A Theory of Slack

How Economic Slack Shapes Markets, Business Cycles, and Policies

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Draft version: March 2026
Draft URL: pascalmichaillat.org/18/

CHAPTER 15.

Unemployment gap

We have seen that in a slackish business cycle model there is no guarantee that the economy is operating efficiently. Generally, a market economy is socially inefficient: the amount of slack might be inefficiently high or low. In this chapter, we compute the US unemployment gap over the past century to measure the departure of the US economy from social efficiency during that time. As we will see in the rest of the book, the unemployment gap is a key sufficient statistic to design stabilization policies.

15.1. Efficient aggregate tightness

In this chapter, we to produce a measure of the efficiency or inefficiency of the aggregate economy. To do that, we solve the problem of a social planner who aims to organize production and trade as efficiently as possible.

15.1.1. Social planner's problem

Because this is a business-cycle analysis, the only factor of production that the planner considers is labor. The other factors of production are taken as fixed. We assumed that social welfare is determined by the amount of labor services that are consumed.

Our starting point is the economy's productive capacity, which is k labor services per unit time.

There is slack in the economy, so a share $u \in (0, 1)$ of all labor services are unsold. The rest of the labor services are sold to buyers: $(1 - u)k$ labor services are sold to buyers.

However, labor is used not only to produce labor services but also to purchase them via help-wanted ads. Hiring labor takes work: designing and advertising help-wanted ads, screening and interviewing candidates, and negotiating contracts. Workers involved in hiring are unable to spend their entire time contributing to social welfare.

As usual, we assume that the economy features a Beveridge curve. The aggregate Beveridge curve links the ad rate v—the number of help-wanted ads as a share of the productive capacity—to the slack rate u. The function $v(u)$ is strictly decreasing and convex.

Moreover, filling help-wanted ads require resources, measured by the hiring cost, $\kappa > 0$. The hiring cost is the number of labor services that are devoted to one help-wanted ad per unit time.

We see that not all $(1-u)k$ sold services are consumed. Some services are instead devoted to hiring and, as they are not consumed, they do not contribute to social welfare. We must subtract $\kappa v k$ services from the $(1-u)k$ services sold to buyers.

In total, social welfare becomes

$$\mathcal{M}(u) = [1 - u - \kappa v(u)]\, k.$$

The social planner's problem is to pick a slack rate u to maximize social welfare $\mathcal{M}(u)$.

15.1.2. Sufficient-statistic formula

The social planner's problem is exactly the same as the market planner's in chapter 10. Hence, the efficiency formula is the same, given by equation 10.5:

$$\left(\frac{v}{u}\right)^* = \frac{1}{\beta\kappa}, \tag{15.1}$$

where κ is the amount of labor devoted to hiring per help-wanted ad, β is the elasticity of the aggregate Beveridge curve.

In the one-market business cycle models of chapters 12 and 14, the ratio v/u corresponds to the aggregate tightness θ. In this context, the formula becomes

$$\beta\theta^*\kappa = 1.$$

15.1.3. Calibration of the sufficient statistics

Ideally, to measure the aggregate efficiency of the US economy, we would need a measure of aggregate tightness, $\theta = v/u$. This in turn would require to measure the slack rate u and the ad rate v across the economy. As we saw in chapter 2, slack involves not only unemployed workers, but also employed workers idle in firms. Counting help-wanted ads in all their forms would require to count job vacancies posted by firms to hire workers, help-wanted ads posted by households to hire specific labor services, and also request for proposals posted by firms to hire teams of workers from other other firm to complete entire projects.

Unfortunately, as this time, we do not have comprehensive measures of slack or help-wanted ads throughout the economy. We therefore use labor market data instead of aggregate data to measure both slack and help-wanted ads. This means that we measure the slack rate by the unemployment rate, the ad rate by the vacancy rate, and aggregate tightness by labor market tightness. The aggregate Beveridge curve reduces to the labor-market Beveridge curve. We now calibrate the efficiency formula under this labor-market perspective.

First, as we saw in figure 2.8, the labor-market Beveridge curve is a rectangular hyperbola, so we set the elasticity to $\beta = 1$.

Second, as we saw in chapter 2 that it takes about 1 full-time worker to service a job vacancy, so $\kappa = 1$.

Since $\beta = 1$ and $\kappa = 1$, the efficient labor market tightness is therefore given by $\theta^* = 1$. Thus, the US economy is inefficiently slack whenever labor market tightness is below 1, inefficiently tight whenever tightness is above 1, and efficient when tightness equals 1.

