FEDERAL RESERVE BANK OF DALLAS HOUSTON BRANCH April 1995

Houston Business

A Perspective on the Houston Economy

Gross Regional Product: Another View of Houston's Economy

This article develops estimates of Houston GRP by major industry group, explains the assumptions behind these estimates and updates these figures to 1994 by using simple forecasting techniques.

Gross domestic product (GDP) is the best and most comprehensive measure of the nation's economic performance, and economists closely follow quarterly releases of these figures for insight into the U.S. business cycle. In 1991, the Department of Commerce began providing estimates of gross state product (GSP), with annual releases of new data and a historical series that reaches back to 1977.

Compared with national data, these GSP figures are not timely and are released only after a three-year delay. For example, 1992 data will be available later this year. Despite this drawback, GSP figures provide new insight into the regional business cycle. They often provide a contrast to releases of employment data, the most timely source of information on regional business conditions. Employment figures are often flatter and change more slowly than production numbers, masking shifts between full- and part-time employment or businesses' hoarding skilled labor over the business cycle.

This article describes a gross regional product (GRP) series for Houston. About the same time we receive the annual GSP estimates for Texas, we also receive estimates of labor compensation, proprietor's income and employer-paid benefits for the Houston metropolitan area. These labor compensation figures make up about two-thirds of Houston's gross regional product, and the Texas GSP numbers provide useful clues to the composition of the remainder, which is made up of indirect business taxes and payments to capital. This article develops estimates of Houston GRP by major industry group, explains the assumptions behind these estimates

and updates these figures to 1994 by using simple forecasting techniques.

METHODOLOGY

Gross product for a state or region is conceptually the same as national estimates of gross domestic product. It is the value of all goods produced for final sale in an accounting period and originates from a particular geographic region such as a metropolitan area, state or nation. Gross product is defined as the market value of all output minus the value of intermediate production expenses. Alternatively, this measure can be computed as the sum of payments to labor, capital and other factors applied in the area under examination. We develop our local estimates from the payments made to these factors of production in Houston.

This article estimates GRP for Houston's major industry groups: farms and agricultural services; mining; construction; manufacturing; wholesale trade; retail trade; finance, insurance and real estate (FIRE); transportation, communications and public utilities (TCPU); personal and business services; and government. We begin with detailed estimates of compensation paid by industry, which are available for Houston and Texas from 1977 through 1992. The key assumption is that the factor composition of Houston and Texas allows a proportional allocation of indirect business taxes and capital payments for each industry at each point in time.

$$\frac{\textit{Houston compensation}}{\textit{Houston GRP}} = \frac{\textit{Texas compensation}}{\textit{Texas GSP}}$$

These estimates are sometimes called *factor blowups*, and were commonly used to approximate state product before the Department of Commerce began publishing actual GSP figures. These state blowups assumed proportionality between a ratio of state and national compensation to gross product. The availability of a GSP for Texas provides a basis for moving the blowup methodology down to the level of Houston or other Texas metropolitan areas.

We must question this proportionality assumption in one key area. A drive along the Houston Ship Channel and a look at its array of chemical plants and refineries suggest the city's manufacturing sector uses capital more intensively than the rest of Texas. We can confirm this observation by examining electricity consumption data. Economists often construct industrial production indexes on the assumption that electric motors drive capital stock. Economists then use month-to-month variations in electricity sales to infer capital utilization rates. Similarly, high electricity sales per dollar of output or per employee indicate that many motors probably are at work, or that capital is used intensively. Data show that during peak years in Houston's business cycle, local manufacturing industries typically consume as much as 60 percent more electricity per dollar of industrial production than the rest of the state, which implies the need to adjust and correct for higher local capital intensity.

