

Has the Recession Started?

Pascal Michaillat, Emmanuel Saez

August 2024

To answer this question, we develop a new Sahm-type recession indicator that combines vacancy and unemployment data. The indicator is the minimum of the Sahm indicator—the difference between the 3-month trailing average of the unemployment rate and its minimum over the past 12 months—and a similar indicator constructed with the vacancy rate—the difference between the 3-month trailing average of the vacancy rate and its maximum over the past 12 months. We then propose a two-sided recession rule: When our indicator reaches 0.3pp, a recession may have started; when the indicator reaches 0.8pp, a recession has started for sure. This new rule is triggered earlier than the Sahm rule: on average it detects recession 1.4 months after they have started, while the Sahm rule detects them 2.6 months after their starts. The new rule also has a better historical track record: it perfectly identifies all recessions since 1930, while the Sahm rule breaks down before 1960. With July 2024 data, our indicator is at 0.5pp, so the probability that the US economy is now in recession is 40%. In fact, the recession may have started as early as March 2024.

Michaillat: University of California, Santa Cruz. Saez: University of California, Berkeley.

1. Introduction

Has the US economy entered a recession? To answer the question, this note develops a new Sahm (2019)-type recession indicator that combines vacancy and unemployment data. The indicator is the minimum of the Sahm indicator—the difference between the 3-month trailing average of the unemployment rate and its minimum over the past 12 months—and a similar indicator constructed with the vacancy rate—the difference between the 3-month trailing average of the vacancy rate and its maximum over the past 12 months. It then proposes a new recession rule: a recession may have started when the minimum indicator reaches 0.3pp.

This new indicator is triggered earlier than the Sahm indicator—which only uses unemployment data. It detects recession with a lag of 1.4 months on average, while the Sahm indicator detects them with a lag of 2.6 months. The new indicator also has a better historical track record. It perfectly identifies all recessions since 1930, while the Sahm indicator breaks down before World War 2.

A one-sided recession rule such as the Sahm (2019) rule tells us whether a recession might have started. To know what is the likelihood that a recession has started, we propose a two-sided recession rule. The bottom threshold is the lowest value that generates no false positives over 1960–2023 (this is how the threshold of 0.5pp is determined in the Sahm rule). The top threshold is the highest value that generates no false negatives over 1960–2023. The two-sided rule is as follows. When the minimum indicator is below 0.3pp, the recession has not started. When the minimum indicator is between 0.3pp and 0.8pp, the recession might have started. And when the minimum indicator is above 0.8pp, the recession has started for sure.

Our two-sided recession rule says that the US economy might have entered a recession as early as March 2024. With July 2024 data, the minimum indicator is at 0.5pp, so the probability that the US economy is now in recession is $(0.5 - 0.3)/(0.8 - 0.3) = 40\%$.

2. Construction of the real-time recession indicator

In this section we construct our real-time recession indicator by combining unemployment and vacancy data for the United States, 1960–2023.

2.1. Definition of the indicator

We start from the Sahm (2019) real-time recession indicator. That indicator is computed in two steps. The first step is taking the 3-month trailing average of the unemployment rate. The second step is taking the difference between the average unemployment rate and its minimum over the past 12 months.

Formally, we denote the monthly unemployment rate by $u(t)$. The first step produces the 3-month trailing average:

$$\bar{u}(t) = \frac{u(t) + u(t-1) + u(t-2)}{3}.$$

The second step takes the difference between the trailing average and its 12-month minimum:

$$(1) \quad \hat{u}(t) = \bar{u}(t) - \min_{0 \leq s \leq 11} (\bar{u}(t-s)).$$

The variable $\hat{u}(t)$ is the unemployment indicator. The unemployment indicator is always positive: it is zero when unemployment is decreasing but it turns strictly positive once unemployment start rising.¹

Our indicator is based on the same idea, but it combines vacancy and unemployment data to be able to detect recessions more quickly and more robustly. Indeed, job vacancies start falling quickly at the onset of recessions, when unemployment starts rising (figure 1). Requiring that both rise gives a more accurate and—maybe counterintuitively—more rapid recession signal.

