

# Estimating Recession Dates in Louisiana

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## Recessions Indicate Economic Under-performance

The repeating cycle of expansion, peak, recession, and trough is an inherent characteristic of our economy. In the short-term, economic activity as measured by the Gross Domestic Product (GDP)<sup>1</sup>, oscillates above and below what we consider our long-term or “potential” GDP growth path<sup>2</sup>. Policymakers are keenly interested in the timing, duration, and magnitude of these swings, known as the “business cycle”.

As an illustration, consider the visualization on the following page of U.S. real Gross Domestic Product, relative to potential GDP. The time frame illustrated covers 1979 to 2006, and illustrates four recessions, among five periods of expansion. The illustration shows how the relationship between real and potential GDP changes at different points of the business cycle.

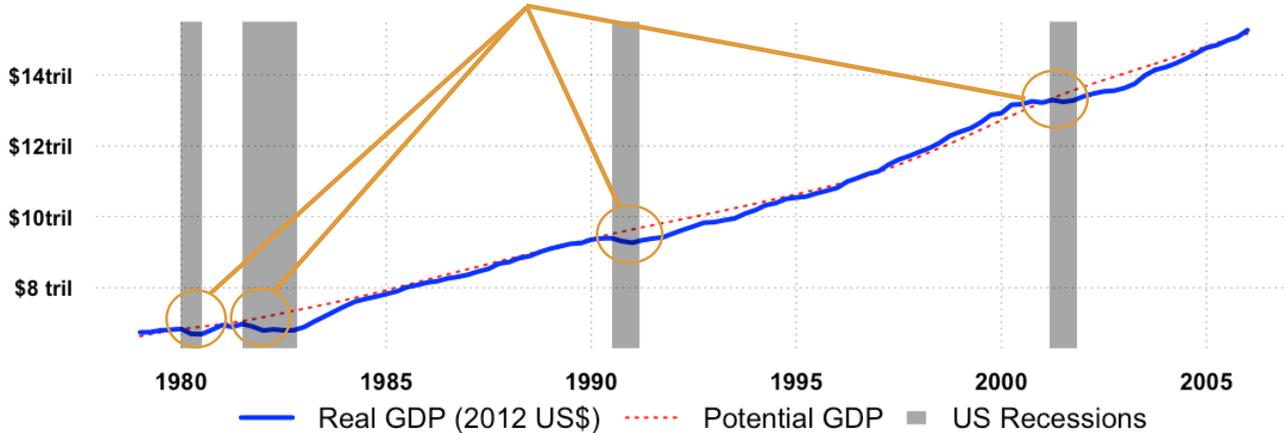
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<sup>1</sup> The most commonly-used indicator of economic health, GDP is a comprehensive measure of the economy which estimates the aggregate value of goods and services produced within the U.S. or any given state. Definition retrieved 10 February 2020 from <https://www.bea.gov/data/gdp/gdp-state> and <https://www.bea.gov/data/gdp/gross-domestic-product>.

<sup>2</sup> The Congressional Budget Office (CBO) constructs the official measure of potential GDP. It is defined as the CBO’s estimate of the “maximum sustainable output of the economy”, and is adjusted to remove the effects of inflation.

Definition retrieved 10 February 2020 from <https://www.cbo.gov/about/products/budget-economic-data#6>.

## Real GDP Shortfalls Coincide with Recessions



Note the following:

- Just prior to recessions, real GDP tends to grow faster than potential, and tends to be at or above potential
- At recession onset, real GDP growth rapidly decelerates relative to potential
- Real GDP eventually ends up well below potential
- Following a trough, real GDP tends to eventually close the gap to potential

## A Formal Definition of a Recession is Elusive; An Authoritative Body Determines If/When They Occur

No formal, universal definition of a recession exists. In the financial and economic press, *two consecutive quarters of declining real GDP* is routinely used as a rule-of-thumb recession threshold. In a macroeconomics textbook, one might see a definition that is closer to *a short-run episode where quarterly growth is slower than the long-term trend, with GDP below its potential*.

As there is no single definition, the National Bureau of Economic Research (NBER) Business Cycle Dating Committee, comprised of several top economists

over the decades, has been considered an authoritative arbiter of start and end dates for national recessions. These dates indicate particular months as peaks or troughs in economic activity, and are produced by a process that includes a great deal of professional judgment by these highly-experienced analysts<sup>3</sup>.

