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ENERGY HIGHLIGHTS

Federal Reserve Bank of Dallas January 1984

Estimates of Oil Price During Disruption Sensitive to Assumptions

A continuing Iranian threat to close the Straits of Hormuz has contributed to fears that the world could be facing the first major disruption of oil supplies in this decade. About 20 percent of the oil currently traded in the free world, or around 8.5 million barrels, passes through the straits daily. Although recent reports suggest that free market allocation of oil during a disruption of this magnitude could carry oil prices above $100 per barrel from the current $29, estimates of the expected increase are sensitive to the assumptions employed.

Market Theory

The price that oil reaches during a disruption depends on two factors: (1) the size of the shortfall that the disruption creates, and (2) the effect that a rising price has in curtailing world oil consumption. Under current market conditions, overland shipments to the Red Sea from Saudi Arabia and excess capacity in oil-producing countries outside the Persian Gulf could replace about 4 million barrels per day of the production lost with a closure of the Straits of Hormuz. Higher oil prices would encourage conservation and a substitution of other energy sources for oil, eliminating those uses of oil least valued in the market. In addition, a slowing of world economic activity, expected as a result of higher oil prices, would further reduce energy consumption.

Changing levels of oil inventories during a disruption can also have a significant influence on the price of oil. Oil prices are likely to be higher during a disruption than before or after. Therefore, the market is most likely to draw from inventories of oil during a disruption, reducing upward pressure on the price of oil. However, if it is unclear how severe the disruption may become, attempts to build inventories could increase upward pressure on the price of oil. Because inventories would be expected to drop in value after the disruption has ended, however, building inventories during a disruption could prove very costly.

Estimates

Using data roughly corresponding to

(Continued on back page)

Recovery, Energy Price Cuts Boost Petrochemicals Industries

Continuing economic growth and falling real energy prices should provide a strong boost to the petrochemicals industries in 1984. Production in these industries, which contributed 20 percent of Texas' value added in 1977, follows the same cyclical pattern as U.S. industrial production. Because short-run fluctuations in the production of both petrochemical industries (chemicals and plastics) are more volatile than total industrial production, however, these industries record stronger than average growth during recoveries. Furthermore, falling oil and natural gas prices and the development of new products can be expected to push the long-run growth rate of petrochemicals output above that of total industrial output.

Business Cycle Response

A comparison of monthly percentage changes in chemicals, plastics, and overall U.S. industrial production reveals that a change in overall industrial production is accompanied by a larger percentage change in chemicals and plastics production. Evidence since 1975 indicates that 10-percent increases in U.S. industrial production have coincided with 12-percent increases in chemical production and 16-percent increases in plastics production. If this relationship continues, gains in industrial production in 1984 are likely to lead to strong growth in the production of petrochemicals.

Long-term Trends

In addition to being more volatile, production in the chemicals and plastics industries has grown at a faster rate than total U.S. industrial

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Table 1
ESTIMATED WORLD OIL PRICE DURING A DISRUPTION

Assumed Disruption*	0.0	4.25			8.5		
Assumed Inventory Change*		-2.0	0.0	+2.0	-2.0	0.0	+2.0
Resulting Free World Oil Consumption[1]*	42.5	42.5	42.25	40.25	40.0	38.0	36.0
Estimated World Oil Price (Dollars per barrel)							
Case 1	$29.00	$29.00	$30.96	$52.93	$56.70	$100.00	$181.85
Case 2	29.00	29.00	29.87	38.06	39.27	50.75	66.50
Case 3	29.00	29.00	29.58	34.76	35.49	42.11	50.43
Case 4	29.00	29.00	29.23	31.20	31.46	33.71	36.25

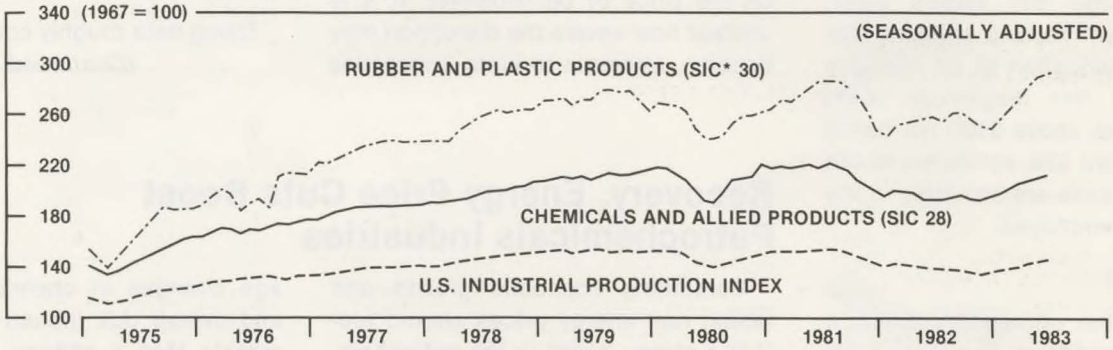
Assumptions for cases:

1. Short-run price elasticity of oil demand, -0.09; no economic slowdown.
2. Short-run price elasticity of oil demand, -0.2; no economic slowdown.
3. Short-run price elasticity of oil demand, -0.3; no economic slowdown.
4. Short-run price elasticity of oil demand, -0.2; an economic slowdown induced by higher oil prices, yields income effects that further reduce oil demand.

