A Theory of Slack

How Economic Slack Shapes Markets, Business Cycles, and Policies

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CHAPTER 19.

Recession detection

So far in this book, we have used vacancy and unemployment data to compute the tightness and unemployment gaps, which are central determinants of optimal stabilization policies. These optimal policies respond to the unemployment gap to try to keep the economy as close as possible to full employment.

However, recessions often lead to rapid changes in slack, and require rapid and sizable policy adjustments. It would therefore be useful to policymakers if recessions could be detected as early as possible. It turns out, as we explain in this chapter, that unemployment and vacancy data are a powerful tool to nowcast recessions. In that way, the vacancy-unemployment combination has not only normative power but some predictive power too: it can signal early that the economy is about to slump.

In this chapter we develop a threshold rule to detect recessions. The rule is inspired by the Michez rule proposed by Michaillat and Saez (2025), in that it relies on a recession indicator that is the minimum of an unemployment indicator and a vacancy indicator. However, the rule proposed here improves the Michez rule by choosing optimized ways to smooth the data and detect turning points. For convenience, this new rule is referred to as the Michez+ rule.

The Michez+ rule leverages two insights from chapter 13. First, recessions are mostly driven by drops in aggregate demand, which trigger drops in labor demand. Second, such shocks produce negative comovements between unemployment rate and vacancy rate as the economy moves along the Beveridge curve. Therefore, a typical recession features both a drop in vacancy rate and a rise in unemployment rate. By combining data on

unemployment and job vacancies—two noisy but independent measures of aggregate demand—we obtain a clearer signal of latent aggregate demand than recession rules relying only on the unemployment rate, such as the Sahm rule.

19.1. Labor market data and their availability

To detect recessions in real time, the Michez+ rule relies on monthly data. Fortunately, the unemployment and vacancy data presented in chapter 2 are available at monthly frequency. Accordingly, we use these monthly data both for assessing the historical performance of the Michez+ rule and for detecting recessions in real time.

Moving forward, the unemployment and vacancy data required to apply the Michez+ rule in any given month are released in the first week of the following month, usually on a Tuesday for the JOLTS data and on a Friday for the CPS data (BLS 2024b).[1] So the rule can be applied in real time.

We should be conscious of the fact that the value of the recession indicator constructed in real time might not be its final value because the unemployment and vacancy data are revised after their initial release. The number of job openings released by the BLS (2025a) is preliminary and updated one month after its initial release, to incorporate additional survey responses received from businesses and government agencies and from the recalculation of seasonal factors (BLS 2024a). Additionally, the BLS revises the prior five years of CPS and JOLTS data each year at the beginning of January, to account for revisions to seasonal factors, population estimates, and employment estimates (BLS 2024a, 2025b). Yet, in practice, revisions to labor market data are generally minimal, especially compared to GDP revisions, so the information provided in real time is almost indistinguishable from the information provided in the final version (Crump, Giannone, and Lucca 2020).

19.2. Construction of the Michez+ rule

We start by constructing the recession indicator used by the Michez+ rule. We begin by combining unemployment and vacancy data into a single recession indicator. We then select a threshold that allows the rule to detect recessions in a timely manner and with accuracy.

19.2.1. Unemployment and vacancy indicators

First, we smooth the monthly unemployment and vacancy series to reduce their noisiness. To smooth them, we use an exponentially weighted moving average, which is defined

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[1]Recall that we shift forward by one month the number of job openings reported in the JOLTS. Hence we have access to the vacancy and unemployment rates required to apply the Michez+ rule in the same week, as soon as the month is over.

recursively by:

(19.1) $$\bar{u}(t) = 0.4 \times u(t) + 0.6 \times \bar{u}(t-1)$$

(19.2) $$\bar{v}(t) = 0.4 \times v(t) + 0.6 \times \bar{v}(t-1),$$

where $u(t)$ and $v(t)$ are the raw monthly series, $\bar{u}(t)$ and $\bar{v}(t)$ are the smoothed series, and the initial conditions simply are $\bar{u}(0) = u(0)$ and $\bar{v}(0) = v(0)$. The amount of smoothing is governed by the scalar 0.4. (A value closer to 1 means less smoothing; a value closer to 0 means more smoothing.) The smooth series are displayed in figure 19.1A.

