

## BEA BRIEFING

# A First Look at Experimental Quarterly Gross Domestic Product by State

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THE VARYING economic experiences across the states during the downturn that began in late 2007 and lasted until 2009 illustrate the need for more timely information on regional economies. Even though measures of gross domestic product (GDP) by state are made available by the Bureau of Economic Analysis (BEA), these measures have been limited to annual statistics that are not available until at least 6 months after the end of the calendar year.

More timely and frequent information on state-level GDP would provide a clearer picture of the U.S. economy. Such data, for example, would provide earlier indications that particular states were experiencing a downturn in economic activity, thus offering insights into the geographic pattern of national economic slowdown. In the most recent recession, quarterly GDP by state statistics would have revealed that in some states, critical industries, such as durable-goods manufacturing, were declining even before the start of the national downturn.

BEA has been exploring the possibility of producing quarterly GDP by state statistics for several years, building on a separate BEA effort that has developed prototype quarterly GDP by industry statistics.<sup>1</sup>

BEA is now preparing to produce quarterly GDP by state statistics regularly. It plans to release its first prototype set of quarterly GDP by state statistics in 2014. These statistics will be released on a quarterly basis as an official product of BEA, beginning in 2015.

The quarterly GDP by state statistics are designed to be used in conjunction with other macroeconomic and regional data produced by BEA. The statistics are consistent with both annual GDP by state statistics and quarterly GDP by industry statistics.<sup>2</sup> The new statistics will also provide the same level of industry detail that is provided in the upcoming quarterly GDP by industry statistics, which will be available beginning in

2014. The quarterly GDP by state statistics, however, will provide information on 21 aggregate industries rather than the 81 industries available in the annual GDP by state statistics.

This “BEA Briefing” provides a first look at the most recent experimental quarterly GDP by state statistics, providing an overview of the methodology and discussing the initial results. It also discusses BEA’s long-term plans to continue, develop, and improve these statistics. BEA plans to update potential users on the development of these statistics. The aim is to solicit feedback on how the current methodology might be improved before the new statistics become an official product of the Bureau.

### Methodology

The methodology used to prepare the quarterly GDP by state statistics is relatively straight forward, using quarterly GDP by industry, annual GDP by state, and quarterly earnings information. Earnings data at the state level are used to interpolate and extrapolate quarterly values. The quarterly GDP by state statistics are scaled to match quarterly GDP by industry and annual GDP by state statistics, which use more detailed source data for estimation.

The experimental quarterly GDP by state statistics are produced in three steps:

- Create a set of quarterly current-dollar GDP by state statistics for the 21 industries that are covered in the quarterly GDP by industry accounts for years for which annual GDP by state is available.
- Create a set of quarterly real chained-dollar GDP by state statistics based on price information used in the quarterly GDP by industry accounts.
- Create advance quarterly GDP estimates of both current-dollar and real GDP for periods beyond which annual GDP by state is unavailable.

### Current-dollar GDP by state

The quarterly current-dollar statistics are constructed in two main steps:

- Initial quarterly GDP by state estimates for each

1. Nicole M. Mayerhauser and Erich H. Strassner, “Prototype Quarterly Statistics on U.S. Gross Domestic Product by Industry,” *SURVEY OF CURRENT BUSINESS* 91 (July 2011): 32–43.

2. GDP by state differs from GDP by industry by the treatment of federal military and civilian activity located overseas, which cannot be attributed to a particular state.

industry are produced by using earnings to interpolate quarterly changes in the annual GDP by state statistics.<sup>3</sup>

- These initial estimates are then scaled to match both the quarterly GDP by industry and annual GDP by state in an iterative process. Scaling the quarterly GDP by state statistics to the annual GDP by state and quarterly GDP by industry statistics confers all the strengths of the annual state-level data and quarterly industry-level data to the experimental statistics.

**Real chained-dollar GDP by state**

The real GDP statistics are calculated by dividing the current dollar GDP by state statistics by the chain-type prices indexes used for the quarterly GDP by industry accounts for the 21 industries. These results are then aggregated for the categories of manufacturing, private industries, and total GDP for each state. This methodology is consistent with the methodology that is used to calculate annual real GDP by state.