We therefore construct a vacancy indicator by taking the 3-month trailing average of the vacancy rate, and then by taking the difference between the average vacancy rate and its maximum over the past 12 months. Formally, we denote the monthly unemployment rate by $v(t)$. The first step produces the 3-month trailing average:

$$\bar{v}(t) = \frac{v(t) + v(t-1) + v(t-2)}{3}.$$

The second step takes the difference between the trailing average and its 12-month maximum:

$$(2) \quad \hat{v}(t) = \max_{0 \leq s \leq 11} (\bar{v}(t-s)) - \bar{v}(t).$$

The variable $\hat{v}(t)$ is the vacancy indicator. It is always positive: zero when vacancies are increasing but strictly positive once vacancies start falling.

Finally, the minimum indicator that we will use to identify recession starts is the minimum of the two previous indicators:

$$(3) \quad x(t) = \min(\hat{u}(t), \hat{v}(t)).$$

¹For some reason, the Sahm indicator provided by the St. Louis Fed is sometimes negative (Sahm 2024). This is strange given that—by definition—a variable cannot be lower than its minimum over the past 12 months. Our indicators are never negative.

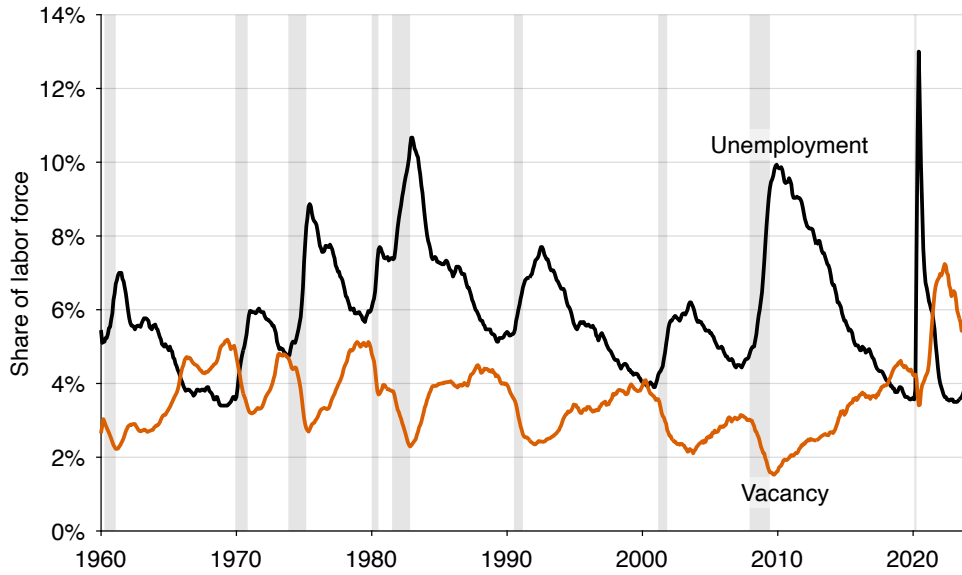


FIGURE 1. Unemployment and vacancy rates in the United States, 1960–2024

Data sources: Unemployment rate: US Bureau of Labor Statistics (2024c). Vacancy rate: Barnichon (2010), US Bureau of Labor Statistics (2024a), US Bureau of Labor Statistics (2024b). The gray areas are recessions dated by the National Bureau of Economic Research (2023). The unemployment and vacancy rates are 3-month trailing averages of monthly series.