To detect turning points in the unemployment rate, we first take the 9-month minimum of the unemployment rate:

$$u^{\min}(t) = \min_{0 \leq k \leq 9} \bar{u}(t-k).$$

Then, the increase in unemployment rate from the turning point is computed as

(19.3) $$\hat{u}(t) = \bar{u}(t) - u^{\min}(t).$$

We proceed analogously to determine turning points in the vacancy rate. We first take the 9-month maximum of the vacancy rate:

$$v^{\max}(t) = \max_{0 \leq k \leq 9} \bar{v}(t-k).$$

Then, the decrease in vacancy rate from the turning point is computed as

(19.4) $$\hat{v}(t) = v^{\max}(t) - \bar{v}(t).$$

The unemployment and vacancy indicators $\hat{u}(t)$ and $\hat{v}(t)$ are displayed in figure 19.1B. The amount of smoothing and construction of the turning points differs from the approach followed in the Sahm and Michez rules: there the data are smoothed with a 3-month moving average and turning points are computed based on a 12-month window (Sahm 2019; Michaillat and Saez 2025). This departure might seem arbitrary, but processing the data in that specific way leads to one of the best possible recession detection rules (Michaillat 2025). We will verify the performance of the rule in the rest of the chapter.

19.2.2. Minimum indicator

The final step is to combine the unemployment and vacancy indicators that we have just constructed. To obtain a less noisy signal of recessions than either indicator, we take the minimum of these two indicators. Formally, the minimum indicator is constructed as
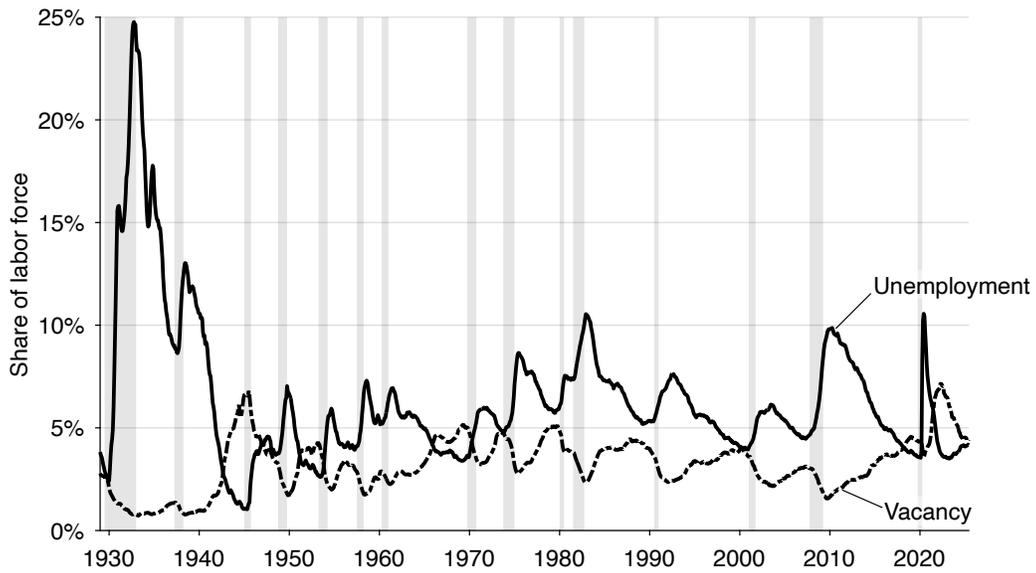
A. Smooth unemployment and vacancy rates
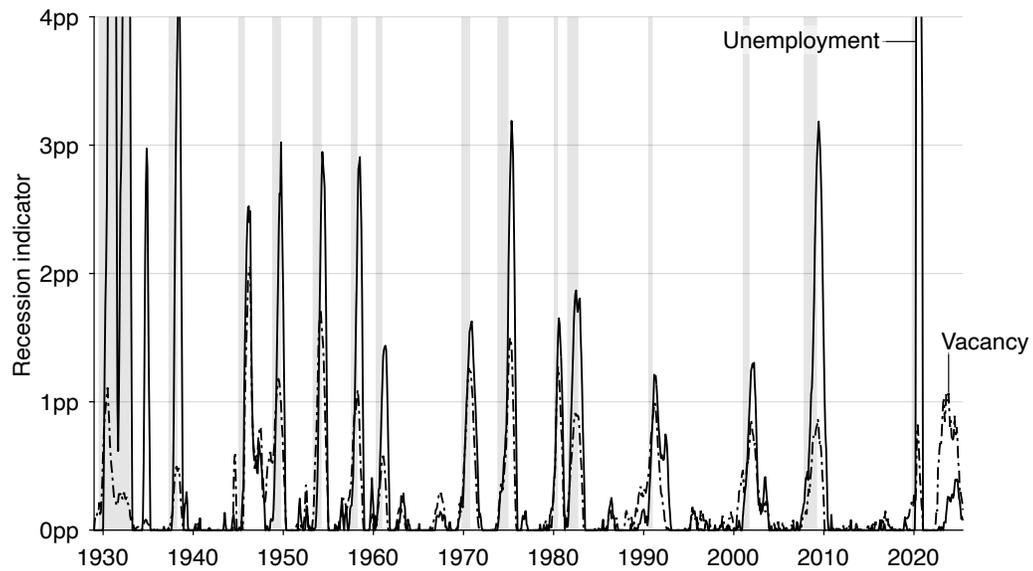
B. Unemployment and vacancy indicators

