Secular Stagnation or Technological Lull?

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Abstract

The slow recovery of the economy from the Great Recession and the lingering low real interest rates have led to fears of "secular stagnation" and calls for government aggregate demand stimulus to lift the growth rate of the economy. I present evidence that the current state of the U.S. economy does not satisfy the conditions for secular stagnation, as originally defined by Alvin Hansen (1939). Instead, the U.S. is experiencing a period of low productivity growth. I suggest that long intervals of sluggish productivity growth may be natural in an economy whose growth is driven by technological revolutions that are large, infrequent, and randomly-timed. If this is the case, then the best description of the recent experience of the U.S. economy is a *technological lull*. In this situation, traditional government aggregate demand stimulus policies are not the appropriate response. Instead policies that can increase the rate of innovation and its diffusion may be more appropriate.

Keywords: secular stagnation, productivity growth, technology, innovation

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1. Introduction

The expansion of the U.S. economy that began in June 2009 is likely to be the longest expansion on record. Nevertheless, lower average GDP growth and the prolonged era of very low interest rates have led observers such as Larry Summers (2014, 2016) to argue that the U.S. is in an era of "Secular Stagnation," a term coined by Alvin Hansen in 1938. This characterization has generated calls for more government spending stimulus.

In this paper, I suggest that the U.S. is not in a new era of secular stagnation. I first review what Alvin Hansen meant by secular stagnation and demonstrate that the current U.S. economy does not satisfy those conditions because it is now experiencing full employment and normal levels of investment. Productivity growth, however, has been slow, and this has been a major factor in the slow growth of potential GDP. I offer arguments and evidence that the U.S. economy is instead in a *technological lull*, which has resulted in slow productivity growth and slow growth of potential GDP. Thus, I agree with Gordon's (2015) hypothesis that the problem is aggregate supply, not aggregate demand.

The nature of technological change naturally leads to medium-run variations in productivity growth, and long periods of sluggish growth are a natural outcome of the process that drives technological change. I call these periods *technological lulls*. To the extent that government policies can improve performance, government policies that stimulate innovation are the most promising. Since there is no output gap, aggregate demand policies may be ineffective or counterproductive.

2. Alvin Hansen's Definition of Secular Stagnation

In December 1938, the U.S. economy was recovering from the 1937-38 recession. The unemployment rate had averaged 18.8 percent during the previous eight years and currently stood at 16.6 percent.[1] In his American Economic Association Presidential address, "Economic Progress and Declining Population Growth," Alvin Hansen (1939) argued that while the business cycle had been the problem of the nineteenth century, chronic underemployment was the main problem of the current time and he attributed it to what he called "secular stagnation." Hansen explained that the essence of secular stagnation was "sick recoveries which die in their infancy and depressions which feed on themselves and leave a hard and seemingly immovable core of unemployment." (Hansen (1939), p.4). He argued that full employment could not be reached in a modern economy without robust investment expenditures adequate to fill the gap between consumption expenditures and that level of income which could be achieved were all the factors employed.

Hansen noted three historical drivers of the high rate of investment in the nineteenth century: (i) population growth, (ii) opening of new territory and discovery of new resources, and (iii) technical innovations. He saw little remaining role for the first two going forward from the 1930s. Population growth had slowed dramatically, from an annual growth rate of 2.7 percent during the 19th century, to 1.7 percent between 1900 and 1924, and only 0.9 percent from 1924 to 1938.[2] The immigration laws enacted in 1924 severely curtailed immigration as a source of

[1] These numbers are based on Ramey and Zubairy's (2018) unemployment series. They include the New Deal emergency workers. If those workers are excluded from the unemployment counts, average unemployment was 15.2 percent during the previous eight years and the December 1938 unemployment rate was 9.9 percent. See the data appendix of their paper for more details on the construction of the series.

[2] These growth rates are based on my calculations using data from Carter et al. (2006),

population growth and the economic hardships caused by the Great Depression had reduced fertility rates. Similarly, the era of developing new territories had ended and there were diminished prospects for the discovery of new resources on existing territories. He concluded: "Thus, the outlets for new investment are rapidly narrowing down to those created by the progress of technology."

