SECTION TWO

# Should Policy Makers Worry about R-Star?

## Reconsidering Interest Rate Policies as a Stabilization Tool

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Policy makers in the Federal Reserve and other central banks have expressed concern that the long-run equilibrium interest rate, referred to as "r-star" in the literature on monetary policy, has declined considerably since the Great Recession, and that this will affect central bank interest rate policies for business cycle stabilization. Specifically, policy makers worry that a low r-star will either constrain or limit the usefulness of traditional monetary (interest rate) policies during economic downturns, given the zero lower bound (ZLB) on nominal interest rates. There is additional concern about monetary policies and the possible effect of r-star through secular stagnation arguments, in which low nominal demand is constraining long-run economic growth.

This chapter presents a very different view of r-star and central bank policies. I argue that the level of r-star is not particularly important, because several of the assumptions underlying the centrality of r-star in policy-making circles, including the importance of short-run monetary policies as an economic stabilizer and the assumed importance of secular stagnation arguments, have limited or in some cases no empirical support. This suggests that policy makers are placing too much emphasis on short-run monetary policies aimed at either stimulating an economy that's perceived to be operating below trend or preventing an economy from rising above trend. I propose an alternative channel for policy makers,

which is aimed at improving the efficiency of the allocation of capital through financial markets.

The text is organized as follows. The first section describes the standard view of r-star, delineating how it may affect monetary policies, as well as presenting evidence that the Phillips curve has little if any empirical support in recent US data. The following section presents band-passed filtered data on macroeconomic variables to show that aggregate fluctuations for over thirty years have been driven primarily by very long-run components that are typically considered to be beyond the scope of monetary policies. The final section presents data on asset returns to show that the secular stagnation view on economic growth and returns to investment has no empirical support among business assets.

## THE STANDARD VIEW ON R-STAR AND ITS IMPACT ON MONETARY POLICY

R-star is defined by the Federal Reserve Board of Governors (2016) as "the short-term real rate such that policy is neither accommodative nor contractionary." To see how the level of r-star impacts short-run monetary policies, consider the standard Fisher equation, in which the nominal interest rate includes two components, expected inflation, which is denoted as $\pi^e_{t+1}$, and the expected real return of the asset, which is denoted as $r^e_{t+1}$:

$$i_t = \pi^e_{t+1} + r^e_{t+1} \tag{1}$$

In our current low-inflation environment, the nominal interest rate will be low when the real return (r-star) is low. This affects the Federal Reserve's ability to pursue interest rate policies during a period of perceived economic weakness because of the ZLB.

Note that the level of r-star matters for central bank interest rate policies, which are tools widely used by central banks for business

cycle stabilization. The assumed importance of short-run interest policies as a stabilization tool is based on three perceptions. One is the Phillips curve, which I define as a systematic empirical relationship between unemployment—or other measures of economic slack—and inflation, which can be exploited by interest rate policies. The second perception is that business cycle fluctuations are assumed to be primarily due to temporary demand shocks. These two perceptions are key assumptions for policy makers because they provide the foundations of the application of interest policies for the purpose of macroeconomic stabilization.

A third, more recent perception, secular stagnation, is complementary to the first two perceptions. This is the view that chronically low aggregate demand is depressing trend economic growth, and as a result the US economy and some other advanced economies are stuck in a low real rate of return environment. This view further suggests that policy makers may need to significantly increase inflation to avoid the ZLB associated with a low r-star in future policy situations.

There is little evidence, however, to support the perceptions that underlie the importance of short-term monetary policies and the importance of the level of r-star. In 2001, Andy Atkeson and I wrote a paper for the Federal Reserve Bank of Minneapolis on the accuracy of inflation forecasting within the Federal Reserve System (Atkeson and Ohanian 2001). At that time, the Fed and many other inflation forecasters based forecasts of future inflation on the Phillips curve or related relationships. The idea behind this forecasting approach is that future inflation would be low if unemployment was high and, alternatively, that future inflation would be high if unemployment was currently low.

Atkeson and Ohanian (2001) compared different inflation forecasting models to determine their relative accuracy. We judged the accuracy of the forecasts using a standard criterion, which is the root mean square error (RMSE) of the forecast. This statistic

measures the average error of the forecast. The forecasts analyzed include those made by the Federal Reserve Board as presented in the Fed's Green Book, which is the material that forms the basis of the discussion by the Fed's Federal Open Market Committee (FOMC), as well as statistical forecasts of inflation developed by James Stock and Mark Watson (2007, 2009).