**Extrapolation for advance quarters**

Estimates for advance quarters—quarters for which there is no corresponding annual estimate—are extrapolated using available earnings data in three steps:

- Ratios of the rate of change for earnings by state for each industry to the rate in the previous quarter are calculated.
- The ratio is then multiplied by the previous quarter’s GDP by state estimate.
- The resulting estimates are then scaled to match quarterly GDP by industry.

An analysis of the size of the revisions expected when extrapolated estimates are updated to reflect a new set of GDP by state statistics yielded promising results (table 1). The size of the expected revisions were small

**Table 1. Mean Absolute Differences Between Extrapolated and Interpolated Estimates of Quarterly Current-Dollar GDP by State for All Major Industries**

	2011			
	I	II	III	IV
Mean absolute differences in millions of dollars .....	140.5	205.0	251.5	276.4
Mean absolute percent difference .....	1.48	2.15	2.61	2.84
Mean absolute difference in percent change.....	3.72	3.49	1.91	0.89

and reasonable in relation to the revisions that are often made when new source data for annual GDP by

3. Frank T Denton, “Adjustment of Monthly or Quarterly Series to Annual Totals: An Approach Based on Quadratic Minimization,” *Journal of the American Statistical Association* 66, no. 333 (March 1971): 99–102.

state become available. This exercise also lends support for the quality of the interpolated statistics that use the same indicators to produce the quarterly estimates.

**A First Look at Quarterly GDP by State**

If quarterly statistics on GDP by state were produced as a regular time series, they would provide new data for analysis. Examples drawn from the experimental statistics show the kind of information and comparisons that could be made.

**Timing of state business cycles**

One advantage of more frequent and timely GDP by state statistics is the changes in state-level economic activity could be identified earlier than the annual GDP by state statistics. Quarterly GDP by state statistics would provide a first read on state-level activity for the first quarter of a year within 5 months after the end of the quarter rather than 6 months after the end of the corresponding year.

For example, although national GDP began to decline in the first quarter of 2008, many states’s GDP began to decline earlier. In the fourth quarter of 2007, in fact, many of the states that showed slow growth or actual declines tended to be grouped in specific regions. No states in the Great Lakes and Southwest regions were in the top two quintiles of growth. However, states in the Plains and Rocky Mountain regions followed the trend of the United States as a whole and showed positive growth in this quarter (chart 1).

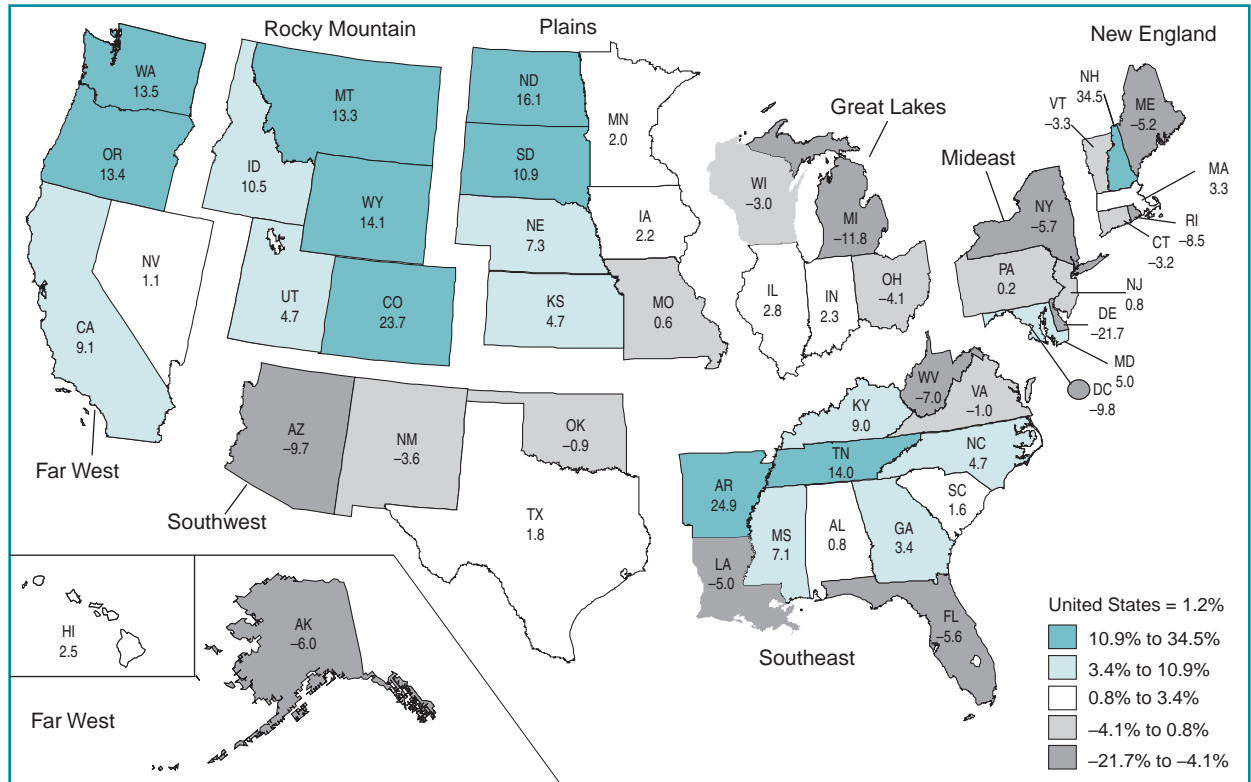
In the second quarter of 2009, as the national economy was approaching the trough, more than 20 states were already beginning to recover. Most of the states in the Great Lakes region were growing: three of the five states were in the top 10 fastest growing states. All states in the Southwest region declined at greater rates than the nation as a whole (chart 2).

