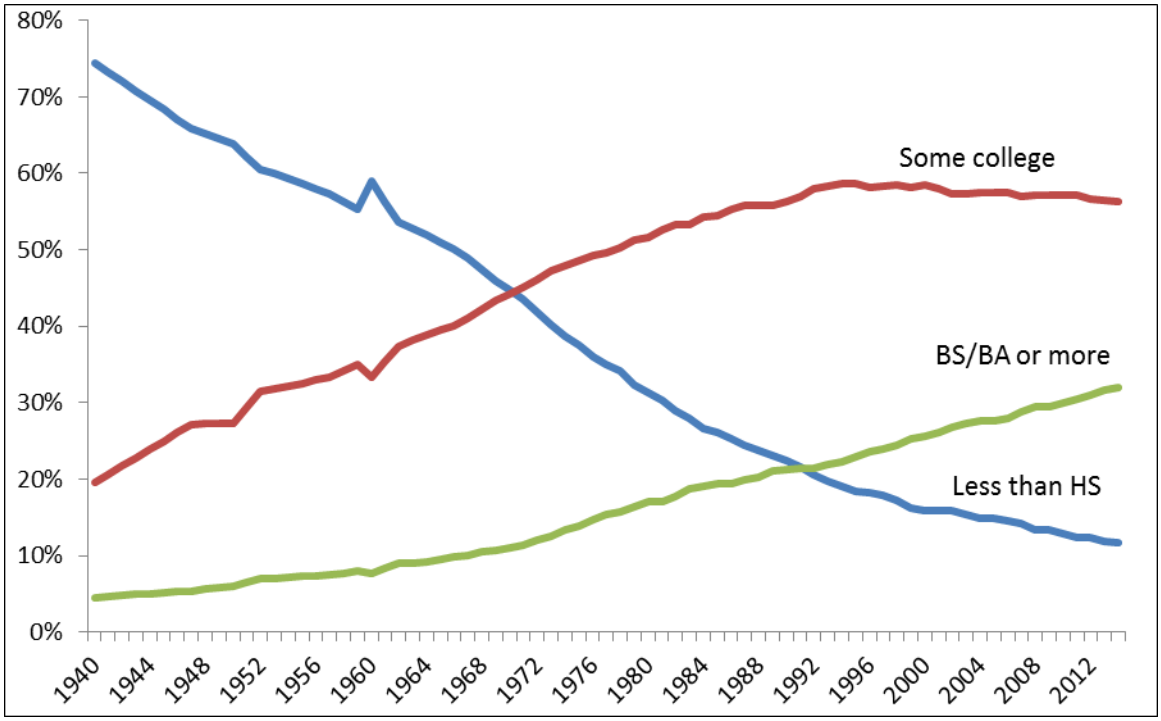
Still, the aging of the population can explain at most one-quarter to two-thirds of the decline in the labor force participation rate.[52] The rest is caused by a decline in labor force participation for all age cohorts. Compounding the effects of an aging population are the lingering effects on the labor market from the Great Recession, discussed above.

Human Capital. Unlike the other sources of growth, **Table 1** did not show a noticeable decline in the growth rate of human capital since 2008. There are many ways to measure human capital, although education-based metrics are probably the most straightforward and easiest to interpret. **Figure 7** shows the change, since 1940, in the percentage of the population age 25 and over by

[52] See Table 1 of CRS Report R43476, *Returning to Full Employment: What Do the Indicators Tell Us?*, by Marc Labonte.

educational attainment. It is clear from the data that the U.S. population today is more highly educated than at any other time in modern history. For example, 75% of the population 25 and older did not have a high school degree in 1940, whereas 12% of the population had not graduated high school in 2014. And while the fraction of the population with some post-secondary educational experience appears to have peaked in the early 1990s at just shy of 60%, the share of college graduates has continued to increase over time.

Figure 7. Percentage of the Population 25 Years and Older by Educational Attainment



Source: CRS analysis of U.S. Census Bureau 1947, 1952-2002 March Current Population Survey, 2003-2014 Annual Social and Economic Supplement to the Current Population Survey, 1940-1960 Census of Population.

