Analyzing Basic Fundamentals of the U.S. Energy Market

by Ritta Beale and Cynthia Kase

For more than 60 years *The American Petroleum Institute's Weekly Statistical Bulletin* – commonly called the *API* statistics, the "stats" or the "APIs" – has formed the cornerstone of U.S. fundamental energy analysis.

While opinions vary on the use of API statistics to determine trading strategy, everyone pays attention to their release on Tuesday evenings (U.S. time). Correlation coefficients between the statistics and futures prices are not high, but this is only because it remains, even in this age of computer-candlesticks, hard to quantify reality precisely.

Because futures markets are also impacted on an ongoing basis by international fundamentals, by news reports and by information passed by word of mouth, buying or selling for a short-term move based on the API statistics can be dangerous. However, when studied over time, the statistics can form a valuable framework for longer-term trading decisions.

The weekly report is a snapshot of the U.S. oil industry. As such, it can provide valuable insights about U.S. supply and demand.

The API collects raw data from some 350 companies that are operators of refineries, bulk terminal, pipelines and importers. Inventories held by this segment of the industry at the top of the supply chain are called primary inventories.

The box on the next page lists all statistics found in the report. Of the many items available, inventory positions for crude oil, distillate and gasoline are the most widely anticipated.

This is because inventory movements of these key commodities reflect, in a single number, the most complete picture of all events related to inputs, outputs, imports and consumption.

Besides reporting national figures, the API report divides the United States into five geographical regions called PAD districts – Petroleum Administration for Defense districts as they were devised during World War II (see map below). These are subdivided into 12 refining districts.

Regional analysis is necessary to form a complete fundamental picture. The East Coast and Midwest together consume 55% of total supply and rely heavily on the Gulf Coast, which refines 46% of the supply but consumes only 25%. West Coast statistics rarely impact New York Mercantile Exchange (NYMEX) prices due to geographical isolation.

Dependence of the northern United States on the Gulf Coast makes the market sensitive to location because oil is a physical commodity and cannot, like financial instruments, be wired. Transportation may become a bottleneck because of the 14 to 24 days it takes to move oil from the Gulf to the Northeast.

For example, halfway through the record cold snap of December 1989, primary distillate inventories on the East Coast were 23% below the three year average (see graph, bottom of page 20). A look at total U.S. Stocks would have shown only a 14% shortfall. It helps to know that heating oil makes up a significantly larger share of the residential fuel mix on the East Coast than in the Mid west.

While you must be aware of transportation links, note that additional caveats also apply.

Many physical oil traders believe due to the time lag in reporting, those "in the know" have already anticipated much of what will be released.

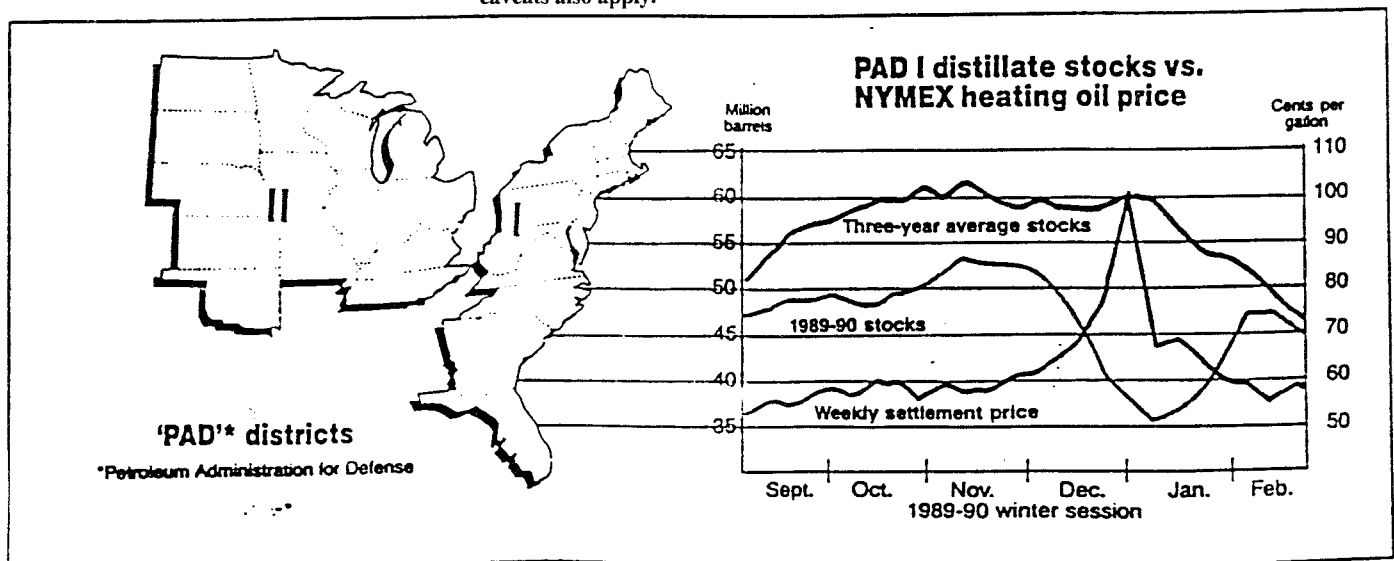Also, oil just coming into company systems occasionally misses the deadline for reporting.