The accuracy of these forecasts was compared to a "naive" inflation forecast, which is similar to a random walk forecast. The naive forecast predicts that inflation over any four-quarter period would be equal to inflation from the previous four-quarter period. We, as well as other forecasters inside and outside the Fed, were very surprised to find that the naive forecast performed considerably better than either the Board of Governors' Green Book forecast or the Stock-Watson forecasts. In particular, the RMSE, which is a standard measure of forecasting accuracy of professional forecasts, was as much as 94 percent higher than that of the naive forecasting model.

These results raise an important question: Why did such a simple forecasting approach, which made no use of any information other than the previous inflation rate, produce much more accurate forecasts than those using far greater information and the considerable expertise of top professional forecasters and economists?

The answer is that the Board of Governors forecasts and the Stock-Watson forecasts reflected a view that economic slack, as expressed in the unemployment rate, predicts future inflation. However, there is no systematic empirical relationship between future inflation and unemployment or other measures of economic slack. This lack of a systematic empirical basis thus induces significant error into these forecasts.

This surprising finding regarding the relative accuracy of these forecasts led to a number of follow-up studies, including several by Stock and Watson (2007, 2009). After considerable analysis of the failure of the Phillips curve to forecast inflation, Stock and Watson

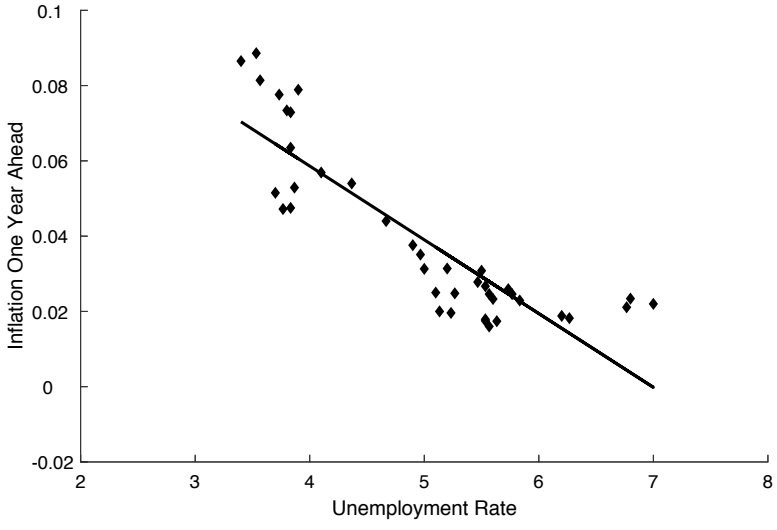


FIGURE 2.2.1. 1959–69: the Phillips curve appears

wrote in 2009, "Suppose you're told the next quarter the economy would plunge into recession, with the unemployment rate jumping by two percentage points. Would that lead you to change your inflation forecast? The literature is now full of formal, statistical evidence suggesting that this information should be ignored."

Figures 2.2.1–2.2.5 demonstrate how the relationship between unemployment and inflation has evolved over time. These figures clearly show the lack of a systematic relationship between these variables. Figure 2.2.1 shows the relationship between the level of unemployment and inflation one year later, between 1959 and 1969, along with a least squares regression line between these variables. This figure shows a negative relationship between these variables and clearly suggests the possibility of using unemployment as a predictor of future inflation based on data at this time.

However, this relationship disappears after 1969. Figure 2.2.2 shows the relationship between the same variables between 1970 and 1999, along with the least squares regression line. Figure 2.2.2

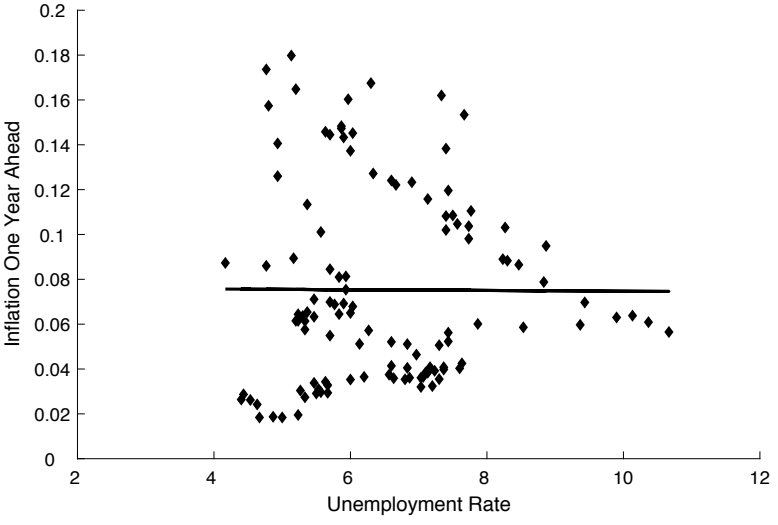


FIGURE 2.2.2. 1970–99: the Phillips curve disappears

shows that the negative relationship is gone, with a regression coefficient that is roughly zero. Figure 2.2.3 shows the Phillips curve from 2008, which is the beginning of the financial crisis, through 2016. The figure shows that the Phillips is now sloping upward. These figures show that the stable, downward-sloping Phillips curve relationships that motivate the forecasting approaches used by the Fed and other forecasters have not been in the data for more than forty years.