Although human capital growth has not decelerated to date, some economists also believe that its growth may soon slow. According to one study, "After 1950, the rise in education [as measured by years of schooling] slows markedly and has ceased for the most recent cohorts." For example, the cohort born in 1950 completed an average of about 13 years of schooling, while the cohort born in 1980 completed an average of about 14 years.[53] The authors also point out that while there is scope for some workers to move into more skilled jobs in the future, that potential source of growth is also finite. For example, "the fraction of the labor force engaged in research cannot growth [sic] forever."[54]

Productivity. Table 1 shows that growth in multifactor productivity (MFP) in 2008 to 2015 matched the 1974 to 1995 period as the lowest since 1948. A shift from manufacturing to services may partly explain the slowdown in MFP, if manufacturing is more amenable to technical improvements and efficiency gains than services. BLS data show that manufacturing accounted

[53] John Fernald and Charles Jones, "The Future of U.S. Economic Growth," Federal Reserve Bank of San Francisco, working paper 2014-02, January 2014, p. 6, at http://www.frbsf.org/economic-research/files/wp2014-02.pdf.

[54] Ibid., p. 5.

for half of the overall growth in MFP between 1987 and 2013, although it accounted for less than half of output. A closer look at the data, however, reveals two potential problems with that theory. First, almost all of the growth in manufacturing MFP was concentrated in computers and electronics. Second, manufacturing MFP growth was negative from 2007 to 2013.[55]

Counterintuitively, the growth and productivity slowdown has coincided with anecdotal examples of rapid changes in how technology affects everyday life. Virtually all industries have incorporated information technology into their production processes in recent decades. Technological innovation has given rise to goods and services that were not previously imaginable (e.g., smart phones and the sharing ["gig"] economy).[56] The slowdown in productivity growth has focused debate on whether recent technological innovations are resulting in profound economic changes or whether they had mainly temporary effects and will lead to only marginal changes in future productivity.[57] This debate is often posed in terms of "is the invention of smartphones as economically important as the invention of electricity, automobiles, and running water?"[58] A related explanation for the decline in MFP growth is that if the number of inventions or discoveries is finite, as time passes, it could become more difficult to make each additional invention or discovery.[59]

Investment. Table 1 shows that from 2008 to 2015 physical investment (the capital stock) grew at less than half the rate it grew in any other period since 1948. **Figure 8** displays U.S. investment in the post-World War II period across three major categories: nonresidential fixed investment; residential investment; and government (federal, state, and local) investment. Nonresidential fixed investment—investment by businesses in plant and equipment—most directly increases output because it enables businesses to produce more goods and services. Government investment can also increase private output, but more indirectly. For example, increased infrastructure investment lowers the cost of production for private businesses. Residential investment is generally more similar to consumption than fixed investment in terms of its impact on the ability to generate goods and services.

Total investment averaged almost 22% of GDP between 1947 and 2007. Investment, however, declined significantly during the Great Recession, reaching a low of just under 18% in 2009 and 2010, as **Figure 8** shows. Nonresidential fixed investment and residential investment show a cyclical pattern, and have generally improved in recent years. But they remain below their historical average and levels reached in previous expansions. In contrast, government investment

[55] BLS, Contributions of Manufacturing Industries to Private Nonfarm Business Multifactor Productivity, July 28, 2015, at http://www.bls.gov/mfp/mfgcon.pdf.

[56] See CRS Report R44365, *What Does the Gig Economy Mean for Workers?*, by Sarah A. Donovan, David H. Bradley, and Jon O. Shimabukuro.

