FEDERAL RESERVE BANK OF DALLAS HOUSTON BRANCH May 1997

Houston Business
A Perspective on the Houston Economy

Seasonal Adjustment of Houston Employment Data

Monthly payroll employment is the most valuable data series for following current economic conditions in states and metropolitan areas. These monthly data, which tell us the number of wage and salary jobs, are released about three weeks after the end of the month and provide industry-specific detail by region. In Houston, for example, the Texas Workforce Commission makes more than 50 data series available monthly, yielding detail on mining, manufacturing, construction, finance, services and other sectors.

Timeliness comes at a price, however, as these early data are based on a sample of establishments, and the information will be revised extensively the following year as additional data become available. The revised data can sometimes differ significantly from the preliminary sample, changing our understanding of ongoing economic events. For this reason, it is important that data users be aware of how preliminary estimates are made, understand their limitations and anticipate the annual benchmark revisions.

This article describes the revision process, with an emphasis on a special problem that arises in the seasonal adjustment of these employment data series. Research at the Federal Reserve Bank of Dallas suggests that we are dealing with two data series—the preliminary and revised data—and that seasonal variation differs in the two series.[1] For a true picture of the economy, separate seasonal estimates must be made for each series and the appropriate seasonal factors applied both to the ongoing sample results and to corrected history. The Bureau of Labor Statistics now employs this method for the seasonal adjustment of state data, and this article extends the methodology to the Houston metropolitan area.

Research at the Federal Reserve Bank of Dallas suggests that we are dealing with two data series—the preliminary and revised data—and that seasonal variation differs in the two series.

PRELIMINARY AND REVISED DATA

State agencies collect payroll employment data monthly, in conjunction with the Bureau of Labor Statistics. The goal is to determine the number of full- and part-time workers who receive pay during the month. Excluded from the count are the self-employed, unpaid family members, volunteers, and farm and domestic workers. A sample is taken across all industries, with every business establishment having 250 or more employees asked to participate. Additional sampling is drawn from smaller businesses.

In late February or early March, administrative records are used to revise the prior 24 months of data. Quarterly reports filed by all companies for the unemployment insurance program provide 99 percent of the data needed for a complete, monthly count of wage and salary employment. The remaining 1 percent of the data is obtained from other government agencies or from additional samples.

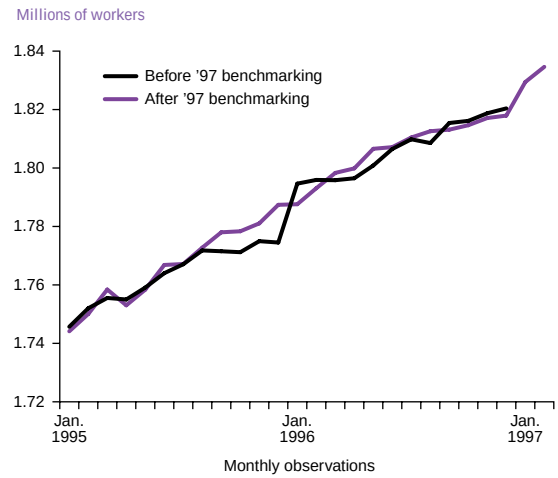
At the time benchmark revisions are made, lags in the delivery of the administrative records typically make them available only through the first or second quarter of the prior year. For example, in March 1997, employment security filings allowed final benchmarking only through the first one or two quarters of 1996 in most states and metropolitan areas. Data for the remainder of 1996 were revised to new levels, as indicated by employment security filings, and then moved forward based on the old sample results. Data for 1997 will be estimated using additional monthly samples. When the 1998 revisions occur, they will give us final results for 1996 and for early 1997.

The revisions can occasionally be substantial. Despite efforts to bring more data to bear in recent years, the sample still overemphasizes large firms at the expense of small ones. This means that sectors such as services, retailing and construction, where small firms predominate, may be subject to the largest revisions. Month-to-month changes in wage and salary employment must be approached cautiously and other information sources sought to confirm new or surprising trends.