In section 10.7, we saw that the welfare analysis could be extended to include nonzero social value of slack. However, we noted in chapter 2 that beyond the idleness of labor generates significant psychological costs. We saw that the value of home production by unemployed labor minus the psychological cost of idleness is about zero, so the social value is about 0. This is why we kept things simple and did not insert a nonzero social value of slack here.

15.1.4. Interpretation of the efficiency condition

Because aggregate efficiency corresponds to a labor market tightness of 1, aggregate efficiency prevails when the unemployment and vacancy rates are equal ($u = v$). When they are not equal, the economy is operating inefficiently. The economy is inefficiently tight when there are more job vacancies than job seekers ($v > u$). In that case, increasing u and reducing v would increase social welfare. The economy is inefficiently slack when there are more job seekers than job vacancies ($u > v$). Then, reducing u and increasing v would increase social welfare.

15.2. Equivalency between efficiency and full employment

Before applying the theory to US data, it is useful to note that the concept of efficiency studied in this chapter and the following ones is synonymous with the notion of full employment used in US laws. Accordingly, the unemployment gap computed in this chapter is a marker not only of the inefficiency of the economy, but also of the distance from full employment.

15.2.1. Full employment in US law

In the United States, the federal government and its central bank are mandated to stabilize the economy at full employment by the Employment Act of 1946, the Federal Reserve Reform Act of 1977, and the Full Employment and Balanced Growth Act of 1978 (US Congress 1946, 1977, 1978).[1]

Fascinatingly, the Full Employment and Balanced Growth Act was written because of excessive slack across US markets. US Congress (1978, p. 1888) was motivated to act by the fact that "the Nation has suffered substantial unemployment and underemployment, idleness of other resources, . . . over prolonged periods of time, imposing numerous economic and social costs on the Nation." The hope of the law is to ensure that in contrast, with appropriate policy, the country is not "deprived of the full supply of goods and services, the full utilization of labor. . . and the related increases in economic well-being that would occur under conditions of genuine full employment."

15.2.2. Full employment in the model

Since the Employment Act and Full Employment and Balanced Growth Act clearly state that achieving full employment is a way to maximize economic well-being, we translate full employment in the model as social efficiency—a state of affairs in which social welfare is maximized. The translation seems well aligned with the spirit of the law. The Employment Act states for instance that reaching full employment is designed "to foster. . . the general welfare" (US Congress 1946, p. 1)—so in theoretical words, to reach efficiency.

We therefore interpret full employment as the allocation of labor that maximizes social welfare. Using the result above, we can state that the economy is at full employment when the unemployment and vacancy rates are equal ($u = v$).

15.2.3. Connection to Beveridge's criterion for full employment

Famously, Beveridge (1944, p. 18) defined full employment to mean that "unemployment is reduced to short intervals of standing by, with the certainty that very soon one will be wanted in one's old job again or will be wanted in a new job that is within one's powers."

[1]"Full employment" is sometimes referred to as "maximum employment." During the debate preceding the Employment Act, "maximum employment" was adopted as a less stringent goal than "full employment" (Duboff 1977, p. 6). In 1978, the Full Employment and Balanced Growth Act amended the Employment Act and replaced "maximum employment" by the more ambitious target of "full employment" (Weir 1987, p. 398).

He then stated that "Full employment...means having always more vacant jobs than unemployed men, not slightly fewer jobs."

Beveridge's criterion has been used in academic research. Early on, Rees (1957, chart 5) applied Beveridge's criterion to the United States. He computed the ratio between number of vacancies and number of unemployed workers and examined under which conditions the US economy reached full employment (a ratio above 1). More recently, Benigno and Eggertsson (2023) used Beveridge's criterion to explain the kink that they observed in the US Phillips curve.

Beveridge's criterion is well known in government circles as well. During a press conference in 2022, Jerome Powell, the chair of the Federal Reserve, was asked by journalist Howard Schneider which tightness the Fed might target, Powell (2022, pp. 12–13) responded: "So in terms of the vacancy-to-unemployment ratio, we don't have a goal in mind.... I think when we got to one-to-one in the, you know, in the late teens, we thought that was a pretty good number." A vacancy-to-unemployment ratio of 1 corresponds to Beveridge's criterion for full employment.

How did Beveridge come up with this criterion? The logic was simple: he interpreted job vacancies as unmet labor demand and accordingly defined full employment as the point where there would be enough labor demand for all workers, so the point where job vacancies exceed job seekers. Beveridge then explains that some workers are always unemployed "however high the demand for labor" because there always is some "frictional unemployment."