FIGURE 19.1. Construction of the Michez+ recession indicator in the United States, 1929–2024

The monthly unemployment rate comes from figure 2.1 while the monthly vacancy rate comes from figure 2.5. The unemployment rate is smoothed according to (19.1) and the vacancy rate is smoothed according to (19.2). The unemployment indicator is constructed from (19.3) and the vacancy indicator is constructed from (19.4).

follows:

$$m(t) = \min(\hat{u}(t), \hat{v}(t)). \tag{19.5}$$

The minimum indicator $m(t)$ is plotted in figure 19.2A. The indicator is zero when either the unemployment rate is trending down or the vacancy rate is trending up. It is positive when both the unemployment rate rises and vacancy rate declines.

Figure 19.1B shows the advantage of taking the minimum of the vacancy and unemployment indicators. Each indicator mostly spikes during recessions, but they also have some uninformative blips. Given that the blips of the unemployment and vacancy indicators do not occur at the same time, taking the minimum of the two indicators smooths out the blips and gives us a less noisy, more accurate recession indicator.

Let us look at a few examples. A striking situation occurred in 1934: the unemployment indicator peaked at 2.97pp, although no recession occurred then. The vacancy indicator is not subject to that blip: it remained close to zero. By construction, the minimum indicator is not subject to the blip either. This situation occurred again in 1959. The unemployment indicator reached 0.41pp, but there was no recession. Thankfully the vacancy indicator remained much lower during that episode, so the minimum indicator was only subject to a minor blip in 1959.

Sometimes, the situation is reversed: the vacancy indicator is subject to an uninformative blip that does not appear in the unemployment indicator. For instance, the vacancy indicator spiked at 0.59pp in 1944 while no recession happened then. Because the unemployment indicator did not rise much at the time, the minimum indicator did not rise much either. In 1967, the vacancy indicator spiked again while no recession was officially identified then—but the unemployment indicator remained low, keeping the minimum indicator low too.

### 19.2.3. Threshold and detection methodology

To complete the construction of the Michez+ rule, we must specify a recession threshold. The threshold is set to 0.19 pp. This threshold produces a detection rule that makes no mistake over the entire 1929–2021 period, and leads to early and accurate detection of recessions (Michaillat 2025).

Figure 19.2A illustrates why the threshold value works well. A lower threshold would create false positives, for instance in 1952. A higher threshold would just increase the detection delay. Hence, 0.19pp represents the optimal threshold for this indicator.

The Michez+ rule defines recessions as episodes when the indicator crosses the threshold from below, provided the economy was in expansion immediately beforehand. The economy remains in recession until it returns to expansion, which occurs once the indi-
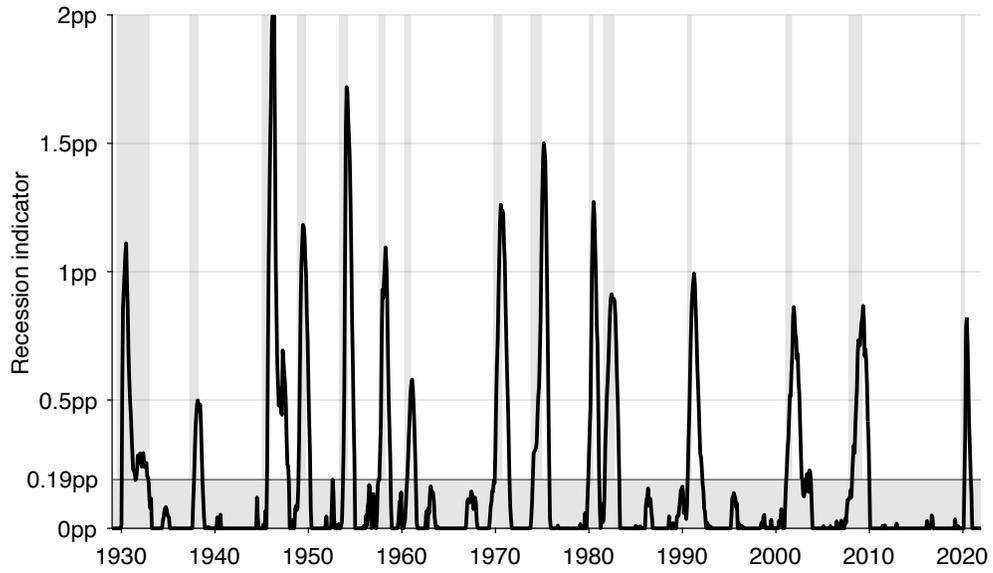
A. Recession indicator and threshold
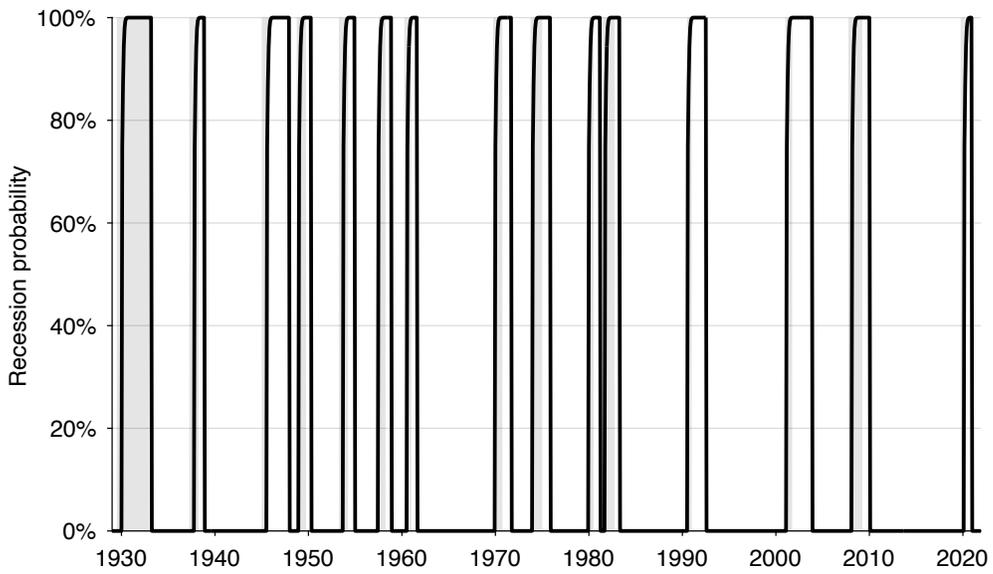
B. Recession probability