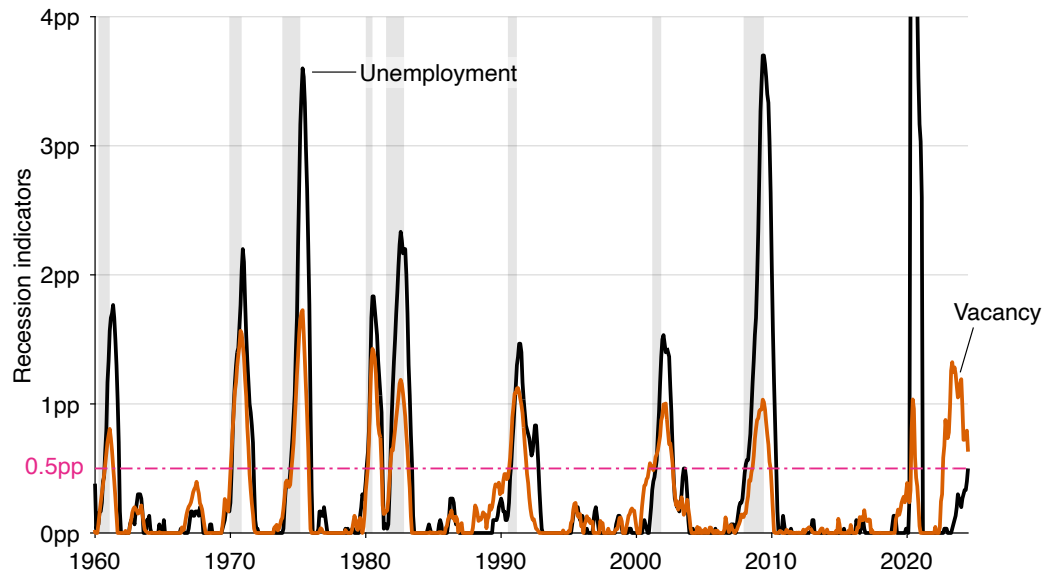
2.2. Construction of the indicator for the United States

Using the unemployment and vacancy data from figure 1, we compute an unemployment indicator using formula (1) (black line in figure 2A). Then we construct the vacancy indicator using (2) (orange line in figure 2A). Figure 2A also plots the threshold that Sahm (2019) proposes to identify recession starts: 0.5pp. The unemployment indicator with a threshold of 0.5pp works perfectly over 1960–2023: it has no false positive (predicted recessions that are not actual recessions) and no false negative (actual recessions that are not predicted as recessions).

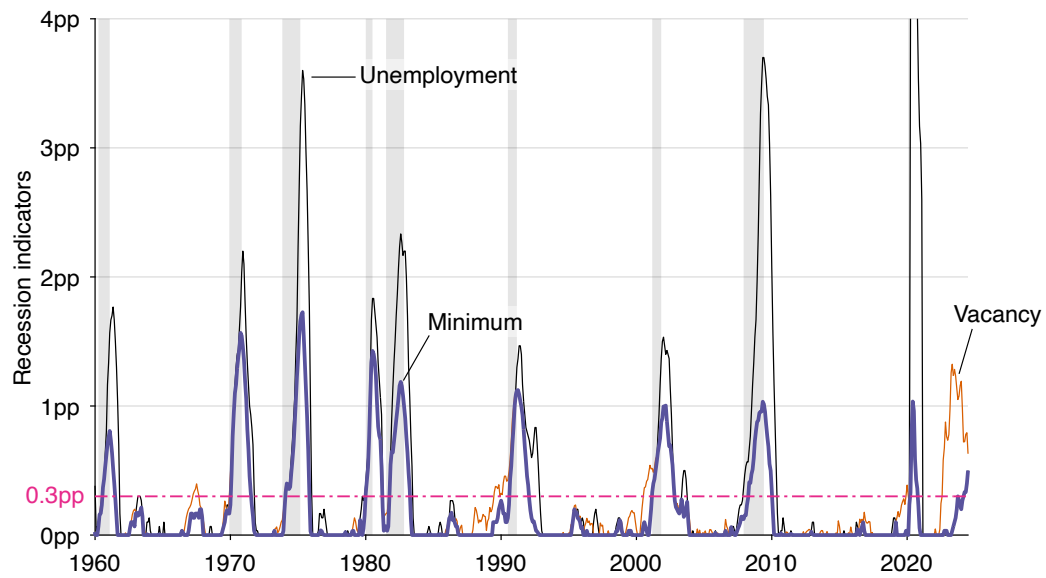
In July 2024, the unemployment indicator has just reached the 0.5pp threshold, so the indicator is on the verge of predicting a recession. That is, the Sahm rule says that the United States might have entered a recession in July 2024.