Our criterion for full employment shares some similarities but is more symmetric than Beveridge's criterion. Beveridge thought that the labor market could be either too slack, when $v < u$ or at full employment, when $v \geq u$. By contrast, we find that having more vacancies than job seekers is a sign of inefficient tightness, just like having more job seekers than vacancies is a sign of inefficient slack. We argue that full employment is achieved exactly when $v = u$, and that on either side of full employment, the labor market is operating inefficiently: either too slack, when $v < u$, or too tight, when $v > u$.

Although our full-employment criterion overlaps with Beveridge's, the logic is entirely different. We do not interpret vacancies as unmet labor demand, but we use vacancies as an indirect measure of the labor devoted to recruiting. In the United States, it takes roughly one recruiter to handle one vacancy, so the number of vacancies tracks the amount of labor devoted to recruiting. This empirical regularity is what we use in deriving the FERU. If we had a direct measures of man-hours devoted to recruiting, we would not even need vacancies to compute the FERU.

Our approach is consistent with slackish theory, in which vacancies do not represent unmet labor demand: they do not represent actual positions but recruiting effort—an effort to try to find new workers through the matching process. As we saw in chapter 11, if a firm wants to recruit one worker this month and knows that a vacancy is only filled with probability 1/2, the firm will post 2 different vacancies to hire one worker in expectation. And each vacancy will require time and effort from the firm's human-resource workers to be filled.

Our approach also appears to be consistent with reality. ZipRecruiter's Julia Pollak explained in an interview with CBS News that firms routinely post several vacancies for each hire they are planning to make (Ivanova 2023):

> When you have fewer candidates per opening, you have to be more creative. The high openings figure does partly reflect recruiting intensity, and not actual roles and seats and slots.

15.3. Efficient, full-employment rate of unemployment

We have established that when the economy operates efficiently—which corresponds to a state of full employment—labor-market tightness is 1. In this section, we construct the rate of unemployment at full employment—the FERU. Having the rate of unemployment when the economy operates efficiently, at full employment, is useful because researchers and policymakers more commonly think about unemployment than about labor market tightness, and because the effects of stabilization policies on unemployment are better understood than those on labor market tightness.

To translate the efficient tightness into an efficient unemployment rate, we need to specify the Beveridge curve. As we discussed in chapter 2, since the Beveridge elasticity is 1, the Beveridge curve is a rectangular hyperbola:

$$vu = A,$$

where $A > 0$ governs the location of the Beveridge curve. At efficiency, the labor market tightness is 1, so $v^* = u^*$, which imposes

$$u^* = v^* = \sqrt{A}. \tag{15.2}$$

To derive the expression for the FERU, we start from equation (15.2) and substitute A out of it by using the Beveridge curve $A = uv$. We find that the FERU is the geometric average of the unemployment and vacancy rates:

$$u^* = \sqrt{uv}. \tag{15.3}$$

Since $uv = A > 0$, expression (15.3) implies that the FERU is strictly positive. Hence, full employment should not be interpreted as zero unemployment.

A first reason why full employment does not mean zero unemployment is that zero unemployment is infeasible. Indeed, the Beveridge curve prevents unemployment from ever reaching zero. Since vacancies require labor, the number of vacancies posted in the economy is bounded above. Accordingly, the Beveridge curve $u = A/v$ implies that the unemployment rate is bounded below by some positive number.

The fact that labor market flows impose a minimum level of unemployment—and therefore that full employment cannot be zero unemployment—has been known for a long time. Beveridge (1944, p. 125) realized that "however great the unsatisfied demand for labor, there is an irreducible minimum of unemployment, a margin in the labor force required to make change and movement possible." As a result, "even under full employment, there will be some unemployment,. . . on each day some men able and willing to work will not be working." Robinson (1946, pp. 169–170) made the same observation: "In a changing world there are always bound to be, at any moment, some workers who have left one job and have not yet found another. . . . Changes in occupation for personal reasons will always be going on. So long as such shifts in employment are taking place there is always likely to be some unemployment even when the general demand for labor is very high."

A second reason why full employment does not mean zero unemployment is that zero unemployment is undesirable. Unemployment is clearly a waste of economic resources as people who would like to work are not able to be productive. Yet, reducing the unemployment rate to zero is not desirable because it would require diverting a vast amount of labor toward hiring.

Equation (15.2) shows that full employment occurs when unemployment and vacancy rates are equal. The equation also shows that the location of the Beveridge curve, A, solely determines these rates at full employment. In a dynamic labor-market model the Beveridge curve's position is determined by the job-separation rate and the efficacy of the matching function (chapter 11). Any change in either parameter shifts the curve, affecting the FERU. However, which parameter causes the shift is irrelevant; only the shift itself matters for welfare and the FERU.