**Acknowledgments**

The experimental quarterly GDP by state statistics were prepared by the Regional Product Division. LeRoynda Brooks, Lam X. Cao, and Todd P. Siebeneck of the Regional Product Branch created and reviewed the statistics. Catherine (Zheng) Wang, Chief of the GDP by State Goods Section; Clifford H. Woodruff III, Chief of the Regional Product Branch; and Joel D. Platt, Associate Director for Regional Economics, provided valuable comments on this briefing. Thomas F. Howells, Industry Economic Accounts, provided insights into U.S. quarterly GDP by industry, and Jonas D. Wilson of the Data and Administrative Systems Group prepared the maps.

**Chart 1. Percent Change in Real GDP by State, 2007:III–2007:IV**

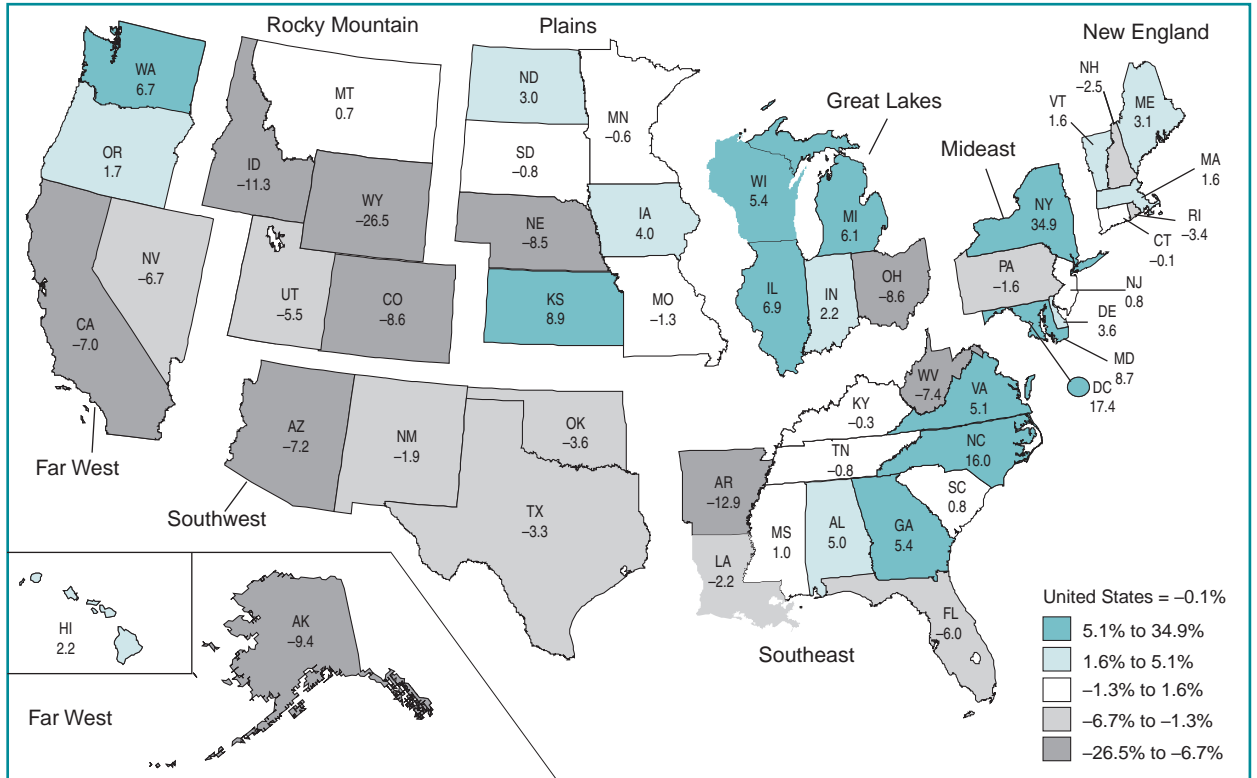
Seasonally adjusted at annual rates



U.S. Bureau of Economic Analysis

**Chart 2. Percent Change in Real GDP by State, 2009:I–2009:II**

Seasonally adjusted at annual rates



U.S. Bureau of Economic Analysis