To know whether a recession has already started, we would need a faster indicator, that predicts recessions earlier. To have a faster recession indicator, we would need to be able to lower the 0.5pp threshold without triggering new false positives. But this is not possible because in June 2003 the unemployment indicator reached 0.5pp but there was no recession (figure 2A).

Looking at figure 2A, the vacancy indicator appears broadly as fast as the unemployment indicator. It would call some recessions slightly earlier (in 1990 and 2001) and some



A. Unemployment and vacancy indicators



B. Minimum indicator

FIGURE 2. Real-time recession indicators in the United States, 1960–2024

Note: The unemployment indicator is computed with (1). The vacancy indicator is computed with (2). The minimum indicator is computed with (3). The unemployment and vacancy rates used to compute the indicators are illustrated in figure 1. The gray areas are NBER-dated recessions. The unemployment indicator was proposed by Sahm (2019).

recessions slightly later (in 2008). In the aftermath of the pandemic, the vacancy indicator started rising in 2022 and peaked in 2023, so it would have delivered a prediction that was so early as to be misleading. This might be due to the extreme outward shift of the Beveridge curve during the pandemic (Michaillat and Saez 2024). This shift led to elevated values of the vacancy rate during that period, and therefore elevated values of the vacancy indicator.

But the main advantage of the vacancy indicator is that it does not present the same uninformative blips as the unemployment indicator. For instance, there is no problematic blip in June 2003 (the vacancy indicator is not 0 but it is much lower than the unemployment indicator). Of course, it presents other uninformative blips. For instance it had a peak in July 1967 while there was no recessions then.

To have a more accurate recession indicator, we therefore construct a new indicator that is the minimum of the unemployment and vacancy indicators. Given that the blips of the unemployment and vacancy indicators do not occur at the same time, taking the minimum of the two indicators will eliminate these blips and allow us to lower the detection threshold below 0.5pp. Of course the minimum of the two indicators will be slower to increase—since it can only increase when both indicators rise. But the reduction in threshold afforded by the higher accuracy will be so large that the minimum indicator will detect recession faster on average.

The minimum indicator, constructed from formula (3), is plotted on figure 2B between 1960–2024. Because the blips from the unemployment and vacancy indicators are eliminated, we can lower the threshold to call recessions to 0.3pp. With such a threshold, our minimum indicator works perfectly over 1960–2023: it has no false positive (predicted recessions that are not actual recessions) and no false negative (actual recessions that are not predicted as recessions). We could not lower the threshold because in 2003 the minimum indicator reached 0.3pp but there was no recession.

3. Predicted recession dates and average prediction delay

The minimum indicator combined with a threshold of 0.3pp has a perfect track record over 1960–2023, just like the unemployment indicator proposed by Sahm (2019).

But the minimum indicator is able to identify recessions faster than the unemployment indicator (table 1). On average, the minimum indicator identifies recession starts with a delay of 1.4 months compared to the actual recession starts determined by the National Bureau of Economic Research (2023). This is more than a month faster than the unemployment indicator, which identifies recession starts with a delay of 2.6 months. The minimum indicator is always faster than the unemployment indicator, except in 2008 when it called the Great Recession 3 months later than the unemployment indicator (in April 2008 instead of January 2008). The slight delay is because job vacancies took some

TABLE 1. Predicted recession start dates in the United States, 1960–2023

NBER start dates		Unemployment indicator > 0.5pp		Minimum indicator > 0.3pp	
Year	Month	Year	Month	Year	Month
1960	4	1960	9	1960	7
1969	12	1970	2	1970	1
1973	11	1974	6	1974	1
1980	1	1980	1	1979	12
1981	7	1981	10	1981	10
1990	7	1990	9	1990	8
2001	3	2001	5	2001	2
2007	12	2008	1	2008	4
2020	2	2020	3	2020	3
Average prediction delay:		2.6 months		1.4 months	

The recession starts are provided by the National Bureau of Economic Research (2023). The unemployment and minimum indicators and the thresholds are displayed in figure 2. The Sahm rule is that unemployment indicator > 0.5pp.

time to drop at the onset of the Great Recession (the delay is visible in figures 1 and 2A).