3. Are We in a New Era of Secular Stagnation?

A. Larry Summers' Hypothesis

In several important papers, Larry Summers (2014, 2016) revived the notion of secular stagnation and suggested that the U.S. is currently in a new era of secular stagnation. In the first, Summers (2014), he appeals to possible hysteresis effects of business cycles, whereby business cycles can affect growth trends. The possibility that business cycle fluctuations can impact growth has precedent in the literature. For example, Blanchard and Summers (1986) offered theory and evidence for hysteresis in European unemployment rates, arguing that negative shocks could have long-lasting effects on unemployment rates because of insider-outsider structures in labor markets. Ramey and Ramey (1991, 1995) offered theory and evidence that business cycle volatility reduced growth. They argued that Lucas' (1987) famous calculation regarding the cost of business cycles overlooked the possible linkages between business cycles and growth. Delong and Summers (2012) extended the hysteresis argument, suggesting that high unemployment during a recession reduces worker skills and attachment to the labor market and that low investment rates during a recession reduce the capital stock. Both of these factors may reduce future potential GDP.

In 2016, Summers refines his hypothesis to suggest that the central problem of secular stagnation is the low equilibrium real interest rates prevailing in numerous countries. He argues that Hansen's imbalances between saving and investment now appear to be due to increased propensities to save, owing to changing demographics, inequality, and other factors. A key question, however, is why the low real interest rates have not spurred more investment. Summers argues that slower growth in the labor force as well as the negative impact of technological change on the traditional demand for physical capital (i.e. the effect of online shopping on demand for brick-and-mortar establishment construction) have reduced incentives to invest. The lack of response of investment to very low interest rates accords with Alvin Hansen's thinking that "the role of the rate of interest as a determinant of investment has occupied a place larger than it deserves in our thinking" (Hansen (1939), p. 5). Hansen agreed with Wicksell that expected profits were the dominant influence on investment.

Summers (2016) argues that expansionary fiscal policy can address secular stagnation by raising the natural real rate of interest by decreasing national saving. Maintaining that the "main constraint on the industrial world's economy today is on the demand, rather than the supply, side," he proposes that demand-side fiscal stimulus is more important than policies that raise potential output (Summers (2016), p. 7).

In the following sections, I present arguments and evidence that the U.S. economy is not in an era of secular stagnation, at least as defined by the originator of the term Alvin Hansen. I argue instead that the U.S. is currently in a *technological lull*. This interpretation of the current situation suggests different policies.

B. Missing Symptoms of Secular Stagnation

Hansen (1939) argued that the essence of secular stagnation was an inability for the economy to reach full employment. He also emphasized a dearth of investment. I now present data comparing the state of the labor market and investment when Hansen gave his speech to the recent period.

Figure 1 shows the monthly civilian unemployment rate from 1930 through 2019.[3] The arrows and captions show that the level of the unemployment rate was 16.6 percent at the time of Hansen's presidential address. In stark contrast, the level in December 2019 was 3.5 percent. This is the lowest rate of unemployment ever attained in the U.S. economy in the absence of a military draft. According to CBO estimates, the natural rate of unemployment is 4.4 percent. Thus, the U.S. appears to be currently *above* full employment.

Of course, it is well-known that the employment-population ratio has shown a trend decline starting in 2000, which is not fully reflected in the unemployment rate. Figure 2 shows the employment-population ratio for the civilian population ages 16 and over as well as for prime age adults ages 25 through 54. For the population ages 16 and over, employment rates have still not reached the levels sustained from the mid-1980s through 2000. However, the aging of the baby boomers as well as the increased years spent in school would be expected to decrease employment rates even without problems of secular stagnation. The employment rate for prime age adults should not be affected by those factors, and this series indeed shows a recovery of

[3] The data from 1930 to 1947 were constructed by Ramey and Zubairy (2018) using information from NBER historical series. The unemployment rate includes New Deal emergency workers. See the appendix of that paper for more detail. The series from 1948 to the present are from the BLS.

that employment-population rate. The current level is a little below the peak hit in the late 1990s, but according to the CBO estimates, the late 1990s were characterized by the unemployment rate being more than a full percentage point below the natural rate at that time. Thus, neither the unemployment rate nor the employment-population ratio for prime age workers suggests that the U.S. economy in 2019 was suffering from a lack of full employment.

Figure 3 shows the ratio of nominal gross private domestic investment to GDP. In 1938, the investment-GDP ratio was under 10 percent. With the exception of the Great Recession years of 2009-2010, the investment-GDP ratio has fluctuated between 15 percent and 20 percent for decades. The addendum table accompanying Figure 3 shows that the current level of the ratio is slightly higher than the average during the high growth years from 1947 to 1974. Eberly (2020) shows that the ratio of net investment to GDP has fallen since the 1990s because of the growing importance of intangible capital, which has higher depreciation rates than physical capital. However, from the standpoint of aggregate demand, what matters is gross investment.

Thus, neither defining feature of a secular stagnation era applies to the current U.S. economy. The unemployment rate is at its lowest level ever, excluding periods with a military draft, and the gross investment-GDP ratio is at its post-war average.