**Composition of GDP by state**

Another additional advantage of more frequent and timely GDP by state statistics is that they can show the states that are most severely affected by declines in the activity of particular industries.

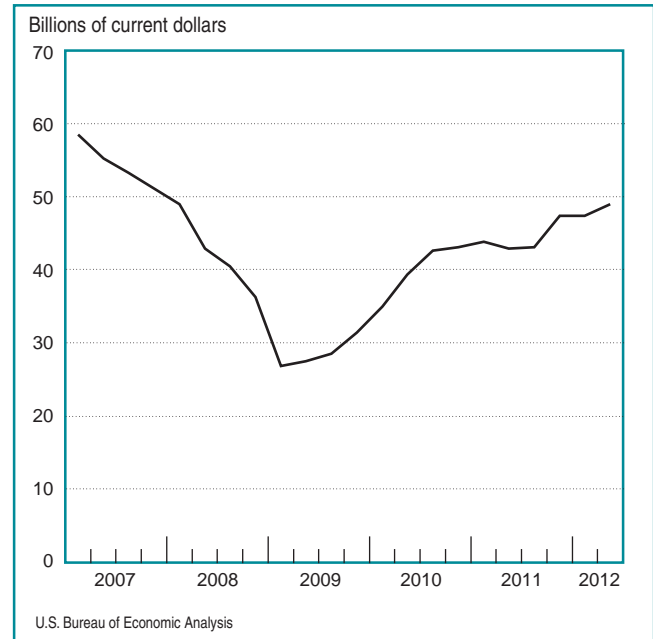
For example, durable-goods manufacturing was one of the leading contributors to the most recent economic recovery. California led the United States in durable-goods manufacturing, followed by Texas and Oregon. In all three states, computer and electronic product manufacturing was the leading durable good. These three states went through slowdowns at different stages, but by the second quarter of 2012, durable-goods manufacturing recovered and surpassed prerecession levels in all (chart 3).

In contrast, Michigan, home of the automotive industry, underwent a decline in durable-goods manufacturing that continued until the second quarter of 2009, when the state began to show its first signs of coming out of the recession. However, as of the second quarter of 2012, durable-goods manufacturing had still not hit its prerecession level (chart 4).