15.4. Inefficiency of the US economy over the past century

In this section we apply the chapter's theoretical results to the US economy. We investigate whether the US economy has operated efficiently over the past century or not. We find that it has not.

15.4.1. Labor market tightness over the past century

We start by looking at the US labor market tightness over the past century. Over 1929–2024, labor market tightness averages 0.73. Tightness is extremely volatile before the end of

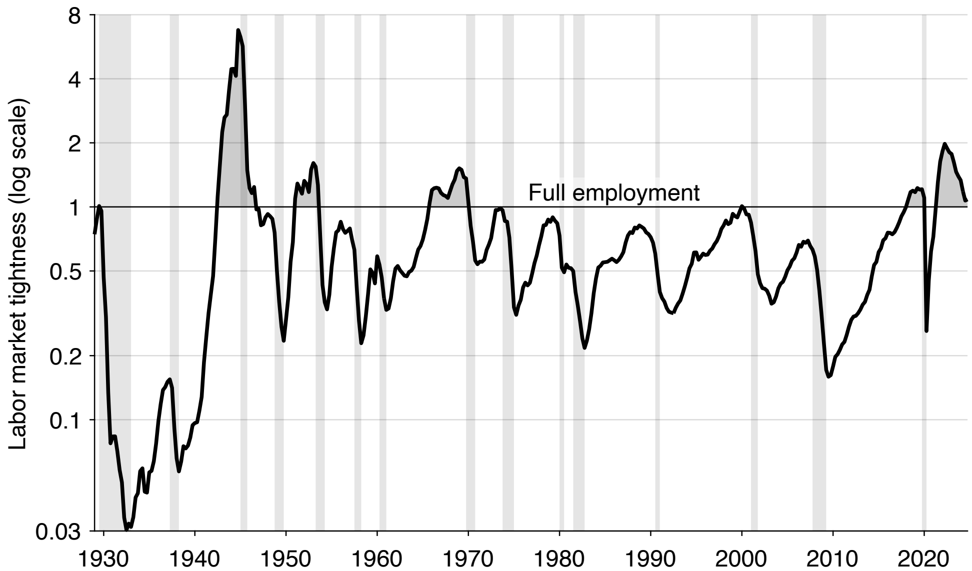

FIGURE 15.1. Labor market tightness in the United States, 1929–2024

Labor market tightness is v/u where the vacancy rate v comes from figure 2.5 and the unemployment rate u comes from figure 2.1. Shaded areas indicate recessions dated by the NBER (2023). The labor market is at full employment when tightness equals 1, inefficiently slack when tightness is below 1, and inefficiently tight when tightness exceeds 1.

World War 2. Tightness reached its most extreme values during that period: tightness plunged to 0.03 during the Great Depression and climbed all the way to 6.8 at the end of World War 2. Things are more quiet in the postwar period. Tightness peaked at 1.60 in 1953Q1, during the Korean War, and it bottomed at 0.16 in 2009Q3, during the Great Recession. Twice, the labor market reached full employment just before entering a recession. This happened before the 1973–1975 recession (tightness peaked at 0.99 in 1973Q3) and before the 2001 dot-com recession (tightness peaked at 1.01 in 2000Q1). In the aftermath of the coronavirus pandemic, the US labor market has become historically tight. In 2022Q2, tightness reached 1.98, a value which it had last reached in 1945.

A first finding is that over almost a century, tightness is generally inefficiently low, so the tightness gap is negative. Furthermore, this gap is exacerbated in recessions (figure 15.1). This means that the economy does not generally operate efficiently. Instead, it is generally inefficiently slack, especially during recessions.

The economy is not always inefficiently slack, however. There are several episodes when it becomes inefficiently tight. And these episodes do not appear at random. Before 2018, the economy had only been inefficiently tight during major wars—World War 2, the Korean War, and the Vietnam War. Keynes (1936, p. 322) doubted that an economy could reach full employment in peacetime. He was essentially right: before 2018 the US economy