Of course, it is not surprising that the recession starts obtained with these indicators lag the NBER recession starts, because the NBER recession starts are backdated. They are identified with hindsight, not in real time, which is what our indicators try to do.

4. Current recession probability

As we know, and as we can see on figure 2A, the unemployment indicator just reached 0.5pp in July 2024, implying that a recession might have started.

What does the minimum indicator say? The minimum indicator actually reached 0.3pp in March 2024, indicating that in fact a recession might have started a few months ago (figure 3). It is not surprising that the minimum indicator is able to call the current recession earlier than the unemployment indicator, since the minimum indicator tends to be faster than the unemployment indicator. In July 2024, the minimum indicator has reached 0.5pp, so is well above the threshold of 0.3pp.

In fact, we can add a second threshold to our analysis to be able to compute the probability that the US economy has entered a recession. The current debate about whether the Sahm rule has been triggered or not, and so whether the US economy has entered a recession or not, comes from the fact that the current analysis only uses one single threshold. This threshold is the lowest threshold such that the indicator does not trigger false positives over 1960–2023. This threshold is 0.5pp in the case of the unemployment indicator (Sahm rule), and 0.3pp in the case of the minimum indicator. The threshold cannot be lowered below 0.3pp because the minimum indicator reached 0.28pp in 2003

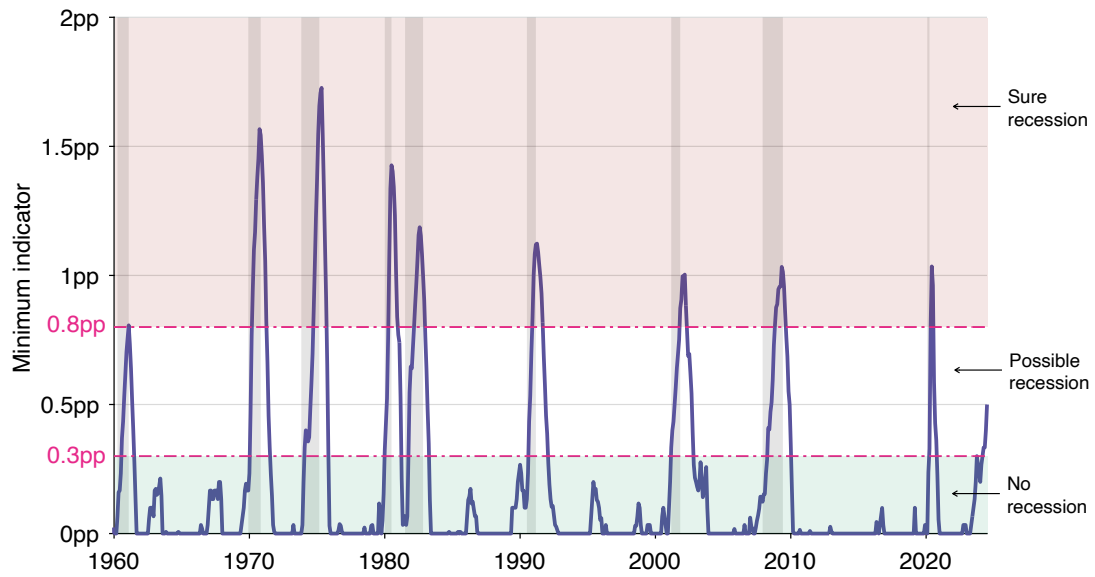


FIGURE 3. Minimum indicator and two-sided recession rule in the United States, 1960–2024

Note: The minimum indicator is computed with (3). The unemployment and vacancy rates used to compute the indicator come from figure 1. The gray areas are NBER-dated recessions. When the indicator is below 0.3pp, a recession has not started. When the indicator is above 0.8pp, a recession has started for sure. When the indicator is in the 0.3pp–0.8pp band, a recession is likely to have started.