FIGURE 19.2. Michez+ recession rule in the United States, 1929–2021

The recession indicator is constructed from (19.5): it is the minimum of the unemployment and vacancy indicators displayed in figure 19.1B. The recession probability is computed from (19.6).

cator falls back to 0. If the indicator crosses the threshold several times after the initial crossing but before the return to expansion, only the first crossing is recorded as the recession's start.

A simpler alternative would be to label recessions as all periods when the indicator exceeds the 0.19 pp threshold—an approach used by the Sahm and Michez rules. This approach, however, misclassifies temporary rebounds at the end of recessions. As downturns fade, the unemployment rate rises more slowly and vacancies stop falling, causing the indicator to decline toward the threshold. During this adjustment, it may briefly dip below and then climb above the threshold before finally settling below it again. Such blips occurred after the Great Depression, after World War 2, and after the dot-com downturn (figure 19.2A). These transient fluctuations do not signal new recessions. To address such misclassifications, the Michez+ rule requires that the economy is in expansion before entering a new recession, and that a return to expansion is confirmed only once the indicator falls to 0. This slightly more complex procedure yields a markedly less noisy and more reliable recession rule.

19.3.   Historical evaluation of the Michez+ rule (1929–2021)

We now evaluate the performance of the Michez+ rule between 1929 and 2021. We stop the evaluation at the end of 2021 because it is too early to say if and when a recession started after that. We focus on false positives and negatives as well as the timeliness of detection.

19.3.1.   No false positives or negatives

The Michez+ rule has a perfect track record between January 1929 and December 2021 (figure 19.2A). First, the Michez+ rule does not produce false negatives: it does not fail to detect existing recessions. Indeed, the rule detects the 15 recessions that occurred between 1929 and 2021. This is because the recession indicator peaks well above the threshold of 0.19pp during each of the recessions.

Second, the Michez+ rule does not produce false positives: it does not detect nonexistent recessions. This is because the recession indicator always remains below the 0.19pp threshold outside of recessionary periods.

In sum, the Michez+ rule identifies all the recessions that occurred between 1929 and 2021, without any false alarms. This is of course due to how the recession rule is constructed: the threshold is chosen to be high enough to avoid false positives but low enough to avoid false negatives.

19.3.2. Timeliness of detection

The Michez+ rule detects the 15 recessions that occurred between 1929 and 2021 without any false alarms. This is a good first step, but it is not sufficient to be sure that we have a good rule to detect recessions—there are many, many recession rules that detect exactly 15 recessions over the period (Michaillat 2025).

However, the Michez+ rule also detects recessions systematically early and accurately. In fact, we picked the rule from the high-precision segment of the anticipation-precision frontier created in Michaillat (2025), so it is one of the most precise recession rules among all fast rules.