4. The Problem: A Technological Lull

I suggest that the main factor behind the slow growth of GDP is a *technological lull.* As I argue below, two factors are contributing to slow growth in potential GDP: slow population growth and slow labor productivity growth. However, since what ultimately matters for growth in standards of living is the growth of real GDP per capita, slower population growth does not necessarily imply a decrease in the standard of living. The key factor affecting the growth in standards of living is slow productivity growth.

A. Growth in GDP, Labor Productivity and TFP

Table 1 shows the average annual growth rates of real GDP and real GDP per capita. Real GDP growth was a vigorous 3.9 percent from 1947 to 1974. It slowed to 3.1 percent in the last quarter of the 20th Century and then to only 2.0 percent in the first two decades of the 21st Century. Growth in real GDP per capita also slowed, though not quite as much. The slowdown from 1947 – 1974 to 2000-2019 in real GDP per capita was one-third less than for real GDP. Thus, taking into slowing population explains part but not the majority of the slowdown in real GDP growth.

We can decompose real per capita GDP growth into two key components: growth in total hours worked per capita (defined as the total population) and growth in average labor productivity. In particular, we can write in log growth rates:

(1)

$$\Delta\, ln\left(\frac{Y}{Pop}\right) = \Delta\, ln\left(\frac{Hours}{Pop}\right) + \Delta\, ln\left(\frac{Y}{Hours}\right)$$

where *Y* is real GDP, *Pop* is the total population, and *Hours* is total hours worked. The first term, hours worked per capita, cannot grow indefinitely though its low frequency changes can impact growth for several decades at a time. Figure 4 shows hours worked per capita.[4] Per capita hours worked rose from 1975 to 2000, owing both to the entry of the baby boom into the labor force and rising female labor participation rates. Hours fell after 2000 through the trough of the Great Recession. There has been some recovery but not to the levels of the 1990s. Just as the entry of the baby boom to the labor force helped increases hours worked per capita, the aging of the baby boom is driving them down. The effects of the aging of the baby boom is likely to slow growth going forward.

The second term in equation (1) is labor productivity, defined as real output per hour. Table 2 shows the average annual growth of labor productivity and TFP (total factor productivity) in the private business sector. The labor productivity series is from the BLS and the TFP series is from the latest update of Fernald (2014). Fernald's TFP series excludes changes in labor quality, whereas the BLS labor productivity series includes them. The growth rate of labor productivity was robust from 1947 to 1974, averaging 3.2 percent but then fell to under 2 percent after 1974. TFP growth fell from 2.1 percent to 0.8 percent. The bottom row of the table shows the decline in growth rates of each series from 1947-74 to 2000-2019. Using growth accounting, the decline in TFP growth accounts for *all* of the decline in labor productivity growth. Thus, it makes sense to focus on TFP growth as a prime source of the slowdown in labor productivity growth.

B. The Nature of Technology-Driven Growth

[4] This series is constructed by dividing total hours worked in the entire economy divided by total population of all ages. The denominator is from the Census and the numerator is based on unpublished BLS data available at http://www.bls.gov/lpc/special_requests/us_total_hrs_emp.xlsx .

Why was TFP growth so high for the decades after WWII and why did it decline after 1974? The answer lies in the nature of technological change. As Hansen noted in his AEA Presidential address:

> The growth of modern industry has not come in terms of millions of small increments of change giving rise to a smooth and even development. Characteristically it has come by gigantic leaps and bounds. Very often the change can best be described as discontinuous, lumpy, and jerky .... And when a revolutionary new industry like the railroad or the automobile, after having initiated in its youth a powerful upward surge of investment activity, reaches maturity and ceases to grow, as all industries finally must, the whole economy must experience a profound stagnation, unless indeed new developments take its place. (Hansen (1939, p. 10).

Economic historians, such as Rosenberg (1982), David (1990), and Mokyr (1990), and productivity economists, such as Griliches (1957), Bresnahan and Trajtenberg (1995), and Gordon (2016), provide evidence and analysis consistent with this characterization. Economists agree that growth-driving technological change is (i) large-scale; (ii) general purpose; (iii) infrequent; (iv) randomly timed; and (v) disruptive. As Laitner and Stolyarov (2003, 2019) note, this type of technological change can result in decades of high productivity growth after the initial arrival of a major general purpose innovation, since waves of reorganization and investment follow in multiple industries as they adopt and adapt to the new technology. Subsequently, though, the economy may settle into possibly long periods of slow productivity growth until the next arrival.

