



# HoustonBusiness

*A Perspective on the Houston Economy*

FEDERAL RESERVE BANK OF DALLAS • HOUSTON BRANCH • MARCH 2006

## Oil Exploration Booms— Is Houston Next?

*Houston finally seems to be once again riding the energy cycle. As producers have slowly accepted the durability of the current oil exploration cycle, Houston has moved to the cusp of yet another oil-driven economic boom.*

**B**etween December 2000 and December 2004, the Houston economy added 26,500 jobs, an employment growth rate of 0.2 percent per year. This is a curious result for a city that by most accounts owes half its jobs, either directly or indirectly, to upstream and downstream oil and natural gas. Oil prices have exceeded \$20 per barrel since late 1999, except for four months on the heels of the 2001 U.S. recession. Natural gas prices at the wellhead passed \$3 per thousand cubic feet in May 2000 and except for a total of 11 months in 2001–02, have not looked back.<sup>1</sup> Since late 2002, both oil and gas prices have risen steadily.

Other measures of the local economy confirm Houston's slow response to high energy prices. Figure 1 shows the city's coincident index of economic activity, a broad-based measure of business-cycle conditions. After sluggish growth through-

out 2002 and 2003, this index indicates that the local economy finally accelerated in 2004.

Similarly, Figure 2 compares the local purchasing managers index to its national counterpart. A value above 50 indicates expansion for both measures, and the two mirror each other throughout 2002–03. Only in the summer of 2004 does energy-driven Houston diverge from the U.S. expansion.<sup>2</sup>

Finally, as seen in Figure 3, the Houston unemployment rate stood a full percentage point above the U.S. rate in mid-2003 and slowly closed this gap by mid-2005. The influx of evacuees from New Orleans in September 2005 sent the rate soaring again, but this event was unrelated to business-cycle conditions.

Why would energy-based Houston respond so slowly to the powerful incentives offered by the oil and gas markets? This article argues that the Houston economy's response was similar to that of the oil industry itself. Oil producers and operators initially viewed high oil and gas prices with skepticism. They deemed the prices too good to last and an inadequate basis for long-lived capital expansion.

But over the past 12 to 24 months, an important paradigm shift has occurred; a world view of OPEC-dominated oil markets has been replaced by one of strong global demand, limited reserves and potentially high energy prices for years to come.

The oil industry has slowly come to believe that price incentives can be trusted this time and has finally begun to act on them. Only when producers reached this conclusion did Houston's energy sector show significant growth.

**Figure 1**  
Houston Index of Coincident Economic Activity, 2000–05



SOURCE: Federal Reserve Bank of Dallas.

**Figure 2**  
Houston and U.S. Purchasing Managers Indexes, 1997–2005



SOURCES: Institute for Supply Management; author's calculations.

**Figure 3**  
Houston and U.S. Unemployment Rates, 2000–05



SOURCES: Bureau of Labor Statistics; Federal Reserve Bank of Dallas.

### The Old Paradigm

The Organization of Petroleum Exporting Countries (OPEC) was founded in 1960 and developed into a force in world oil markets in the 1970s. Since 1982, OPEC has met regularly to set production quotas among its members to control the price of crude oil. Its current 11 members control about 40 percent of the world's crude oil production and two-thirds of its reserves. OPEC's excess production capacity has played a crucial role in recent years as the world's swing production.

In March 2000, in response to the collapse of world oil prices following the Asian financial crisis, OPEC established a price band based on a basket of seven crude oils. The cartel's intent was to use production adjustments to maintain the basket's price between \$22 and \$28 per barrel. OPEC would increase production any time the price moved above \$28 for 20 consecutive trading days and would cut production if the price fell below \$22 for 10 consecutive

trading days.

The lower band was to protect OPEC revenues by maintaining the price at a sufficiently high level. The upper band was to make sure the price did not go too high, creating exploration and production incentives for non-OPEC producers. Here the cartel drew on its experience in the 1970s and 1980s, when non-OPEC oil flowed to market in response to high pre-1982 prices and brought about the oil market collapse of 1986. The upper band was OPEC's commitment to use its significant surplus production to keep prices below \$28.