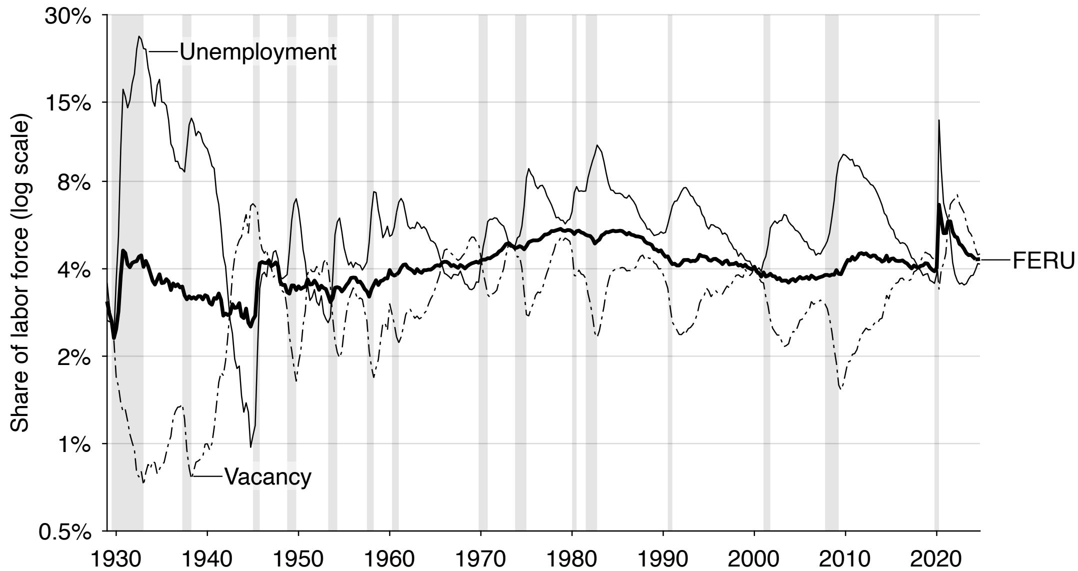

FIGURE 15.2. FERU in the United States, 1929–2024

The unemployment rate u comes from figure 2.1. The vacancy rate v comes from figure 2.5. The FERU is $u^* = \sqrt{uv}$, so on a logarithmic scale it is the midpoint between the unemployment and vacancy rates. Shaded areas indicate recessions dated by the NBER (2023).

had only reached full employment in wartime.

Since 2018, the economy has been inefficiently tight just before the coronavirus pandemic (2018Q3–2020Q1), and in the aftermath of the pandemic (2021Q3–2024Q4). The state of the economy around the pandemic is therefore a rarity: it is the only peacetime episode during which it became inefficiently tight—the only episode of peacetime overheating.

15.4.2. FERU over the past century

Next, we combine the US unemployment and vacancy rates between 1929 and 2024 to compute the FERU. Given that the US labor market experienced extreme fluctuations during the entire period, especially in the first two decades, we plot the unemployment and vacancy rates, as well as labor market tightness and FERU, on logarithmic scales. Besides improving the readability of the figures, logarithmic scales have several advantages. First, the symmetry of the unemployment and vacancy movements on a logarithmic scale makes it clear that the Beveridge curve is a rectangular hyperbola. Second, the FERU is particularly easy to construct on a logarithmic scale. Indeed, the FERU is just the midpoint between the unemployment and vacancy rates: as $u^* = \sqrt{uv}$, then $\ln(u^*) = 0.5 \times \ln(u) + 0.5 \times \ln(v)$.

Over 1929–2024, the FERU averages 4.1% (figure 15.2). The FERU is quite stable over time, remaining between 2.5% and 6.7% over almost a century. Despite significant macroeconomic volatility during the prewar period, the FERU is stable: it remains between 2.5% and 4.6%. The FERU is also stable during the postwar period: it remains between 3.1% and 5.5%. The Beveridge curve shifts in and out during the postwar period (figure 2.7), but the shifts are not large enough to produce noteworthy changes in the FERU. Finally, the FERU temporarily rose above 6% during the pandemic, before falling back down below 5% after 2023.

The sharp increase of the FERU at the onset of the pandemic is unprecedented: the FERU increased by almost 3pp, from 4.0% in 2020Q1 to 6.7% in 2020Q2. This sharp increase is explained by the gigantic outward shift of the Beveridge curve that took place in the spring of 2020 (figure 2.7). Indeed, the FERU is solely determined by the location of the Beveridge curve, so only an the outward shift of the Beveridge curve can raise the FERU.

15.4.3. Unemployment gap over the past century

The inefficiency of the US economy over the past century is clearly visible by computing the US unemployment gap, $u - u^*$ (figure 15.3).

Over 1929–2024, the unemployment gap averages +2.3pp. The unemployment gap was of course positive and very large during the Great Depression: the labor market was much too slack then. The unemployment gap reached +20.9pp in 1932Q3, its highest level on record. The economy recovered only slowly from the depression. The economy reached full employment in 1942Q3, a few quarters after the United States had entered World War 2. The unemployment gap kept falling during the war; it reached −1.6pp in 1945Q1, its lowest level on record.