* Millions of barrels of oil per day.

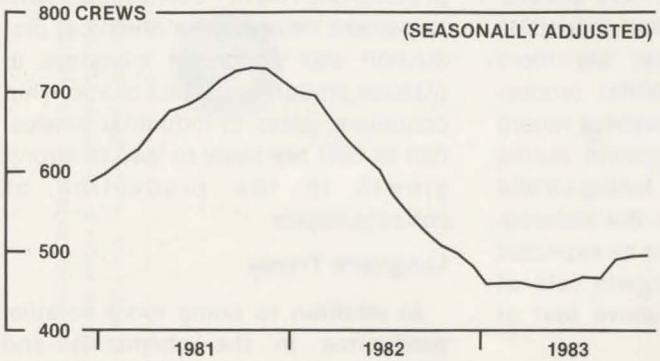
1. Resulting Free World Oil Consumption equals 1983 free world oil consumption (42.5), or it equals 1983 free world oil consumption plus excess capacity of 4.0 minus assumed disruption and assumed inventory change, whichever is smaller.

Chart 1
COMPARATIVE GROWTH OF PLASTICS, CHEMICALS, AND U.S. INDUSTRIAL PRODUCTION



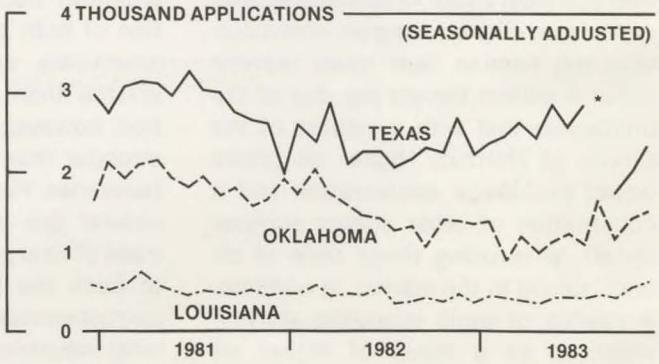
* Standard Industrial Classification Code.
SOURCE: Board of Governors, Federal Reserve System.

SEISMIC CREW COUNT



SOURCES: Society of Exploration Geophysicists.
Federal Reserve Bank of Dallas.

WELL PERMIT APPLICATIONS



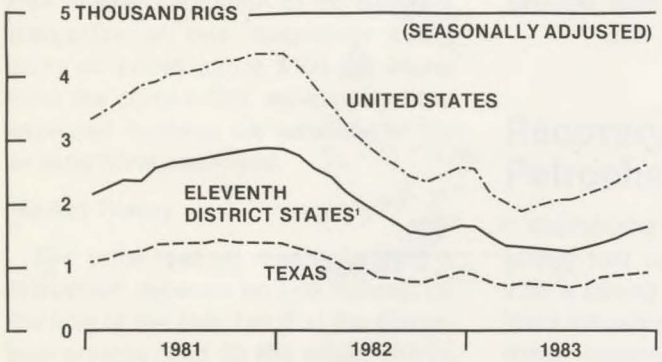
* August 1983 figure is 9,870.
SOURCES: Texas Railroad Commission.
Louisiana Office of Conservation.
Oklahoma Corporation Commission.
Federal Reserve Bank of Dallas.

ENERGY BRIEFS

Although stable oil prices and an expanding economy have sustained a mild recovery in the U.S. oil and gas industry, renewed weakness in spot oil prices may foreshadow reversals in some sectors.

- Drilling in Texas and the U.S. continued to respond to stable oil prices. On a seasonally adjusted basis the Texas and U.S. rig counts posted fourth quarter gains of 19 percent and 16 percent, respectively, over the third quarter.
- Leading indicators of drilling activity—the seismic crew count and well permit applications—climbed through November. The seismic crew count posted seasonally adjusted gains for the third consecutive month.
- Sharing in the recovery, Texas energy industry employment rose through November. Employment in the manufacture of oil field machinery was a seasonally adjusted 4.3 percent above its low of 44.0 thousand in May, while in oil and gas extraction, employment was a seasonally adjusted 4.4 percent above its most recent low of 278.8 thousand in June.
- Adjusted for the effects of Hurricane Alicia, refinery production in Texas during the third quarter of 1983 was 4.4 percent above that in the second quarter. However, falling demand may have been reflected in slipping spot prices for refined products and the slight decline that Texas refining showed in October.
- Despite a December OPEC decision to maintain current prices and production quotas, falling spot prices for crude oil continued to put downward pressure on official oil prices. The refining industry could expect to benefit from lower crude prices while natural gas production and drilling activity would suffer.
- Texas instituted a $100 filing fee for drilling permits in September. As a result, an abnormally high number of well permit applications were filed in August. Much lower totals in subsequent months can be attributed to the August filings.