The 2000 price-band mechanism was more formal than previous efforts to control oil markets, but OPEC's history as a price regulator is not good. Periods of slack demand and OPEC-member cheating on quotas have led to periodic oil-price collapses. As a result, the price band seemed to offer non-OPEC producers a price outlook that could be moderately high but with likely periodic breakdowns at the bottom when demand slackened.

Thus, non-OPEC producers met the general firming of oil markets in 2000 with considerable wariness. High crude oil prices had quickly come and gone in the past, and drilling programs launched in pursuit of these fleeting oil revenues had often proved unproductive. Figure 4 shows the three drilling cycles that have occurred since 1995. Each line is the number of domestic working rigs, beginning with the drilling trough in each cycle. The 1995–98 cycle lasted 33 months and ended with the commodity glut that followed the Asian financial crisis. The 1999–2001 expansion was cut short after only 26 months by the 2001 recession and a decline in natural gas prices.

The current cycle has lasted 44 months and is showing significant endurance. Despite drilling incentives much higher than in previous cycles, the response has been measured. Early in the expansion, many producers announced that this time they would not waste the high revenues they were earning by chasing unproductive projects. Many public companies indicated that they would simply return these revenues to stockholders by increasing dividends or by repurchasing debt or outstanding stock.

Other factors also slowed drilling. This period saw the consolidation of a number of major oil companies into supermajors—ExxonMobil, Chevron-Texaco and ConocoPhillips, for example—whose huge drilling programs were combined and rationalized. Also, the financial scandals set off in late 2001 by Enron, WorldCom and Global Crossing created widespread concerns about the health of corporate balance sheets. Oil companies were not immune to the need to curtail investments and strengthen balance sheets as a defensive measure.

As a result, drilling markets did not begin to tighten until late 2004. It took 32 months for drilling to return to its prior peak of 1,260 working rigs, leaving drillers as well as oil service and support companies with excess capacity. Producers shared high

oil and gas revenues with their stockholders, but it was 2005 before these revenues began to filter down to the rest of the industry.

### A New Paradigm

Over the past year, a new paradigm has emerged to drive oil-related investment. OPEC's surplus capacity and production quotas have been sidelined—at least temporarily—by a powerful surge in demand for crude oil, largely spurred by rapid economic growth in the United States, China and emerging economies. Since 2001, global oil demand has accelerated from the 1.3 percent annual growth that prevailed after 1989 to 2 percent today (*Table 1*). North America (led by the United States) is important not only because of its rapid growth, but also because of its size. Among the non-Organization for Economic Cooperation and Development countries, Chinese oil demand accelerated from 5.8 percent to 8.9 percent per year after 2001, and the former Soviet Union pulled out of its economic tailspin. Other non-OECD countries, led by Asian developing nations, increased their growth in demand from 1.7 percent to 3 percent per year.

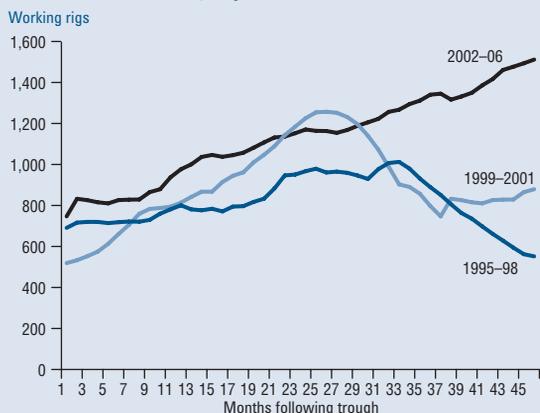
One result of this surge in demand has been to leave OPEC without spare sustainable capac-

ity (production capacity that can be brought to market within 30 days and sustained for 90 days). This capacity, which OPEC would normally tap to police the upper limit of its price band, is now being nearly fully utilized to meet global oil demand. The International Energy Agency estimates OPEC's current spare sustainable capacity at about 2.6 million barrels per day—and only 1.4 million barrels if suspect capacity in Iraq, Venezuela and Nigeria is removed.<sup>3</sup>