The breakdown of the 1959–69 Phillips curve led some economists to reformulate the Phillips curve. This reformulation of the Phillips curve was known as the non-accelerating inflation rate of unemployment (NAIRU) Phillips curve. The NAIRU specification of the Phillips curve fits a relationship between the change in the inflation rate and unemployment, rather than the level of inflation and unemployment, as used in Figure 2.2.1.

Figure 2.2.4 shows the NAIRU Phillips curve for the 1970–83 period for unemployment, and the change in inflation one year

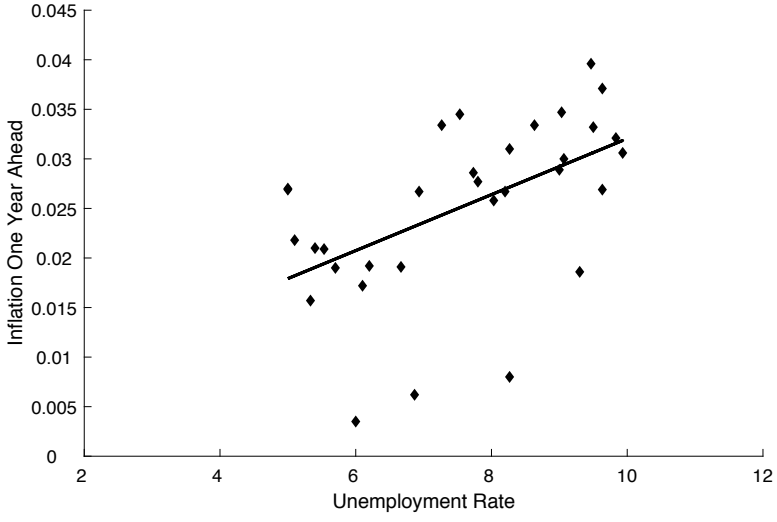


FIGURE 2.2.3. 2008–16: the Phillips curve is gone

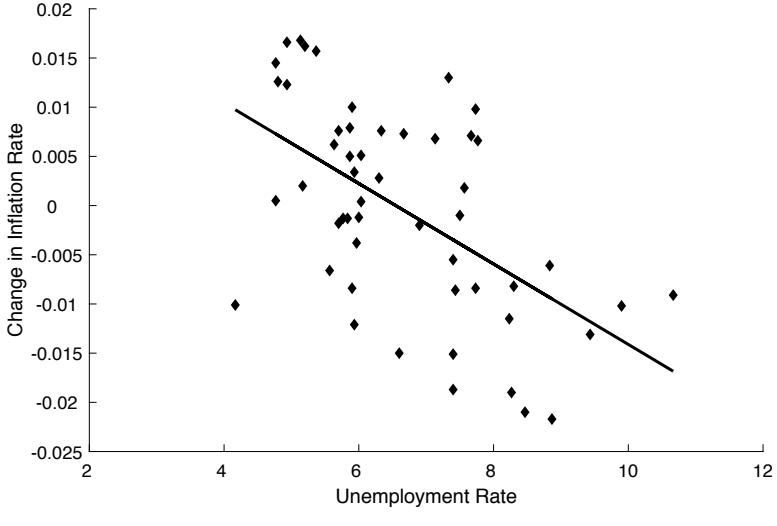


FIGURE 2.2.4. 1970–83: the expectation Phillips curve appears

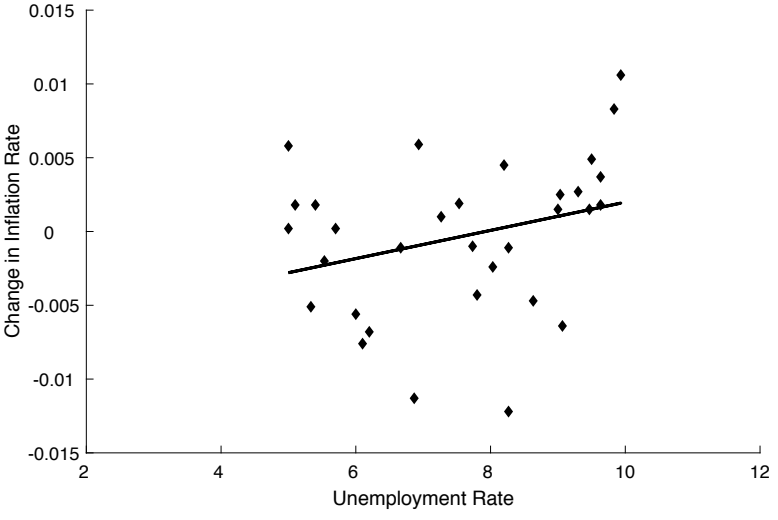


FIGURE 2.2.5. 2008–2016: the expectation Phillips curve is gone

later. Note that a negative relationship appears in this graph, which led forecasters to believe they had found a reliable specification to forecast inflation based on the Phillips curve. However, this reformulated specification also broke down over time. Figure 2.2.5 shows the NAIRU Phillips curve between 2008 and 2016, and as in the case of the standard Phillips curve, the regression line is upward sloping, indicating the exact opposite relationship between unemployment and future inflation relative to forecaster beliefs. These data highlight why Stock and Watson indicate that unemployment and other measures of economic slack should not be used to forecast inflation.

These figures show that both formulations of the Phillips curve broke down over time and raise questions as to why it has changed so much. Since Lucas (1976), economists have known that the Phillips curve is probably not a structural relationship and therefore may exhibit temporal instability that reflects individual and business expectations. However, the breakdown in the Phillips curve

probably goes much deeper than that. The premise behind the Phillips curve is that nominal wages and nominal prices are both inflexible and can take quite some time to change in response to monetary policy changes. However, there are a number of good reasons for why these nominal price and wage inflexibilities have changed over time. In fact, there is considerable evidence to suggest that impediments to changing nominal prices and wages, as well as incentives to change nominal prices and wages, have changed considerably.