These technological revolutions can affect macroeconomic variables in subtle and counter-intuitive ways. For example, on the initial arrival of a breakthrough technology, stock prices may fall because the technology is embodied in new capital and new firms, resulting in capital losses for the existing firms (e.g. Greenwood and Jovanovic (1999)). Moreover, new technology can lead to temporary declines in productivity as businesses reorganize and workers grapple with learning-by-doing (e.g. Hornstein and Krusell (1996), Greenwood and Yorokoglu (1997)). Thus, the arrival of a revolutionary technology may be accompanied by what would typically be considered negative economic events: stock market crashes and declines in productivity growth.

The *possibility* of this type of technological change can also affect asset returns on average. As Laitner and Stolyarov (2019) show, an economy known to face infrequent, randomly timed, and disruptive large technological revolutions will be characterized by a large equity premium and a low risk-free rate. In contrast to the common explanation of the equity premium as stemming from rare *bad* events, in this type of economy the equity premium stems from rare *good* events.

Because of these counter-intuitive effects, the advent of a technological revolution may not be perceived by most observers until years after its inception. Alvin Hansen is a prime example. He believed the U.S. to be in a period of reduced innovative activity, stating in his speech: "It is my growing conviction that the combined effect of the decline in population growth, together with the failure of any really important innovations of a magnitude sufficient to absorb large capital outlays, weighs very heavily as an explanation for the failure of the recent recovery to reach full employment." (Hansen (1939), p. 11.) As it turns out, Hansen was speaking during what Alexander Field (2003) has called "the most technologically progressive decade of the century."

It was only decades later that economists realized that the 1930s was a tremendously innovative decade. Mensch (1979) conducted detailed case studies and argued that the surge in innovations during the 1930s was what eventually overcame the Great Depression. Figure 5 shows Mensch's (1979) series of the number of major innovations each year. As the graph shows, the number of major innovations sky-rocketed in the 1930s despite the Great Depression. Other evidence corroborates his findings. For example, Figure 6 shows five-year averages of TFP growth, using Gordon's (2016) TFP series. As the arrow shows, Hansen gave his speech at a point in time when the five-year average annual growth rate of TFP was much higher than average. Of course, series on TFP were not constructed until several decades later (e.g. Kendrick (1961)). In addition, Francis and Ramey's (2004) estimated technology shocks using time series methods and Alexopoulos and Cohen's (2009) innovation series based on the number of new technical book titles all reach the same conclusion: the 1930s was the most innovative decade of the 20th Century. A possible factor in the surge of innovation has been highlighted by Moser, Voena, and Waldinger (2014), who link the increase in invention in the sciences to the Jewish émigrés expelled from German universities by the Nazis. Thus, all series constructed in modern times point to high rates of technological progress. Yet even Alvin Hansen, a keen economic observer, did not recognize the surge in innovation taking place.

Returning to the present U.S. economy, the question is whether the U.S. is experiencing a technological lull. I purposefully chose the word *lull* because it is defined to be a *temporary* state. Might it be, however, a more permanent state? Bloom, Jones, Van Reenen, and Webb (forthcoming) suggest a more ominous downward trend in research productivity. They present evidence on aggregate research productivity as well as detailed case studies suggesting that it now takes many more researchers to generate the same number of ideas. They measure aggregate research productivity as TFP growth divided by the number of researchers in the U.S. and show a downward trend since the 1930s. A close look at the graph shows that productivity was at a high level through the 1930s but then declined subsequently. Thus, a possible alternative interpretation is that there was a golden age of innovation in the 1930s and the subsequent decades have seen a slow decline in research productivity as researchers mined the more productive spinoffs first and have now moved to less productive avenues for research. Then again, it might be the case that Gordon's (2016) hypothesis that new inventions will not be able to match the old ones is right, suggesting a more pessimistic view.

C. Possible Solutions to a Technological Lull

Suppose that we are in a "technological lull." What are the options? One possibility is simply to be patient. We could be experiencing the beginnings of an innovation wave but not realize it, just as Hansen did not realize that he was writing in the midst of the biggest wave of innovation of the 20th Century. Nevertheless, it is natural to think of ways that government policies can help.

Historically, most revolutionary technological changes come from the private sector, not from government inventions. However, government policies can potentially speed them up and/or lay the foundation for faster diffusion. I will briefly discuss various government policies that might be helpful.

Subsidies to Research and Development

Much research suggests large returns to government subsidies to basic research and development (R&D). Currently, R&D spending constitutes only four percent of total government purchases. Thus, even a noticeable increase in R&D subsidies would have only small budgetary consequences.