The dates at which the Michez+ rule detects US recessions are reported in table 19.1, together with the mean, standard deviation, minimum, and maximum of detection errors. How is the performance of the rule assessed? For each recession $j = 1, 2, \ldots, 15$, we compute the detection error, which is the difference between the date when the recession officially started, $s(j)$, and the date when the rule first detected the recession, $d(j)$: $e(j) = d(j) - s(j)$. This is doable because the rule detects the correct number of recessions, so there are as many start dates as detection dates. If $e(j) > 0$, recession j is detected with some delay. If instead $e(j) < 0$, the recession is detected with some anticipation.

We then compute two performance measures over the training period. The first measure is the mean of the detection errors, given by

$$\mu = \frac{\sum_{j=1}^{15} e(j)}{15}.$$

The second measure is the standard deviation of the detection errors, given by

$$\sigma = \sqrt{\frac{\sum_{j=1}^{15} \left[e(j) - \mu \right]^2}{15}}.$$

We observe that the Michez+ rule always detects recession starts within 5 months of their actual occurrence. It takes 5 months to detect the first three recessions in the sample (1929, 1937, 1945). But after that, the rule performs better, and never takes that long to detect a recession. The next longest delay is 3 months, for the 1960 recession. After that the longest detection delay is only 2 months, for the 1981 and 2008 recessions.

The Michez+ rule generally detects recessions with some delay: the average detection delay over the entire period is 1.5 months—so about 6 weeks. The detection delay is cut in half over the 1960–2021 period: the average detection delay then is 0.7 months—about 3 weeks. It is not surprising that the Michez+ rule often detects recessions after their official start dates because the official dates are identified retrospectively (NBER 2021). Unlike what the Michez+ rule aims to do, the NBER identifies recessions with hindsight, not in

real time.

However, a few recessions are detected 1 or 2 months before they have officially started. For instance, the 1957 recession was detected in July, although the NBER determined that it started in September. The 1980 and 2001 recessions are also detected 1 month before their official starts.

Furthermore, the Michez+ rule is able to detect recessions significantly before the official dates are announced by the NBER (2021). For instance, the NBER waited until December 2008 to announce that the previous business cycle peak had occurred in December 2007, and therefore that the Great Recession had started in January 2008. By contrast, the Michez+ rule detects the Great Recession in March 2008, so 9 months before the official NBER announcement. On average, between 1979 and 2021, the NBER announces recession starts 7.3 months after a recession's onset. Over the same period, the Michez+ rule detects recession starts with a delay of 0.3 months only. So on average the Michez+ rule detects recessions 7 months faster than the NBER.

We have just seen that the maximum detection delays occurred with the first 3 recessions in the sample, which were the hardest to detect for the Michez+ rule. It appears more generally that the rule does better in the recent part of the sample (1960–2021) than the old part (1929–1959). The mean detection delay is 2.7 months over 1929–1959 but only 0.7 months over 1960–2021. The standard deviation of the detection error is 2.7 months over 1929–1959 and only 2.2 months over 1960–2021. So the rule is able to detect recessions earlier and more precisely in the last two-thirds of the sample. A possible explanation is that the unemployment and vacancy data are noisier in the first third of the sample. This noisiness might be explained by the facts that the unemployment data come from a patchwork of sources before 1948 (when the BLS started collecting data via the CPS), and that the vacancy data were collected by private entities (MetLife and Conference Board) and not by the BLS until 2000.

19.3.3. Recession probability

We can also use the structure of detection errors to compute a recession probability from the Michez+ rule. If for instance the rule is on average exactly on time, the recession has started with 50% probability when the rule is triggered—assuming a symmetric detection error. If the rule is early on average, the probability is less than 50%. If the rule is late on average, the probability is more than 50%, and so on. In the months following detection, the probability converges to 1 along the detection error's cumulative distribution function.

More formally, each detection generates a detection date d and detection error e. Then, it is easy to compute the probability that a new recession's start time, s, truly occurred

before time t_1, given that the rule detected a recession at time $d = t_0 \leq t_1$:

$$P(t_1) = \mathbb{P}(s < t_1 \mid d = t_0, \mu, \sigma) = \mathbb{P}(d - s > t_0 - t_1 \mid \mu, \sigma) = \mathbb{P}(e > t_0 - t_1 \mid \mu, \sigma).$$

For convenience, we assume that the detection error is normally distributed with mean μ and standard deviation σ. We therefore get

$$P(t_1) = \mathbb{P}\left(\frac{e - \mu}{\sigma} > \frac{t_0 - t_1 - \mu}{\sigma}\right) = 1 - \Phi\left(\frac{t_0 - t_1 - \mu}{\sigma}\right),$$

where Φ is the cumulative distribution function of the standard normal distribution. Hence, the probability that a recession has started at time t if a recession is detected at d:

$$(19.6) \qquad\qquad P(t) = \Phi\left(\frac{t + \mu - d}{\sigma}\right),$$

as long as the economy remains in a recession state. When the rule signals that the economy is in expansion, we set the probability to $P(t) = 0$. The probability $P(t)$ is only positive when the rule signals that the economy is in recession. The value d used in the probability is then the most recent recession detection date.