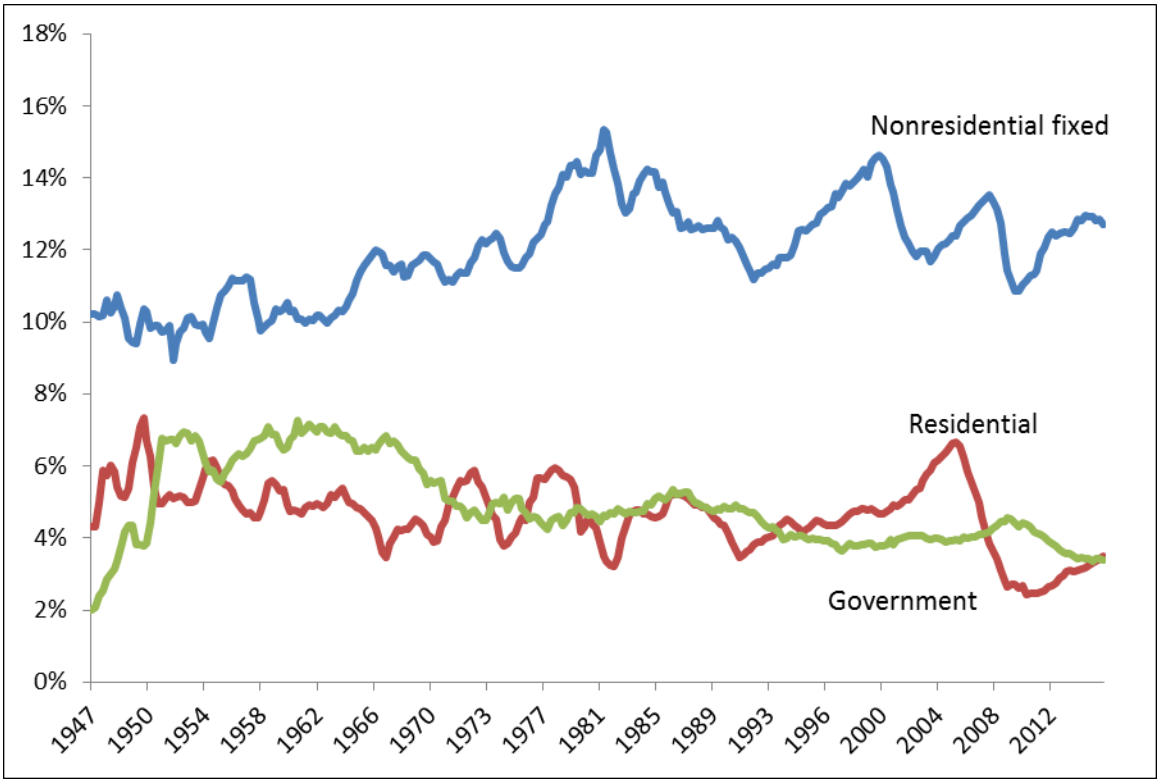
[57] Another explanation is that recent technological changes have caused increases in consumer welfare that are mismeasured or not recorded in economic growth. For example, the Internet has caused many products (e.g., information that used to be provided by maps, encyclopedias, directories, and so on) to become freely available, which is measured as a decline in GDP. See David Byrne, John Fernald, and Marshall Reinsdorf, "Does the United States Have a Productivity Slowdown or a Measurement Problem?," *Brookings Papers on Economic Activity*, March 1, 2016, at http://www.brookings.edu/~/media/projects/bpea/spring-2016/byrneetal_productivitymeasurement_conferencedraft.pdf. After adjusting for technological changes, the study still finds a productivity slowdown since the financial crisis.

[58] Robert Gordon, "Is U.S. Economic Growth Over?," National Bureau of Economic Research, working paper no. 18315, August 2012, http://www.nber.org/papers/w18315.pdf. For a more optimistic perspective on long-term growth, see Joel Mokyr, "Secular Stagnation? Not in Your Life," in *Secular Stagnation: Facts, Causes, and Cures*, ed. By Coen Tuelings and Richard Baldwin, CEPR Press: 2014, p. 83, at http://www.voxeu.org/sites/default/files/Vox_secular_stagnation.pdf.

[59] John Fernald and Charles Jones, "The Future of U.S. Economic Growth," Federal Reserve Bank of San Francisco, working paper 2014-02, January 2014, p. 7, at http://www.frbsf.org/economic-research/files/wp2014-02.pdf.

did not experience the same decline during the recession due to fiscal stimulus intended to support the economy, but has tapered off since.

Figure 8. Investment by Type as a Share of GDP, 1947-2015



Source: CRS analysis of Bureau of Economic Analysis (BEA), National Income and Product Accounts, Table 1.5.5.

Notes: Figure shows gross investment in fixed business investment, residential investment, and government investment. Government investment includes federal (defense and nondefense) and state and local.

To the extent that the slowdown in private investment growth can be explained by long-term factors, it is often in reference to labor and productivity. A slowdown in productivity could reduce the opportunities for new profitable fixed investment. The mainstream (Solow) growth model predicts that growth in the capital stock declines to zero in the absence of MFP growth or labor supply growth. It has also been pointed out that a high-tech economy based on the service sector may require less fixed investment in plant and equipment than one based on manufacturing and heavy industries.[60] A slower-growing workforce may also require fewer capital inputs, to the extent that capital is complementary to, as opposed to a substitute for, labor. And slower population growth may reduce total consumption growth, necessitating a slower growth rate of capital investment to produce consumption goods. (By contrast, the reduction in government investment is a policy choice, and may be directly altered by future policy decisions.)