One important factor is that unionization is much different today than in the past. In the 1950s and 1960s, which is the period in which the Phillips curve was present in the data, the private-sector unionization rate peaked at about 35 percent. Moreover, union collective bargaining contracts specified wages for periods as long as five years into the future. Today, the private-sector unionization rate has declined from a peak of 35 percent to about 6 percent. Moreover, the duration and rigidity of nominal wages within collective bargaining contracts have changed. Thus, a large and important source of wage stickiness has changed considerably over time.

The incentives to change nominal wages have also changed. The implicit view underlying nominal wage stickiness is that the benefit of modifying the employment terms is fairly small, amounting to less than the cost of making these changes. But a growing body of literature shows that workers who lose a job during a recession experience a very large drop in long-term future wages. This research dates back to work by Jacobson, Lalonde, and Sullivan (1993) and more recently includes research by Davis and Von Wachter (2011). These analyses show that workers who lose a job during a recession suffer future wage declines of as much as 25 percent far into the future. This evidence suggests that workers will be highly motivated to renegotiate their wages with their current employer should the value of their labor services decline, rather than accept a layoff, experience potentially long-term unemployment,

and ultimately accept future compensation that is 25 percent lower than their previous compensation.

In terms of price stickiness, enormous technological change has affected many aspects of consumer and business transactions, including pricing technologies and information about prices, as well as marketing and distribution technologies. This has been accompanied by tremendous growth in online purchases and imports, both of which suggest considerably more competitive pressure today relative to the economy of the 1950s and 1960s. These developments suggest that the cost of changing prices has declined significantly, and the incentives to change prices have increased, as the failure to do so may substantially affect a firm's ability to compete. In addition, deregulation in transportation, telecommunications, finance, and other areas indicates more price competition.

While much more research is required to gain a better understanding of these important issues, these points suggest that nominal wage and price stickiness, as well as the distortionary allocative effects of this inefficiency, may have declined considerably over time. This indicates that the disappearance of the Phillips curve from recent US data is not at all surprising, and that this disappearance may indeed be a permanent feature of the US economy.