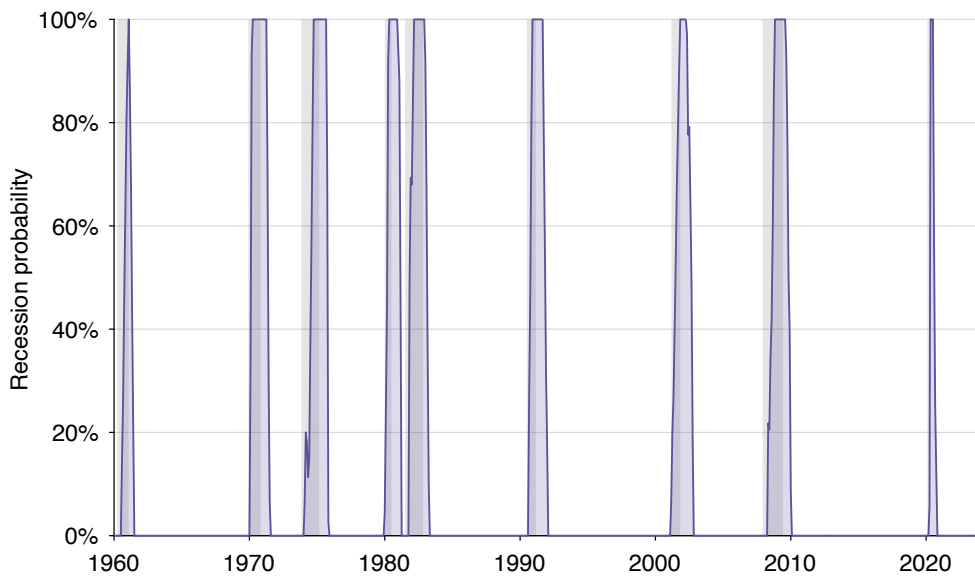


FIGURE 4. Recession probability in the United States, 1960–2024

Note: The recession probability is given by formula (4). The formula uses the minimum indicator and thresholds displayed in figure 3. The gray areas are NBER-dated recessions.

while there was no recession then.

But we can also produce another threshold, which is the highest threshold such that the indicator does not produce false negatives over 1960–2023. In the case of the minimum indicator, this threshold is 0.8pp (figure 3). This threshold, which is the highest value that the indicator can reach before we are bound to acknowledge that the economy is in a recession. This conservative threshold cannot be raised above 0.8pp because the minimum indicator reached 0.81pp in 1960, which was a recession year.

With the two thresholds, 0.3pp and 0.8pp, we have a two-sided rule. When the minimum indicator is below 0.3pp, the rule says that the US economy is not in a recession. When the indicator is above 0.8pp, the rule says that the US economy is in a recession for sure. When the indicator is between 0.3pp and 0.8pp, the two-sided says that a recession might have started.

Furthermore, we can compute the probability that the recession is recession has any point when the indicator is in the 0.3pp–0.8pp band. The probability simply reflects the share of the 0.3pp–0.8pp band that has been covered by the indicator. For instance, in July 2024, the minimum indicator is 0.5pp, so the probability that the US economy is in a recession is $(0.5 - 0.3)/(0.8 - 0.3) = 40\%$ (figure 4). In general, when the minimum indicator has a value of $x(t) \in [0.3, 0.8]$, the probability that the recession has started is

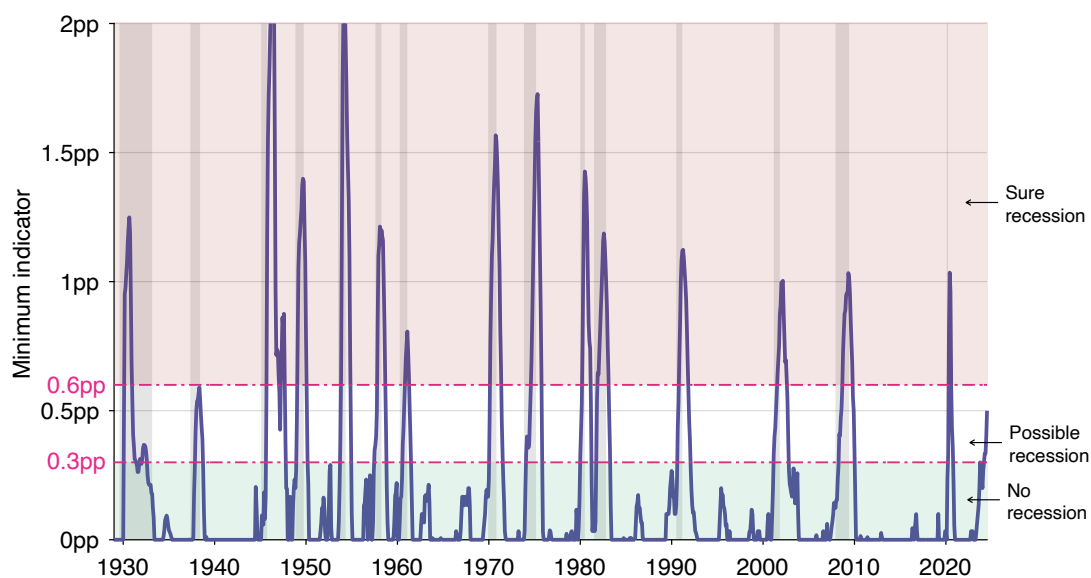
$$(4) \quad p(t) = \frac{x(t) - 0.3}{0.8 - 0.3}.$$