Government Investment in Infrastructure

In Ramey (2019) "The Macroeconomic Consequences of Infrastructure Spending," I review the theory and evidence for infrastructure spending in the short run and long run. Both theory that incorporates time-to-build delays and empirical evidence suggest that the short-run multipliers on infrastructure spending are low during normal times. However, the estimates of the returns to public capital support long-run positive effects, with higher multipliers. More infrastructure spending in key areas might be able to increase productivity growth, but that increase would apply only to the transition path, and not to a permanent change in growth rates.

Government Investment in Human Capital

In Hulten and Ramey (2019), we emphasize the important interactions between skill accumulation and technical change and the importance of an educated workforce for innovation and diffusion. By most measures, the U.S. does an inferior job in educating its population. How to do it better is the challenge. There is a large literature on improving education that is presently seeking answers to the question.

Regulatory and other structural changes

In his 1938 speech, Alvin Hansen highlighted restrictions on technical change from "the growing power of trade unions and trade associations, the development of monopolistic competition, of rivalry for the market through expensive persuasion and advertising, instead of through price competition … (and) the tendency to block the advance of technical progress by the shelving of patents." Recent research suggests a rise in firm concentration and markups (e.g. DeLoecker, Eeckout, and Unger (forthcoming), Philippon (2019)). If so, these forces may be impeding innovation and antitrust action might be warranted.

5. Conclusions

In this paper, I have argued that the U.S. does not currently face a problem of high unemployment and low investment, which are hallmarks of secular stagnation. The U.S. does face a problem of low productivity growth, however. I have argued that the nature of technological change naturally leads to medium-run variation in productivity growth. Thus, it might be that the U.S. is currently experiencing a technological lull. One solution is to wait patiently for the next technological revolution. However, there is a possible role for government policies that encourage innovation and diffusion of technology.

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Table 1. Average Annual Growth Rates of Real GDP

Time Period	Real GDP	Real GDP Per Capita
1947 - 1974	3.9 %	2.4 %
1974 - 2000	3.1	2.1
2000 - 2019	2.0	1.2
Difference: 1947-74 minus 2000-19	1.9 %	1.2 %

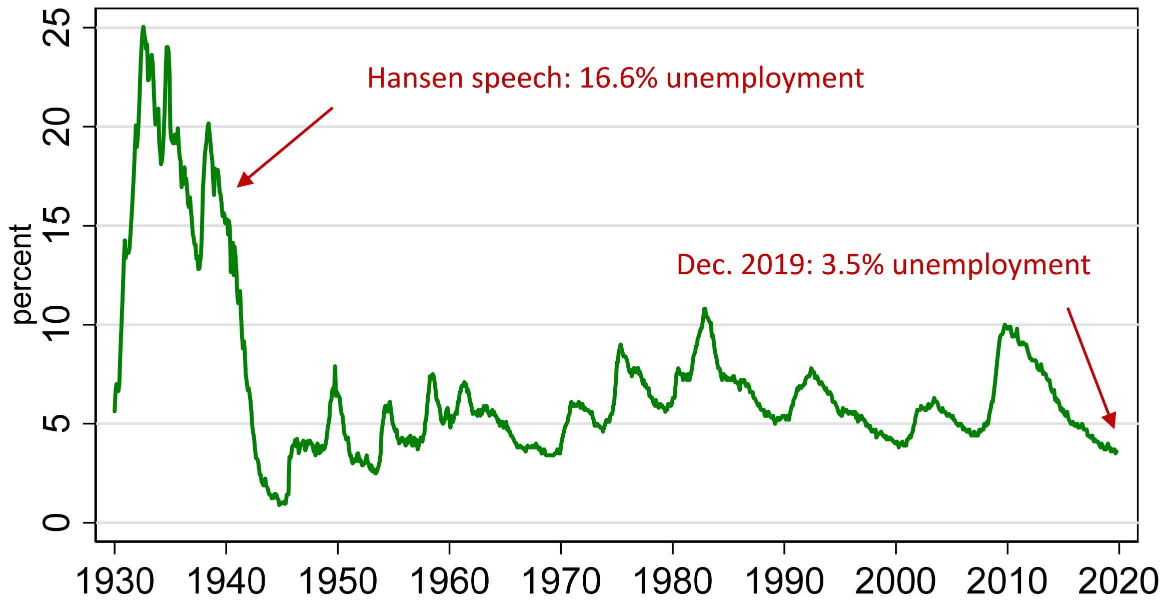
Notes. Calculations based on variables GDPC1 and POP from https://fred.stlouisfed