## MACROECONOMIC FLUCTUATIONS ARE DRIVEN BY EXTREMELY PERSISTENT SHOCKS

The second perception underlying the importance of r-star is that transitory demand shocks are the dominant component driving US cyclical fluctuations. This perception is key, because it is a long-standing foundation of the use of traditional central bank interest rate policies as a tool for macroeconomic stabilization. Figures 2.2.6–2.2.12 show that this view has limited empirical support, particularly for fluctuations since the early 1980s. These figures, which are updated from recent research I conducted with Gary

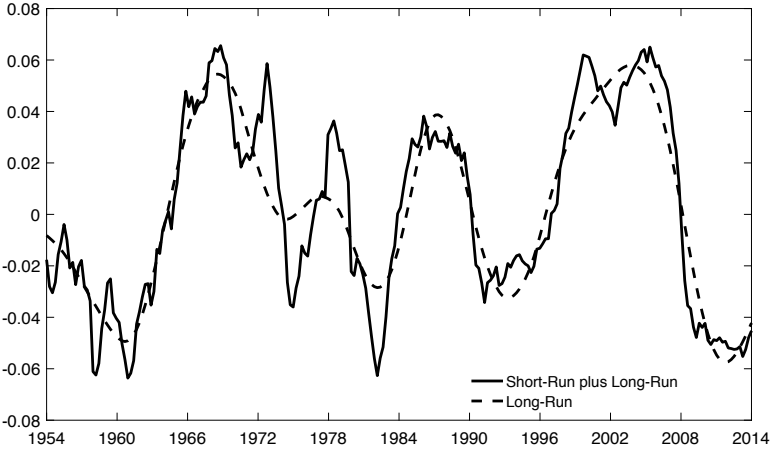


FIGURE 2.2.6. The relative importance of long- and short-run components in a log of real GDP

Hansen (Hansen and Ohanian 2016), decompose a number of macroeconomic variables into two components. One component is the traditional business cycle, with cycles of no more than eight years in length. The other component involves very long-run fluctuations, which have cycles between eight and fifty years. Monetary policy is traditionally presumed to be potentially important for the short-run cycles, but not for the very long-run cycles.

These components are constructed using the band pass filter (see Hansen and Ohanian 2016). The sum of the two components is roughly equal to all deviations from a straight trend line. Figure 2.2.6 shows the log of real GDP in the United States from 1954 through 2016. The solid line represents the sum of the two components, and the dashed line represents only long-run fluctuations of more than eight years. There are two notable patterns. In the 1960s and 1970s, there's a large difference between the dashed line and the solid line, which means that the short-run transitory component is quantitatively important. This pattern, however, changes after the early 1980s. After this time, the dashed and solid

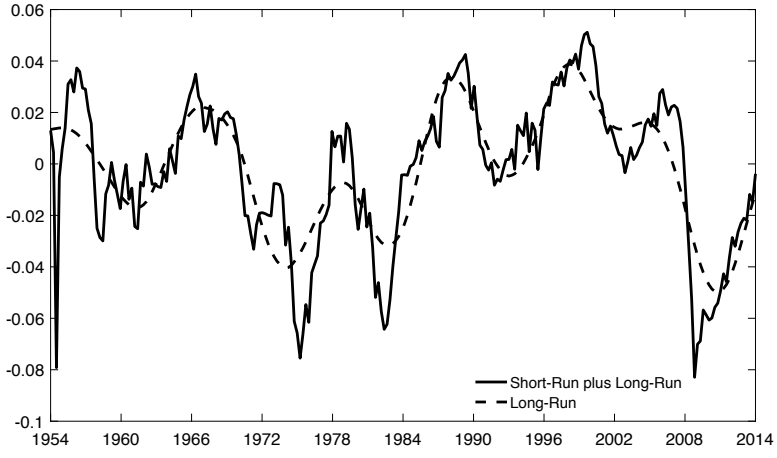


FIGURE 2.2.7. The relative importance of long- and short-run components in a log of total hours worked

lines are almost the same. This means that the transitory movements in real GDP for most of the last thirty-five years are negligible, indicating that the potential for monetary policy either depressing the economy or promoting economic growth in this period was negligible. In contrast, almost all of the deviations from trend most likely reflect very long-run factors, such as technological change, and long-run policy changes, rather than monetary policy. Figures 2.2.7–2.2.9 present analogous graphs for US hours worked, consumption, and total factor productivity. These graphs present similar patterns, with a significant short-run component in the earlier years but very long-run fluctuations being by far the most important after the early 1980s.