Figure 19.2B shows the recession probability given by the Michez+ rule on the period 1929–2021, on which the rule was selected. In each of the 15 recessions, the recession probability rapidly rises at the onset of the recession and quickly reaches 1. The probability then starts declining right after or somewhat after the recession has ended.

19.4.   Application of the Michez+ rule to the current situation (2022–2024)

Finally, we apply the Michez+ rule to contemporary data to assess the current risk of recession in the United States. Has the US economy entered a recession between January 2022 and December 2024?

The recession indicator crossed the 0.19pp threshold in October 2023, so the Michez+ rule detected a recession at that time (figure 19.3A). After crossing the threshold, the recession indicator continued climbing. In October 2024, the indicator attained 0.40pp. The indicator then fell somewhat, as the labor market stabilized at the end of 2024.

Finally, we apply formula (19.6) to current data to assess recession risk in real time (figure 19.3B). The recession probability turned positive in October 2023, when the recession was detected, and kept rising after that. Given that the standard deviation of detection errors is only 2.2 months, the probability that the detection error is more than 5 months is tiny (and indeed in the 15 past recessions the Michez+ rule has never been more than 5 months late). Accordingly, the recession probability reaches almost 1 (99.8%) in March 2024 and remained there afterwards.

TABLE 19.1. Detection of US recession starts by the Michez+ rule, 1929–2021

| Official start date | | Detection date | | | | | |
| | | Michez+ | | Michez | | Sahm | |
Year	Month	Year	Month	Year	Month	Year	Month
1929	September	1930	February	1930	February		
1937	June	1937	November	1937	December		
1945	March	1945	August	1945	September		
1948	December	1949	January	1949	January		
1953	August	1953	October	1953	October		
1957	September	1957	July	1957	July		
1960	May	1960	August	1960	August	1960	October
1970	January	1970	January	1970	February	1970	March
1973	December	1974	January	1974	February	1974	July
1980	February	1980	January	1980	January	1980	February
1981	August	1981	October	1981	October	1981	November
1990	August	1990	August	1990	September	1990	October
2001	April	2001	March	2001	March	2001	July
2008	January	2008	March	2008	April	2008	February
2020	March	2020	March	2020	April	2020	April

Detection error for 1929–2021			
Mean:	1.5 months	1.9 months	
Minimum:	−2 months	−2 months	
Maximum:	5 months	6 months	
Standard deviation:	2.2 months	2.3 months	

Detection error for 1960–2021			
Mean:	0.7 months	1.2 months	2.7 months
Minimum:	−1 month	−1 month	0 months
Maximum:	3 months	3 months	7 months
Standard deviation:	1.3 months	1.4 months	2.1 months

Notes: Official recession start dates are provided by the NBER (2023). The Michez+ rule signals a recession when the indicator displayed in figure 19.2A crosses the threshold of 0.19pp. The detection dates for the Michez and Sahm rules are provided by Michaillat and Saez (2025, tables 1 and 2).

The Michez+ rule's detection of a recession starting in October 2023 has not yet been confirmed by the NBER. As of late 2025, available GDP figures and equity markets remain strong, perhaps buoyed by developments in artificial intelligence. However, the labor market indicators that form the basis of the rule tell a different story. The rule's historical track record suggests that labor market deterioration of this magnitude and persistence has always coincided with recessions. Whether the NBER will eventually backdate a recession to late 2023 or 2024, or whether this represents the rule's first false positive in its 95-year history, remains to be determined.

19.5.   Comparison with the Sahm and Michez rules

To conclude this chapter, we briefly compare the performance of the Michez+ rule to that of the Michez rule, on which it is based, and that of the Sahm rule, which is the most famous slack-based recession detection rule.

19.5.1.   Comparison with the Michez rule over 1929–2021

The Michez+ and Michez rules both perfectly detect the 15 recessions that occurred between 1929 and 2021 (table 19.1). However, the Michez+ rule detects these recessions slightly faster than the Michez rule. On average, the Michez+ rule detects recessions 1.5 months after their official start dates, whereas the Michez rule takes on average 1.9 months to detect recessions. Furthermore, the Michez+ rule detects all 15 recessions within 5 months of their official starts, while the Michez rule sometimes takes 6 months to detect them. The Michez+ rule also outperforms the Michez rule on the recent part of the data (1960–2021): on the more recent segment, the mean detection error is 1.2 months for the Michez rule but only 0.7 months for the Michez+ rule.

In fact, the Michez+ rule detects each and every recession as fast or faster than the Michez rule. For 8 recessions, the detection occurs in the same month; but for 7 recessions (1937, 1945, 1970, 1974, 1990, 2008, 2020), the Michez+ rule detects the recession start 1 month earlier than the Michez rule.

