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# FRBSF WEEKLY LETTER

December 19, 1986

## Does OPEC Set Oil Prices?

Over the first half of this year, the price of oil fell by more than fifty percent. The proximate cause of this sharp drop was the failure of the members of OPEC to agree on the steps needed to reduce the cartel's output of oil. This disagreement and its eventual outcome contrasts markedly with the two sharp increases in the price of oil during the 1970s, when the cartel was successful in coordinating its efforts to curtail output. These episodes appear to have fostered the belief that OPEC alone can determine the price of oil.

In this *Letter*, we argue that there is substantial evidence indicating that the foreign exchange value of the dollar significantly influences the price of oil even though short-term swings in that price make it appear to be determined independently of other economic developments. While OPEC's actions have had a considerable impact on the price of oil over the last fifteen years, the nature of this impact has had more to do with the extent and the timing of these price changes than their direction.

### **The dollar and the price of oil**

The value of the dollar has an important influence on the price of oil because crude oil traded in world markets is priced in dollars. When the value of the dollar falls, oil-importing nations find that the price of oil in terms of their own currencies has also fallen. Consequently, they raise their consumption of oil. At the same time, oil exporters discover that the price of oil measured in their own currencies has decreased. They react by reducing the quantity of oil they are willing to supply at the prevailing dollar price. Both reactions tend to raise the dollar price of oil.

Thus, a decrease in the value of the dollar will lead to an increase in the dollar price of oil. Similarly, an increase in the value of the dollar will lead to a decrease in the dollar price of oil.

This discussion is not meant to deny a role for OPEC in determining oil prices. Since the value of the dollar affects the revenues of oil producers, it is extremely likely that OPEC's actions are strongly influenced by changes in the value of the dollar.

### **Relationship until 1985**

The behavior of oil prices and the dollar's value from the late 1950s to 1985 is consistent with the hypothesis presented. Oil prices were relatively stable until about 1970, as was the dollar's value (see Chart 1). Large declines in the value of the dollar preceded both "oil shocks" of the 1970s. And the large increase in the value of the dollar in the early 1980s was followed by falling oil prices.

Formal statistical tests confirm the existence of an inverse relationship between oil prices and the dollar. Test results reveal that an increase in the value of the dollar begins to lower the price of oil approximately two quarters later, with the peak effect occurring after approximately two years. Furthermore, changes in the value of the dollar account for almost half of the variation in oil prices over the period 1956-1985.

### **Interpreting the findings**

These findings suggest that, given the behavior of the dollar during this period, the dollar price of oil would have increased in the 1970s and decreased in the 1980s even in the absence of OPEC. More specifically, they suggest that a large proportion of the price increases that took place during the so-called oil price shocks of the 1970s actually represented discontinuous price adjustments to changes in the economic environment. This discontinuity in oil price changes probably resulted from the cartel's mode of operation, which has been one of making large changes in output while adhering to a pre-announced dollar price.

The 1973 "oil shock" episode provides one example of this behavior. The rate of inflation in the United States had begun to pick up in the late 1960s. The dollar depreciated sharply in 1971, stabilized for a while, and then fell again in late 1972-early 1973. The price of oil stayed more or less unchanged until well into 1973, when it jumped to approximately 3 times its earlier level. In a competitive market, the dollar price of oil would probably have reflected changes in the dollar's value somewhat earlier.

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Once again, we are not claiming that the entire increase in oil prices during this episode can be explained by exchange rates, only that a considerable proportion of it would have taken place — perhaps in a more gradual manner — even without OPEC.

## The price of oil in 1986

At first glance, the sharp fall in the price of oil in early 1986 seems to contradict the hypothesis discussed earlier. After all, the dollar had been falling since early 1985. Why then did the price of oil decline so dramatically? To answer this question, we need to look at developments a few years earlier.

The dollar began to appreciate steadily after 1980. This appreciation, which continued for approximately five years, tended to reduce non-U.S. demand for oil while increasing supply from countries other than OPEC. In the absence of any action by the cartel, these developments would have reduced the price of oil.

