

Petroleum Industry Research Foundation, Inc.

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New York, N. Y. 10168

HEATING OIL PRICES AND CRUDE OIL COSTS

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Since the beginning of the current heating season there have been repeated charges in the media and by some public officials that heating oil prices are not market sensitive. The principal evidence cited is that while crude oil prices declined throughout 1985, and much more since then, heating oil prices have not reflected this decline at the wholesale or retail level. This paper attempts to examine these assertions and analyze the factors which determine the price of heating oil.

Our examination shows that:

- o Over the longer term, heating oil and other products prices follow crude oil prices;
- o In the short term, product markets will dictate the timing and the extent of a crude oil price passthrough;
- o The threat of a severe price decline in crude oil and products markets influenced inventory management behavior and thus the supply/demand balance for heating oil by the 4th quarter 1985;
- o The low distillate inventories at the onset of the heating season caused prices to rise rapidly in the 4th quarter at both the wholesale and retail levels;
- o Retail prices respond more slowly (up and down) and are less volatile than wholesale prices over short periods of time;
- o Wholesale prices started to decline in December and retail prices in January in response to the drop in world crude oil prices. Currently most prices are lower than a year ago and additional reductions are very likely during the remainder of the heating season.

Historical Relationship between Heating Oil and Crude Oil Prices

Let us start with an examination of the longer term price relationship between crude oil prices and wholesale and retail heating oil prices.

**CRUDE OIL COSTS AND DISTILLATE FUEL (NO. 2) OIL PRICES,
ANNUAL, 1981-85**

	Crude Oil Refiner <u>Acquisition Cost</u>	No. 2 Oil			Northeast <u>Retail Prices</u>
		New York Harbor <u>Barge Prices</u>	N.Y. Metro Area Terminal <u>Prices</u>		
	<u>\$/Bbl</u>	<u>cents/gallon</u>			
1981	35.24	83.90	95.86	99.88	125.82
1982	31.87	75.88	90.58	95.29	121.88
1983	28.99	69.02	79.65	84.90	110.59
1984	28.63	68.17	78.60	85.00	112.85
1985	26.75	63.69	76.53	81.45	107.72
1981-85		-20.21	-19.44	-18.45	-18.10
1984-85		-4.48	-2.07	-3.55	-4.93

The table shows that since 1981 (the peak year for all oil prices) the annual averages of all four prices declined by about the same order of magnitude.* The table shows further that the nationwide average refiner crude oil cost was equal to about 85% of the wholesale price, the New York barge price, of distillate fuel oil. The same calculation for retail price shows crude cost at about 60% of the Northeast's retail price. Thus, while the principal cost factor in all distillate prices is the crude oil cost component, these prices are also affected by other costs and market factors. For example, each distribution level incurs operating costs and seeks a profit.

*"Barge" prices represent purchase prices for wholesalers and those retailers able to accommodate large shipments. "Terminal" prices represent the price to a retailer buying truck lots "under the rack" at a wholesaler's tank farm or other storage facility. Many retailers do not maintain their own storage facilities.

Operating costs for marketers include storage, transportation, and labor. As shown in the attached table, which is based on a trade publication's survey of retailers, the cost of delivery (trucks and truck fuel, driving, etc.) was the most important operating cost item in the 1980-81 heating season. By 1984/85 however, "overhead" had become the most important operating cost. Part of the reason for the rapid rise in overhead is the declining sales volume for many operations. While the average seasonal use per heating oil customer in the New York metropolitan area was 1200 gallons in the late 1970's, it has fallen to less than 900 gallons in the mid-1980's.

**OPERATING COSTS AND PROFITS OF HEATING OIL MARKETERS,
HEATING SEASON 1980/81 AND 1984/85**

	(cents/gallon)	
	<u>1980/81</u>	<u>1984/85</u>
Costs		
Bulkplant	1.73	2.43
Delivery	5.54	6.35
Selling	1.52	2.23
Overhead	4.70	7.02
Total	13.49	18.03
Gross Margin	17.53	25.41
Profit	4.04	7.38

Source: Fuel Oil & Oil & Oil Heat

It should be pointed out that virtually all heating oil retail marketers in the U.S. are unaffiliated with refining companies. Thus, retail price decisions are not made by refining companies but by independent business firms which buy products at arms-length from refiners, terminal operators or jobbers in cargo, barge or truck lots, depending on location and size of operations. Some of these firms have only retail operations, others are also wholesale marketers.