As spare capacity disappears from world oil markets, crude oil prices tend to rise (*Figure 5*); they climb dramatically as spare capacity drops below 10 percent. January's spare capacity was about 8.2 percent of OPEC's total sustainable capacity (4.4 percent if Iraq's, Venezuela's and Nigeria's spare capacity is removed). This lack of extra capacity mitigates any threat that OPEC will flood the market with crude and renders meaningless the \$28 upper bound. OPEC's basket of crude oil has now been priced above \$28 for 18 consecutive months.<sup>4</sup>

In addition to high oil prices, the lack of spare sustainable capacity has two collateral effects, both hallmarks of the current oil market. First, prices become volatile. OPEC's spare capacity has served in recent years as the swing capacity needed to deal with oil shocks,

**Figure 4**  
Last Three U.S. Drilling Expansions, 1995–Present



SOURCE: Baker Hughes; data seasonally adjusted by author.

**Table 1**  
Growth Rate of Crude Oil Demand, 1989–2005  
(Annual percent)

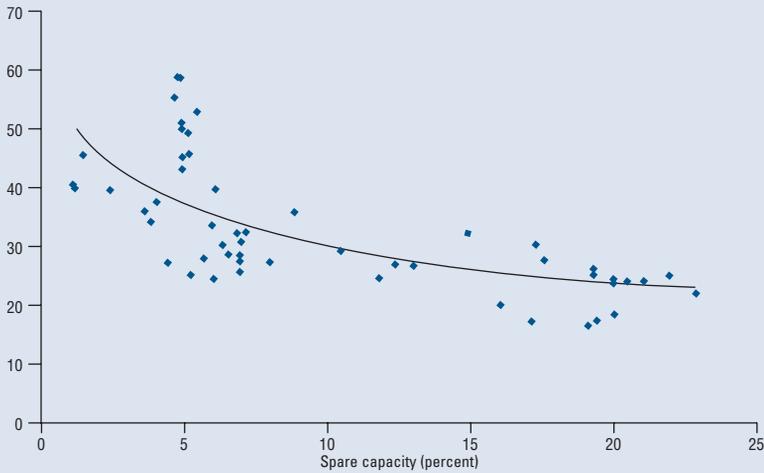
		1989–2001	2001–05	1989–2005
OECD	North America	2.0	1.5	1.8
	Europe	1.5	.5	1.2
	Pacific	3.5	0	2.6
Non-OECD	Former Soviet Union	-7.0	0	-5.3
	China	5.8	8.9	6.5
	Other	1.7	3.0	2.0
World	Total	1.3	2.0	1.5

SOURCE: International Energy Agency.

**Figure 5**

**Crude Oil Price and OPEC Spare Sustainability Capacity**

Price (dollars per barrel)



NOTE: Spare sustainable capacity is production that can be brought online within 30 days and sustained for 90 days.

SOURCES: International Energy Agency; Energy Information Administration.

and 3 million to 4 million barrels is regarded as the minimum to serve this role well. As surplus capacity has fallen, every glitch in the delivery system (weather, geopolitics, mechanical breakdown) is magnified, causing large and rapid price swings. Figure 6 shows the average weekly percentage change in the price of West Texas Intermediate, averaged for each year from 1990 through 2005. Oil prices show a clear tendency toward greater volatility since 2000.

The second collateral effect of limited spare capacity upstream is an increase in end-user inventories downstream. Figure 7 plots the monthly inventories of crude oil held in the U.S. (excluding the Strategic Petroleum Reserve) against the price of crude oil.<sup>5</sup> The line in Figure 7 has been fitted to the dark blue points that mark the inventory–price relationship from 1992 to 2003. The light blue points are monthly observations of this same relationship in 2004 and 2005, when it breaks new ground with a peculiar combination of tight supplies, high prices *and* larger-than-normal inventories. As buffer stocks in the ground have been lost upstream, end users have sought shelter from

supply disruptions by holding larger stocks.