The short-run component is also quantitatively unimportant in other countries. Figures 2.2.10–2.2.12 show real GDP from three European countries: France, Germany, and Spain. Note that the dashed and solid lines are almost identical, indicating that almost all the deviation from a linear trend is due to very long-run changes and not short-run, demand-induced changes. As discussed above,

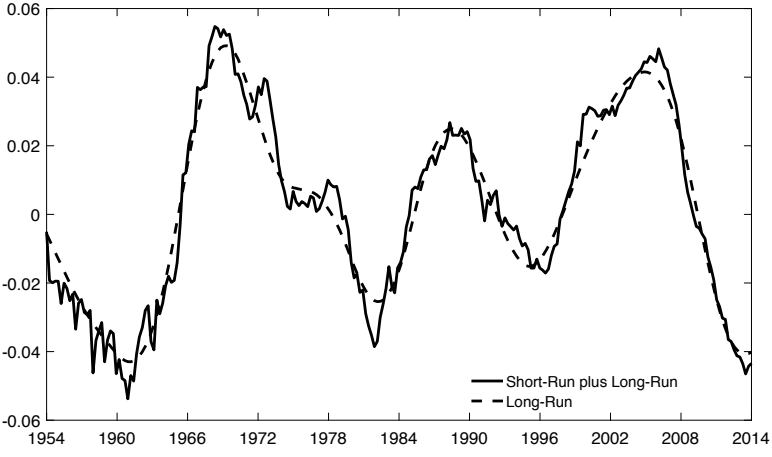


FIGURE 2.2.8. The relative importance of long- and short-run components in a log of consumption

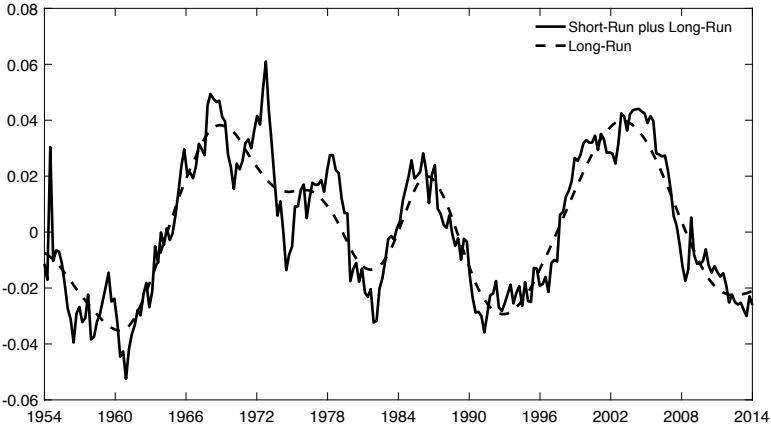


FIGURE 2.2.9. The relative importance of long- and short-run components in a log of total factor productivity

these long-run changes more plausibly reflect long-run changes in technologies, demographics, and regulatory, tax, or other long-run policies, rather than monetary policy. These data provide substantial evidence against the view that monetary policy is an effective stabilization tool in today's economy, irrespective of the level of r-star.

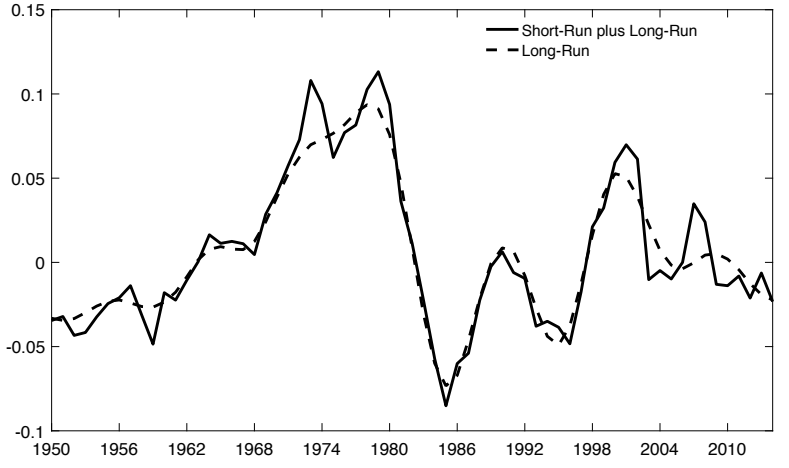


FIGURE 2.2.10. The relative importance of long- and short-run components in a log of real GDP: France

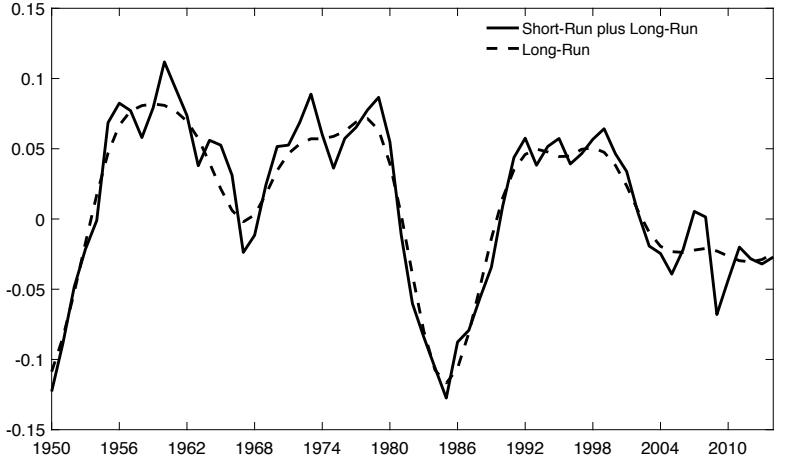


FIGURE 2.2.11. The relative importance of long- and short-run components in a log of real GDP: Germany