In the postwar period, the unemployment gap peaked at +5.9pp in 2009Q4, during the Great Recession. At the end of the Volcker recession, in 1982Q4, the gap reached the slightly lower value of +5.7pp. The lowest value taken by the unemployment gap is −0.8pp, in 1969Q1, during the Vietnam War. During the Korean War, the unemployment gap was almost as low, reaching −0.7pp in 1953Q1.

While the unemployment gap averages 0 over the pandemic and post-pandemic period, the labor market experienced sharp departures from full employment. The unemployment gap was initially positive and large: the labor market was much too slack in the first year of the pandemic. The unemployment gap peaked at +6.3pp in 2020Q2, its highest level since 1945. But the economy recovered quickly and reached full employment in the middle of 2021. The unemployment gap turned negative after that, reaching −1.5pp in 2022Q2, its lowest level since 1945. The gap then shrunk to −0.2pp in 2024Q4. So during 2022–2024, the labor market was well beyond full employment.

Because the US economy has generally been inefficient, there is a role for the government to stabilize slackish markets and attempt to bring tightness to its efficient level.

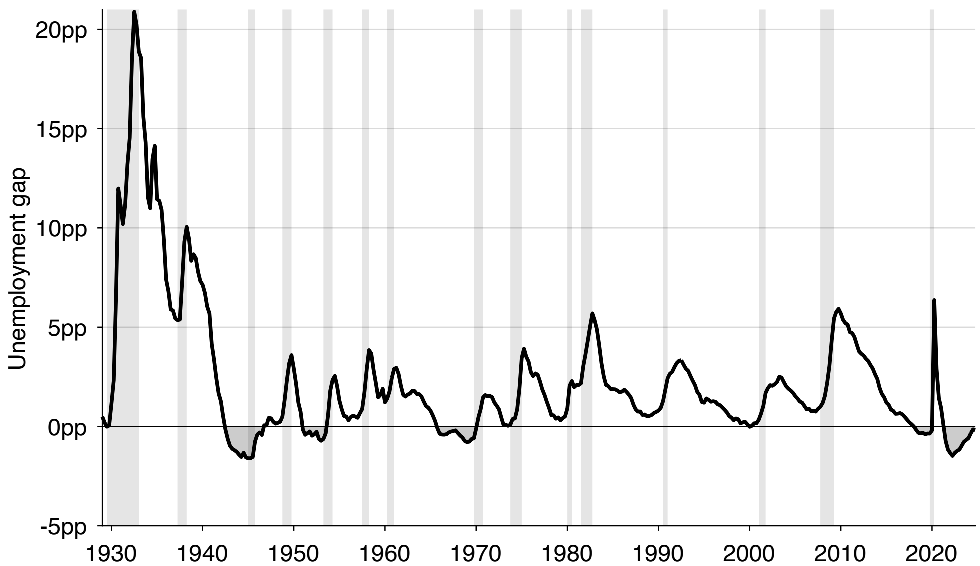

FIGURE 15.3. Unemployment gap in the United States, 1929–2024

The unemployment gap is $u - u^*$, where the unemployment rate u comes from figure 2.1 and the FERU is u^* comes from figure 15.2. Shaded areas indicate recessions dated by the NBER (2023).

Reassuringly, the result from the theory of slack is in line with what US law says. If markets always operated efficiently, then there would be no need to pass laws that says that the government and the central bank have to cooperate to maintain the economy at full employment. Yet this is exactly what the Employment Act of 1946, the Federal Reserve Reform Act of 1977, and the Full Employment and Balanced Growth Act of 1978 do.

15.5. Other unemployment targets

In this final section, we briefly review other series that US policymakers have used to measure full employment: the natural rate of unemployment (NRU) and the nonaccelerating-inflation rate of unemployment (NAIRU).[2] We explain why they are unsatisfactory.

15.5.1. Why not use the NAIRU or NRU instead of the FERU?

Why should we use the FERU if there are perfectly acceptable series such as the NAIRU or NRU to serve as full-employment targets? The main reason is that the NAIRU and the NRU have nothing to do with labor market efficiency, so they are not useful to compute an unemployment gap that captures departures from efficiency.

[2] See Backhouse, Forder, and Laskaridis (2023) for a comprehensive history of the two concepts.

The NAIRU is the unemployment rate at which inflation remains stable; it is measured by estimating accelerationist Phillips curves.[3] Although the NAIRU might contain information relevant to the Fed's price-stability mandate, there is absolutely no guarantee that the unemployment rate coming out of the NAIRU estimation measures the efficient rate of unemployment. These estimation procedures look at price dynamics. They do not measure the social costs and benefits from unemployment, so they cannot produce an estimate of the efficient unemployment rate, or equivalently of full employment.