Unfortunately, their formal methodology is not made publicly available, and it is unlikely that there is any single approach consistently taken. In fact, NBER's stated definition of a recession is left open to significant interpretation: "*a significant decline in economic activity spreads across the economy and can last from a few months to more than a year.*" Further, the "*Committee does not have a fixed definition of economic activity. It examines and compares the behavior of various measures of broad activity...<sup>4</sup>*".

NBER's terms do not commit to thresholds along these important dimensions:

- No specific magnitude qualifying as "significant decline"
- No obligation to consistently rely on any particular metric or metrics
- No specific minimum or maximum length

Additionally, NBER tends to release these dates well after the fact. For example, the trough in June 2009 was not announced by the Dating Committee until September 2010.

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<sup>3</sup> Retrieved 10 February 2020 from <https://www.nber.org/cycles/recessions.html>. See also: [https://www.nber.org/cycles/recessions\\_faq.html](https://www.nber.org/cycles/recessions_faq.html)

<sup>4</sup> Ibid.

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## A Method to Replicate and Predict NBER's Recession Dates

Several methodologies have attempted to predict and reproduce the results published by the Business Cycle Dating Committee. An approach that has proven relatively reliable has been developed in part by some of its former members.

This method is designed to process an index of very broad economic activity- a theoretical variable that cannot be directly measured. A standardized and high-quality estimate of this variable is routinely generated and published by the research staff of the Federal Reserve Bank of Philadelphia, both for the U.S. and for individual states. This useful measure is known as the State Coincident Economic Activity Index (CI)<sup>5</sup>. The algorithm used to process the index, written by prior members of the NBER Dating Committee, is known as the Bry-Boschan (BB) algorithm<sup>6,7</sup>.

In particular, a "diffusion index" of the CI, which is simply the percentage of state indices indicating expansion minus the percentage indicating recession, has performed very well as a leading indicator of national recessions<sup>8</sup>. The CI and its diffusion index have the additional advantage of being released monthly, while we must wait for quarterly releases of GDP figures.

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<sup>5</sup> Retrieved 10 February 2020 from <https://www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident>

<sup>6</sup> James H. Stock & Mark W. Watson, 2010. "[Estimating Turning Points Using Large Data Sets](#)," NBER Working Papers 16532, National Bureau of Economic Research, Inc.

<sup>7</sup> See also <https://www.frbsf.org/economic-research/files/wp11-28bk.pdf>

<sup>8</sup> [https://www.philadelphiafed.org/-/media/research-and-data/publications/business-review/2006/q1/q1\\_06\\_newindexes.pdf?la=en](https://www.philadelphiafed.org/-/media/research-and-data/publications/business-review/2006/q1/q1_06_newindexes.pdf?la=en)

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## Generating Statewide Recession Dates, By Incorporating Louisiana-specific Data

We utilize a basic methodology based on the Philadelphia Federal Reserve Bank Coincident Economic Activity Index (CI) for Louisiana, generated monthly, to determine peak and trough months for the statewide economy.

The approach consists of constricting the BB algorithm to recognize declines or expansions in an index of economic activity as a formal expansion or recession phase of a full cycle if they are sustained for a minimum of six months. In addition, a full cycle is constrained to a minimum of 15 months. A number of additional constraints are imposed, and the index itself is slightly transformed. A detailed discussion of the method is presented by the authors of the algorithm<sup>9</sup>.

The authors of the algorithm argue that based upon experiences participating on the Dating Committee, the application of these settings will cause the BB algorithm to reliably indicate nationwide minima and maxima that correspond closely to the dates ultimately indicated by the Dating Committee. The authors of leading econometrics textbooks note in a leading economics publication that this approach is widely used<sup>10</sup>.

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<sup>9</sup> Retrieved 4 February 2020 from [https://www.nber.org/books/bry\\_71-1](https://www.nber.org/books/bry_71-1)