Structural Factors Reconsidered. The main drawback to the structural explanation is the timing—was it just a coincidence that the slowdown started at the same time as the worst

[60] This argument is assessed in Jason Furman, "Business Investment in the United States," remarks at the Progressive Policy Institute, Washington, D.C., September 30, 2015, at https://www.whitehouse.gov/sites/default/files/page/files/20150930_business_investment_in_the_united_states.pdf.

financial crisis since the Great Depression? It is a possible but potentially unsatisfying explanation.

Or did the slowdown pre-date the crisis? Growth in the 2001-2007 period was lower than from 1948 to 2000, but as discussed above, the growth rate from 2008 to 2015 was even lower. Furthermore, the growth in output per hour was above average before the crisis, and only slightly lower than during the 1995-2000 period. It is unclear why strong output per hour would be consistent with a long-term slowdown related to physical capital or MFP.

Concluding Thoughts

By any of the standard measures, economic growth has been markedly slower since 2008 than it was during the four other distinct growth episodes since 1948. Less than a decade is still too short, however, to be confident that, absent policy changes, the slowdown will persist. All of the explanations for the current growth slowdown have aspects that are compelling, but none is able to provide a comprehensive explanation that disproves the others. Given the complexities of the economy, it is perhaps unsurprising that there is not one simple explanation for the slowdown. But if the slowdown has a number of distinct causes, it implies that there is unlikely to be one "silver bullet" policy response that can reverse it.

Further, the potential capacity of government policy to reverse the slowdown is arguably limited for the following reasons. First, the worldwide nature of the slowdown suggests that its cause is partly beyond U.S. control and if there were an easy policy solution, some country would likely have hit upon it by now. Second, the nature of some of the causes of the slowdown, such as the aging of the population, is hard for policymakers to influence, particularly in the short run.

Finally, the longer growth record suggests that growth is relatively steady over long periods of time despite large changes in policy, society, and the economic environment. When there has been a long-lasting change, it has largely been because of changes in productivity growth. Policymakers and economists have struggled to predict, explain, or influence productivity growth. In the long run, changes in productivity growth are largely driven by technological breakthroughs that are, by their nature, hard to predict. Because productivity growth is affected by nearly every aspect of government policy, there is no simple policy change to significantly raise it. At the same time, economists generally agree that efficient and sustainable fiscal policies, stable monetary policies, and an environment conducive to innovation are keys to long-term economic growth.

Appendix. Sources of Long-Term Growth

This appendix provides an overview of why long-term growth depends on labor, capital, and productivity in the context of economic growth theory.

Physical Capital

Physical capital refers to the man-made resources, such as machines, computers, equipment, factories, and infrastructure, workers use to produce goods and services. Greater amounts of capital increase the productive capabilities of workers, which in turn, increases the productive capacity of the economy. For example, giving each member of a construction crew their own tools will result in more buildings being built than if the crew had to share a single set. Recent figures suggest that there is around $280,000 worth of physical capital per worker in the United States.[61] This is nearly three times the amount of capital per U.S. worker in 1950.[62] Therefore, it should not be surprising that worker productivity, and also GDP per capita, has increased in the post-World War II period.

Over time the amount of capital an economy has will depend primarily on its rate of (net) investment.[63] The higher a country's investment rate, all else equal, the faster its capital stock will grow. And the faster its capital stock grows, the more capital workers will have and the faster the productive capacity of the economy will expand. Thus, ensuring that a nation's investment rate is adequate to build its capital stock has important ramifications for the economic capabilities of a nation.

While investment leads to increases in the capital stock, it comes at a cost. Investment involves a diversion of resources away from the production of goods and services that, in turn, could be enjoyed today. Specifically, to increase investment a certain amount of an economy's resources must be directed toward the production of capital, and although investment is expected to reap a return, that return may not be realized for some time. Thus, investment comes at the cost of lower current consumption today in exchange for potentially greater production and consumption in the future.

Economic growth theory also emphasizes that investment's impact on long-run growth becomes smaller and smaller as the capital stock grows. This results from the diminishing returns larger capital stocks produce, holding the labor supply and productivity constant. That is, successive additions to the stock of physical capital eventually yield steadily smaller and smaller increases in worker productivity to the point where there will be little growth-boosting effect remaining. Referring back to our previous example, once each crew member has been equipped with their own set of tools, additional investment will yield a smaller and smaller return—perhaps it may help to keep an extra toolbox on hand to address the occasional lost or broken tool, but beyond that further redundancy results in little extra output. In the end, investment may elevate growth over the medium term, but not the long term.