So, upon release, data is at best five and possibly 12 days old. The degree of futures market reaction depends partly on how the report differs from anticipated figures.

Reporting is voluntary, so company sampling tends to be incomplete. Data inherently contains some error but, as a rule, refiners tend to take reporting seriously and try to comply fully. The API numbers are believed to over 100% of total refinery inputs.

Further downstream however, product inventories are viewed as more strategically important and therefore, are less widely reported.

Because the API counts oil only at the primary level, sometimes inventory figures can be misleading if custody only shifts from primary to secondary – that is, into the hands of jobbers and re-sellers. Such movements can give false impressions about real consumption.

Disappearance of crude stocks can also be misinterpreted as in the case of conversion into feedstock, which displaces crude as refinery feed in the future. Also note that exports are not stated explicitly but rather are buried within primary stock movements.

'PAD'* districts

*Petroleum Administration for Defense

PAD I distillate stocks vs. NYMEX heating oil price

Million barrels

Cents per gallon

Three-year average stocks

1989-90 stocks

Weekly settlement price

Sept. Oct. Nov. Dec. Jan. Feb.

1989-90 winter session

Also the shift toward cleaner gasoline has changed spring inventory patterns as jobbers drain tanks to accommodate new grades.

Short-term wobble

These and other inherent inaccuracies can cause week to week aberrations in the statistics. Often, they are corrected the next week or evened out in a few weeks. Thus, evaluating statistics in the context of the longer term is the most valuable approach.

The chart comparing distillate stocks in early 1991 vs. 1990 seems to indicate stocks were quite high. In fact, they were well below the three year average. Without comparing against the average, a trader may not know whether a rising or falling market is more typical.

Generally, API data is transformed from its raw form for analysis. Each trader must decide what method is most suitable, given his or her trading time frame and purpose.

"Days of supply" (days of supply = inventories ÷ rate of consumption) is one of the more revealing statistics in determining if stocks are high or low. It represents the theoretical number of days stocks cover demand in a given consumption environment.

Supply data can be used to build a proxy for the rate of consumption, given the timeliness of the API report. Apparent consumption = refinery output + imports - stock change.

Traders also study mathematical relationships between API data and futures prices to assess opportunities and risk. The relation between Mid-continent crude oil supply and the backwardation, or contango, in futures market is of particular interest to energy market traders. The Mid-continent is relevant as Cushing, Oklahoma, is the physical delivery point for NYMEX's crude contract.

The bottom chart on the previous page shows the regression line and data points for past gasoline seasons.

Tests, such as the t-test and f-test, reveal that, while the relationship is statistically significant correlation is low. Therefore, you cannot feel totally confident using such analysis all the time.

Similar results appear in the relationship between East Coast distillate stocks and heating oil prices during winter in the United States.

Other statistics can be examined regularly to gain insights into U.S. oil market fundamentals. Becoming familiar with API data and manipulation is not easy, but it is a good place to begin developing a fundamental understanding of the market.

Once such evaluations are integrated into your trading process, they will help set the stage for analyzing longer-term price behavior.

API Statistics

REFINERY OPERATIONS
Refinery Inputs
Crude Runs
Inputs to Crude Unit
Utilization Rate

REFINERY OUTPUT
Total Gasoline
 Leaded
 Unleaded
Naphtha Jet
Kerosine Jet
Distillate Fuel
Residual Fuel

PRODUCT STOCKS
Total Gasoline
 Leaded
 Unleaded
 Blending Components
Naphtha Jet
Kerosine Jet
Distillate Fuel
Residual Fuel
Unfinished Oils

CRUDE DATA
API Production
DOE Production
Total Crude Imports
Imports from Canada
Crude Stocks
Alaskan Crude in Transit

PRODUCT IMPORTS
Same as Product Stocks
plus LPG
 Other Category
 Total

API weekly distillate inventories

PAD II crude supply vs. WTI intermonth futures spread
(For 1986-1991, April 1 through Aug. 31 only; each dot represents one day)

Days' supply of PAD II crude stocks

*West Texas Intermediate oil futures, first/second month spread