5. Historical track record

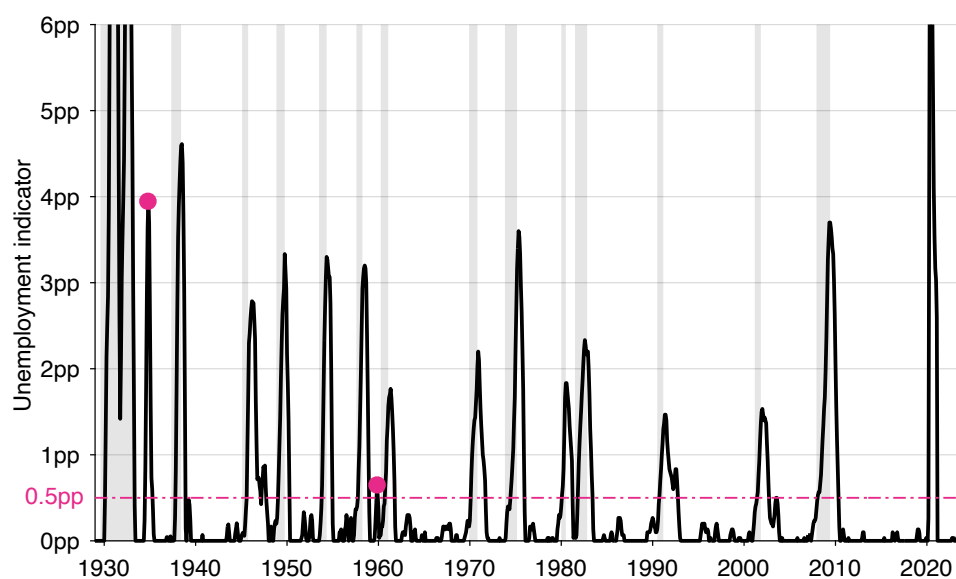
A final advantage of our minimum indicator is to have a perfect historical track record. Using a threshold of 0.3pp to announce the possible start of a recession, the minimum indicator identifies the 15 recessions of the 1930–2024 period without producing any false positive (figure 5). Over the entire 1930–2023 period, on average, the minimum indicator identifies recession starts with a delay of 2.1 months compared to the actual recession starts determined by the National Bureau of Economic Research (2023) (table 2).

Because of the recession starting in 1937, however, it is necessary to lower the top threshold to avoid producing a false negative. The highest possible threshold that does not produce any false negatives over 1929–2023 is 0.6pp (figure 5). Using this lower top threshold, the probability that the US has entered a recession in July 2024 climbs to $(0.5 - 0.3)/(0.6 - 0.3) = 67\%$.