We adjust for increased local capital intensity by segregating refining and chemicals from all other manufacturing and developing independent estimates of capital payments for these sectors. Refining and chemical industries concentrate on the Texas Gulf Coast and use large

Figure 1
Houston's Gross Regional Product, 1977–94

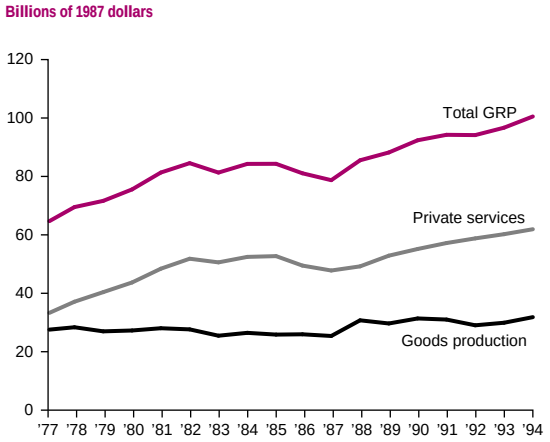

Table 1
Distribution of Houston's Economic Activity, Gross Regional Product in 1977 and 1994

Sector	1977	1994
Mining	16.2	11.0
Construction	9.5	4.8
Manufacturing	16.8	15.6
TCPU	9.9	13.8
Wholesale trade	6.0	8.0
Retail trade	6.7	8.4
FIRE	15.4	14.5
Services	13.5	17.1
Government	5.9	6.7

NOTE: FIRE is finance, insurance and real estate; TCPU is transportation, communications and public utilities.

amounts of capital; segregating these estimates captures the effects of the local industry mix. Employing this procedure, we derive production estimates that are higher than using simple blowups based on all manufacturing. Overall, this adjustment raises our estimate of Houston manufacturing output by 5 to 7 percent before 1986 and increases it more sharply after 1985 as the economic health of chemicals and refining improved. For example, our manufacturing production estimate for 1988 increases 21 percent when we isolate these two industries and explicitly account for their capital payments. Overall, the adjustment raises total GRP estimates by less than 1 percent for the years before 1985, but in later years, GRP rises by as much as the 3.7-percent increase in 1988.

For the years after 1991, we approximate gross product for each industrial sector using a simple regression equation. For most sectors, we forecast local real gross product per worker using data from 1977 to 1991. We also use a combination of variables as predictors: U.S. gross product, real oil prices and a trend term. For inherently local sectors such as FIRE and personal and business services, we related real output per worker to the *local* business cycle, using Houston-based goods production as the key predictor variable. In all cases, we multiplied these estimates of output per worker for 1992–94 by employment to determine gross product.

SOME RESULTS

Figure 1 shows Houston's gross regional product growth during 1977–94. Over these 17 years, Houston's GRP grew by 58.4 percent, or 2.74 percent per year, outpacing U.S. growth of 51.1 percent, or 2.45 percent per year. Compared with overall growth, Houston's goods production gained only 0.9 percent per year, while the larger private service sector grew 3.6 percent per year. As Table 1 shows, growth in personal and business services, wholesale and retail trade and TCPU squeezed out mining and construction.

Table 2 shows how different the economy's structure can look if measured by production rather than employment. Mining and manufacturing, for example, make up only 14.6 percent of nonagricultural employment but are 26.6 percent of product. In contrast, retail trade and services make up 46 percent of employment but only 25.5 percent of output. Much depends on each sector's ability to combine capital and new technology with labor to produce high levels of output per worker, and goods-producing sectors can use technology better than labor-intensive trade or services.

Figure 2
Comparison of Houston's FIRE-Sector Gross Product And Employment, 1977–94

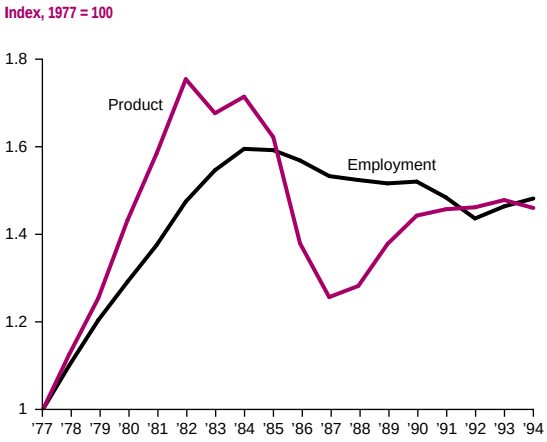

Figure 2 illustrates how gross product and employment can differ over the course of the business cycle. The sector chosen is FIRE, containing both banking and real estate, two industries that suffered significant setbacks in Houston in the 1980s. Note the relatively smooth behavior of employment compared with product; gross product rises 75.4 percent from 1977 to 1982, then falls 28.4 percent by 1987. Big balance-sheet losses and declining compensation rates work to reduce the product estimates sharply after 1982, even as the total number of jobs declines slowly.