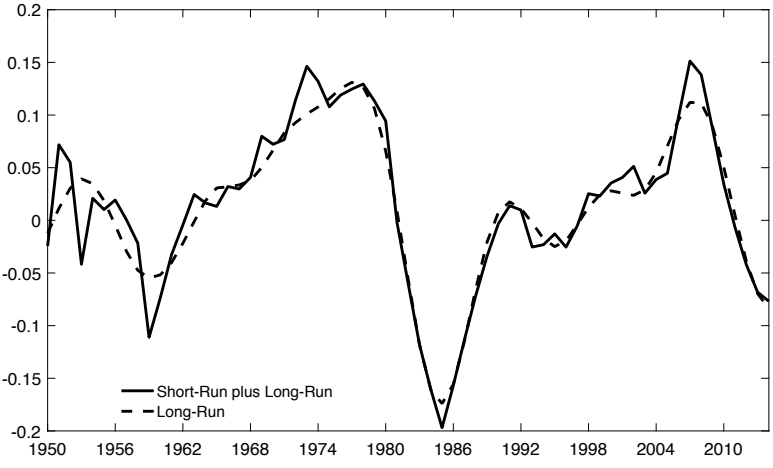


FIGURE 2.2.12. The relative importance of long- and short-run components in a log of real GDP: Spain

## SECULAR STAGNATION? THE RETURN TO PRIVATE-SECTOR CAPITAL IS HISTORICALLY HIGH

Concern about the level of r-star is also associated with secular stagnation, which is the perception that the combination of high savings and low demand keeps returns to saving low, which in turn depresses economic growth. This section presents data on returns and shows that returns to business capital—which is the stock of assets that are directly relevant for economic growth—are historically high, not low, and that low returns only exist for safe government assets. The data presented here are updated from that presented in Gomme, Ravikumar, and Rupert (2011), which constructed returns on a number of assets, both government assets and private assets.

Figure 2.2.13 shows the return for the ninety-day real Treasury rate. Today's real Treasury rate is clearly low compared to historical performance. Recently the real rate has been around twenty-five basis points or even less, whereas it fluctuated from fifty basis

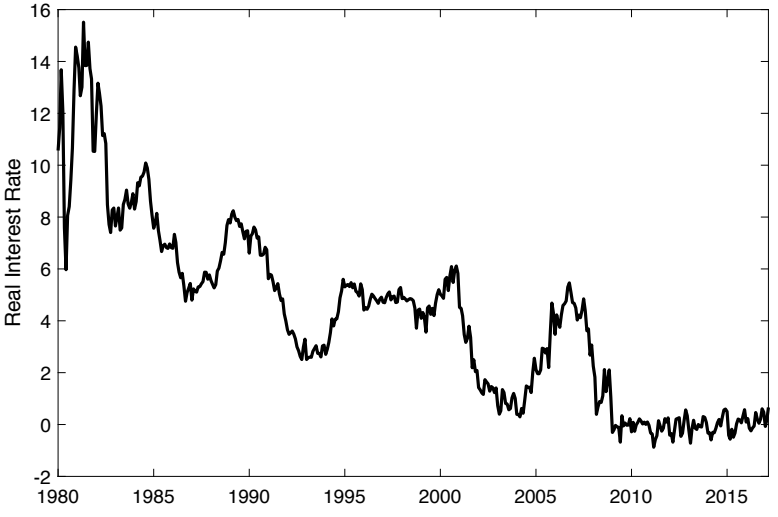


FIGURE 2.2.13. The ninety-day real Treasury rate

points all the way up to nearly 6 percent between the early 1990s and 2005. Today's low returns on government debt are the foundation of the secular stagnation view. However, these assets are government assets, and they are not the capital used by private business to produce goods and services. Figures 2.2.14 and 2.2.15 show both before- and after-tax returns to private business capital. Figure 2.2.14 shows the raw returns, and Figure 2.2.15 shows the same returns smoothed using a moving average. These data indicate that both pre- and post-tax returns to investment are historically high. Over the last five years, the pre-tax return has been about 11.8 percent per year, which is about 110 basis points above its historical average, and the post-tax return has been about 7.6 percent, which is about 160 basis points above its historical average.