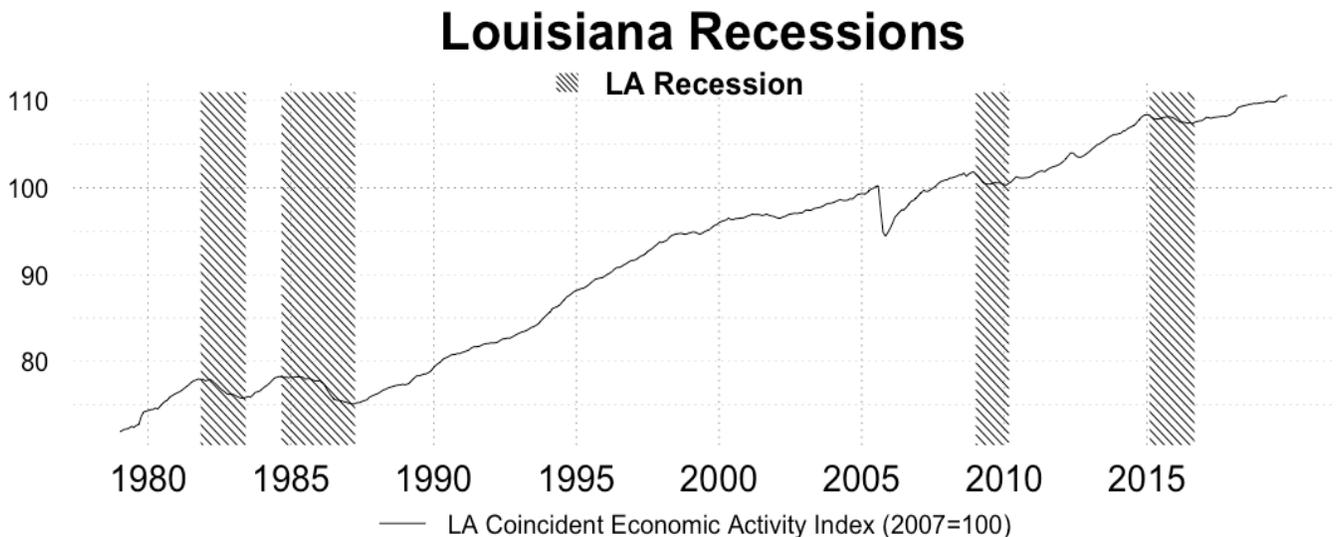
<sup>10</sup> Stock, James & Watson, Mark. (2010). Indicators for Dating Business Cycles: Cross-History Selection and Comparisons. *American Economic Review*. 100. 16-19. 10.1257/aer.100.2.16.

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## Result: Louisiana Recession Dates

The raw concurrent activity index, as of January 2020, reflects the current levels of broad economic activity in the Louisiana. We import the coincident economic data index via R software, and apply the BB algorithm as described above via the R package “bbdetection”<sup>11</sup>. The resulting peak and trough months since 1979 are reflected in the chart and table on the following page. Additionally, the “Depth of Trough” column provides the magnitude of the decline, relative to the peak, in percentage terms.

Algorithm results indicate that the most recent LA recession began in February 2015, following the drastic 2014-15 decline in the price of oil, and ended in September 2016.



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<sup>11</sup> Retrieved 4 February 2020 from [https://vzakamulin.weebly.com/uploads/4/2/4/2/42424487/introduction\\_to\\_the\\_bbdetection\\_package.pdf](https://vzakamulin.weebly.com/uploads/4/2/4/2/42424487/introduction_to_the_bbdetection_package.pdf). See also <https://vzakamulin.weebly.com/uploads/4/2/4/2/42424487/bbdetection-manual.pdf>