[61] This figure was computed as the ratio of capital to employment engagement from the Penn World Tables (PWT 8.0). The most recent matching data year from PWT 8.0 for this statistic was 2011. The exact capital to worker ratio for 2011 was found to be $288,607.

[62] Using the PWT 8.0 it was found that the capital to worker ratio in 1950 was $101,951, measured in 2005 dollars.

[63] Net investment is total (or gross) investment minus depreciation.

Human Capital and Labor Supply

The productivity of the workforce can also be increased by improving the skills of workers, a process commonly referred to by economists as human capital investment. Typically, increases in human capital occur through formal education and on-the-job skill development. A greater stock of human capital allows workers to be more productive, which, like physical capital, increases the production potential of the overall economy. Human capital also often complements increases in physical capital and the development of new technologies. For example, a worker with little experience operating a cutting-edge machine will not find the new technology very useful until she has also acquired the skills (human capital) needed to operate it. Likewise, increases in the human capital stock that are associated with more researchers, scientists, and engineers will also likely have a positive influence on the creation of technological knowledge and exert an indirect influence on the growth of worker productivity.

Human capital is similar to physical capital in that it is also produced by diverting resources (students, teachers, schools, libraries, etc.) from the production of goods for current consumption. For example, an individual can spend four years obtaining a bachelor's degree after high school, accumulating further human capital, or she could begin working immediately after high school and producing goods for consumption. Therefore, the accumulation of human capital is also a form of investment which dictates the need to make a trade-off between lower current consumption and greater future production potential. Also, like physical capital, the accumulation of human capital is subject to diminishing returns—the degree to which individuals' productive abilities increase with each additional year of school becomes smaller as the amount of schooling or training is increased.

Not only is the stock of human capital an important determinant of economic growth, so too is the size of the workforce—more workers can produce more goods and services.

Productivity

Multifactor productivity refers to the ability of economic agents to combine capital and labor to produce goods and services. Improvements in productivity are an indication that the economy is more efficiently employing its resources in the production process.

Productivity increases result from a number of sources including the generation of new technologies, production processes, and ideas, but also from improvements in the institutional and regulatory environment within which the economy operates. Used in this sense, productivity serves as a catch-all for the factors that affect growth but that do not fit neatly into the category of items that augment the nation's physical and labor inputs.

While numerous factors may affect productivity, it is often advances in technological knowledge that receive the most attention. Technological knowledge has a special property that makes it distinct from the other physical inputs in the production process. Specifically, knowledge and ideas, unlike the physical inputs of capital and labor, are non-rivalrous—one person's use of a new idea does not result in any less of that idea being available for others to use. For example, an engineer in Chicago who is building a bridge using the Pythagorean Theorem does not prevent engineers in New York City from simultaneously using the theorem to build a sky scraper. Non-rivaly is an innate property of knowledge and ideas. This is not to say that they cannot be granted excludability. Governments can, and in fact often do, give a person or company exclusive legal right of use to non-rivalrous goods via patents.

The non-rivalrous character of ideas leads to a crucial distinction between the returns to the physical inputs of capital and labor, and ideas. Recall previously the discussion about how capital

and labor eventually run up against diminishing returns. This implies that, in the long run, the influence of capital and labor on per capita growth falls to zero. Non-rivalry of ideas, however, allows for the possibility that an economy can continue to build its stock of ideas and never run up against this limitation.[64] That is, the constant generation of ideas can potentially generate long-run sustainable growth. There is debate among economists about that rate of future idea discovery. If, as some have argued, we should not expect steady idea discovery, then the prospects for growth are diminished.

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Acknowledgments

Jeffrey Stupak, former CRS Analyst in Macroeconomic Policy, contributed to this report.

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[64] This insight was first rigorously incorporated into an economic growth model by economist Paul Romer. Romer's research was a continuation of research by economist Robert Solow. Solow developed what became known as the "Solow growth model." Ironically, while the Solow growth model can explain why countries can have varying growth rates over several decades, it is not able to explain what leads to very long-run underlying growth. Romer's contribution was to essentially take the Solow growth model, which assumes productivity is determined exogenously (given), and model idea creation endogenously (determined by the model).