In addition to being a bit faster than the Michez rule, the new Michez+ rule is a bit more precise: the standard deviation of detection errors is 2.3 months for the Michez rule but only 2.2 months for the Michez+ rule.

It is not surprising that the Michez+ rule does better than the Michez rule, since it was constructed to reduce the mean and standard deviation of the detection error as much as possible. Compared to the Michez rule, the smoothing method and selection of turning points have been optimized.
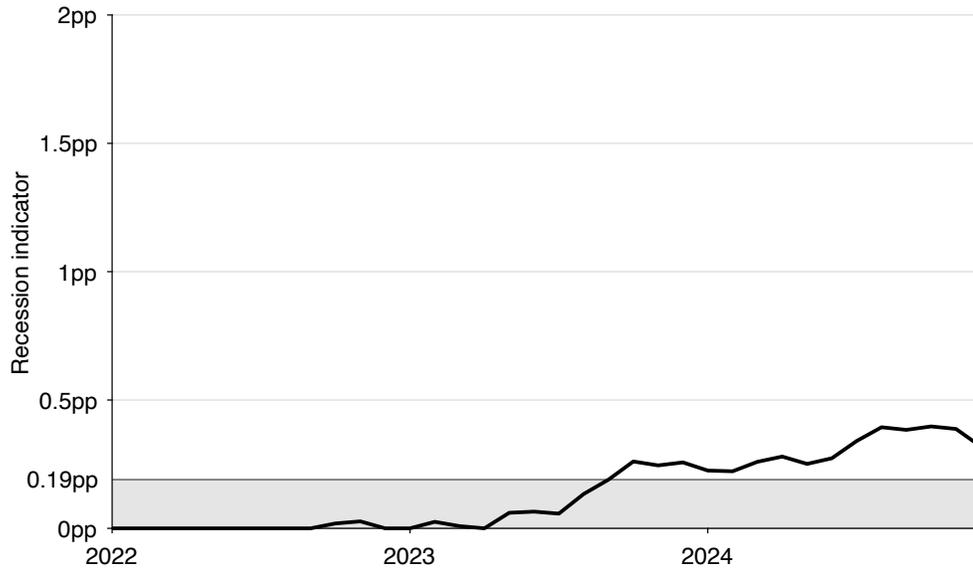
A. Recession indicator and threshold
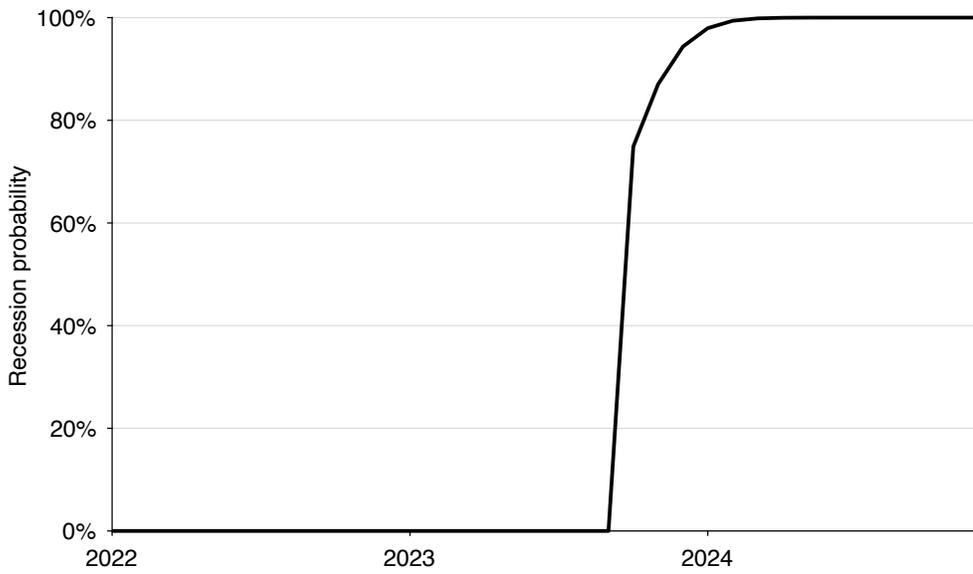
B. Recession probability

FIGURE 19.3. Michez+ recession rule in the United States, 2022–2024

The recession indicator is constructed from (19.5): it is the minimum of the unemployment and vacancy indicators displayed in figure 19.1B. The recession probability is computed from (19.6).

19.5.2. Comparison with the Sahm rule over 1960–2021

The Sahm rule only works between 1960 and 2021—it produces false positives before that (Michaillat and Saez 2025). Hence, we focus on that period for the comparison with the Michez+ rule.