The Sahm (2019) rule is that a recession has started when the unemployment indicator reaches 0.5pp. We saw that the rule works perfectly for 1960–2023 (table 1). But the rule breaks down just before 1960 because in 1959 the unemployment indicator reached 0.6pp but there was no recession (figure 5B). This issue is easily fixed, however, by raising the



A. Minimum indicator and two-sided recession rule



B. Comparison with the Sahm (2019) rule

FIGURE 5. Historical record of the minimum indicator in the United States, 1929–2024

Note: The minimum indicator is computed with (3). The unemployment rate used to compute the indicator come from Petrosky-Nadeau and Zhang (2021) and US Bureau of Labor Statistics (2024c). The vacancy rate used to compute the indicator come from Petrosky-Nadeau and Zhang (2021), Barnichon (2010), and US Bureau of Labor Statistics (2024a,b). The gray areas are NBER-dated recessions. When the minimum indicator is below 0.3pp, a recession has not started. When the minimum indicator is above 0.6pp, a recession has started for sure. When the minimum indicator is in the 0.3pp–0.6pp band, a recession is likely to have started.

TABLE 2. Predicted recession start dates in the United States, 1929–1959

NBER start dates		Minimum indicator > 0.3pp	
Year	Month	Year	Month
1929	8	1930	1
1937	5	1937	11
1945	2	1945	8
1948	11	1948	12
1953	7	1953	9
1957	8	1957	6

The recession starts are provided by the National Bureau of Economic Research (2023). The minimum indicator and the threshold are displayed in figure 5A.

threshold used in the rule to 0.6pp. This would make the rule a little slower at detecting recession starts, but it would allow the rule to continue working until World War 2.

Before World War 2, the unemployment indicator faces a much bigger problem and breaks down (figure 5B). The reason is that in 1934, the unemployment indicator peaked at 4pp but there was no recession. That peak is higher than many later recessionary peaks, and because of it, there are no rules based on the unemployment indicator that can have both no false positives (which would require the threshold to be above 4pp) and no false negatives (which would require the threshold to be below 1.5pp, the peak reached in the 1990 recession). The minimum indicator, on the other hand, continues to work before World War 2. With any threshold between 0.3pp and 0.6pp, the minimum indicator produces no false positive and no false negative between 1929 and 2023 (figure 5A).

References

- Barnichon, Regis. 2010. “Building a Composite Help-Wanted Index.” *Economics Letters* 109 (3): 175–178. <https://doi.org/10.1016/j.econlet.2010.08.029>. Data available at <https://docs.google.com/spreadsheets/d/1fkMinSHkjTL99-bLZYFldQ8rHtgh8lxd>.
- Michaillat, Pascal, and Emmanuel Saez. 2024. “ $u^* = \sqrt{uv}$.” arXiv:2206.13012. <https://doi.org/10.48550/arXiv.2206.13012>.
- National Bureau of Economic Research. 2023. “US Business Cycle Expansions and Contractions.” <https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions>.
- Petrosky-Nadeau, Nicolas, and Lu Zhang. 2021. “Unemployment Crises.” *Journal of Monetary Economics* 117: 335–353. <https://doi.org/10.1016/j.jmoneco.2020.01.009>. Data available at https://docs.google.com/spreadsheets/d/1Ym0zkHZtIvb73zjLzL2cz_P5lXrulzFgvZpA5ZYyElI.
- Sahm, Claudia. 2019. “Direct Stimulus Payments to Individuals.” In *Recession Ready: Fiscal Policies to Stabilize the American Economy*, edited by Heather Boushey, Ryan Nunn, and Jay Shambaugh, chap. 3: Brookings Institution. <https://perma.cc/V55T-TJQ8>.

Sahm, Claudia. 2024. "Real-time Sahm Rule Recession Indicator." FRED, Federal Reserve Bank of St. Louis. <https://fred.stlouisfed.org/series/SAHMREALTIME>.

US Bureau of Labor Statistics. 2024a. "Civilian Labor Force Level." FRED, Federal Reserve Bank of St. Louis. <https://fred.stlouisfed.org/series/CLF160V>.

US Bureau of Labor Statistics. 2024b. "Job Openings: Total Nonfarm." FRED, Federal Reserve Bank of St. Louis. <https://fred.stlouisfed.org/series/JTSJ0L>.

US Bureau of Labor Statistics. 2024c. "Unemployment Rate." FRED, Federal Reserve Bank of St. Louis. <https://fred.stlouisfed.org/series/UNRATE>.