



## A Crude Crude Oil Calculation

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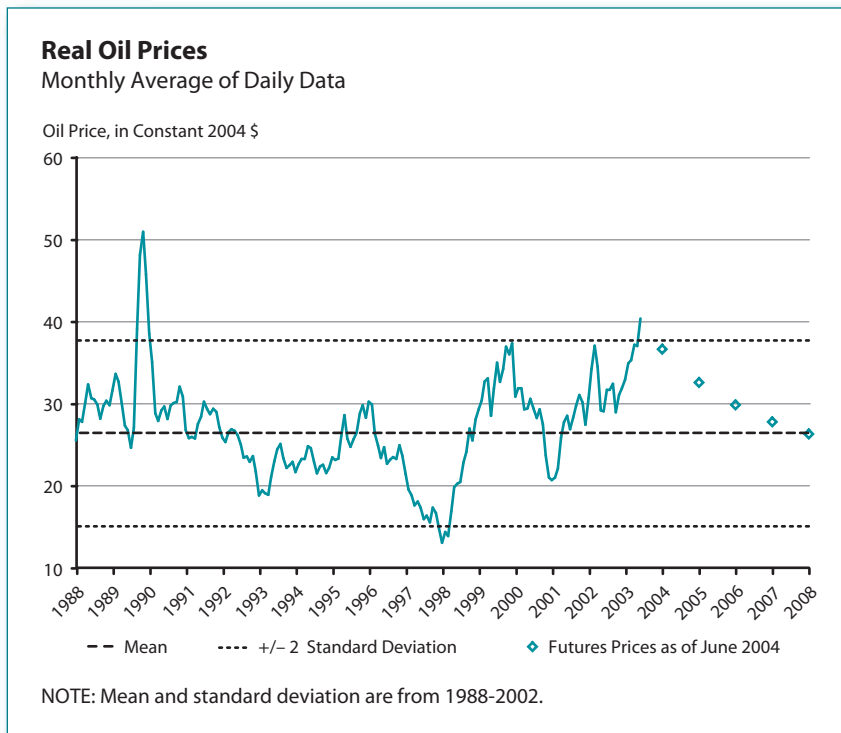
A key macroeconomic development during 2003 and 2004 has been the higher price of crude oil. Analysts have attributed the higher price to several possible sources, including supply disruptions in key oil-producing countries, demand increases from a global economy performing better than expected, especially in Asia, and a risk premium associated with an uncertain security environment in the Middle East. Oil prices have a long and checkered history in U.S. and global macroeconomics, with some analysts going so far as to associate every postwar U.S. recession with sharp increases in oil prices. In this context, it is important to try to assess the impact of the present episode. Has the recent price behavior in this market changed significantly from what it was over the previous 15 years?

The chart shows the monthly average price of a barrel of West Texas intermediate crude oil from 1988 through June 2004, deflated by the U.S. consumer price index (CPI) to obtain the price in constant 2004 dollar terms. The mean plus and minus two raw standard deviations of these prices, calculated from 1988-2002, are indicated in the chart. The two-standard-deviation rule of thumb is one simple way to separate unusually large movements from ordinary fluctuations. Prices consistently outside the two-standard-deviation band might indicate that the market has undergone some type of structural shift and that the inflation-adjusted mean price might be substantially higher in the future.

The chart indicates that, as a first approximation, this market displayed a constant mean price of about \$27 per barrel in 2004 dollars through the period 1988 to 2002. Since 2002, the real price has increased, recently moving outside the two-standard-deviation band. This price is higher than any observed since 1988, except for the brief period of \$50-per-barrel oil during the run-up to the first Gulf War. So even taking normal volatility into account, today's prices are high.

The question is, should we expect this price level to be sustained?

One way to answer this is to consider the futures market prices for this commodity. The December contracts for 2004 through 2008 stipulate an expected future price, which we can then convert into 2004 dollars by guessing an expected rate of CPI inflation in the U.S. over the life of the contract. The University of Michigan monthly survey of household expectations suggests this longer-run expected inflation rate is currently about 3.0 percent, and we will assume it is constant through December 2008. The diamonds in the chart indicate the real price of crude oil expected in futures markets according to this measure. The calculation suggests that the price of crude oil will return to its 1988-2002 mean gradually over the next several years. By this measure, the market does not foresee a substantially higher long-run real price of oil. ■



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