OPEC's response, with the exception of a small price cut in 1982, was to make large reductions in output. Through cutbacks, it succeeded, at least for a time, in keeping oil prices relatively stable — in marked contrast to the prices of other commodities. But while the cartel managed to slow the price adjustments required by market forces, it was ultimately unable to withstand the pressures generated by the conflict between these forces and its own policies. Disagreements about how the necessary reductions in output were to be allocated among members of the cartel led to the collapse of oil prices.

A straightforward way to test the validity of this scenario is to use statistical techniques to measure the historical relationship between the value of the dollar and the price of oil, and then to predict the price of oil today on the basis of this relationship. Such a test was carried out by estimating the relationship between the quarterly growth rates of the price of oil and the exchange rate from 1959 to 1978, which is the year before the "second oil shock". This relationship and the actual values of the exchange rate were then used to "predict" the growth rate of the price of oil from the first quarter of 1979 to the second quarter of 1986.

Chart 1  
The Price of Oil has Varied Inversely with the Dollar's Value

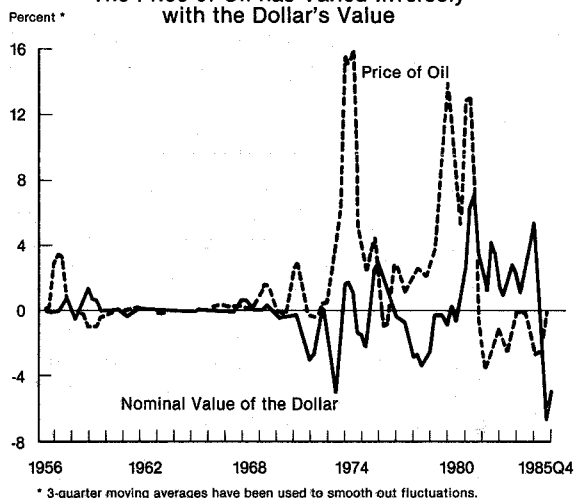
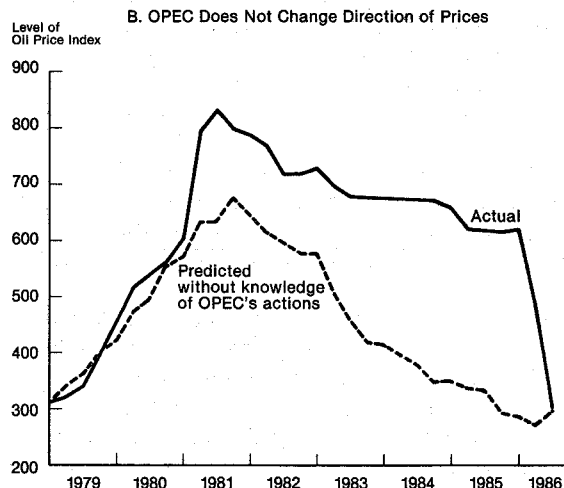
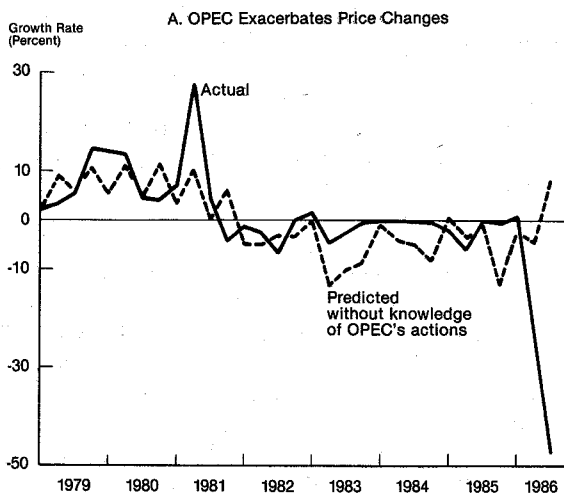


Chart 2  
OPEC's Impact on the Price of Oil



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The results (shown in Chart 2A) reveal that, given knowledge of the relationship between oil prices and exchange rates prior to 1979 and the value of the dollar since then, we would have predicted increases in the price of oil through the end of 1981. Since this prediction is made without knowledge of OPEC's actions, it implies that the widely held view that the price of oil increased in 1979 simply because OPEC decided to charge more for a barrel of oil should be treated with some skepticism.