Table 2. Average Annual Growth Rates of Labor Productivity and TFP

Time Period	Labor Productivity	TFP (Fernald)
1947 - 1974	3.2 %	2.1 %
1974 - 1999	1.7	0.7
2000 - 2019	1.9	0.8
Diff: 1947-74 - 2000-19	1.3	1.3

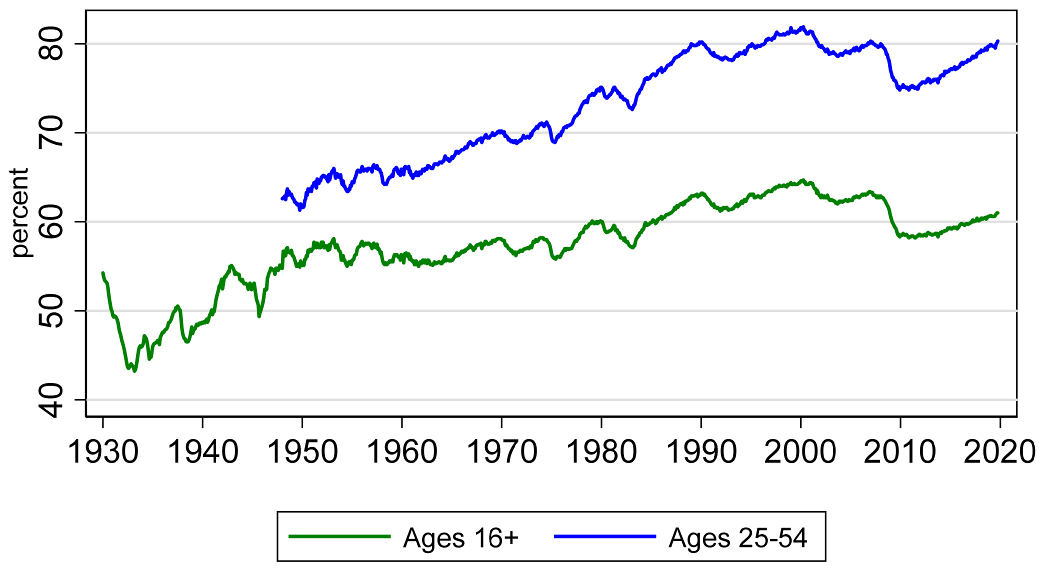
Notes: Labor productivity growth is growth in output per hour in the private business sector, from the BLS. TFP (Total Factor Productivity) growth is from Fernald's (2019) estimates, which net out changes in labor quality.

Figure 1. Civilian Unemployment Rate



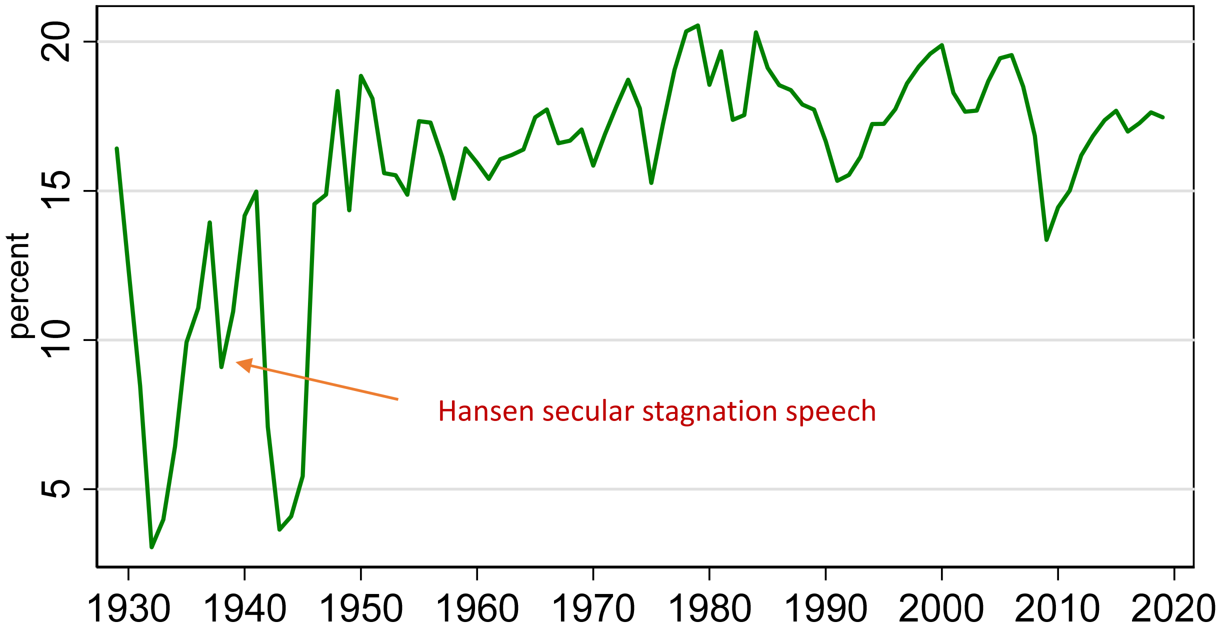
Data sources: 1930-1947 – Ramey and Zubairy (2018), 1948-2019 – BLS.