In fact, a robust finding from the macroeconometric literature estimating the NAIRU is that estimates of the NAIRU are very imprecise (Staiger, Stock, and Watson 1997; Laubach 2001). The Phillips curve developed in chapter 14 might explain why. In that model, inflation might be stable at any level, for different unemployment rates: the Phillips curve is not accelerationist in the slackish model. If unemployment is at full employment, inflation is stable at the target; if unemployment is above the FERU, inflation is stable below the target; and if unemployment is below the FERU, inflation is stable above the target. So the concept of NAIRU is not well defined in a slackish monetary model. Ball and Mankiw (2002) argue that the NAIRU concept is implicit in any model in which monetary policy influences both inflation and unemployment. But it's not present in a slackish model designed to study how monetary policy affects inflation and unemployment. If the world is slackish, then the NAIRU is not well defined, explaining why it might be very difficult to estimate.

The NRU is a nebulous concept, but generally refers to some trend of the unemployment rate (Rogerson 1997). To be concrete here, we consider the NRU series produced by the CBO, which is well known and widely used.[4] The CBO's NRU is a slow-moving trend of the unemployment rate computed by assuming that the labor market was at full employment in 2005, and then by incorporating changes in the demographic composition of the labor force over time.[5] Although the NRU conveys information about the demographic forces exerted on the labor market, without a theory of full employment, it is impossible to know whether the US labor market was at full employment in 2005 or not, and by induction, whether the NRU in any year measures full employment. More generally, in a slackish labor market, there is no guarantee that the trend of unemployment is efficient (chapter 10). Thus, the NRU cannot be a satisfactory measure of full employment or efficiency.

[3]For different methods to estimate the NAIRU, see Staiger, Stock, and Watson (1997), Gordon (1997), Laubach (2001), and Ball and Mankiw (2002).

[4]The CBO rebranded the "natural rate of unemployment" as "noncyclical rate of unemployment" after 2021—leaving the acronym NRU unchanged and highlighting the fact that the natural rate is generally considered as the trend or noncyclical component of unemployment.

[5]The construction of the CBO's NRU is described in Shackleton (2018, appendix B) and reviewed in Bok et al. (2023).

15.5.2. The NAIRU and NRU are higher than the FERU

We have seen that the US economy has been inefficiently slack for most of the past century (figure 15.3)—despite the fact that the Federal Reserve and Congress have been mandated to keep the economy at full employment since 1946 (US Congress 1946). A possible reason is that the unemployment targets designed to represent full employment—which have been available since the middle of the 1970s—were higher than the FERU.

A first possible measure that the Fed and other policymakers often use to measure full employment is the NRU computed by the (CBO 2025). The CBO opened its doors in 1975 (US Congress 1974). It started producing estimates of the NRU shortly after that.[6]

For example, when he was President of the Federal Reserve Bank of Boston, Rosengren (2014, p. 180) measured the departure of the Fed from its full-employment mandate by "the squared deviations of unemployment from an estimate of full employment utilizing the Congressional Budget Office assessment of the natural rate for each year."

Over 1949–2019, the NRU averages 5.5% (figure 15.4). This is 1.2pp above the average FERU between 1949 and 2019. So policymakers might have targeted an unemployment rate that was just too high. The average distance between FERU and NRU explains by itself almost the entire average postwar unemployment gap.

Another measure of full employment that policymakers sometimes use is the NAIRU—although there is no standardized time series for it. The concept of NAIRU was proposed by Modigliani and Papademos (1975), although in a slightly modified form—they introduced NIRU for "noninflationary rate of unemployment". The acronym NAIRU then appeared in Baily (1976) and Baily and Tobin (1977). These early papers also offered measures of the NAIRU for the United States, that could be used as targets for monetary policy.

Today, the Federal Reserve and government continue to use the NAIRU as a full-employment target. For instance, the Council of Economic Advisers (2024, p. 24) describes the concept of full employment as follows: "Modern economics has generally defined full employment by citing the theoretical concept of the lowest unemployment rate consistent with stable inflation, which is referred to as u^*, . . . the non-accelerating inflationary rate of unemployment (termed NAIRU)." The quote is particularly meaningful because the Council of Economic Advisers was created by the Employment Act to ensure that the government achieved its full-employment mandate.

Just like the NRU, the NAIRU is significantly higher than the FERU. For instance, the NAIRU computed by Crump et al. (2024) using state-of-the-art techniques averages 5.9% over 1960–2019 (figure 15.4). This is 1.5pp more than the average FERU over the same period. Once again, by using the NAIRU, policymakers would have targeted an unemployment rate that was too high. At the beginning of the 1980s the NAIRU hovered around 8.5%. It

[6]See for instance this report produced by the CBO in January 1987: `https://www.cbo.gov/sites/default/files/100th-congress-1987-1988/reports/doc01b-entire_0.pdf`.