These data do not support the secular stagnation view that returns to business assets are low.

Despite these high returns to business capital, business investment has been remarkably low. To demonstrate, I first note that in

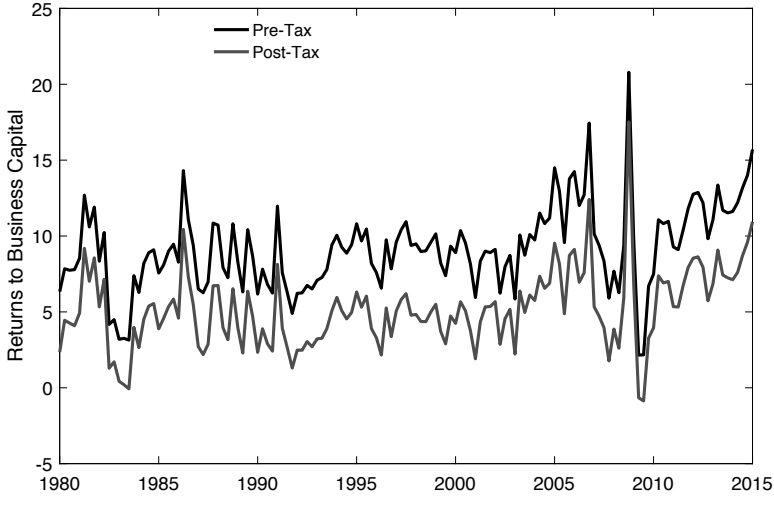


FIGURE 2.2.14. Pre-tax and post-tax returns to capital are high: raw returns

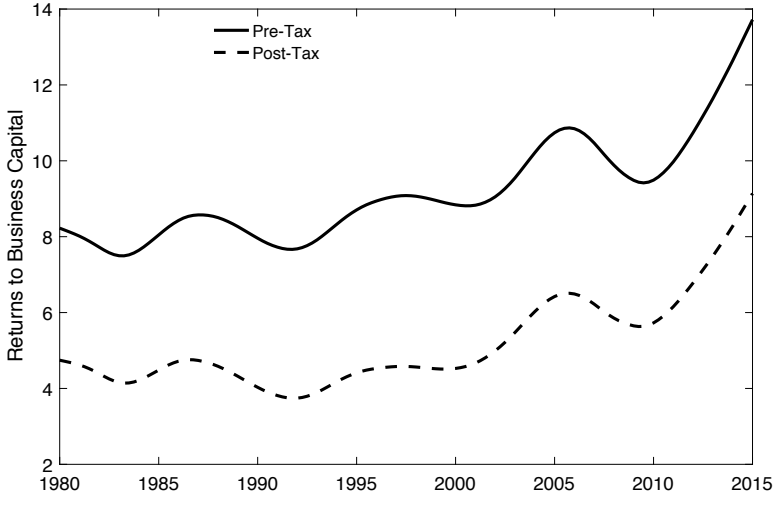


FIGURE 2.2.15. Pre-tax and post-tax returns to capital are high: moving average

the 1960s and 1970s real gross domestic investment growth averaged over 5 percent per year. This declined to just under 4 percent for the 1980s, but then rebounded to nearly 6 percent in the 1990s. Since 2000, however, the business investment growth rate is just 1.1 percent. This long-run decay in business investment is incredibly troubling for future economic growth. Future research should consider why investment is so low, despite historically high current real returns. One possibility is that expectations of future productivity growth will be low. Another possibility is that the perception of future risk is very high, and this is constraining investment. Both of these factors, however, are well beyond the scope of being addressed by monetary policy.

## CONCLUSION

The data presented here shows little evidence for policy-maker concerns about the level of r-star. In fact, these data refute the view that traditional monetary policies can be potent stabilizers of the US economy, independent of the level of r-star. These data show that there is little evidence supporting the Phillips curve and that most economic fluctuations appear to be due to very long-lived components and not short-run demand factors. Moreover, the data show that returns to business capital are high, which challenges the secular stagnation view.

Taken together, these data suggest that monetary policy makers should consider placing less emphasis on short-run demand management through monetary policy. As an alternative, monetary policy makers could work on developing policies that promote long-run growth and investment. Much of the job creation, innovation, and productivity growth in the United States comes from rapidly growing start-ups. Those running start-ups frequently remark how difficult it is to obtain financing for their organizations, particularly in recent years. This suggests that policies which advance

the efficient allocation of capital investment, such as reforming banking and financial system regulatory policies, could have sizable growth and welfare benefits for the United States.

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