Strong Dollar Adds to Refining Woes

The U.S. refining industry has performed poorly during the current economic recovery. A common reason given for this poor performance is increased petroleum product imports—spurred by the strong dollar. This explanation is not completely supported by the facts because imports have no larger share of the petroleum product market than they had in the past. Reduced demand for refined products, brought about by energy conservation efforts and a shifting composition in U.S. industrial output, accounts for much of the reduction in national refinery production. The strong dollar has contributed to reduced U.S. demand for refined products by intensifying the shift of the industrial mix away from basic manufacturing.

Refining, Imports and the Dollar

Until recently, domestic refinery production generally mirrored movements in the U.S. economy as a whole. As shown in Chart 1, cyclical variation in domestic refinery production (adjusted for petroleum product prices) closely matched that of U.S. industrial output, accounts for much of the reduction in national refinery production. The strong dollar has contributed to reduced U.S. demand for refined products by intensifying the shift of the industrial mix away from basic manufacturing.

Increased competition from imports of refined products is not the problem. Although the share of U.S. petroleum product consumption claimed by imports has shown a gradual rise during the current economic recovery, it is at or below levels posted in the mid- and late seventies (Chart 2). Even the peak during the current recovery is below peak levels of earlier years. Furthermore, during the past year, both oil product imports and domestic refinery production have fallen in absolute terms.

Weak Demand is the Problem

The problem that U.S. refiners face is one of reduced demand for their products. Energy demand has grown more slowly during the current recovery than it did in previous recoveries. Reduced demand is the result of a number of factors—only one of which is the high value of the dollar.

Sharp increases in oil prices during the seventies led to a number of changes in the U.S. economy. Consumers undertook energy conservation programs. In addition, rising energy prices shifted the relative prices of goods throughout the economy. Those requiring more energy to produce became relatively more expensive. As a result, consumption—and, therefore, inventories—are subject to variation over time because holdings change based on expectations about the future price of crude oil (Chart 3). When prices are expected to rise, inventories are increased to protect against such increases. Suppliers draw down their inventories when they anticipate lower future prices which reduce the benefits of holding stocks relative to the costs.

Link Between Inventories and Oil Prices Weakens

In the past, changes in petroleum inventories exacerbated price movements in world oil markets. The situation is significantly different today, however. Inventories are currently so low that they are unlikely to be a major source of additional supply to the oil market. Conversely, market conditions make it improbable that oil companies will significantly increase their inventories. As a result, the Organization of Petroleum Exporting Countries (OPEC) cannot depend on an inventory buildup to bolster oil prices.

The Role of Inventories

Oil companies keep inventories of crude oil and refined products primarily to enable them to meet unexpected increases in demand and to guard against supply disruptions that would suddenly raise prices. Holding these inventories is expensive, however, because of storage costs and the alternative profitable uses for funds used to acquire the inventories.

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(Continued on back page)
Chart 1
REFINERY AND INDUSTRIAL PRODUCTION
15 PERCENT DEVIATION FROM TREND

*NOTE: Adjusted for changes in product prices.
SOURCE: Federal Reserve Bank of Dallas.

Chart 2
IMPORTS AS SHARE OF PETROLEUM PRODUCTS SUPPLIED


Chart 3
PETROLEUM INVENTORIES IN DAYS OF SUPPLY
85 DAYS (SEASONALLY ADJUSTED)


Chart 4
PETROLEUM INVENTORIES AND REFINER'S ACQUISITION COST OF CRUDE OIL
110 (JANUARY 1981 = 100) (SEASONALLY ADJUSTED)


SEISMIC CREW COUNT
700 CREWS (SEASONALLY ADJUSTED)


WELL PERMIT APPLICATIONS
4 THOUSAND APPLICATIONS (SEASONALLY ADJUSTED)

1. The August 1983 figure for Texas is 9,104.
The Eleventh District energy sector continues to feel the effect of depressed oil prices.