Figure 2. Civilian Employment-Population Ratio



Data sources: 1930-1947 – Ramey (2013), 1948-2019 – BLS.

Figure 3. Investment-GDP Ratios

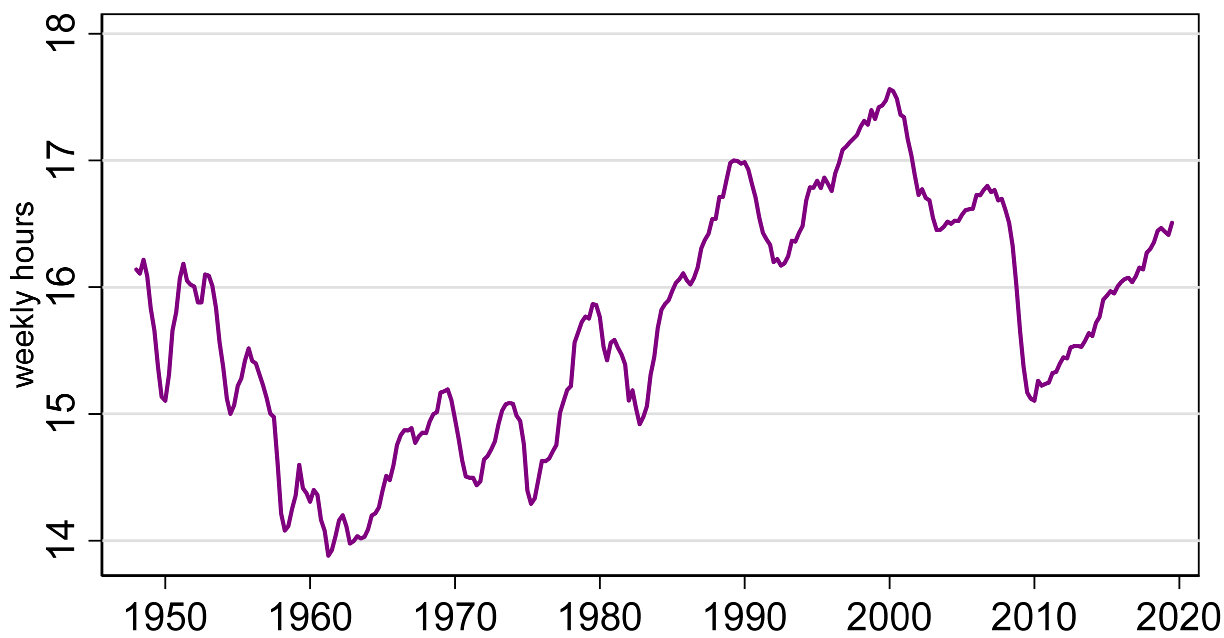


Notes. Data are nominal and are from the BEA Table 1.1.5. Investment is gross private domestic investment.