ROTARY DRILLING RIGS RUNNING



1. Louisiana, New Mexico, Oklahoma, and Texas.
SOURCES: Hughes Tool Company.
Federal Reserve Bank of Dallas.

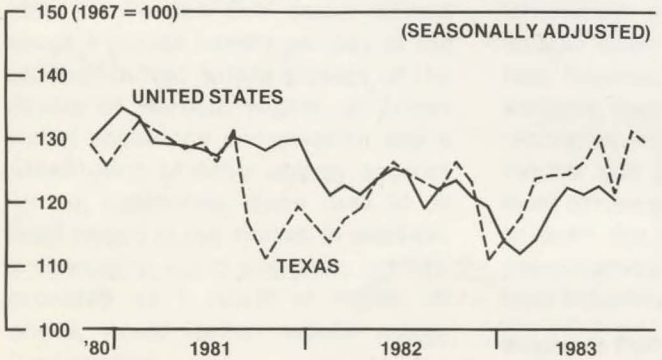
CRUDE OIL PRODUCTION AND NATURAL GAS EXTRACTION

(Seasonally Adjusted)

	Percent change from previous quarter				Daily average 1983:Q3
	1982	1983			
Oil	Q4	Q1	Q2	Q3	Thousand barrels
Texas	0.6	-0.2	-1.1	-0.1[2]	2,474[2]
District states[1]	0.2	0.7	0.3[2]	n.a.	n.a.
United States	0.1	-1.0	0.7	-0.2	8,661
Gas					Million cubic feet
Texas	-2.3	-4.3	-2.0	0.0[2]	15,760[2]
District states[1]	-5.5	-4.1[3]	-5.6	6.0[2]	37,531[2]
United States	-4.3	-3.9	-4.5	1.4[2]	43,702[2]

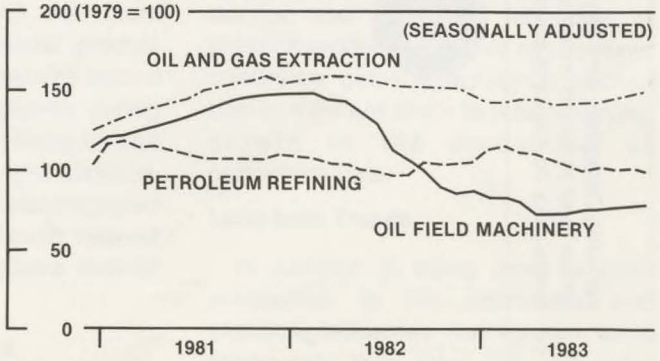
n.a. indicates not available.
1. Louisiana, New Mexico, Oklahoma, and Texas.
2. Preliminary figures.
3. Revised.
SOURCES: U.S. Department of Energy.
Federal Reserve Bank of Dallas.

REFINERY PRODUCTION



SOURCES: Board of Governors, Federal Reserve System.
Federal Reserve Bank of Dallas.

TEXAS ENERGY INDUSTRY EMPLOYMENT



SOURCES: U.S. Bureau of Labor Statistics.
Federal Reserve Bank of Dallas.

Estimates (cont.)

conditions prevailing in 1983, a variety of assumptions were employed to obtain estimates of the effect that a disruption could have on the price of oil. Because military experts doubt that Iran can sustain a total blockade of shipping through the Straits of Hormuz, both a total disruption (of 8.5 million barrels per day) and a partial disruption (of 4.25 million barrels per day) were considered. As is shown in Table 1, assumptions are the key in estimating the price to which oil rises during a disruption. If, for instance, it is assumed that there is no economic slowdown and that the demand for oil is very unresponsive to its price (a short-run price elasticity of demand more inelastic than -0.1), a price exceeding $100 per barrel is indicated. If the accompanying economic slowdown is considered or the oil demand is thought to be more responsive to price, however, much lower prices are to be expected.

—Stephen P. A. Brown

Petrochemicals (cont.)

production. (See Chart 1). Between 1975 and mid-1983, production in the plastics and chemicals industries grew 90 percent and 50 percent, respectively, while total U.S. industrial production grew only 27 percent. Higher growth rates in the petrochemical industries can be attributed primarily to the development of new products. For example, plastics have replaced steel and wood in automobile and home products. Similarly, the chemicals industry has developed a wide range of new products in the areas of pharmaceuticals, fertilizers, and synthetic materials.

Relative growth in these industries, however, is affected by changes in energy prices. Because oil and natural gas are major inputs to the petrochemicals industries, rising energy prices in years prior to 1981 slowed the growth rates of petrochemicals production. Conversely, the past year's decline in energy prices has given these industries an added boost. Additional oil price cuts in 1984 could be expected to increase the growth of the petrochemicals industries relative to total industrial production. For example, a 10-percent decrease in real oil prices, if coupled with a forecasted 10-percent increase in U.S. industrial production this year, would be expected to expand plastics and chemicals production by 18.8 percent and 12.3 percent, respectively.

—Ronald H. Schmidt
—Gary M. Ziegler

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