- World oil demand remains weak, falling well short of production capacity. As a result, downward pressure on prices has returned to world oil markets. Product prices, after firming in recent months, have shown renewed weakness lately, leading to lower spot crude oil prices.
- Problems with the differentials between the prices of light and heavy crude oil continue to plague OPEC. The settlement of the year-long British coal miners' strike reduced the demand for residual fuel oil, which is refined more readily from heavy crude. Mexico deviated in June from its support of OPEC's pricing structure by lowering the price of its heavy crude.
- The Environmental Protection Agency's "lead phasedown" program lowering the maximum lead content in gasoline to an average of 0.5 grams per gallon is likely to squeeze refiners' profits further. Attaining comparable octane levels without lead is more expensive, but refiners may not fully be able to pass the cost along to consumers.
- Depressed oil prices are accelerating the prolonged declines in both the Texas and United States rig counts. The number of active drilling rigs in Texas for June was 25 percent below its level a year earlier. The decline for the U.S. fell more than 20 percent on a year-over-year basis. Factors that are also depressing the rig count are takeover activity in the industry (which ties up funds that could be used for drilling) and fears of unfavorable tax law changes.
- Leading indicators foreshadow a further downturn in drilling activity. The rate of decline in the seismic crew count is equaling the pace of the rig count. Well permit applications are declining in Texas, Louisiana, and Oklahoma.
- Employment in oil and gas extraction and oil field machinery manufacturing have slumped along with the rig count. Month-to-month declines have occurred for most of 1985 and year-over-year growth rates have slowed.

### ROTARY DRILLING RIGS RUNNING

<table>
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<th>4 Thousand Rigs (Seasonally Adjusted)</th>
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<tr>
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<tr>
<td>2</td>
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<tr>
<td>1</td>
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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)

<table>
<thead>
<tr>
<th>Percent change from previous quarter</th>
<th>Daily average 1984-85</th>
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<table>
<thead>
<tr>
<th>Oil</th>
<th>Thousand barrels</th>
<th>Million cubic feet</th>
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<tbody>
<tr>
<td>Texas</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Regional states¹</td>
<td>0.0</td>
<td>0.3</td>
</tr>
<tr>
<td>United States</td>
<td>0.7</td>
<td>0.3</td>
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<table>
<thead>
<tr>
<th>Gas</th>
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<tbody>
<tr>
<td>Texas</td>
<td>-1.9</td>
</tr>
<tr>
<td>Regional states¹</td>
<td>-0.0</td>
</tr>
<tr>
<td>United States</td>
<td>-0.9</td>
</tr>
</tbody>
</table>

1. Louisiana, New Mexico, Oklahoma, and Texas.
2. Preliminary figures.

**SOURCES:** U.S. Department of Energy, Federal Reserve Bank of Dallas.

### REFINERY PRODUCTION

<table>
<thead>
<tr>
<th>140 (1967 = 100) (Seasonally Adjusted)</th>
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<tbody>
<tr>
<td>130</td>
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<tr>
<td>120</td>
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<td>110</td>
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**SOURCES:** Board of Governors, Federal Reserve System, Federal Reserve Bank of Dallas.

### TEXAS ENERGY EMPLOYMENT

<table>
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<th>170 (1979 = 100) (Seasonally Adjusted)</th>
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<tr>
<td>140</td>
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<tr>
<td>110</td>
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<tr>
<td>80</td>
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Strong Dollar (cont.)

production—began to shift away from these energy-intensive goods.

Appreciation of the dollar may have exacerbated this shift in the industrial mix. During the current economic expansion, manufacturing has not kept pace with the remainder of the economy. Some research has tied the weakness in manufacturing to strength of the dollar. Many U.S. manufacturing industries compete with imported products or sell to export markets. The strong dollar has made imported goods relatively cheap in the United States and U.S. goods relatively expensive in foreign countries. One consequence has been reduced output and, hence, reduced energy consumption by these industries.

—William T. Long Ill and Stephen P. A. Brown

Link (cont.)

As Chart 4 shows, prices and inventories move together. Both peaked in 1981 and have since trended downward.

In recent years, the response of inventories to price movements has tended to destabilize petroleum prices rather than smooth them out. In 1979 the Iranian revolution interrupted the normal flow of oil exports from that country. The shortage worsened when oil companies, expecting further increases in petroleum prices, added to their stocks. Prices were significantly affected by inventories again in 1983 when inventories fell an average of 1.5 million barrels per day, supplying nearly 10 percent of U.S. consumption. This increased pressure on OPEC to lower oil prices. Given the size of inventory changes, it is not surprising that the major declines in oil prices have accompanied substantial reductions in inventories, as Chart 4 shows.

Outlook

In the United States during May, inventories equaled about 67 days of consumption, very near the recent low of 65 days supply reached in early 1984. This level is close to the minimum inventories needed to operate refineries and pipelines efficiently, and is much lower than the 82 days of consumption available in early 1983. The current level precludes much further drawdown so that inventories are not likely to be a source of downward pressure on prices. On the other hand, oil companies have little incentive to add to inventories. The large amount of excess oil-producing capacity will prevent any significant supply disruption and accompanying price increase. With this price outlook, oil companies probably will be comfortable with the low stocks levels that have persisted for the last two years.

—Roger H. Dunstan and William T. Long Ill

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.