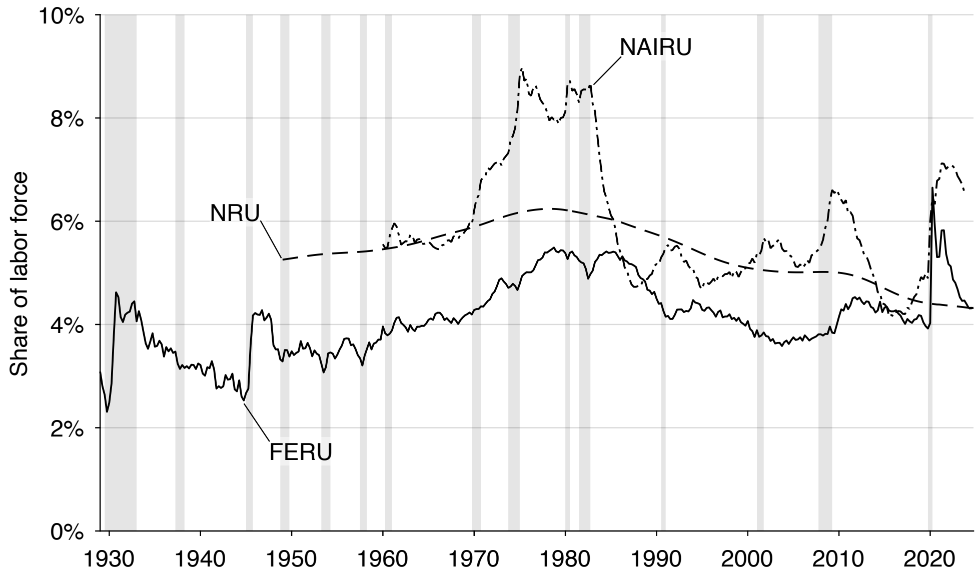

FIGURE 15.4. FERU, NRU, and NAIRU in the United States, 1929–2024

The FERU comes from figure 15.2. The NRU is constructed by the CBO (2025) for 1949–2024. The short-term NRU is constructed by the CBO (2021) for 1949–2020. The NAIRU is constructed by Crump et al. (2024, figure 2) for 1960–2023. Shaded areas indicate recessions dated by the NBER (2023).

reached 6.6% again after the Great Recession.

15.6. Summary

This chapter argues that the US economy has seldom operated at its socially efficient level of slack. Using the efficiency framework of slackish markets, and combining it with the available empirical evidence, we found that in the United States efficient tightness equals 1: full employment corresponds to one vacancy per job seeker. Historically, tightness has been well below unity, indicating pervasive inefficiency and excessive slack, except during wartime and, more recently, during the post-pandemic expansion when the market became inefficiently tight.

We also showed how the efficient tightness can be translated into an efficient unemployment rate, which we called the full-employment rate of unemployment (FERU). In our slackish model, the FERU simply is the geometric mean of the unemployment and vacancy rates. The FERU formalizes the concept of full employment as a state of social efficiency rather than as zero unemployment. The FERU remains stable over time—around 4%—despite decennial shifts of the Beveridge curve. This FERU contrasts sharply with conventional indicators such as the NAIRU or the CBO's NRU, which lack a welfare-theoretic foundation and have systematically overstated the unemployment rate consistent with full employment.

Although the Federal Reserve has a mandate to maintain the US economy at full employment, there is no agreed-upon measure of the FERU, which makes it difficult for them to design policy to achieve full employment, and for observers to assess their performance. One contribution of this chapter is to propose a simple, welfare-based formula for the FERU that can be implemented in real time: $u^* = \sqrt{uv}$.

The historical analysis reveals that the US economy has been inefficiently slack for most of the past century, especially in slumps. The exceptions—wartime mobilizations and the post-pandemic period—reflect large, transitory demand expansions. Such fluctuations in the unemployment gap open the door to stabilization policies: monetary and fiscal policy should systematically respond to these fluctuations to maintain unemployment as close as possible to its efficient level. In the rest of the book we will see how to conduct policy over the business cycle.

The historical analysis also reveals that, despite the legal mandate to maintain full employment, the unemployment rate has often been above the FERU. Of course, the Federal Reserve has a dual mandate: full employment and price stability. One possibility is that what was required to maintain price stability forced the Fed to accept an elevated unemployment rate. We will assess this possibility in chapter 16.

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