NOTES: Jun Ishii, an economics student at Rice University, contributed to this article. Copies of these GRP estimates for Houston are available by sector from the authors.

Table 2
Distribution of Houston's Economic Activity, Gross Product vs. Employment in 1994

Sector	Gross product	Employment
Mining	11.0	3.9
Construction	4.8	6.6
Manufacturing	15.6	10.7
TCPU	13.8	6.8
Wholesale	8.0	6.5
Retail	8.4	17.1
FIRE	14.5	5.8
Services	17.1	28.9
Government	6.7	13.9

Moderate economic growth continues in Houston, although warm winter weather has slowed some retail and energy activity. Petrochemical production and prices remain the bright spots in the local economy, with large construction projects now being planned or announced for the ship channel.

RETAIL SALES AND AUTOS

Warm winter weather has hurt local retailers, making it difficult to clear out winter clothing for the spring season. Generally, clothing sales have been slow for the past year, as consumers have shown less sensitivity to changing fashion trends. Warm winter weather worsened this situation. Sales of electronics and home furnishings continue strongly.

Automobile and truck sales in February were up 6 percent compared with last year, after lagging by 5 percent in January. Strong sales of trucks and sport/utility vehicles continue to dominate total sales figures. Winter sales make up a small part of the annual total, but local dealers seem confident of a strong year in 1995.

ENERGY PRICES AND DRILLING ACTIVITY

Warm winter weather has greatly influenced prices of natural gas and energy products and dampened the market for drilling. Spot natural gas prices on the Gulf Coast were $1.30 to $1.40 in February and strengthened by 20 cents or more in the second half of the month. The gas prices have been stronger than anticipated, given the large storage overhang from warm weather and that many producers have shut-in capacity in response to low prices.

With natural gas prices down and oil prices holding steady at $4 per barrel higher than when drilling decisions were being made last year, domestic drilling plans have swung in favor of oil. So far, weaker natural gas prices have not slowed drilling activity in the Gulf of Mexico, although fewer rigs are obtaining contracts for the second quarter of this year. Day rates for rigs in the Gulf are currently very poor, mainly reflecting oversupply. Otherwise, oil service companies report little decline in demand or price, with overseas activity and continued work in the Gulf offsetting lost gas drilling.

REFINING AND PETROCHEMICALS

Over the winter, warm weather in the Midwest and Northeast hurt refiners by limiting fuel oil sales. Efforts to swing as much production as possible to gasoline left that market glutted, and overall profit margins became weak or nonexistent. Regulatory turmoil over whether some parts of the country would be allowed to opt out of the program for reformulated gasoline also kept prices weak and erratic, particularly on futures markets. Several Gulf Coast refineries curtailed output or extended seasonal maintenance because of poor profits.

Petrochemical production and prices remain prominent features of Houston's economy, with strong demand from customers around the world. Some respondents, however, feel that prices may have peaked after six rounds of increases in 1994. Large capacity expansions have been announced on the ship channel for ethylene and propylene, which should help total construction figures for the rest of 1995.

CONSTRUCTION AND LUMBER

Residential construction has slowed significantly since the beginning of the year. Inventories of completed homes on the ground were out of line in the second half of 1994 and are still being worked off. Lenders are reported to be very cautious in this soft housing market. Good traffic continues through model homes, however, and the existing home market has shown signs of improvement.

Very large commercial projects for office or medical buildings are largely absent from the market. However, light commercial construction for retail, warehouses and apartments is strong and local general contractors are developing backlogs. Across the state, the strong construction market has contributed to local shortages of some construction skills. Lumber demand has slowed locally, and price increases for lumber and roofing materials are not increasing as rapidly as in 1994. Local wallboard prices are still rising, however.

For more information, call Bill Gilmer at (713) 652-1546.
For a copy of this publication, write to
Bill Gilmer • Houston Branch • Federal Reserve Bank of Dallas
P.O. Box 2578 • Houston, Texas 77252