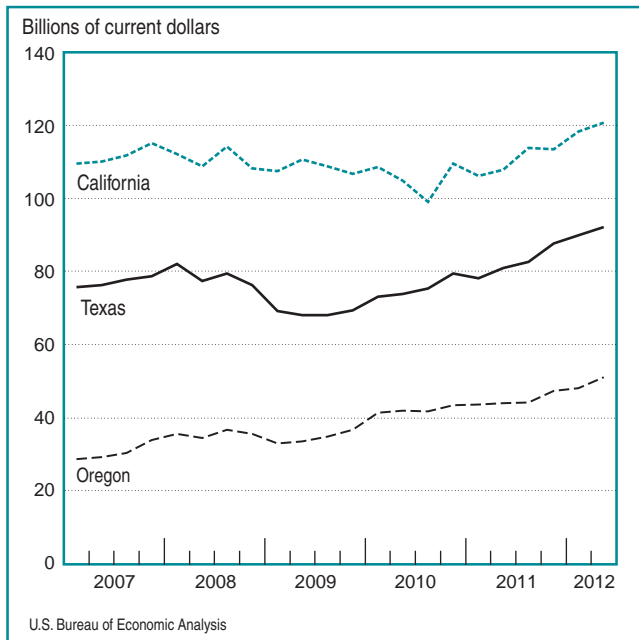
Mining offers another interesting example. The top three states in this industry are California, Louisiana, and Texas. The experimental quarterly statistics show

declines in the fourth quarter of 2008, growth after the fourth quarter of 2009, and a path of recovery characterized by upswings and downswings (chart 5).

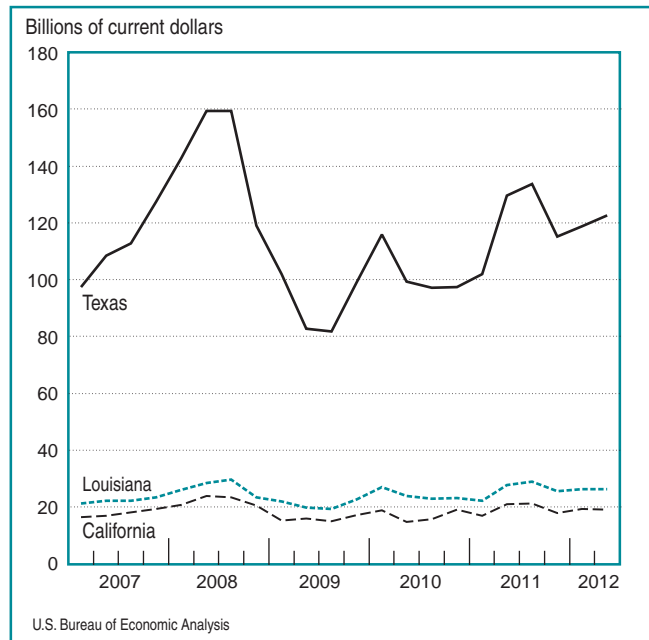
**Chart 4. GDP by State for Durable-Goods Industries for Michigan**



**Chart 3. GDP by State for Durable-Goods Industries for California, Texas, and Oregon**



**Chart 5. GDP by State for Mining Industries for Texas, California, and Louisiana**



Mining played a major role in North Dakota's economic growth, doubling its share of state GDP from 2009 to 2012 and leading the boom of the state economy (chart 6).

The varying experiences of the durable-goods manufacturing and mining industries across states that are reflected in the experimental statistics demonstrate the importance of using earnings data to capture individual state trends in the GDP by state statistics.

### Next Steps

The initial experimental quarterly GDP by state statistics are promising, but more work needs to be done before these statistics can be regularly released. To that end, BEA is seeking comments, which can be addressed to [zheng.wang@bea.gov](mailto:zheng.wang@bea.gov).

The following schedule outlines a timeline for completing the quarterly statistics on GDP by state for 2015, based on the availability of resources.

- **Spring 2014.** Continue to evaluate the statistics with new data from the quarterly GDP by industry accounts using a new base year for real dollar estimates.
- **Summer 2014.** Release prototype statistics for further comments and evaluation.
- **Summer 2015.** Release quarterly statistics shortly after the quarterly release of the GDP by industry

statistics. This would provide information on the first quarter of economic activity in the states almost a full year before the related annual statistics are released.

**Chart 6. GDP by State for Mining Industries for North Dakota**