Addendum to Figure: Average Rates

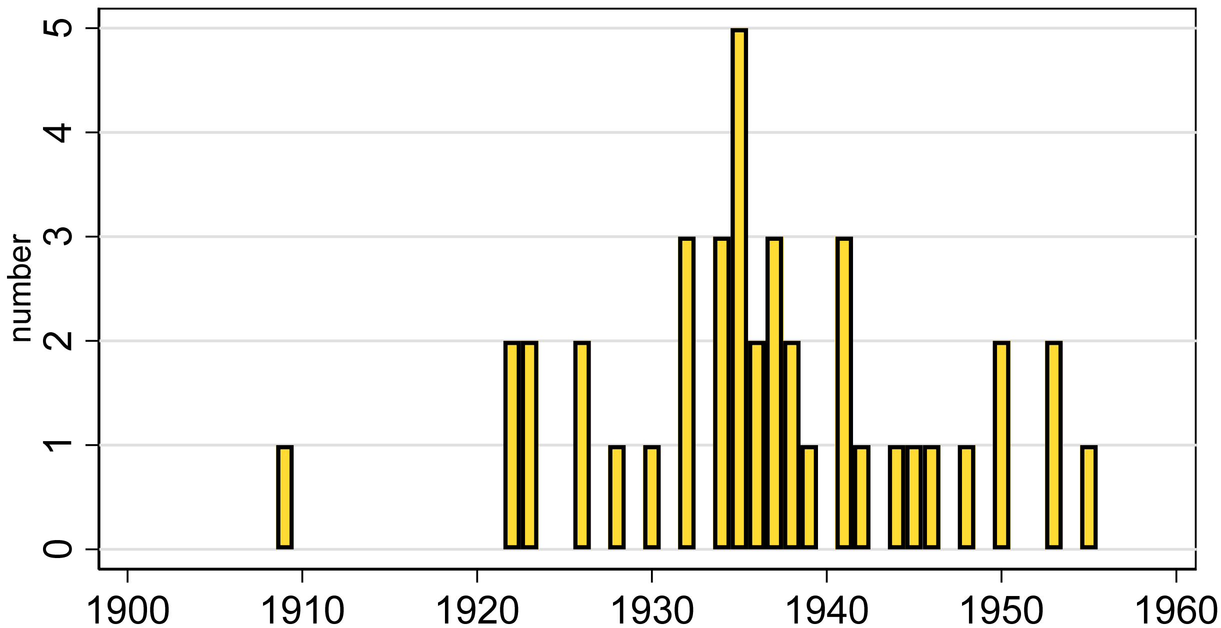
Time period	**Investment-GDP Ratio**
2019	17.6
Average, 1947-2019	17.3
Average, 1947-1973	16.6

**Figure 4. Trends in Average Weekly Hours Per Capita
Post-War U.S.**



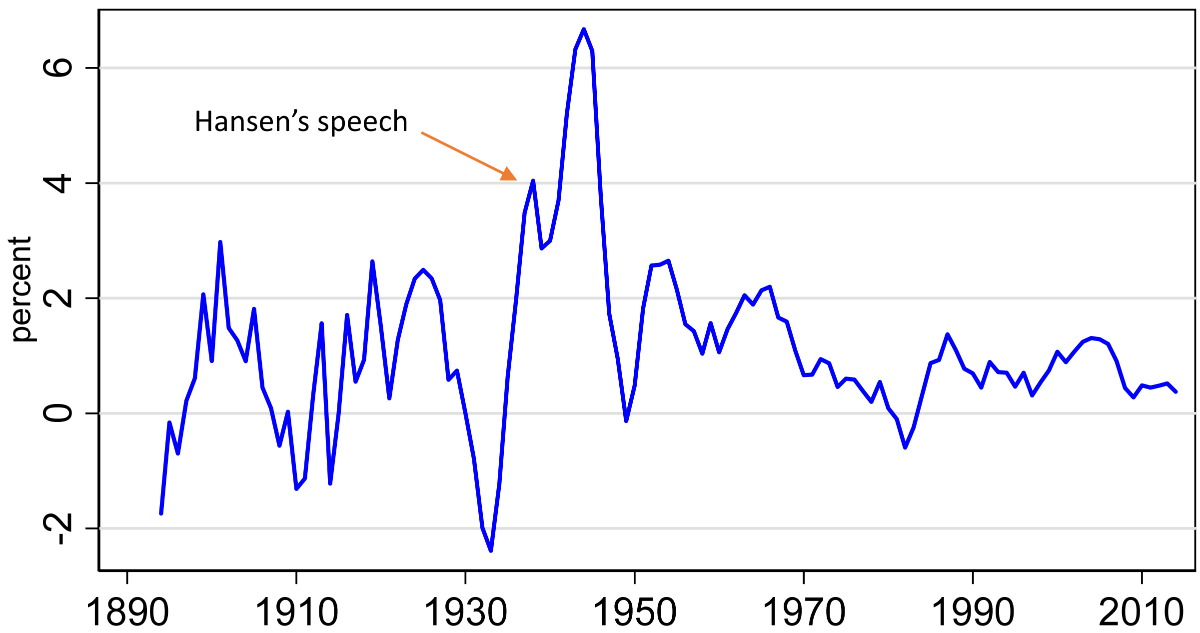
Notes. The series shown is total hours worked in the U.S. economy divided by the total U.S. population. The hours series are based on unpublished BLS data, available at: http://www.bls.gov/lpc/special_requests/us_total_hrs_emp.xlsx).

Figure 5. Number of Major New Innovations Per Year



Notes. Data based on Mensch (1979), Table 4.4.

Figure 6: Total Factor Productivity Growth, Average over Previous 5 Years



Notes. Total factor productivity series is from Gordon (2016).