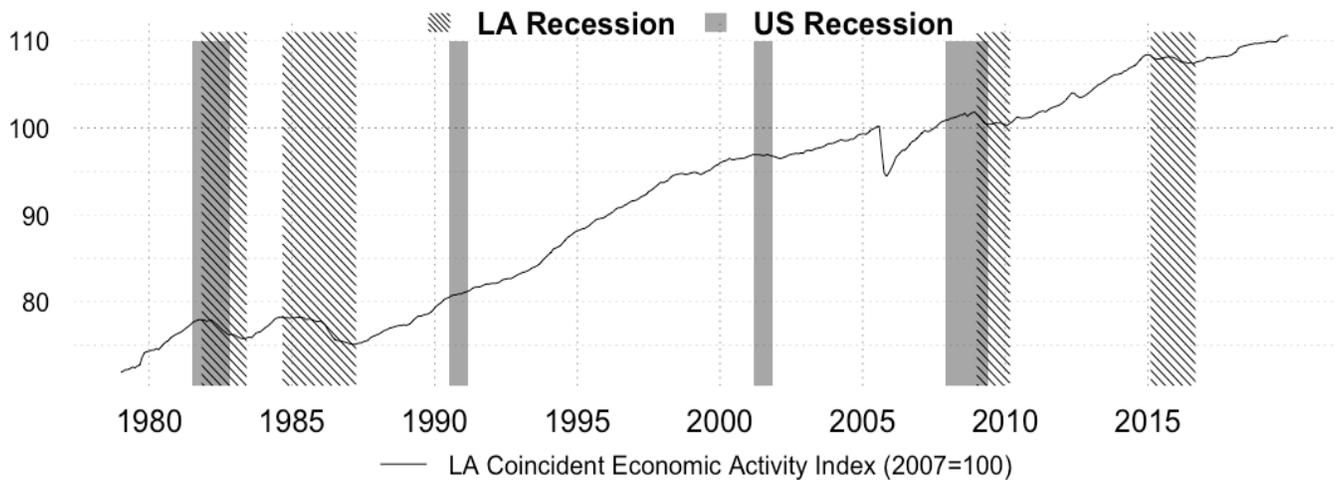
<b>LA Recession Start</b>	<b>LA Recession Duration</b>	<b>Depth of Trough</b>	<b>Trough/ Expansion Start</b>
<b>November 1981</b>	<b>19 months</b>	<b>4%</b>	<b>June 1983</b>
<b>September 1984</b>	<b>31 months</b>	<b>5%</b>	<b>April 1987</b>
<b>January 2009</b>	<b>14 months</b>	<b>1%</b>	<b>March 2010</b>
<b>February 2015</b>	<b>19 months</b>	<b>1%</b>	<b>September 2016</b>

One might immediately note that following Hurricanes Katrina and Rita, a large and easily-observed decline in activity occurred, but this period is not designated a recession. Some discussion of the proper interpretation of this follows in a subsequent section.

Below is a visualization of (NBER-defined) national recession dates, plotted with (algorithm-defined) Louisiana recession dates.

Solid grey-shaded areas represent national recessions, and as before, hashed black-shaded areas represent Louisiana recessions:

## Louisiana & US Recessions



## Initial Discussion and Future Extensions

**No Katrina/Rita Recession Designation.** Noteworthy in the algorithm result is that the sharp decline in economic activity following Hurricane Katrina/Rita in 2005 does not qualify as a recession. This is consistent with theory, as the immediate destruction of capital and workforce exodus followed by a rapid rebound is not reflective of a traditional business cycle. Additionally, in this case the negative shock and subsequent rapid rebound resulted in a trough and recovery that was met too quickly for the downturn to satisfy the minimum duration constraint. In fact, the activity index rapidly returned to near its previous path, and did not experience a sustained downturn until 2009.

**Nationwide and statewide recessions do not necessarily occur simultaneously.**

Episodes of state and national recessions since 1980 are shown in the table on the following page. Episodes of concurrent recessions for the U.S. and Louisiana are in bold.

<b>US Peak</b>	<b>LA Peak</b>	<b>US Trough</b>	<b>LA Trough</b>	<b>LA Lag, Peak</b>
January 1980	-	July 1980	-	-
<b>July 1981</b>	<b>November 1981</b>	<b>November 1982</b>	<b>May 1983</b>	<b>4 months</b>
-	September 1984	-	March 1987	-
July 1990	-	March 1991	-	-
March 2001	-	November 2001	-	-
<b>December 2007</b>	<b>January 2009</b>	<b>June 2009</b>	<b>March 2010</b>	<b>12 months</b>
-	February 2015	-	September 2016	-

In the last few decades, two U.S. recessions have not been accompanied by Louisiana recessions, and on two other occasions, Louisiana has been in recession with no accompanying national recession. In two cases, national recessions have been accompanied by and have led Louisiana recessions.

In the case of the national recession that began in July 1981, Louisiana followed into recession four months later. As the nation entered a recession in December 2007, Louisiana followed 12 months later. Additionally, Louisiana narrowly avoided recession (not reflected on the table above) one month after the nation entered recession in March 2001.

This metric does not imply that there is no relationship between the business cycle at the national level and the state level. In fact, visual evidence overwhelmingly supports at best a deceleration, if not outright decline, in state activity following the onset of national recessions.

A clearer picture of the relationship between national activity and state activity may be observed by measuring the time-lagged relationship between national recessions and slowdowns in narrower statewide metrics, such as employment growth or wage growth. These will be explored in future potential applications of the BB algorithm.