SEASONAL ADJUSTMENT

Seasonal adjustment removes month-to-month variation from these data series that results from repeated annual occurrences, such as holidays, the tourist season and the end of the school year. The most widely used seasonal adjustment procedure is the federal government's X-11 package, which divides a data series into trend, cyclical, seasonal and irregular components. Its approach is somewhat ad hoc, but X-11's lack of statistical sophistication is overcome by stable and predictable results.

Figure 1
Seasonally Adjusted Wage and Salary Employment in Houston



The wage and salary employment series has demonstrated some peculiar results when it is seasonally adjusted. Figure 1 illustrates one example—the disappearing January blip. Total wage and salary employment is shown for the Houston metro area before and after the 1997 benchmarking, and both series are seasonally adjusted using X-11. Note that the prebenchmark series shows a sharp jump in January 1996; this jump disappears in 1996 in the postbenchmarked series, but it reappears in January 1997. This result isn't confined to Houston or Texas data. The Federal Reserve Bank of Dallas study cited earlier finds a similar break in the January results consistently reported by 46 states between 1984 and 1992.

The Dallas Fed study suggests a reason for this peculiarity, as well as a solution. The problem is that we are really dealing with two data series—a preliminary sample and a complete census based on administrative records. With a straightforward application of X-11, the most recent January data are from a sample, but almost all the information used to seasonally adjust it is based on final benchmarked data. The blip disappears each year as benchmarked data is added, but reappears 12 months later in the new sample.

The Fed study's authors suggest the con-

struction of a historical series based on sample values released over the years and provide details on how to build it. Based on data for all 50 states, they show that the seasonal factors from such a sample series differ from the benchmark series, and the differences are statistically significant. They conclude that seasonal adjustment factors from the historical benchmark series should be applied only to final benchmark data; the most recent sample figures (always the data of most interest) should use seasonal factors developed from the history of sample values.

Table 1
Sectors Where Seasonal Adjustment Factors Differ Between Series, Houston, 1986–96

	Total	Mining	Manufacturing	TCPU	Trade	FIRE	Services
Jan.	•					•	•
Feb.	•						•
Mar.							•
April						•	
May							•
June							•
July							•
Aug.							•
Sept.							
Oct.							
Nov.				•	•		
Dec.	•	•	•	•	•	•	
Total	•			•	•	•	•

NOTE: TCPU is transportation, communications and public utilities; FIRE is finance, insurance and real estate. No significant differences were found for construction and government in any month.

APPLICATION TO HOUSTON

We applied this methodology to Houston for total wage and salary employment and for eight major industry groups. The benchmarking in March 1997 yielded final benchmarked series that included the first three quarters of 1996. We seasonally adjusted benchmarked data from the first quarter of 1986 through the third quarter of 1996 using X-11. We constructed a history of initial sample estimates over the same period and applied X-11 to that series as well.

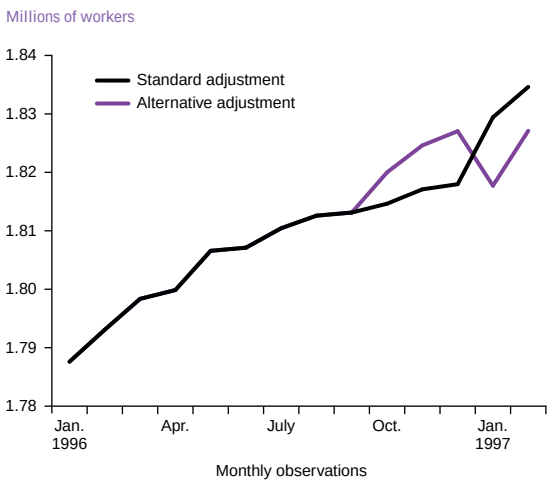
The resulting seasonal adjustment factors were different between the two series. Statistical tests of the differences between the series are shown in Table 1, by month and by industrial sector. No significant differences were found between the series for construction or government, but the seasonal factors differed for at least one month for all other series. Monthly differences were most common during the winter months, and only services showed significant differences in summer months. A joint test for all months was significant for the following sectors: transportation, communication and public utilities; trade; finance, insurance and real estate; services; and total employment.