Based on the historical relationship, we would also have predicted decreases in the price of oil through the first quarter of 1986. This pattern is consistent with the actual changes in oil prices over this period, although we do underestimate the increases in the pre-1982 period (most noticeably in the first quarter of 1981) and predict decreases that were sharper than those that actually occurred prior to the second quarter of 1986. We are also unable to predict the large decline that took place in the second quarter.

In terms of the levels of oil prices, the "predicted" value tracks the actual price quite closely in the beginning of the period, and, like the actual price, also begins to decrease after the middle of 1981 (see Chart 2B). However, after that year, it drops at a noticeably faster pace than actual oil prices; at the end of 1985, the predicted price level is quite a bit lower than the actual price. Nevertheless, the large decline in oil prices in 1986 actually brings the actual price back into line with the predicted value.

These results are not meant to demonstrate the existence of a hypothetical "free-market" price of oil that is determined solely by the value of the dollar. Other forces obviously influence the price of oil. What these results do provide is strong evidence that the exchange rate is an important determinant of oil prices.

They also suggest that the recent behavior of oil prices is not very different from what we have seen before. OPEC's policy of maintaining "stable prices" once again forced a sharp adjustment instead of the gradual changes that may otherwise have taken place in response to changing economic conditions.

There is, of course, a difference in the present direction of OPEC's efforts — the cartel is now obviously unwilling to accept lower oil prices. But the crucial point is that the existence of the cartel appears to have had the same effect on price changes in either direction: it has made them jump sharply each time.

### **Conclusions**

Although OPEC succeeded in keeping prices higher than they otherwise might have been in the 1970s, it would be wrong to ascribe the entire change in oil prices that took place during the various oil shocks to the whims of the cartel. A considerable proportion of these changes was due to changes in the economic environment, but the cartel's mode of operation led to sudden, large jumps in the price of oil. These discontinuous movements have, in turn, exaggerated the apparent importance of OPEC in determining the price of oil.

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## BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT (Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 11/26/86	Change from 11/19/86	Change from 11/27/85 Dollar	
Loans, Leases and Investments <sup>1 2</sup>	203,892	— 825	4,661	2.3
Loans and Leases <sup>1 6</sup>	183,473	— 864	2,996	1.6
Commercial and Industrial	49,988	— 761	— 1,911	— 3.6
Real estate	66,968	— 220	1,162	1.7
Loans to Individuals	39,725	144	1,652	4.3
Leases	5,577	2	152	2.8
U.S. Treasury and Agency Securities <sup>2</sup>	12,655	142	1,270	11.1
Other Securities <sup>2</sup>	7,764	— 104	394	5.3
Total Deposits	208,625	2,494	4,493	2.2
Demand Deposits	56,526	3,200	4,742	9.1
Demand Deposits Adjusted <sup>3</sup>	37,153	1,063	— 10,162	— 21.4
Other Transaction Balances <sup>4</sup>	18,228	25	3,774	26.1
Total Non-Transaction Balances <sup>6</sup>	133,872	— 729	— 4,021	— 2.9
Money Market Deposit				
Accounts—Total	46,403	— 500	763	1.6
Time Deposits in Amounts of				
\$100,000 or more	32,345	— 318	— 6,176	— 16.0
Other Liabilities for Borrowed Money <sup>5</sup>	26,362	— 1,353	156	0.5
<b>Two Week Averages of Daily Figures</b>	<b>Period ended 11/17/86</b>	<b>Period ended 11/3/86</b>		
<b>Reserve Position, All Reporting Banks</b>				
Excess Reserves (+)/Deficiency (—)	66	21		
Borrowings	63	64		
Net free reserves (+)/Net borrowed(—)	3	— 42		

<sup>1</sup> Includes loss reserves, unearned income, excludes interbank loans

<sup>2</sup> Excludes trading account securities

<sup>3</sup> Excludes U.S. government and depository institution deposits and cash items

<sup>4</sup> ATS, NOW, Super NOW and savings accounts with telephone transfers

<sup>5</sup> Includes borrowing via FRB, TT&L notes, Fed Funds, RPs and other sources

<sup>6</sup> Includes items not shown separately

<sup>7</sup> Annualized percent change