**Houston Rides the Wave**

The timing of Houston’s expansion suggests that the local economy was not waiting for higher oil prices, but for oil producers to believe that these prices might persist. Producers have slowly come around to the view that OPEC’s upper price limit has been erased for now. Downside risk is still present in this market, but it is no longer the one posed by OPEC’s artificial production quotas and cheating. Oil market risk today consists of a significant decline in crude oil demand, perhaps from another Asian financial crisis or a future U.S. recession.

Oil producers and operators in 2004 and 2005 decided that the current oil market provides a more secure foundation for oil-related investments than OPEC and its price band. Drilling surged, and the market for rigs, oil services and various support industries tightened quickly. Figure 8 shows how Houston’s oil exploration jobs

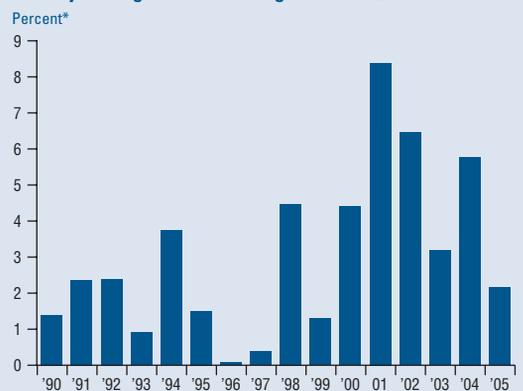
finally returned to the peak of the previous oil cycle in May 2004 and then surged another 10.4 percent, or 7,300 jobs, by the end of 2005. The bulk of the new Houston oil jobs have been at oil service companies— jobs often tied closely to the rig count and overall drilling activity.

Houston’s manufacturing jobs are also tied closely to oil services and drilling activity. They bottomed in the summer of 2004 and have since grown 4.4 percent. Oilfield skills have become a scarce and highly sought commodity; wages and bonuses are rising rapidly and are expected to climb another 10 percent or more in 2006. These wage gains quickly filter through to the rest of the economy, bringing expansion to secondary sectors as well.<sup>6</sup>

Are producers right? Has strong demand pushed us into a new world for oil markets? OPEC has not admitted even temporary irrelevance, but it has launched a number of projects to develop oil fields and restore surplus capacity, the source of its power over oil markets. Some observers see at least some element of a speculative bubble in these markets, a mismatch between oil prices and market fundamentals. The entry of a large number of noncommercial participants (hedge funds and pension funds) into the oil

**Figure 6**

**Weekly Average Percent Change in Prices, 1990–2005**

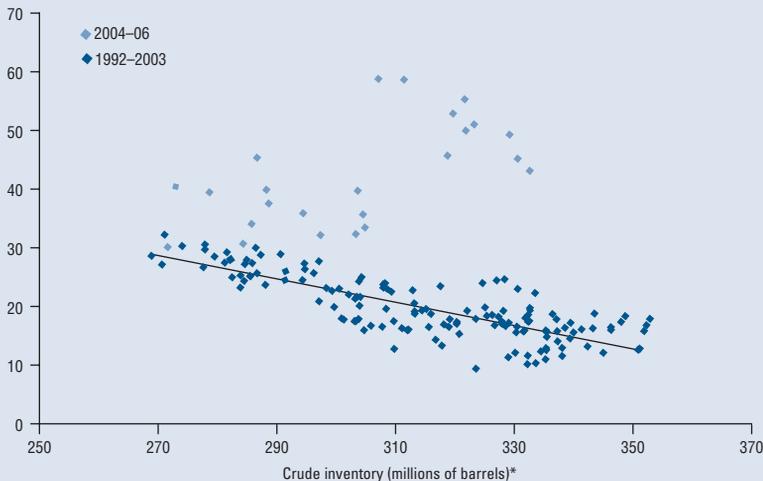


\* Average of absolute value of percentage weekly changes in the price of West Texas Intermediate crude oil.