While crude oil costs are the major determinant of product prices in the longer term, other market factors can weigh more heavily in the short term. These short term factors and recent price trends are outlined in the ensuing sections.

Market Perceptions and Balances

The most important determinant of prices in the short term is the perceived supply/demand balance. Leading up to the current heating season, concern was expressed that the rate of inventory build was abnormally low and that this would cause tight supplies and consequent price increases during the heating season. The concern was justified for a period. In September, October and November end-of-month primary inventories were 18%, 20% and 14% respectively below the year-ago level and substantially below the comparable level in any recent year. However, by mid-December the year-to-year difference had fallen to 10% and, from then to mid-February 1986 it fell still further.

The principal reason for the lower than normal stock accumulation during the fall of 1985 was price uncertainty. At a time of a generally declining price trend with wide short term fluctuations, refiners and terminal operators (who together

account for the bulk of primary products inventories) wanted to postpone seasonal inventory build as long as possible to minimize potential large inventory losses. Of course, even at its lowest point the level of inventories was volumetrically fully adequate to meet all end-use requirements at all times.

Low inventory levels were, however, not limited to the U.S. nor to distillates last Autumn. Low crude stocks worldwide caused spot crude oil prices to rise above \$30/Bbl (compared to U.S. crude oil postings of \$28). In the U.S. the extremely low heating oil inventories caused wholesale prices to rise by 18 cents/gallon from July to November. (Retail prices rose by much less, so retail margins were compressed in the early heating season. Retail markets are discussed in a later section.)

Other factors--market responses--counteracted the rising trend. Refiners responded by increasing distillate supplies. For instance, the distillate share of products output and the actual volumetric output in the 4th quarter 1985 were at their highest level in a decade. Furthermore, refiners and marketers increased distillate fuel imports: while imports had dropped by 32% from the year-ago level in the first 11 months of the year, they were 53% higher than last year's level in the month of December and 45% higher in January 1986 than in January 1985, according to Department of Energy data.* Thus, the total new supply of distillate heating oil in the first 2 months of the prime heating season was significantly higher than a year ago.

*Since mid-February distillate imports have been again below the year-ago level due to exceptionally cold weather in Europe.

Distillate supplies in the U.S. come from a variety of sources and a variety of market players. The table below shows the supply balance for middle distillates in the 17 East Coast states which make up the oil industry's PAD I and which account for about 80% of total U.S. residential heating oil sales. Last year the region required about 1 million B/D in total distillate fuel oil. About 30% of this supply came from local refineries, nearly 20% from foreign sources (mostly from Caribbean, Venezuela and Canadian refineries) and just over half from U.S. refineries outside PAD I, primarily the Gulf Coast.

**PAD I (EAST COAST)
DISTILLATE FUEL OIL BALANCE, 1985**

	<u>MB/D</u>	<u>%</u>
Local Refinery Production	297	29
Imports	176	17
Transfers from Other PADs	527	51
Stock Withdrawals	<u>38</u>	<u>4</u>
	1037	100

Source: Department of Energy

Since most East Coast and Gulf Coast refineries as well as most foreign refineries have substantial spare capacity, distillate fuel oil supply is highly responsive to price changes. This is particularly true on the U.S. East Coast, where a critical role is filled by a tier of large independent marketers, especially terminal operators, who buy distillate fuel oil in cargo lots from foreign and domestic refineries for resale or direct retail distribution. These companies are primary

suppliers to the region, and have superseded refiners in their importance in the regional products market.