The Michez+ rule detects recessions markedly faster than the Sahm rule (table 19.1). On average, the Michez+ rule detects recessions 0.7 months after their official start dates, whereas the Sahm rule takes on average 2 additional months, so a total of 2.7 months, to detect recessions. Furthermore, the Michez+ rule detects all 9 recessions within 3 months of their official starts, while the Sahm rule sometimes takes 7 months to detect them.

In fact, the Michez+ rule detects each recession at least 1 month faster than the Sahm rule, with the exception of the Great Recession, which it detects 1 month more slowly. In 2008, the Michez+ rule detected the recession in March, whereas the Sahm rule was able to detect it in February. The slight delay is because job vacancies took some time to drop at the onset of the Great Recession (figure 19.1).

In addition to being faster than the Sahm rule, the Michez+ rule is much more precise: the standard deviation of detection errors is 1.3 months for the Michez+ rule while it is 2.1 months for the Sahm rule.

It is not surprising that the Michez+ rule does better than the Sahm rule. The unemployment rate—which the Sahm rule uses—is only a noisy measure of the latent state of the economy. We know that recessions feature not only an increase in the unemployment rate but also a decline in the vacancy rate as the economy moves along the Beveridge curve. These joint movements are clearly visible on figure 19.1. Therefore, by combining data on unemployment and job vacancies, we obtain a recession indicator that is less noisy than unemployment-only indicators, such as the Sahm indicator. Thanks to the reduced noisiness, the detection threshold can be lowered once both unemployment and vacancy data are used, and recessions can be detected earlier and more precisely.

19.6. Summary

In this chapter, we develop and evaluate the Michez+ rule, a new tool for real-time recession detection based on unemployment and vacancy data. Building on the insights of previous chapters, the Michez+ rule exploits the negative comovement between unemployment and vacancies along the Beveridge curve—a defining feature of recessions driven by aggregate demand shocks. By combining both indicators into a single minimum-based measure, the Michez+ rule extracts a cleaner and timelier signal of economic downturns than rules relying on either variable alone. Its construction involves optimized smoothing and turning-point detection procedures, designed to detect recessions as early and accurately as possible.

Between 1929 and 2021, the Michez+ rule performs exceptionally well. It identifies all 15 recessions recognized by the NBER without any false positives and with an average delay of only 1.5 months—reduced to 0.7 months since 1960. Compared with the Sahm and Michez rules, the Michez+ rule is both faster and more precise, consistently detecting recessions earlier and with lower variance in detection errors.

The NBER Business Cycle Dating Committee has existed since 1979. During the Committee's existence, it has taken on average 7.3 months to announce recession starts. By contrast, over the 1979–2021 period, the Michez+ rule only takes 0.3 months to identify recessions after they have started. Hence, the rule detects recessions roughly 7 months earlier than the NBER's official announcements. The Michez+ rule therefore offers policymakers and analysts a practical, transparent, and near real-time instrument to identify recessions and adjust stabilization policies accordingly.

Applied to current data, the Michez+ rule indicates that the US economy entered a recession in late 2023, with a recession probability approaching 100% by early 2024. Regardless of the eventual NBER call, the labor market has been deteriorating at a recession-like pace since late 2023—which is what the rule is detecting.

Bibliography

BLS. 2024a. "JOLTS Frequently Asked Questions." `https://perma.cc/22QW-ASAL`.

BLS. 2024b. "Release Calendar." `https://perma.cc/ZC78-SDPN`.

BLS. 2025a. "Job Openings: Total Nonfarm." FRED, Federal Reserve Bank of St. Louis. `https://fred.stlouisfed.org/series/JTSJOL`.

BLS. 2025b. "Technical Documentation (CPS)." `https://perma.cc/DZ9K-AJP8`.

Crump, Richard, Domenico Giannone, and David Lucca. 2020. "Reading the Tea Leaves of the US Business Cycle – Part One." Liberty Street Economics, Federal Reserve Bank of New York. `https://perma.cc/W79A-EFPF`.

Michaillat, Pascal. 2025. "Early and Accurate Recession Detection Using Classifiers on the Anticipation-Precision Frontier." arXiv:2506.09664. `https://doi.org/10.48550/arXiv.2506.09664`.

Michaillat, Pascal and Emmanuel Saez. 2025. "Has the Recession Started?" *Oxford Bulletin of Economics and Statistics* 87 (6): 1047–1058. `https://doi.org/10.1111/obes.12685`.

NBER. 2021. "Business Cycle Dating Committee Announcements." `https://perma.cc/JL65-XDWH`.

NBER. 2023. "US Business Cycle Expansions and Contractions." `https://perma.cc/B4LH-BVT8`.

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. Washington: Brookings Institution. `https://www.brookings.edu/articles/direct-stimulus-payments-to-individuals/`.