SOURCE: Energy Information Administration.

**Figure 7**  
**U.S. Crude Oil Inventory vs. Price**

Refiner acquisition price of crude (dollars per barrel)



\* Excludes Strategic Petroleum Reserve.

SOURCE: Energy Information Administration.

futures market has fed these views. But recent studies suggest these new players have no significant impact on spot prices and a limited influence on longer-dated futures prices.<sup>7</sup>

It really doesn't matter whether oil producers are right or not. As long as they believe in this market, it will drive growth in Houston. The current tightness and high prices will end eventually, of course, as price-driven conservation results in investments that limit the use of oil, as new oil supplies come to market or as the demand for crude meets less heated economic conditions. Producers are simply betting that cooling this market will take time and that time is now on their side.

Houston finally seems to be once again riding the energy cycle. Recently revised data show that the city added 37,500 jobs in 2004 (a 1.6 percent increase) and 75,100 jobs in 2005 (3.2 percent). The 2005 gain was the largest since 1998, the last time the local economy was clearly being fueled by oil exploration and production. As producers have slowly accepted the durability of the current oil exploration cycle, Houston has moved to the cusp of yet another oil-driven economic boom.

—Robert W. Gilmer

*Gilmer is a vice president of the Federal Reserve Bank of Dallas.*

**Figure 8**  
**Oil Extraction Jobs in Houston, 1990–Present**

Thousands of jobs



SOURCE: Bureau of Labor Statistics.

## Notes

- <sup>1</sup> The prices quoted here are the refiner acquisition cost of imported crude oil and the wellhead price of natural gas, both reported by the Energy Information Administration.
- <sup>2</sup> This comparison is based on similar calculations explained in "Purchasing Managers Provide New Insight into Houston Economy," by Robert W. Gilmer, Federal Reserve Bank of Dallas *Houston Business*, December 1998.
- <sup>3</sup> *Monthly Oil Market Report*, International Energy Agency, July 17, 2006, p. 13.
- <sup>4</sup> OPEC's spare capacity is tracked monthly in IEA's *Monthly Oil Market Report*, in a table typically titled "OPEC Crude Oil Production." This relationship between spare capacity and price is a staple of presentations on current oil market conditions. See, for example, "Today's Oil Prices: Temporary Tightness, Paradigm Shift, or Speculative Bubble?" by Edward L. Morse, presentation to the Annual Energy Policy Conference of the National Capital Area Chapter, U.S. Association for Energy Economics, pp. 22–23, [www.ncac-usaee.org/policy\\_2005\\_ppt/policy\\_2005\\_ppt\\_pdf/Morse\\_NCAC\\_SAIS\\_05.pdf](http://www.ncac-usaee.org/policy_2005_ppt/policy_2005_ppt_pdf/Morse_NCAC_SAIS_05.pdf).
- <sup>5</sup> This chart is similar to and adapted from "Oil Market Overview," a presentation by David Fyfe of the International Energy Agency to the Committee on Non-Member Countries, Paris, Oct. 7, 2004.
- <sup>6</sup> Much more goes into determining Houston's employment than oil. But the U.S. economy (important to companies like Continental Airlines and HP/Compaq) and the global economy (important to a port city) have also been strong. Similar circumstances in 1997–98, with rapid U.S. and global growth and an oil boom, brought Houston 9.2 percent total job growth in two years, or 196,700 new jobs. For a discussion of productivity's role in dampening job growth, see "Upstream Employment Rises with Exploration," by Robert W. Gilmer and J. L. Story, *Oil and Gas Journal*, vol. 103, no. 30, Aug. 8, 2005, pp. 20–25.
- <sup>7</sup> "The Structure of the Oil Market and Causes of High Prices," by Pelin Berkmen, Sam Ouliaris and Hossein Samiei, Sept. 21, 2005, is a summary by International Monetary Fund researchers that concludes a tight market and the perception this market will remain tight are the primary reasons for high oil prices. The authors (like other literature they cite) find a limited role for nonindustry speculators to exert much influence on spot or futures prices. Available at [www.imf.org/external/np/pp/eng/2005/092105o.htm](http://www.imf.org/external/np/pp/eng/2005/092105o.htm). See also Morse (note 4).