Recent Price Trends

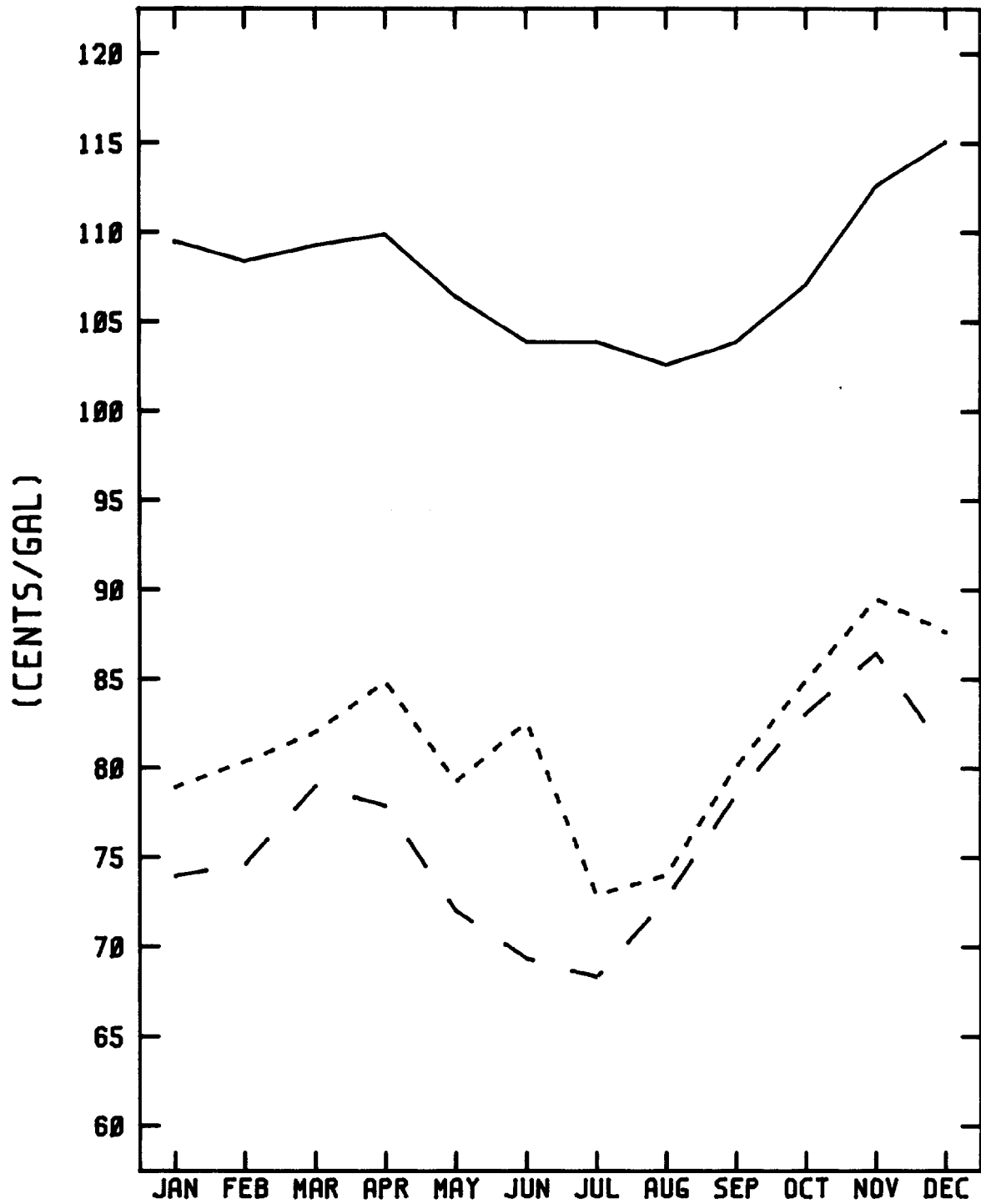
As the graph below shows, Northeast retail prices were below a year ago for the first 10 months of 1985 but rose 3.5 cents/gallon above the year-ago level in November and 6.3 cents in December. In the New York Metropolitan terminal market the price increase started in September and continued through December. In the N.Y. Harbor barge market the rise began in October and continued through November.

In December 1985 barge prices started to decline and by January 1986 the monthly average was 10% below the year-ago level. Metropolitan terminal prices also declined below the year-ago level in January but only by 3.5%.