The results strongly suggest Houston wage and salary data could benefit from the alternative seasonal adjustment methodology. Figure 2 shows the results of the standard X-11 adjustment and the alternative if applied to recent Houston employment numbers. The alternative methodology does eliminate the January blip, and it seems to tell a different story—a stronger finish for 1996 and a weaker start for 1997. All the previous qualifications about the quality of this sample data still apply, and we will have to wait to see how accurate these results are.

A copy of the seasonally adjusted history for Houston and monthly seasonal adjustment factors for 1997 for all sectors can be obtained from the Houston Branch of the Dallas Fed.

—Robert W. Gilmer
Daniel Eric Arzola

Figure 2
A Comparison of Seasonal Adjustment Methods For Houston Employment



[1] Franklin D. Berger and Keith R. Phillips (1994), "Solving the Mystery of the Disappearing January Blip in State Employment Data," Federal Reserve Bank of Dallas *Economic Review*, Second Quarter, 53–62.

Houston Beige Book respondents were optimistic and excited about the local economy. Local conditions may not be booming, but they have strengthened in recent months along with the U.S. economy and with contributions from a very healthy energy sector. Seasonal declines in energy prices have not slowed down oil exploration and services, and they have improved profits for petrochemicals and refining.

RETAIL SALES

It will be the end of April before we know how Easter season sales compare with last year's, but retail merchants think they will come out 4 to 5 percent ahead of 1996. This has generally been a good year for local retailers, with late cool weather helping clear winter inventories. Promotions and discounting continue this year, but not at last year's pace. Even heavy spring rains did not depress Easter sales.

OIL AND NATURAL GAS PRICES

Despite a cold start, the 1996–97 winter turned out to be warmer than normal. Lower heating oil demand in late winter reduced pressure on inventories, diminished the need for domestic refiners to keep output levels high and by January had snapped the crude oil rally. After peaking at $25 to $26 per barrel in December, crude oil prices have slowly fallen, averaging $19 to $20 per barrel by April.

Warmer weather also pushed natural gas prices back under $2 by February, where they stayed except for a mid-April rally based on unusually cold spring weather. Storage additions will be a favorable factor for natural gas prices over the summer because storage—although higher now than after the tough 1995–96 winter—is still below normal.

OIL EXPLORATION, SERVICES AND MACHINERY

There was no significant pause in drilling this spring, as the rig count has climbed over 900 for the first time since the Persian Gulf War. Texas and Louisiana account for 60 percent of the increase in the rig count over the past year.

Oil service and machinery companies continue to report very high levels of activity. This activity is driven by high cash flows for producers over the past 18 months and by the broader range of prospects new technology has opened to the industry. Activity is constrained by shortages of mechanical engineers, machinists, numerical control operators, drilling crews, offshore and large land rigs, and drilling pipe.

PETROCHEMICALS AND REFINING

Downstream prospects have brightened as energy feedstock prices have fallen. Over the winter, commodity petrochemical profit margins were hurt by high energy prices, particularly for natural gas and gas liquids. However, very strong demand is now holding up the price of petrochemicals, even as feedstock costs fall, and the second quarter should be highly profitable. Producers of plastic products further downstream—such as PVC, PET, polyethylene and polystyrene—tried to raise prices on a variety of products in March. Some price increases are still pending, but with the exception of polyethylene, the earlier price increases did not stick.

Refinery margins have improved in recent weeks because the price of crude has fallen more rapidly than the price of heating oil and gasoline. Gasoline stocks still remain below the usual operating range, but fears of summer supply problems have been eased by the earlier than expected end to the heating season.

REAL ESTATE

Real estate activity remains strong throughout Houston. A number of retail projects are under construction: several megatheater complexes, a big outlet mall and several smaller, upscale shopping centers in both Harris and Fort Bend Counties. Announcements of speculative warehouse projects continue. Sales of both new and existing homes slowed in March from their year-earlier level. Rising interest rates spurred interest in home purchases, but not enough to match the very strong sales of March 1996.

For more information, contact Bill Gilmer at (713) 652-1546 or bill.gilmer@dal.frb.org

For a copy of this publication, write to Bill Gilmer, Houston Branch,
Federal Reserve Bank of Dallas, P.O. Box 2578, Houston, Texas 77252.

This publication is available on the Internet at www.dallasfed.org