**E**nergy is clearly beginning to move the Houston economy again. Oil and gas extraction jobs were up 5.9 percent in 2005, and manufacturing jobs rose 3.3 percent. The Houston Purchasing Managers Index jumped to 67.9 in January, its highest level since the measure's inception in 1995. Downtown real estate remains distressed, but energy companies are taking space again. Energy-driven corporate relocations are boosting an already healthy housing market.

### Retail Sales

Houston retailers reported strong January sales, perhaps partly the result of finally closing out the holiday season with the redemption of gift cards sold in December. But the strong start to 2006 turned soft in February, as department stores and discounters struggled to stay on plan. Upscale stores continue to report very good sales, while furniture stores complain of continued weakness.

### Real Estate

Energy is stirring the pot for downtown real estate, with at least one major office building acquisition by an energy company and others rumored to be in the works. However, energy mergers and downsizing are also returning space to the market, so the net change remains uncertain. At present, Houston still has too much space, and rents in the central business district are depressed. Citywide, at year-end Houston saw healthy gains in absorption, largely in Class A space.

Apartment absorption also picked up in late 2005, as many

hurricane evacuees moved from hotels. Class B space seemed to be the major beneficiary, based on absorption and improved rents.

After a record year for both new and existing home sales, the housing market accelerated in early 2006, thanks to an improving job market and corporate relocations. January might have been helped by warm weather, but that can't account for the fact that existing home sales were up 16 percent over last year. New home sales were up 23 percent.

### Energy Prices

Crude oil prices were near \$63 per barrel in early January and have ranged from \$58 to \$68 over the past two months. The primary factor driving prices has been geopolitical situations that threaten deliveries to a very tight market: militants in Nigeria, U.N. sanctions against Iran and attacks on Saudi oil facilities. A much warmer than normal winter pushed natural gas from \$9 per thousand cubic feet to below \$7. Inventories are currently 48 percent above their five-year average. Unless the weather turns extraordinarily cold soon, we will go into spring and summer with record-high inventories.

### Refining and Petrochemicals

Weak gasoline and heating oil prices have pulled refining margins down sharply, although even negative margins rebounded to five-year average levels by the end of February. Some re-

fineries briefly cut back production for economic reasons. Margins should strengthen, however, as gasoline prices bounce back over the summer. Operating rates on the Gulf Coast are declining as the industry begins the spring turnaround season. Many maintenance turnarounds will be longer than normal because last fall's hurricanes resulted in the postponement of so much work.

Prices of petrochemicals (such as ethylene, polyethylene, polypropylene, PVC and chlorine) have given ground this year but remain well above pre-hurricane levels. Downward price pressure has resulted from precautionary stocking of imports following the hurricanes, seasonal weakness and domestic production's return to normal levels. Product margins have been under pressure from price declines, but this has been offset by the declining price of natural gas feedstock.

### Oil Services

The domestic drilling market remains extremely strong, with the rig count adding about 75 rigs since early January. The increase is partly the addition of some foreign rigs and some hurricane-damaged rigs returning to service, but it's primarily new rigs going to work. Another 250 rigs are under construction, with some delivery delays caused by shortages of components. The key driver of activity is the same: land-based drilling directed toward natural gas.



For more information or copies of this publication, contact Bill Gilmer at (713) 483-3546 or [bill.gilmer@dal.frb.org](mailto:bill.gilmer@dal.frb.org), or write Bill Gilmer, Houston Branch, Federal Reserve Bank of Dallas, P.O. Box 2578, Houston, TX 77252. This publication is also available on the Internet at [www.dallasfed.org](http://www.dallasfed.org).

The views expressed are those of the authors and do not necessarily reflect the positions of the Federal Reserve Bank of Dallas or the Federal Reserve System.