Retail prices continued to rise in December, reflecting in part the higher priced inventory, but dropped somewhat in January and even more in February when they dropped below the year-ago level. Thus, in N.Y. State the average heating oil price in mid-January was \$1.132/gal or about 3 cents below the December average but still slightly above a year ago. By mid February, however, the price had dropped to \$1.039 or 7 cents below the year-ago level, according to the N.Y. State Energy Office (see the table below). Similarly, a dealer survey by Platt's Oilgram Price Report showed that in six Northeast locations the mid-February price averaged \$1.045, or 11.5 cents below the January level and 6.7 cents below the February 1985 level.*

* Platt's Oilgram Price Report, 2/20/86, p. 1

DISTILLATE PRICES, 1985



— NORTHEAST RETAIL
- - - - NY METRO TERMINAL
- . - NYC HARBOR BARGE

NEW YORK STATE AVERAGE RETAIL HEATING OIL PRICES

(cents/gallon)

<u>Date of Survey</u> <u>1985/86</u>	<u>1985/86</u> <u>Season</u>	<u>Last Heating</u> <u>Season</u>
10/11	109.1	111.2
10/23	109.6	111.2
11/08	113.0	111.0
11/20	114.0	110.9
12/04	115.5	110.7
12/18	116.0	110.4
01/08	115.3	110.1
01/23	113.2	111.2
02/07	108.4	111.0
02/19	103.9	110.9

Source: New York State Energy Office

At any given moment, the price determinants at the retail level may differ from those at the refining or wholesale level, as noted earlier. The graph illustrates plainly that the wholesale prices, for instance, are substantially more volatile than the retail prices. The declines and the increases in barge and terminal prices are sharper than the movements in retail prices. Retailers are slower to move prices either up or down. Heating oil dealers, like most businesses providing individual customer delivery services, are generally under less pressure to reduce prices immediately when costs decline than are refiners and terminal operators which face an intensely competitive environment. Retailers' gross profit margins, which were under downward pressure through November, have been substantially higher than in recent seasons since December. These elevated margins, however, will prove temporary; as shown in the

historical data, competition will force pass-through of the reduced costs over time.

One reason the retail prices were rising in December was the weather. In the heating oil regions of the U.S. it was 38% colder than in the previous December and 13% colder than normal, measured by the number of degree days.** Retail distributors react to sharp unexpected increases in the demand for their product the way any business does: they raise prices and keep them there as long as possible.

In this connection it must also be kept in mind that heating oil retail operations are severely proscribed by seasonal factors, since two thirds of annual residential heating oil consumption takes place in the 4-month period December-March. For refiners, by contrast, the seasonal factor is far less important: distillates account for less than 25% of their total output of refined products, and the bulk of distillate oil is not used for space heating but to fuel diesel engines. Consequently only about 40% of total annual distillate sales take place during the 4 peak consumption months of this product.

Another major contributor to the seeming insensitivity of retail prices to changes in crude oil cost is the lag effect in price transmission: the heating oil sold in January at the retail level was probably purchased in December at the wholesale level and was processed from crude oil acquired or contracted for in October or November. Thus, a change in crude oil prices may not

** Platt's Oilgram Price Report, 1/08/86, p. 4

affect retail prices until some months later. Consequently, the very sharp drop in New York Harbor barge prices from about 87 cents/gallon in late November to about 50 cents in mid February or the equally sharp decline of tank car terminal prices has not yet been fully reflected in lower retail prices because much of the oil in the hands of retailers was purchased before the wholesale price reduction became momentous.

Near Term Heating Oil Price Outlook

The prime heating season has only another 4-5 weeks to go, assuming normal weather. Even if cargo and barge prices, which have dropped much more sharply than average U.S. refiner crude oil costs since the beginning of the year, were to strengthen somewhat, retail prices will surely continue to decline. This will hold true regardless of the fact that at the the end of February they were significantly below the year-ago level in most major markets.

In trying to relate these retail prices to the recent decline in crude prices one should keep in mind not only the aforementioned time lag between changes in raw material costs and corresponding changes in retail prices but also the fact that the most widely reported crude oil price declines, namely those in the spot market, represent only a relatively small volume of total refinery crude oil acquisitions, and are often for delivery in a later month. Thus, while spot prices have been skidding since mid-January and were as low as \$14 in February, the actual average crude oil acquisition cost for U.S. refiners in February was more than \$20. This is only \$5.50/Bbl, or 13 cents/gallon, below last year's average price, not the \$12-14 drop registered

in the spot market. However, the current average crude cost to refiners is steadily declining. Consequently, consumer prices will also continue to decline. Curiously, the drops registered so far in retail markets are about equal to 13 cents. But the full impact of the crude oil price drop may not reach the consumer until the end of the current prime heating season.